Being Smart is Not Enough: A Mixed Methods Approach to Defining, Framing and Building a Scale to Measure Psychological Safety in Secondary School Student Contexts

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Declaration

I certify that this thesis is entirely my work and to the best of my knowledge and belief, there is no material in this thesis that has been submitted in part or in whole for the award of any previous application for a degree in my name at any university or tertiary institution. This thesis does not contain any material previously written or published by another person, except where due reference or acknowledgement is stated.



Cynthia Jones

12 November 2024

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List of Abbreviations and Acronyms

ACARA	Australian Curriculum, Assessment and Reporting Authority
ACER	Australian Council for Educational Research
ADHD	Attention-Deficit Hyperactive Disorder
AI	Artificial intelligence
AIG	Australian Industry Group
AIC	Akaike information criteria
AMOS	Analysis of moment structures
APA	American Psychological Association
ASCD	Association for Supervision and Curriculum Development
ASD	Autism Spectrum Disorder
ASV	Average shared variance
AVE	Average variance extracted
BATEC	Boston Area Advanced Technological Education Connections
BCA	Business Council of Australia
BIHECC	Business, Industry and Higher Education Collaboration Council
BME	Bayes modal estimation

C3L	Centre for Change and Complexity in Learning
CBI	Confederation of British Industry
CCA	Constant Comparative Analysis
CDSR	Cochrane Database of Systematic Reviews
CF	Consent form
CFA	Confirmatory factor analysis
CFI	Comparative fit index
CMIN	Chi-square
CMIN/DF	Normed Chi-square
.cqc	ConQuest command file
CR	Composite reliability
CRT	Common Review Type
CTD	Clear team direction
.dat	Data file
DCP	Data collection point
DF	Degrees of freedom
df	Degrees of freedom

DfE	Department for Education
DfESA	Department for Education South Australia
DfEWA	Department for Education Western Australia
DPS	Definition of Psychological Safety
DoE	Department of Education
DST	Descriptive statistics
e	Error
EAP	Expected a-posteriori
EBD	Emotional and behavioural disorder
FA	Factor analysis
FG	Focus group
GMAC	Graduate Management Admission Council
h^2	Communality values
H_O	Null hypothesis
HREC	Human Research Ethics Committee
IBM	International Business Machines Corporation
ICSEA	Index of Community Socio-Educational Advantage
ID	Intellectual disability

IFI	Incremental fit index
IND	Indicator
INM	Internal motivation
IRT	Item response theory
JNV	Job involvement
K	Kindergarten
K-12	Kindergarten to Year 12
KMO	Kaiser-Meyer-Olkin
.lab	Label file
LEAP	Leadership Program for Liberal Education and America's Promise
LTR	Literature review
M	Mean
MCAR	Missing completely at random
MeSH	Medical subject headings
MNSQ	Mean squared scaled residual
MSD	Main study
MCEETYA	Ministerial Council on Education, Employment, Training and Youth Affairs

MSV	Maximum shared variance
N	Number
NACE	National Association of Colleges and Employers
NCEE	National Centre on Education and the Economy
NHMRC	National Health and Medical Research Council
NIHR	National Institute for Health and Care Research
NSW	New South Wales
OECD	Organisation for Economic Cooperation and Development
p	Probability
P	Participant
PCA	Principal components analysis
PIO	Population-Intervention-Outcome
PIS	Participant information sheet
PLS	Plausible scale
PISA	Programme for International Student Assessment
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PROSPERO	International Prospective Register of Systematic Reviews database

PSD	Pilot study
PSES	Peer and self-evaluation system
PCM	Partial credit model
QLA	Qualitative analysis
qual	qualitative
QUAL	Qualitative
QUAN	Quantitative
QUANQUAL	QUANTITATIVE-QUALITATIVE
r	Correlation coefficient
R	Reception
R-12	Reception to Year 12
RDS	Research design
RMSEA	Root mean square error of approximation
RP	Research Project
RQ	Research question
RQA	Research question analysis
RSM	Rating scale model

.sav	SPSS data file
SA	South Australia
SACE	South Australian Certificate Examination
SALSA	Search, Appraisal, Synthesis and Analysis framework
SD	Standard deviation
SEM	Structural equation modelling
SHuCoS©	Situational Human Connection Skills [copyright]
Sig.	Significant
SLR	Systematic literature review
SOC	Supportiveness of school context
SPSS	Statistical Package for the Social Sciences
SRC	Student Representative Council
STEM	Science, Technology, Engineering, and Mathematics
TAFE	Technical and Further Education
TCO	Team composition
TDS	Task design
TEF	Team efficacy

TFW	Theoretical framework
TLB	Team learning behaviour
TLC	Team leader coaching
TLI	Tucker-Lewis Index
TPE	Team performance
TPS	Team psychological safety
.txt	Text file
UAE	United Arab Emirates
UK	United Kingdom
UniSA	University of South Australia
US	United States [of America]
v	Version
W	Weight
WA	Western Australia
WEF	World Economic Forum
WHO	World Health Organisation
WLE	Weighted likelihood estimation

X	Independent or predictor or input or manipulated variable
Y	Dependent or criterion or outcome or response variable
α	Alpha coefficient
β	Regression coefficient
©	Copyright
σ	Intercept (slope)
χ^2	Chi-square

Glossary

Collaborate: The driving force that allows a team to function as a cohesive unit by combining their diverse knowledge and skills to achieve a common objective.

Group: A collection of students with individual interests or goals who come together mainly for social or informal purposes, and do not necessarily share a common objective or need to interact frequently, and who are evaluated on individual contributions.

Psychological safety: "A shared belief held by team members that the team is safe for interpersonal risk taking and captures a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up." (Edmondson, 1999, p. 354).

Secondary School Student: "pupils attending a school offering any secondary curriculum for grades 9, 10, 11 or 12." (https://www.lawinsider.com/dictionary/secondary-school-student)

***Synonyms based on the Country of schooling*:** High school student, Senior high school student, Junior high school student, Upper secondary school student, Lower secondary school student, Middle school student, Academy student, College student, Sixth-form college student, Upper school student, Vocational school student.

Team: A cohesive unit of individual students with defined roles who work together closely, interdependently, and collaboratively with a commitment to a common purpose and goal to achieve a shared objective often sharing information, expertise, and resources, and are evaluated in the context of the team's collective outcomes.

Abstract

In this Knowledge Age where creative and innovative pursuits for cutting edge team performance is valued in the workplace, *psychological safety* is a team norm that is highly desired by employers. *Psychological safety* refers to a feeling shared by team members that they can safely take interpersonal risks (Edmondson, 1999) and make contributions in an inclusive space where the status quo can be safely challenged without fear of embarrassment, punishment, rejection (Clark, 2020) or negative impact to one's image or status (Kahn, 1990). Thus, skilling secondary school students, the future workforce, with the critical team norm of *psychological safety* to support their academic attainment, wellbeing and career-readiness, while at school, is important. Yet, to date, *psychological safety* research has focussed on adults, primarily in workplaces and tertiary settings, with limited studies exploring the *psychological safety* of students in Kindergarten to Year 12 (K-12).

Underpinned by social learning theory (Bandura, 1977), symbolic interactionism (Blumer, 1969) and 'constructivist' grounded theory (Charmaz, 2014), this research employed a multi-phased, mixed methods design that amplified student voices in the exploration of *psychological safety* in secondary school student team contexts. Data were collected, analysed, integrated and interpreted in four phases to test three hypotheses and inform two overarching research questions: "What are the observed indicators of psychological safety in secondary school student team contexts?" (RQ1) and "How can psychological safety be measured in collaborating secondary school students?" (RQ2).

Following a broad scoping of the scholarly landscape with a traditional (narrative) review, phase one employed a systematic literature review (SLR) to gain additional critical insights from a rigorous, reproducible, targeted, and comprehensive synthesis of extant literature on *psychological safety* in the secondary school student context. The complementary findings of both review types revealed a clear knowledge gap in the literature for further investigation that articulated and justified the need for this research. In phase two, a sequential, convergent, mixed methods pilot study collected

quantitative and qualitative data from 60, Year 9 South Australian (SA) students. The integrated findings informed critical insights on the conceptualisation of the main study (phases three and four). Together, phases three and four employed a parallel, convergent, mixed methods design. In phase three, an online survey instrument was designed on the Qualtrics platform and used to collect demographic, quantitative, and qualitative data from 372, Years 10-12, SA students. A 23-item scale adapted from Edmondson's (1999) psychological safety scale for working adults was used to collect the quantitative data in the online survey from adolescents. It was thus subsequently validated for its reliability and accuracy for measuring *psychological safety* in the secondary school student team context, using Factor Analysis and Rasch Analysis. In phase three, qualitative data were also collected from the 372 respondents with a two-part item in the online survey: a multiple-choice option and an open-text prompt. In phase four, additional qualitative data were collected with audio-recorded focus groups from 52, Years 10-12, SA students. In both cases, the qualitative data collected in phases three and four were thematically analysed with the hybrid coding approach using Constant Comparative Analysis (CCA).

Prioritising the students' voices, the integrated findings of phases three and four identified three core themes of *psychological safety*: (1) Situational Human Connection Skills© (SHuCoS©), (2) feeling valued and included, and (3) effective leadership with shared objectives. The scale validation process resulted in the discovery of a plausible 16-item scale [$\alpha = 91$; RMSEA = .077; CFI = .93]. This was named by the researcher as the Situational Human Connection Skills© scale abbreviated as "The SHuCoS© Scale". The associations among the latent variables in the scale are explained with "The SHuCoS© Model" [RMSEA = .000; $p = .838$]. "The SHuCoS© Framework" that was grounded in the data, also emerged, contributing to a novel definition of *psychological safety* in the secondary school student team context. This research makes original and significant contributions that provide policy and decision-makers with empirically grounded and practically actionable recommendations for

enhancing the performance, wellbeing and career-readiness of secondary school (and potentially K-12) students in a rapidly changing world of interdependence, interconnectedness, and pluralism.

Chapter One: Thriving Beyond Brains

1.1 Introduction

This multi-phased research contributes to the field of *psychological safety* in collaborative environments within the seemingly unexplored context of secondary school student teams. **Chapter One** establishes the significance and relevance of exploring *psychological safety* in this context to improve academic attainment, enhance soft skills that advance creativity, and boost the career-readiness of adolescents in this Information Age and beyond. The chapter begins by sharing the researcher's personal experiences that activated an interest in the investigation of *psychological safety* in student teams. The chapter continues with a critical examination of empirical debates to present a common understanding of *psychological safety* for the purpose of this research. The three theoretical lenses that provide focus, rigour and an interpretable framework for this research, are discussed. The questions that clarified the purpose, scope, and significance of this research are identified. An overview of the structure and organisation of the thesis from conceptualisation to the drawing of meaningful and practically relevant conclusions are provided before concluding with a summary.

1.2 The Grade Bullpen

Do grades matter? Do grades define a learner? Do grades predict a learner's future success? Is being smart enough for improved life outcomes? The experiences discussed below explicate the experiential reasons why these enquiries ignited my interest in the investigation titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety through student voices".

Firstly, when I was in primary and secondary school, at the end of each term, our awarded grades were used to officially position us on a 'smart scale' in relation to our classmates and documented in our academic reports at the end of each term. Anecdotally, we tended to be

categorised as “clever” (i.e., more able) or “blockheaded” (i.e., less able) when we were ranked at the first three positions and the last three positions in class, respectively. When termly reports were released, a learner’s documented position in class quickly became public knowledge in our community and had the potential of earning the learner a municipal nickname. Some of these nicknames, be they beneficial or detrimental, stayed with and somewhat defined the learner for life, at least in the sight of his/her peers. Not only did grades define the learner, but the learner’s family also. A learner’s perceived level of graded ‘smartness’ could even cost their family members a potential future spouse. At home, demands were great, expectations were high, and greatness was expected, for these matters and more. So, yes, grades mattered, but did they enhance the learner’s capacity to communicate effectively in collaborative contexts for successful endeavours as a future employee or entrepreneur?

During my school reunions, I observed from catch-up conversations that some of my peers (including myself) who were regarded as ‘smart’, did not seem to have realised their full potential. On the other hand, some of those who were regarded as ‘blockheaded’ seemed to have blazed trails in their lives and were changing the world. I was curious. What had happened? Was being smart not enough? Yes, it may seem so for it was evident that some of the learners who did not make the grades may have been equipped with the capacity for successful collaborative communication hence their fruitful entrepreneurial achievements.

While at University, I discovered through my diverse socialisation and interactive experiences via travel that my worth and future success were not solely defined by my grades. Besides, my leadership positions during my tertiary education showed me that the acquisition of soft/transferable skills were beneficial to life’s quality and success.

When I completed my tertiary education and became an employee, my grades did not matter; they were not relevant anymore. It was my interpersonal skills that supported my employment across the world. I did not fail to note the absence of soft skills or team norms such as intercultural literacy, conflict resolution for progression, and an optimistic outlook in some of my

'smart' colleagues. I opine that organisations that employed me used passionate marketing strategies to advertise for individuals who could champion innovative change, but their leaders were sometimes often unprepared to accept the transformational discomfits that complemented the revolutionary attitudes of their hired ground breakers. Some of those in leadership or management positions often viewed differing perspectives and actions by creative team members as a threat to their authority and the status quo. These perceptions and their accompanying threatening reactions (sometimes a loss of employment) made communication and collaboration, challenging, thereby impacting individual productivity and team performance.

Thirdly, as an educator for many years, I observed many of my secondary school students' focus on academic grades, as I did in my childhood. Unlike my own childhood, many of my students did not come from large family units or collectivistic communities. Therefore, they did not necessarily have the social affordances that I had, to develop their soft skills and team values. I felt their focus on grades while neglecting the development of their soft skills was unbalanced. I understood the students' motivation to work for outstanding grades, for education continues to have a competitive edge, which can be arguably partially overcome with good grades. I strived to teach my students to work to achieve excellence within their academic and non-academic capabilities within a safe and positive environment to influence their future education, employment, and entrepreneurship pathways. The development of the soft skills and team values of my students to complement their academic skills was imperative to me, as their educator, and this skill development was supported with an increasing emphasis on collaborative work in instructional spaces. I tried to communicate to my students that their grades mattered; very much so, but their grades did not solely define them or offer a crystal ball's forecast of their future quality of life, success, or fortunes. What then, I wonder, are the true drivers for employment and entrepreneurial success and life quality beyond brains for today and the future?

1.3 Our Changing World

When it comes to employability skills for school leavers, our world is complex for it has shifted from the industrial age into the digital age. This era is characterised by globalisation (Friedman, 2006; O'rourke & Williamson, 2002), automation (Willcocks, 2020), and artificial intelligence (AI) (Brynjolfsson & Mcafee, 2017). These characterisations have given rise to the emergence of complex and competitive business systems (Whysall et al., 2019) that have birthed fierce competition in the business world (Koster & Wittek, 2016; Scheepers & Whelpton, 2018). To manage the universal competition, organisations are now dependent on talented and high-performing teams (& Lin, 2021) comprised of individuals with creative minds who exhibit responsive adaptability (Folke et al., 2002). As Kaufman and Gregoire (2016) and Wells (2022) describe, creative people are wired differently. Commonly, creative people can be socially perceived and stereotyped (Aronson et al., 2006; Hermawan et al., 2022; Li et al., 2021) as highly competent (Rudowicz et al., 2009), problem solvers (Mitchell & Walinga, 2017), warm and popular (Zhang et al., 2020), but impulsive and dreamy (Runco & Johnson, 2002), and risk-takers with status quo-challenging streaks. These non-conformist attributes are vital for creativity but have been reported to expose creative people to misunderstandings and interpersonal conflicts in groups (Runco & Johnson, 2002). Creative people are consequently prone to being labelled as adversaries in team situations (Batey & Furnham, 2008) because they see similarities and differences, have aesthetic taste, are unorthodox, and question societal norms (Stenberg, 1985b). They may experience challenges with prejudice (Gocłowska & Crisp, 2013), social isolation and social rejection (Neihart et al., 2015). Whilst the creative ideas generated might be innovative and groundbreaking (Proctor & Burnett, 2004;), these interpersonal conflicts have the potential to stifle and decrease the creative capacity of people in the workforce. Appropriate support structures, soft or transferable skills or team values (Anderson et al., 2014) such as *psychological safety* have been perceived to be vital to individual and collaborative success in contemporary business systems (Kim et al., 2020).

Nations have therefore been called to upskill their young people to prepare them with adequate team values and soft skills to meet the needs of current and future workplaces, organisations, and businesses within an increasingly automated, multicultural, and contemporary economy (Noah & Aziz, 2020). Employers expect career-ready graduates to be prepared with the necessary soft skills and team values such as *psychological safety* when they commence an organisational role (Clarke, 2017; Foundation for Young Australians, 2017; Lowden et al., 2011). Given the significance of *psychological safety* within the workplace, it is important to understand how it is perceived, understood, and defined in secondary school student team contexts.

Psychological safety was defined by Edmondson (1999) as "a shared belief held by team members that the team is safe for interpersonal risk taking and captures a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up" (p. 354). *Psychological safety* does not by any means refer to a comfortable status quo where good friends retreat in a group with decreased conflict (Barsade, 2000) and work in an environment with no pressure, problems, conflict, disagreements, nor a willingness to present divergent viewpoints (Janis, 2008; Sunstein & Hastie, 2015). "Psychological safety is a condition in which you feel (1) included, (2) safe to learn, (3) safe to contribute, and (4) safe to challenge the status quo—all without fear of being embarrassed, marginalized, or punished in some way" (Clark, 2020, p. 3). "Psychological safety is a sense of being able to show and employ self without fear of negative consequences to self-image, status, or career" (Kahn, 1990, p. 708).

1.4 The Status of Preparing Young People for Today and the Future

A deeper examination of the contemporary global skills gap shows that school leavers are not being adequately prepared for future employment (Jackson & Bridgstock, 2021). While hard skills (i.e., formal educational qualifications) can be taught, learned, assessed, measured, and verified, the same cannot be said for soft skills (Murti, 2014). Soft skills have been globally recognised as being the key to developing proficient learners and successful societal contributors (Hanley, 2019). Whilst soft skills

have resultantly been integrated into intended curricula e.g., Australian Curriculum's General Capabilities (ACARA, 2023a), the United Kingdom's Character Education Framework (DFE, 2020), and the assessment of global competence (OECD, 2018), it is contended that the direct teaching and learning of soft skills like communication, information skills, collaboration, global awareness, critical thinking, time management, conflict resolution, leadership, problem-solving (Doyle, 2018; Salem & Salem, 2013; Singmaster, 2018), and critical thinking and creativity have not been well fostered (Alsaleh, 2020; Halaweh, 2023). While standardised test achievements generally define a student's and school's positional success on the national education ranking scale, *the Hechinger Report* (Stallones, 2020) founded this soft skill deficit on the predominant time in Kindergarten to Year 12 (K-12) schools focusing on preparing for, and completing standardised tests (Balcar, 2016; Evans et al., 2020; Forrest & Swanton, 2021). Bostes (2014) also argued that the Australian Curriculum's national body does not "endorse general capabilities and cross-curriculum perspectives as frames for delivery of mandatory curriculum content and outcomes" (p. 14). A review of the developmental process of the Australian Curriculum by Learning First in 2023, revealed that it was very much shaped by broad objectives and manipulated by wide-ranging education debates that were "very light on the detail of the curriculum" even though that was what really mattered (Jensen et al., 2023, p. 33). The increasing focus to provide national, local, and site-specific pastoral structures and wellbeing programmes in K-12 schools (Seligman & Adler, 2018; Waters & White, 2015) to support the wellbeing of young people and equip them for the future, does not however necessarily address the development of fundamental soft skills or team values like *psychological safety*.

Within Australia, the context of this research, many wellbeing and mental health frameworks and programs have been implemented by education systems and K-12 schools, including the National Safe Schools Framework (Ministerial Council for Education Early Childhood Development and Youth Affairs, 2011), the National Review of Mental Health Programmes and Services (National Mental Health Commission, 2014), the New South Wales Wellbeing Framework (NSW Department of Education, 2015), positive psychology (Seligman, 2018) and the Measuring What Matters: Wellbeing

Framework (Australian Government, 2023). Additionally, several government mental health and wellbeing initiatives such as Emerging Minds, Better Access, Be You, Headspace, KidsMatter and MindMatters have also been implemented. The Productivity Commission Report (2020), however, found these Australian government initiatives did not necessarily address the fundamental issues that interfered with the holistic capacity of K-12 schools to measurably influence wellbeing and mental health positively. Despite the proven benefits of some of these mental health and wellbeing programmes for the young people, it has been challenging to adequately assess the outcomes of the interventions because they do not often directly relate to wellbeing or the learning of soft skills (Svane et al., 2019). For example, positive psychology (Seligman, 2018) applies a lens on an individual's personal attributes but not on the impact of the social or environmental context that the student operates within, or from which wellbeing skills will be obtained (Kern & Wehmeyer, 2021). Some Australian schools have spent time and resources on a range of mental health and wellbeing programmes. However, while mental health, wellbeing and *psychological safety* are related concepts, they are not synonymous and thus an important distinction for this research. Even though researchers agree that a global consensus should be reached on an unambiguous definition of wellbeing (Simons & Baldwin, 2021), some researchers describe wellbeing as encompassing a wider spectrum of variables that are related to an individual's holistic emotional, spiritual, physical, and mental health (OECD, 2013; WHO, 2018). An individual's mental health is a state of wellbeing that enables an individual to realise their own abilities, cope with life's normal stresses, work productively and make fruitful contributions to their communities (OECD, 2013) from which positivity, social connectedness, and purposefulness emerge (Bublitz et al., 2024).

The distinctiveness of *psychological safety* that forms the scope of this study, is the focus on an individual feeling supported, respected, and valued to be able to communicate, collaborate, create, and innovate in a team environment (Clark, 2020; Edmondson, 2018; Khan et al., 2020). In terms of education, *psychological safety* has emerged as a critical factor in promoting student wellbeing, engagement, and productivity *(*Baeva & Bordovskaia, 2015). This is aimed at enhancing collaborative

communication (Edmondson, 2018) to improve the talent pool, and advance the employability of school leavers (Clark et al., 2019); the future workforce.

1.5 Purpose of Research

At the secondary education stage, character building begins (Ahmad et al., 2019). Adolescents learn to manage interpersonal relationships, develop a balanced attitude and emotional intelligence, and other personal attributes such as integrity and tolerance that are crucial elements of a good work ethic and career success (Heckman & Kautz, 2012). Given this significant stage in development, this research focuses on exploring the secondary school student team context in two schools in South Australia.

As previously identified, a majority of the exploration on *psychological safety* has been conducted in workplaces by researchers such as Chen et al. (2019), Nicolaides & Poell (2020), and Taha et al. (2016). Some have been undertaken in tertiary student contexts by researchers such as by Courtney-Pratt et al. (2018) and Torralba et al. (2020). The findings of this research thereby contribute evidence to the dearth of empirical evidence about *psychological safety* in secondary school student team contexts. One may ask why this research uses the term 'team' and not group?

Teams are small groups that come in several forms that offer a sense of belonging in adult and student learning communities (Csiszárik-Kocsir & Berényi, 2024). To advance teaching and learning, secondary school students are grouped into teams which are smaller communities within a big group in subjects such as Mathematics and Science (Kalaian & Kasim, 2014). For example, students from the same year group undertaking a practical science lesson in a laboratory can be split into smaller teams. The teams will then be made up of data collectors, analysers, or evaluators who collaborate towards shared goals such as timely completion and have shared accountability for enhanced academic performance. Hence the term 'team' will be used to describe this research's collaborating adolescent participants.

1.6 Aim and Research Questions

This research aimed to explore *psychological safety* in secondary school student team contexts.

Two overarching research questions (RQ) framed this research:

- RQ1: What are the observed indicators of *psychological safety* in secondary school student team contexts?
- RQ2: How can *psychological safety* be measured in collaborating secondary school students?

Hypotheses testing is crucial for theory formulation in this research as it provides a structured method for validating or refuting potential explanations for the *psychological safety* phenomenon that reflects reality in the secondary school context. Within this research, empirical validation through data analyses determined whether the hypotheses were supported or contradicted. Initial assumptions were refined to strengthen the underlying theory, and scientific rigour of objectivity, transparency, reproducibility, and credibility, thereby resulting in an emergent framework that augments the knowledge and understanding of *psychological safety* in secondary school student team contexts. **Table MSM1.1** reflects the four sub-questions (RQ1a., RQ1b., RQ1c., RQ1d.) of RQ1.

Table MSM1.1

Research Question One and Four Sub-Questions

Overarching research question (RQ)	Sub-questions
RQ1. What are the observed indicators of psychological safety in secondary school student team contexts?	**RQ1a.** What is the secondary school student's understanding of psychological safety in their team context?
	RQ1b. How is psychological safety enabled in secondary school student teams?
	RQ1c. What are the barriers to psychological safety in secondary school student teams?
	RQ1d. How can psychological safety be implemented in secondary school student team contexts?

Table MSM1.2 reflects the three sub-questions (RQ2a., RQ2b., RQ2c.) of RQ2 as well as its three null hypotheses (H_{o1}, H_{o2} and H_{o3}).

Table MSM1.2

Research Question Two, Three Sub-Questions and Three Hypotheses

Overarching research question (RQ)	Sub-questions
RQ2. How can psychological safety be measured in collaborating secondary school students?	**RQ2a.** Does a student's feeling of efficacy in the team [TEF] influence their feelings of psychological safety in the team [TPS]? $H_{o1:}$ *Team psychological safety does not positively influence team efficacy.*
	RQ2b. To what extent does a student's feeling of psychological safety in a team [TPS] predict his/her learning behaviour [TLB] in that team? $H_{o2:}$ *Team psychological safety does not predict team learning behaviour.*
	RQ2c. How can a student's attitude to learning in a team [TLB] affect the team's efficacy [TEF]? $H_{o3:}$ *Team learning behaviours do not influence team efficacy.*

1.7 Methodology

A multi-phased, mixed methods research design was adopted to ensure the validity and reliability of the study, integrating adherence with ethical responsibilities. This research was designed in four phases: (1) systematic literature review, (2) pilot study, (3) main study: online survey, and (4) main study: focus groups. The systematic literature review in phase one provided critical insights on the *psychological safety* phenomenon that set the strong conceptual, theoretical and methodological foundations for this research. The pilot study in phase two collected and analysed demographic, quantitative and qualitative data with a sequential, convergent, mixed methods approach from 60,

Year 9 students at a South Australian, independent, metropolitan, secondary school. Quantitative data were collected from the participants with an online survey instrument that included a 35-item scale adapted from Edmondson (1999). The data was analysed with principal components analysis (PCA) in IBM SPSS (v26). Qualitative data were collected with focus groups, and thematically analysed in Microsoft Word (Microsoft Corporation, 2018). The justifications for the data collection methods used in the mixed methods main study [phases three and four] were informed by the key findings of the pilot study in phase two. Phase three of the main study included the collection of demographic, quantitative, and qualitative data with a redesigned online survey instrument from 372, Years 10 - 12 students who were sampled from two schools [public and independent] in metropolitan and regional South Australia. Quantitative data were collected with an adapted 23-item scale from Edmondson (1999) in the online survey. This online survey data were analysed with PCA in IBM SPSS (v29), confirmatory factor analysis (CFA) in IBM SPSS AMOS (v29), convergent validity and discriminant validity examinations in Microsoft Excel (Microsoft Corporation, 2018), and Rasch Analysis in ACER ConQuest 5.0 (Adams et al., 2020). In phase three, the qualitative data were collected with a psychographic item in the online survey. In phase four, additional qualitative data were collected with focus groups in a concurrent approach with phase three. The qualitative data collected in phases three and four were analysed with a hybrid coding approach using Constant Comparative Analysis (CCA) in Microsoft Word. The frequencies of utterance from the resulting categories of the observed indicators of *psychological safety* that highlighted the students' voices were graphed in Microsoft Excel (Microsoft Corporation, 2018). The graphs enabled quick, visual snapshots of the trends and patterns that emerged from the extensive verbal data for enhanced understanding.

1.8 Philosophical Assumptions Underpinning the Research

According to Melnikovas (2018) and Saunders et al. (2016), research can be likened to an onion which has several layers that have to be peeled until its core is revealed, suggesting that

research without an awareness of the underlying philosophical assumptions can lead to a research journey based on unexamined and unrecognised assumptions (Mertens, 2019).

1.8.1 Philosophical Approaches to Knowledge

Ontologically, with multiple realities co-existing socially in the world today (Bryman, 2007), two paradigms were used to frame the nature of the reality of this mixed methods research: realism and constructivism. Per the aim of this research, realism enabled the objective identification and measurement (Collis & Hussey, 2003; Creswell, 1994) of the observed indicators of *psychological safety* in secondary school student team contexts.

Constructivism was applied to understand the creation, implementation, and sustenance of *psychological safety* from the subjective and constructed perceptions, experiences, social interactions, and shared understandings (Collis & Hussey, 2003; Creswell, 1994) of the secondary school students in their team contexts. *Psychological safety* in secondary school student team contexts is thus viewed as an existing, objective phenomenon that is socially constructed based on individual and collective experiences.

Epistemologically, this research applied two perspectives of positivism and interpretivism, to frame the nature and scope the knowledge (Crotty, 1998) of *psychological safety* in secondary school students engaging in teams. Positivism was used to gather quantified knowledge and understanding through standardised procedures such as the objective observations of secondary school students through an online survey (Remenyi et al., 2005). Since positivism emphasises objectivity, the online survey was used to collect data to minimise researcher bias while also generating results (Collis & Hussey, 2003; Creswell, 1994). Ensuring that the online survey produced consistent (i.e., reliable) and accurate (i.e., valid) results was central to positivism, hence this research tested three hypotheses (H_{01}, H_{02}, H_{03}) and validated the adapted 23-item scale from Edmondson (1999) that was used to collect quantitative data (Onwuegbuzie & Leech, 2005).

Interpretivism was used to gather nuanced, contextual meanings and subjective, co-constructed interpretations of the social interactions (Collis & Hussey, 2003; Creswell, 1994) that

complemented the objective comprehensions of *psychological safety* captured in the online survey. From the interpretivist perspective, data were collected with a qualitative item in the online survey as well as focus groups which deeply explored the co-constructed meanings of the subjective, lived experiences, opinions, beliefs, and perceptions (Bryman, 2004; Schwandt, 1998) of secondary school students about *psychological safety* in their team contexts.

The use of multiple paradigms is encouraged in mixed methods research (Creswell & Plano Clark, 2018) although Denzin et al. (2023) cautions not to forget about the differences that underpin ontologies, epistemologies and methodologies that frame quantitative and qualitative research. The adoption of the mix of realist and constructivist ontologies and positivist and interpretivist epistemologies as demonstrated in **Figure MSM1.1** below, enabled this research to be framed in a way that the perspectives supported each other (Fidel, 2008) sequentially or simultaneously (Johnson & Onwuegbuzie, 2004; Johnson et al., 2007; Morse, 2010). These approaches offered a rich understanding of how the observed indicators and latent variables of *psychological safety* were perceived, developed, implemented, and measured in secondary school student contexts, thus providing insights that informed practice, policy, and future research

1.8.2 Theoretical Lenses

The above philosophies demonstrate that *psychological safety* is a contextual, socially constructed phenomenon that can be defined and measured. To support these ontological and epistemological perspectives, three theoretical lenses: 'constructivist' grounded theory (Charmaz, 2014), symbolic interactionism theory (Blumer, 1969), and social learning theory (Bandura, 1977) guided the research design, data collection and analyses, and data interpretation with the purpose of informing **RQ1** and answering **RQ2**.

1.8.2.1 Symbolic Interactionism. Founded in social psychology and heavily influenced by the work of Georg Mead [1863 – 1931] in social behaviourism (1934), Herbert Blumer's [1900 – 1987] symbolic interactionism theory (1969) acted as an underpinning theoretical perspective to

explore *psychological safety* in the micro-level interactions within secondary school student team contexts. This differs from Emile Durkheim's [1858 – 1917] structural functionalism (Durkheim, 1895/1956) that focuses on the macro-level interactions that contribute to social stability and cohesiveness in social institutions. It also differs from Karl Marx's [1818 - 1883]) social conflict theory (Marx, 1848, 1867) with the focus on the macro-level interactions that influence power dynamics between the varied social groups to shape social institutions and social structures.

Being pragmatic forebears symbolic interactionism (Plummer, 1996) where symbols are used as tools of interaction to maintain, change, or construct new subjective meanings (Mead, 1934, 1959). Applying symbolic interactionism facilitated the exploration of meaning, which arises in the process of these individual, micro-level, face-to-face interactions, and is not fixed but fluid, open to review and can be altered based on action, interaction, and perspectives (Blumer, 1969). Human interactions and behaviours are impacted by the way we see and construe our world including the situations we have to deal with, such as the secondary students' engagement in teams. It enabled the co-construction of meanings from the social interactions of the secondary school students who participated in the focus groups including the researcher's personal experiences, beliefs, and opinions (Charmaz, 2017; Sandelowski, 1995a). Symbolic interactionism afforded opportunities for valuable insights into how individual student identities were formed within the social dynamics of the focus groups that were not based on exerted control and competition, or social cohesion and a lack of change. Symbolic interactionism is also associated with quantitative (Ulmer & Wilson, 2003) and qualitative research approaches (Morse & Field, 1995).

Symbolic interactionism provided a dynamic lens for this mixed methods research, whereby the individual interactions of the participants are contextualised within the social dynamics of the teams where the participant's behaviours, engagements and performances were considered (**Figure MSM1.1** below). This contextualisation was complemented by integrating social learning theory (Bandura, 1977).

1.8.2.2 Social Learning Theory. Arguing that an individual's behaviour is influenced by observational learning or vicarious conditioning from their environment, Albert Bandura's [1925 – 2021] social learning theory (1977) contemplated the impact of human personality and the environment on one's behaviour (Gioia & Manz, 1985). The socio-environmental learning [nurturing] (Watson, 1913) associated with the behaviour modification posited by Bandura (1977) is supported by Ivan Pavlov's [1849–1936] classical conditioning theory (Pavlov, 1897) and Burrhus Frederic Skinner's [1894 – 1961] operant conditioning theory (Skinner, 1937). Pavlov (1897, 1906) explained that behaviours are modified with reward or punishment, but his theory delimited the thought patterns of the human's free will (Jensen & Burgess, 1997; Kane, 1998) and did not explain real-life learning (Bandura, 1978). Skinner's (1937) theory focused on behaviour modification through association or generalisation but did not consider the influence of genetic dispositions (Kohler et al., 1999) and cognitive features (Bandura, 1977). Both Pavlov (1897) and Skinner's (1937) theories were reliant on the consequences of demonstrated actions in animals, while Bandura's (1977) social learning theory was based on human observations of significance for the qualitative, face-to-face, focus groups with secondary students exploring *psychological safety* in this research. In collaborative environments such as secondary schools, it is believed that operant and classical conditioning could compel the minimisation of critical thinking and enforce negative stereotypes, which are seemingly detrimental social norms to student teamwork (Jolly & Chang, 2021; Michalak et al., 2019; Pugh et al., 2003); the premise of this research.

The secondary school students involved in this research were humans who have complex thought processes that drive their behaviours (Bandura, 2008). Social learning theory (Bandura, 1977) is dependent on the environmental context and observational learning through modelling actions, emotional reactions and attitudinal behaviours of other humans in the setting. Social learning theory (Bandura, 1977) provided the researcher with the observational tools within the student team environmental context to experience and analyse the dynamics in the social environment. Observing how the individual interactions of the students are co-constructed and

interpreted to influence engagement and performance within the team environment aimed to further inform the understanding of *psychological safety* in secondary school student teams (**Figure MSM1.1** below). It is also important to note that while this research aimed to contribute to the identification and measurement of the observed indicators of *psychological safety* in secondary school student teams, it also aimed to contribute to the construction of an emergent framework for *psychological safety* in schooling team contexts. These would be achieved through engaging with secondary school students and applying 'constructivist' grounded theory (Charmaz, 2014) to project the students' perspectives and voices supported by the researcher's perspectives and experiences.

1.8.2.3 'Constructivist' Grounded Theory. Aiming to construct a theoretical framework and not solely describe a phenomenon, Kathy Charmaz's (2014) 'constructivist' grounded theory was perceived to be a suitable lens for this research on *psychological safety* in secondary school student contexts. It is important to note that grounded theory has varied approaches. For example, Charmaz (2014, 2015, 2017) adopted different approaches to the 'classic' and 'evolved' grounded theories. Glaser and Strauss (1967), the originators of 'classic' grounded theory were critiqued for not illuminating the design's underpinning philosophical perspectives (Chamberlain-Salaun et al., 2013). This methodological naivety (Bryant & Charmaz, 2007) of the 'classic' grounded theory originators was challenged by the 'evolved' grounded theory (Corbin & Strauss, 2014) and the 'constructivist' grounded theory (Charmaz, 2014). 'Constructivist' grounded theory (Charmaz, 2017) contrasted to the other grounded theory variants ['classic' and 'evolved'] by:

> (1) assuming a relativist epistemology, (2) acknowledging your and your research participants, multiple standpoints, roles, and realities, (3) adopting a reflexive stance toward your background, values, actions, situations, relationships with research participants, and representations of them, and (4) situating your research in the historical, social, and situational conditions of its production. Constructivist grounded theory attends to researchers and research participants' language, meanings, and actions. (p. 299)

In this research, 'constructivist' grounded theory (Charmaz, 2014) was applied instead of the 'classic' variant of Glaser and Strauss (1965) as the phenomenon under exploration was considered an under-researched area, thus the study aimed to inform a theoretical framework. This assisted with the comprehension of the significance and scope of this investigation within the broader *psychological safety* scholarship including the consideration of the researcher's own culture, traditions, beliefs, opinions, and experiences. It must be noted that there are existing models and theories of *psychological safety* for adults in organisations by researchers such as Clark (2020), Edmondson (1999) and Khan (1990). Drawing on theory construction researchers such as Borsboom et al. (2021), De Groot (1969), and Hawkins-Elder and Ward (2020), the theory construction about the *psychological safety* phenomenon in the secondary school student team context in this research was facilitated through six iterative processes to develop a framework: (1) observing and describing the participants' social interactions; (2) defining and clarifying the meaning of the related variables to the *psychological safety* phenomenon; (3) testing generated hypotheses about the relationships between the variables; (4) collecting and analysing data, hypotheses and identified relationships between the variables; (5) developing a framework from the analysed data about the *psychological safety* phenomenon; and (6) critically evaluating the constructed framework in terms of its validity and reliability, and revising the framework based on new emerging evidence on its explanatory power.

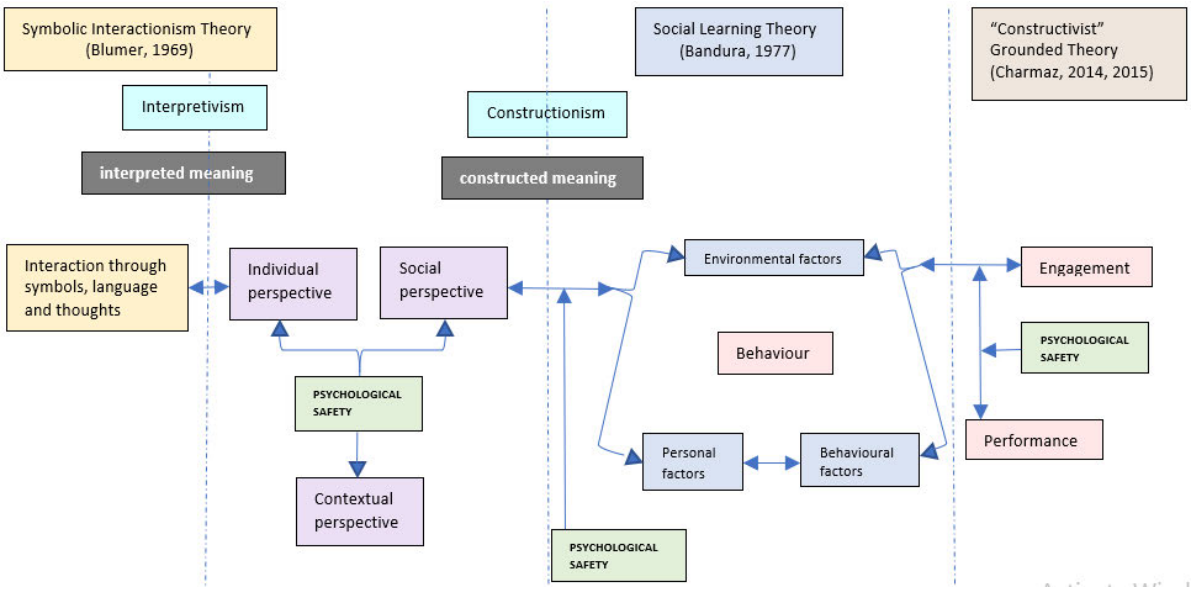
Being an under-researched area, grounded theory as expounded above, was an ideal lens for this research on *psychological safety* in secondary school student contexts where the researcher's personal perspectives (Sandelowski, 1995a) and the contextual socio-economic, cultural, and positional realities that influenced the participants' languages, symbols and thoughts were acknowledged whilst collecting and analysing the data. However, to prevent the formation of preconceived ideas about *psychological safety* in secondary school student contexts, grounded theory generally advises against the review of literature before collecting and analysing data (Deering & Williams, 2023). Nonetheless, the analyses of the collected data from the individual and collective

engagement of the participants based on the co-constructed interpretations of their interactions in the research process within the context of the social dynamics of the research environments were considered.

The three theoretical perspectives that were eclectically employed to investigate *psychological safety* in secondary school student contexts are illustrated in the conceptual framework in **Figure MSM1.1**. The framework explains the relationships between the guiding theories, concepts, variables, ideas, and assumptions that will assist with the understanding of the manifestation of *psychological safety* in the secondary student team context from a student-informed perspective.

Figure MSM1.1

Conceptual Framework



Note. Conceptual framework used to guide the focus of the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts".

1.9 Significance of Research

The findings of this research will have significant implications for the learning, academic attainment, wellbeing and employability of collaborating secondary school students. Drawing on data from the voices and perspectives of secondary school students, indicators of *psychological safety* that can be observed and measured in the secondary school student context will be identified to inform K-12 teaching and learning and wellbeing practices. These practices will inform supportive measures to augment *psychological safety* in a collaborative student environment for positive and creative student contributions to holistic and innovative learning outcomes as well as the development of soft skills and team norms for their future careers. The *psychological safety* measurement tool will enable the timely and regular assessment of a student's *psychological safety*. This will not only support the students with their socio-emotional regulation but will also support educators with their monitoring of the student's academic and pastoral progress, social skills, wellbeing advancement and the development of transferable skills for their future careers. This research will provide insightful knowledge and recommendations for stakeholders in K-12 educational organisations and education curriculum and policymakers to endorse and prioritise the timely acquisition of age-appropriate, soft skills and team values such as *psychological safety* towards the development of young people's career readiness for today and the future.

1.10 Organisation of Thesis

This thesis is organised into six chapters. **Chapter One** has presented the background, problem, purpose, aims, methodology, underpinning theoretical lenses and the significance of this research.

Chapter Two provides a comprehensive, critical synthesis of extant literature through a narrative review and a systematic literature review. The complementary findings of these reviews

contextualised and informed the rigorous design of this research on *psychological safety* in secondary school student teams situated within previous scholarship.

Chapter Three presents the research design detailing the rationales for the chosen methodological and theoretical approaches for data collection and analyses. The researcher's positionality and ethical considerations are discussed in the chapter.

Chapter Four presents the results of the integrated analyses of the demographic, quantitative and qualitative data collected from the student responses to an survey that included a 23-item scale adapted from Edmondson (1999) and a psychographic item.

Chapter Five presents the discussions of the analyses the qualitative data collected with focus groups and its findings. It also demonstrates how the analytical results and findings of the online survey data are integrated with the findings of the focus groups to inform the triangulated findings.

Chapter Six concludes with a summary of the integrated analytical key findings that inform the research questions, critiques the research methodology and outlines implications for future research and educational policy and practice.

1.11 Summary

The introduction set out the three-fold inspiration for this research before discussing its overall purpose, aims and significance. Empirical evidence has suggested that many future jobs will demand job seekers to demonstrate effective communication and collaborative skills that support innovation and creativity (Alsaleh, 2020; Balcar, 2016; Carroll, 2013; Doyle, 2018; Evans et al., 2020; Forrest & Swanton, 2021; Halaweh, 2023; Salem & Salem, 2013; Singmaster, 2018; Stallones, 2020). However, educational researchers report that these transferable skills are currently not being explicitly facilitated in schools. Yet, these skills are required by individuals and teams to sustain or progress organisations at a competitive edge in education and business, especially in today's globalised, digitised, and automated world. Arguably, the onus falls on educators to find efficacious ways of teaching, assessing, and measuring soft skills or team norms such as *psychological safety* in

collaborating students. The implications for this approach were perceived to have the potential to engender successful educational, employment and entrepreneurial success to improve the future talent pool, globally. Local, national, and international conversations have included debates on the importance of team values like *psychological safety*. Some of the questions being raised are,"Is being smart is enough?" and "Are K-12 students; the future workforce, adequately prepared to promote and sustain competitive local, national, and international business success in the world of today and the future?" In contributing to this identified problem, it was necessary for this research to contribute new knowledge for understanding *psychological safety* in the context of secondary school student teams to expand the field of research beyond adult workplaces and organisations and the tertiary context. It was also important to aim to identify a scientifically robust way of accurately measuring the *psychological safety* of collaborating students, informed by the elevated voices of the students. To support the translation of the findings into broader educational application, this research also aimed to contribute to the construction of a theoretical framework of *psychological safety* for secondary school students and potentially, K-12 contexts too. To inform the exploration of *psychological safety* in secondary school student team contexts, a review of empirical studies is presented in **Chapter Two**.

Chapter Two: Review of Literature

2.1 Introduction

Aimed at establishing the foundation for the context and focus of this research, **Chapter Two** critically reviews the empirical evidence on *psychological safety* in secondary school student contexts. With a literature review purposed to explore and summarise existing literary knowledge, identify key themes and trends, and highlight gaps in existing research, the extant literature on this matter was examined with two review approaches. To explore and synthesise existing knowledge on *psychological safety*, the empirical landscape was broadly scoped with a traditional (narrative) review, which is descriptive in nature. This was followed by a search and synthesis of existing research with a systematic literature review (SLR), a more rigorous, structured and targeted approach. The SLR used a predefined methodology and strict eligibility criteria to minimise bias and ensure transparency and reproducibility. The complementary, critical insights offered an evaluation of the knowledge, theories, concepts, methodologies, and research findings of previous researchers that revealed a clear gap in knowledge for further investigation.

2.2 Chronicles of the Psychological Safety Concept

The word, *psychological safety* has existed for a while. Its advent dates back to the 1950s during Carl Rogers' [1902 - 1987] investigation of human creativity. In **Chapter One**, Charmaz (2017) advised researchers to situate "research in the historical, social, and situational conditions of its production" (p. 299). Guided by 'constructivist' grounded theory (Charmaz, 2014), the chapter commences with a descriptive history of the emergence of the *psychological safety* construct that clarifies its contextual significance in workplaces and educational institutions. The perspectives on the conceptual, theoretical and methodological frameworks used by some of the researchers of *psychological safety* as well as their findings and recommendations through time, are narrated,

below, therefore. This overview sets a critically insightful and theoretically sound foundation for this research by connecting yesterday's world of *psychological safety* to that of today's and the future's.

2.2.1 Psychological Safety in the 1950s

In 1954, Rogers proposed his humanistic theory (Rogers, 1954) that built on the work of Abraham Maslow's [1908 - 1970] hierarchy of needs theory (Maslow, 1943). Rogers [1902 - 1987] observed that as humans, in our individual and family lives, in our industrial roles, and in our education, we tended to conform to stereotypes and pigeonhole behaviours (Ching et al., 2023) that destroyed our abilities to think freely, originally, and creatively. Rogers [1902 - 1987] nevertheless believed in humanity; that people were inherently good and born with creative attributes (Groce, 2010; McLeod, 2014), which could be constructed to enable us to adapt to the demands of our rapidly changing world. He thus formulated a theory of creativity (Rogers, 1954) forwarding several hypotheses for rigorous and objective testing in the hope that humans will adapt to our evolving world through our creative behaviours.

2.2.1.1 Critical Insights from the Investigation of Psychological Safety by Carl Rogers.

Carl Rogers [1902–1987] is reported to have formulated his humanistic theory (Rogers, 1954) through multi-methods, a combination of observations from his clinical practice, personal experiences, and theoretical exploration.

2.2.1.1.1 Personal Experiences. Carl Rogers [1902–1987] is reported to have experienced a somewhat socially isolated life as an introverted teenager (Thorne, 2003) due to mediocre personal health and a rather strict, uncompromising, religious, and ethical, parental upbringing (Rogers, 1961). His lived experiences provided personal perspectives for the formulation of his theories on humanism and creativity (Rogers, 1954).

2.2.1.1.2 Clinical Practice Observations. Carl Rogers [1902–1987] devoted a lot of his time (about 15-20 hours each week) to practicing his client-centred therapy (Looti, 2023). Of note is his live, video-recorded demonstration of his client-centred therapeutical approaches (Rogers, 1951) at

the Evolution of Psychotherapy conference in 1985 at Arizona, US; the first and largest of its kind with 7200 people in the audience. It was at this conference that Rogers engaged in a one-to-one dialogue with a volunteering, female member of the audience. The volunteer explained her sadness and grief at not being able to conceive again after miscarrying twins following a period of childbirth procrastination due to her career pursuance. After sharing her personal experiences with Rogers in this videoed, one-to-one (1:1) public interview, Rogers and the female volunteer continued to have a public debrief on their public dialogue where Rogers offered empathetic advice about the volunteer's individual capacity for positive self-experience. After their public demonstration of client-centred therapy, Rogers and the volunteer turned their attention to the audience who joined them in further discussions in what could be considered, as a very large focus group with randomly selected participants. Analysing the qualitative data collected through the 1:1 interview and an extensive focus group spanning nearly an hour of interactions, Rogers (1985) found that three, basic conditions of empathy, congruence, and unconditional positive regard were required for effective therapy. Offering an alternative to psychoanalytic and behaviourist theories with his emphasis on human freedom, dignity, and self-actualisation, Rogers extended his creative, therapeutical ideations into the world of education where he advocated for learner-centred approaches. Significantly, he advocated for the creation of supportive, respectful, and empathetic educational environments believing strongly that humans are hugely impacted by what significant others in their lives think of them (Rogers, 1951). The researcher was unable to locate the actual measurement scale that Carl Rogers [1902–1987] used to assess self-actualisation.

From the findings of his studies, Rogers (1954) postulated that children with comparably better-developed creative potential were nurtured by parents in psychologically safe and psychologically free environments where non-judgemental, unconditional acceptance and empathy were genuinely demonstrated. Rogers (1954) described that *psychological safety* for a human is established by three, linked processes: (1) "accepting the individual as of unconditional worth", (2) "providing a climate in which external evaluation is absent", and (3) "understanding empathetically"

(pp. 257-258). He posited that when humans are given permission by their parents, facilitators, or enablers to express themselves freely, think freely and feel free, their constructive creativity is fostered because a climate of psychological freedom exists (Runco, 2014). He cautioned though that when this permission to be free to share their discoveries with others in a social group who will understand them was offered, humans must take responsibility for their errors and achievements (Rogers, 1959). Unlike Jean Piaget's [1896 - 1980] frameworks of cognitive development theory (Piaget, 1952) that were modelled for universal, childhood developmental stages, Rogers' (1954) framework focused on personal growth and the therapeutic process, emphasising the significance of the journey towards self-actualisation and the person's unique, subjective experiences, which according to Rowson (2008, 2014) could extend long into adulthood. Believing in the inherent goodness and potential of individual humans, Rogers (1995) hypothesised that the provision of psychological freedom by different cultural groups such as classes of students in schools, could be comparably measured to reveal whether creativity and personal growth were truly being fostered. Rogers (1954) contended that the standard by which creativity could be judged is non-existent because "the very essence of the creative is its novelty" (p. 252). From the discussions above, the humanistic theory of Rogers focused on human potential, self-actualisation, and the importance of the person's subjective experiences. His findings substantiated his 1954 findings on the three, linked processes for establishing a safe space where his clients felt understood and valued to enable them to explore their true selves and make positive changes. This phenomenon Rogers (1985) described is synonymous with the construct referred to as *psychological safety*.

2.2.2 Psychological Safety in the 1960s

In the 1960s, a study about organisational learning and change was undertaken by Edgar Schein [1928 - 2023] and Warren Bennis [1925 - 2014] who moved industrial psychology from an individual orientation to a group and organisational systems orientation (Schein & Bennis, 1965).

2.2.2.1 Critical Insights from the Investigation of Edgar Schein and Warren Bennis.

Following their exploration of the organisational climate, Schein and Bennis (1965) opined that an

individual's anxiety about their worth and communal acceptance was reduced when they felt psychologically safe. Schein and Bennis (1965) communicated that *psychological safety* generates a context that "encourages provisional tries and tolerates failure without retaliation, renunciation, or guilt" (p. 45), by minimising perceived threats and eliminating barriers to change.

2.2.3 Psychological Safety in the 1990s

Following a period of dormancy, in the 1990s, Boston University's Professor William Kahn resurrected the interest in the *psychological safety* construct with his immersive, ethnographic study on personal engagement for which he was an active participant as well as a researcher.

2.2.3.1 Critical Insights from the Investigation of Psychological Safety by William Kahn.

Further research contributing to the field of *psychological safety* was undertaken by Kahn (1990) who aimed to generate theories about personal employee engagement by using two research projects to explore the commonalities in the divergent but contextual, work conditions that support employees' experiences that cause their personal engagement or disengagement.

The studies were conducted, firstly, at an adolescent summer camp in the Caribbean (N = 16), and afterwards, at a prestigious, northeastern US architecture firm (N = 16). Qualitative and quantitative data were sequentially collected and analysed, and the findings were converged to support the description of a conceptual model of personal employee engagement and disengagement as well as informing a definition of psychological safety. At the first study site, the participants of the Caribbean, summer camp were 16 counsellors (including the researcher as the head tennis counsellor) who were 15 White Americans and one British; nine men and seven women (aged 20-35 years) from middle- and upper-class backgrounds. The counsellors were supervising 100 adolescents (aged 12–17 years) from advantaged American and Western European backgrounds on a six-week summer camp in the West Indies when they participated in the research (Kahn, 1990). Applying the grounded theory of Glaser and Strauss (1965), Kahn (1990) collected data using qualitative methods including document analyses, informal conversations, and observations to help

generate hypotheses, and 45-90 min (per interview), audio-taped interviews based on 24 open-ended questions and self-reflections.

At the second study site, the participants from the architecture firm included 16 employees (10 men and 6 women aged between 24 – 54 years) who were from White American, middle-class backgrounds with diverse organisational rankings, and experiences, working for an average of 5.8 years with the firm. Data were collected with five open-ended questions from support staff (*N* = 2), interns (*N* = 2), draftsmen (*N* = 5), designers (*N* = 2) and senior architects who included the firm's owner and its vice presidents (*N* = 5) with audio-taped, in-depth interviews that lasted for 40-90 min each. The interview formats were based on foundational knowledge from the conduct and findings of the first study at the Caribbean camp (Kahn, 1990). To inform the research questions, "How meaningful is it for me to bring myself into this performance? (RQ1); "How safe is it to do so?" (RQ2); and "How available am I to do so?" (RQ3), Kahn (1990) analysed the data qualitatively and quantitatively.

Qualitatively, 186 participant experiences (i.e., 86 examples of personal engagement and 100 examples of personal disengagement) were analysed in three phases with an independent coder. The thematic analysis at phases one and two occurred after the data collection at the Caribbean, summer camp and architecture firm, respectively. For the third phase, the researcher returned to recode the data he collected at the Caribbean camp for the discovery of more complex categories and themes of engagement and disengagement. From this thematic analysis, three psychological conditions (safety, meaningfulness, availability) emerged.

Quantitatively, the three conditions (*psychological safety*, psychological meaningfulness, psychological availability) were scaled on a nine-point format from extremely absent to extremely present and rated by the 186 participant experiences. Correlational statistics were used to statistically determine the inter-rater reliability for each of the three, psychological condition scales. Kahn (1990) documented the genders, ethnicities, social statuses, and work rankings of the

participants of his study. From his findings, Kahn (1990) developed a model of engagement at work on an individual, interpersonal, group, intergroup, and organizational levels.

Kahn's (1990) findings led him to conclude that *psychological safety* was one of the conditions that significantly and positively influenced personal engagement on a cognitive, emotional, and physical level. Kahn's (1990) findings led him to describe *psychological safety* as the "sense of being able to show and employ self without fear of negative consequences to self-image, status, or career" (p. 708). Drawing conclusions, Kahn (1990) recommended:

> I have emphasized people's expressions, employments, withdrawals, and defences of their personal selves as the mechanisms by which they connect their depths to role performances. Future research might focus more closely on those depths and how they are plumbed in the course of role performances. Here, I have drawn little distinction between the physical, cognitive, and emotional paths along which people personally engage and disengage. It is likely, however, that a hierarchy relates increasing depths of engagement to the investment of self along physical, then cognitive, and finally emotional dimensions. (p. 719)

2.2.3.2 Critical Insights from the Investigation of Psychological Safety by Amy Edmondson.

Further advancing the field of *psychological safety*, Amy Edmondson, in 1999, aimed to explore the role of an individual's interpersonal context in their preparedness to be involved in team situations where learning behaviours are perceived as somewhat threatening. This initial study of Edmondson (1999) in an office-furniture-manufacturing organisation in the US was the first to project *psychological safety* as a team construct. Seeking to add to research knowledge through the test of a theoretical model she developed on organisational team learning, Edmondson (1999) designed and employed a 54-item *psychological safety* scale (**Appendix G**) in a cross-sectional, mixed methods research study. Edmondson (1999) used the scale to measure the effects of both team psychological safety and team efficacy on the learning and performance of employees.

Following preliminary interviews and observations that suggested a wide variability in the intra-organisational teams, Edmondson (1999) drew the participants of her study from adult work teams in the organisation of 5,000 employees. Through her primary contact at the organisation (i.e., a manager), the researcher scheduled meetings and interviews and recruited 53 different work teams (*N* = 496) that already existed within the organisation as participants of the study. In three phases, Edmondson (1999) collected quantitative data with surveys and qualitative data with interviews and observations to examine the team effectiveness of the 53 teams.

Phase one included one-to-three-hour observations of the teams and seventeen, 45-60 min interviews with selected individual members of each team, to collect data from eight teams. Some of the observations were conducted by the researcher [Amy Edmondson], and others, by the team observers who were managers external to the teams being observed (two or three per team).

Phase two involved additional structured interviews and the development and administration of two surveys (based on the qualitative data in phase one) for all the members of the 53 teams. Edmondson's (1999) survey scales included 54 items measuring 13 constructs (on 5-point or 7-point Likert scales) from the "Team" and "Observer" perspectives. Eleven "Team" constructs (supportiveness of organisation context, task design, clear direction, team composition, team efficacy, team psychological safety, team leader coaching, team learning behaviour, team performance, internal motivation, and job involvement) were measured across 43 items. Two "Observer" constructs (team learning behaviours, and team performance) were also measured across 11 items. The survey was delivered to participants in sealed envelopes to be completed before or after meetings by participants. Some were delivered by post to participants with return envelopes to the researcher [Amy Edmondson], directly. During phase two, to minimise bias and to obtain independent data to support the establishment of the construct validity of the 'team design' variable in the *psychological safety* scale, another researcher who knew nothing of the survey construct interviewed 31 managers (not serving as team observers) about team design (goal, task, composition, and context support).

In phase three, the researcher observed and interviewed seven teams regarding the level of the teams' learning behaviours. These seven teams were selected following the results of the analyses of the data collected with the survey in phase two.

In the quantitative analyses, Edmondson (1999) used Factor Analysis to assess the factor structures of the survey scales. The researcher coded the survey responses on a team basis; not as individual participants. Edmondson (1999) tested eight hypotheses with a regression analyses; six of which were supported. The results of the regression analyses, generalised linear model (GLM) analyses, and Factor Analysis of the data collected from 51 adult teams (*N* = 427) who completed the surveys "supported the proposition that team psychological safety affects learning behavior, which in turn affects team performance" (p. 376). Edmondson (1999) deliberated that her psychological safety scale required further inquiry to "explore factors that promote team psychological safety" and to conclusively differentiate it from other related empirical, interpersonal constructs such as trust (p. 378).

Discussing limitations and drawing conclusions from her study's findings, Edmondson (1999) stated:

> …Further research is needed to establish construct validity…further research is needed to explore factors that promote team psychological safety…The theoretical model also leaves out the dynamic interaction that is likely to take place in which team psychological safety facilitates taking the risks of learning behavior, which, when unpunished by the team, further reinforces team psychological safety…Conducting the study in a single company imposed limitations, suggesting caution in drawing conclusions for teams in other organizations…Larger studies could strengthen the validity of the findings...Future team research has much to gain by investigating how structural and interpersonal factors are interrelated rather than which is more important. To do this, it is essential to study real work teams…Beyond the need to study real groups, longitudinal research could help to develop

> an understanding of how psychological safety develops or erodes with changes in membership, leadership, or context. (pp. 378 - 380)

Among her discoveries, Edmondson's (1999) study revealed that the environmental context and *psychological safety* supported team learning behaviours, and the high-performing teams actually made more mistakes than the low performing teams. The former, however, were interestingly, admitting the mistakes that they made. Edmondson (1999) thus concluded that teams who shared a belief that it was acceptable to ask questions, share concerns, speak up about ideas and admit mistakes worked in a psychologically safe environment and thus had better outcomes. The findings of Edmondson's (1999) study led her to define *psychological safety* as "a shared belief held by team members that the team is safe for interpersonal risk taking and captures a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up" (p. 354).

2.2.4 Psychological Safety from 2000 onwards

Since the work of Edmondson (1999), several studies on *psychological safety* have been conducted by other researchers like Dollard and Bakker (2010), Langfred (2004), Pearsall and Ellis (2011) and Roussin et al. (2016).

2.2.4.1 Critical Insights from the Investigation of Psychological Safety by Maureen Dollard and Arnold Bakker.

In 2007, Dollard related Edmondson's (1999) definition of psychosocial safety to freedom from harm or psychological and social risk. In the same year, 2007, Dollard also drew inspiration from Reichers and Schneider (1990) who described organisational climate as the "shared perceptions of organisational policies, practices, and procedures" (p. 22). Aiming to contribute to the existing knowledge on *psychological safety* and organisational safety climate, Dollard and Bakker (2010) subsequently undertook a research project to define a new construct, psychosocial safety climate (PSC). PSC was purposed to address the psychosocial working conditions of employees.

The researchers used a longitudinal study to explore the effects of school level PSC on the individual PSC of education employees. Dollard and Bakker's (2010) study collected data from employees of the Department for Education (DfE) in Australia who were teaching staff (80%) and non-teaching staff (20%) (*N* = 209 – 288). Data were collected at three time points from the participants (females = 79%; males = 21%) aged between 17 - 65 years from 19 nested schools in two, Australian, metropolitan regions: primary schools (*N* = 11), high school (*N* = 1), secondary colleges (*N* = 4), year 12 college preparation (*N* = 1), and special schools (*N* = 2). Time point one was separated by two months from time point two, and time point three was separated by 12-months from time point one.

Dollard and Bakker (2010) collected quantitative data with a four-item scale and analysed the data with principal components analysis (PCA) and confirmatory factor analysis (CFA), using hierarchical linear modelling (HLM) to test five hypotheses.

The results of the study of Dollard and Bakker (2010) verify PSC as a distinct variable with good validity and reliability with "evidence of a top-down effect of PSC on lower level work entities" (p. 593). The researchers discovered that "PSC was directly related to job resources… (p. 594) and provides confidence in its prediction of skill discretion which in turn, moderated, employee engagement, job demands (work pressure and emotional demands) and psychological health problems (i.e., psychological distress, and emotional exhaustion). Dollard and Bakker (2010) recommended the examination of PSC over time in future studies to support its establishment as a distinct, novel component of organizational climate.

2.2.4.2 Critical Insights from the Google's Project Aristotle. Through Google's Project Aristotle in 2015, 250 team-level factors were explored by the Google organisation. The findings of Project Aristotle discovered that the successful teams in the Google organisation shared five common variables – "dependability, meaning, structure and clarity, impact of work, and psychological safety" (Kim et al., 2020, p. 2).

Psychological safety was discovered to be the most important key dynamic that underpinned the others (Rozovsky, 2015). *Psychological safety* was described as the shared perception that a work environment is safe for interpersonal risk taking (Chiu et al., 2011; Edmondson, 2018). It was noted by the project's findings that to overcome this level of risk and its complementary anxieties, the members of the team had to be in the right work environment that supported the generation of interactive and cognitive processes that were appropriate and effective for that work context (Carmeli et al., 2016; Paulus et al., 2012).

Systematic reviews and meta-analyses of *psychological safety* literature in workplaces were also performed by researchers.

2.2.4.3 Critical Insights from the Systematic Literature Review of Amy Edmondson and Zhike Lei.

The systematic examination of 30 articles by Edmondson and Lei (2014) examined the early history and contemporary research about *psychological safety* in individuals, groups and organisations. In their identification of empirical papers for their review, the researchers restricted some of their eligibility criteria to studies that had "explicitly used the terms psychological safety or psychological safety climate" (p. 25).

The findings of Edmondson and Lei (2014) showed that *psychological safety* is not a remedy to address all the identified difficulties faced by collaborators in an organisational environment. Edmondson and Lei (2014) concluded that *psychological safety* is a moderator of an interpersonal safety climate. For accurate and consistent measurements of *psychological safety* however, Edmondson and Lei (2014) recommended:

> Longitudinal research that allows both a better assessment of cause and effect and an examination of changes in psychological safety over time…Multilevel and cross-level research on psychological safety…Hybrid methods that mix qualitative and quantitative data, as well as studies that blend field and laboratory research to illuminate the phenomena and assess causality simultaneously… (p. 40)

Edmondson and Lei (2014) also advised future studies to take the opportunity to explore the influence of *psychological safety* on individual, team, and organisational outcomes while their operations take place in different cultural settings. They debated that for a positive impact, *psychological safety* had to be "combined with other essential elements (e.g., strategy, vision, goals, supportive leadership, and so on) to best enable learning and performance" (p. 40). The researchers discovered that *psychological safety* could have negative impacts when in excess because it "may send people down a path of wasting valuable time on unimportant things or a path of losing the motivation to really learn" (p. 41).

2.2.4.4 Critical Insights from the Meta-Analysis of Brett Sanner and Stuart Bunderson.

In their meta-analysis of 25 studies, Sanner and Bunderson (2015 tested three hypotheses through a comprehensive meta-synthesis of the extant literature on *psychological safety*, team learning, and team performance. Their eligibility criteria for the coding of identified studies strictly included "only studies of teams", "only studies with original data", and studies "had to measure *psychological safety* and team learning and/or team performance" (p. 12). With the latter, a study qualified as measuring *psychological safety* if it complied with the definition of Edmondson (1999).

The results of their exploration of *psychological safety* in predicting experiential learning in teams demonstrated that *psychological safety* sets a critical, perhaps even indispensable, foundation for learning in teams" (p. 23), and *psychological safety* is perceived as a "direct predictor of learning in teams" (p. 24).

2.2.4.5 Critical Insights from the Systematic Literature Review of Alexander Newman, Ross Donohue and Nathan Eva.

The systematic literature review of 83 empirical studies on the antecedents and outcomes of *psychological safety* was undertaken by Newman et al. (2017). For their eligibility criteria, they included "only studies that mentioned the words *psychological safety* in their title, abstract or keywords or included *psychological safety* in their empirical analysis" that were "published between 1990 (the year in which Kahn did his seminal work

on *psychological safety*) and the end of 2015" (p. 523). Additionally, Newman et al.'s (2017) review only included "studies that focused on psychological safety in work environments" and excluded "studies with students or non-working adult samples" (p. 523).

Their findings identified a predictive association between *psychological safety* and learning and performance outcomes, encouraging managers to engage in supportive leadership roles that fostered team bonds. Newman et al.'s (2017) findings also showed that Edmondson's (1999) *psychological safety* scale was consistently found to be reliable across diverse samples considering its good internal consistency and strong psychometric properties. Interestingly, Newman et al. (2017) discovered that nearly all the reviewed empirical studies investigating *psychological safety* at the organisational or team level applied the measurement scale of Edmondson's (1999) as well as Edmondson's (1999) definition of *psychological safety*. Newman et al. (2017) recommended that future studies choose to apply Edmondson's (1999) psychological safety scale in preference to "proxy or "in-house" measures of psychological safety" (p. 4).

Furthermore, Newman et al.'s (2017) findings showed the considerable use of cross-sectional designs and quantitative data collection approaches in *psychological safety* studies. The researchers, therefore, suggested that future researchers consider alternative research designs and qualitative data collection approaches to gain a better understanding of how *psychological safety* manifests in individual and team contexts, holistically. Some of the methodologies Newman et al. (2017) suggested were interviews, observations of the non-verbal and verbal communication strategies of interacting people as well as face reading software that might enable the determination of the levels of comfort, and willing engagement of interacting people in interpersonal risk-taking actions. To explore the dynamic nature of *psychological safety* in individuals, teams, between individuals and between teams, Newman et al. (2017) recommended longitudinal studies. Where there is evidence that team members do not share the same beliefs, opinions and experiences of *psychological safety*, the researchers also suggested the consideration of the use of social network approaches to analyse the influence of *psychological safety* on team learning behaviours and team

performance within dyadic relationships (Roussin et al., 2016). Besides, Newman et al. (2017) advised future researchers to consider investigating the identity of the factors that predict the strength of *psychological safety* in individuals and teams and how changes in this variable "moderates the relationships between team psychological safety and its outcomes" (p. 11).

Moreover, similar to the recommendations of Edmondson and Lei (2014), Newman et al. (2017) recommended the study of *psychological safety* in different cultures. The findings of their systematic review of the literature showed that most of the existing studies had investigated *psychological safety* in the workplaces of Western cultures, mainly the US (Newman et al., 2017). These studies, according to Hofstede (2001), have been characterised by power distance, low levels of collectivism, and uncertainty avoidance resulting from the cultural tradition of the indigenes to be more direct in their communication approaches to voicing new ideas and engaging in experimentation, even in the absence of *psychological safety*. In non-Western cultures, it has been considered to be comparably more costly to speak out in such direct manners as in the Western cultures, and it may also be less common for indigenes to engage in experimenting with new ideas because of the risk of losing face and being rejected by other members of the team or group (Friedman et al., 2006; Liu et al., 2010). Newman et al. (2017) suggested that exploring *psychological safety* in non-Western cultural contexts might permit a more rigorous assessment of the predictive validity of *psychological safety* of teams.

2.2.4.6 Psychological Safety Systematic Literature Review of Lance Frazier, Stav Fainshmidt, Ryan Klinger, Amir Pezeshkan and Veselina Vracheva.

The meta-analysis of 136 theoretical and empirical studies on the antecedents and outcomes of *psychological safety* by Frazier et al. (2017) tested eight hypotheses and answered four research questions. One of the questions (RQ2), "Do research design characteristics influence effect sizes in the nomological network of psychological safety?" was related to the moderating factors of *psychological safety* validities.

Guided by previous research, the researchers justified a meta-analysis of the data by setting the minimum number of primary studies at three (Chambless & Hollon, 1998; Seibert et al., 2011) or

two in specific cases. The part of the meta-analysis that examined and reported findings on *psychological safety* research designs and measures are discussed below.

Subsequent to an examination of the likelihood of file-drawer effects (Rosenthal, 1979) and publication biases (Hubbard, 1997), the researchers used a number of approaches to assess whether common method biases play a role in the relationships between *psychological safety* and its moderating factors (Podsakoff et al., 2003). One methodological approach used to inform their second research question (RQ2) was to compare the effect sizes of *psychological safety* measurements based on different data collection contexts. This implies that the data was checked to ascertain whether the variable of interest and *psychological safety* were both collected (a) at the same time or at a different time, (b) by the same or different sources, and (c) at the same or different time points. Two other approaches were used to assess the scope of the effect sizes on the outcome correlations of *psychological safety* that were measured objectively or subjectively, and to compare the potential impact that student samples and non-student samples have on effect sizes.

Frazier et al. (2017) used a hybrid coding method of data-driven and theory-driven approaches to create a coding framework for qualitative analysis.

Quantitatively, for their meta-analytic computations, in the R software package (Viechtbauer, 2010), the researchers employed sample-size-weighted mean estimates of the correlations (*r*), computing composite correlations where two or more variables could not be categorised as a single one. The researchers also computed and reported reliability and validity coefficient estimates (including incremental validity where required) for the moderating variables of *psychological safety*, using Cronbach alpha (α) (Cronbach, 1951) where possible. The researchers used hierarchical regression, meta regressions as well as weighted regression analyses with random effects models. These approaches were employed in the instances where there were potential correlations between *psychological safety* moderators, and where the study sets were not identical in terms of their methodologies or sample characteristics (Borenstein et al., 2010). To ensure

unbiased findings, the researchers used equal estimates to correct the raw scores of sample-weighted effect sizes (*r*) for unreliability in both the independent and dependent variables.

Frazier et al. (2017) found from their analysis that common method bias is a major concern when the data for both *psychological safety* and the variable of interest were collected from the same source because high validity coefficients were generated. The researchers recognised that data collection from different sources, which they recommended, may decrease the true validities of the variables of interest (Frese & Zapf, 1988). So, they cautioned future researchers that when data are collected from the same source, research designs plan to "introduce temporal separation between the variables to minimize artificial inflations of effect sizes" (p. 143) due to common method bias (Podsakoff et al., 2012). Frazier et al. (2017) also found a significant difference between objective and subjective measures of task performance where higher effect sizes resulted when the nature of the measures was subjective and *psychological safety* was rated by the perceiving source. Future researchers were urged by Frazier et al. (2017) to collect data for subjective measures when investigating *psychological safety*.

Finding a skew towards quantitative methodology in *psychological safety* research, Frazier et al. (2017) encouraged the use of "qualitative comparative analysis (Ragin, 2000) or necessary condition analysis (Dul, 2016) which are better suited to address these issues than standard regression approaches" (p. 145). Frazier et al. (2017) found that "psychological safety is an important construct at both the individual and group level of analysis" (p. 150). Their analyses also discovered that high levels of *psychological safety* may be associated with negative outcomes (Bolino et al., 2004) such as cheating behaviours (Pearsall & Ellis, 2011), so they suggested future research explores a deeper understanding of such possibilities. Further supporting empirical evidence indicated that *psychological safety* has been studied predominantly in English-speaking, Western cultures, Edmondson & Lei, 2014; Friedman et al., 2006; Hofstede, 2001; Liu et al., 2010; Newman et al., 2017). The findings of Frazier et al. (2017) thus confirmed the need for the exploration of *psychological safety* across different cultural contexts. The researchers also found that apart from

the study of Liang et al. (2012), which collected data six weeks apart, few studies are known to have investigated the evolution of *psychological safety* over time, so Frazier et al. (2017) recommended longitudinal studies to assess causality for future studies.

Since Frazier et al.'s (2017) study, there have been additional studies about *psychological safety* in workplaces on team leader behaviours (Edmondson, 2003b), organisational structure (Edmondson & Mogelof, 2006), employee engagement (Eldor & Gadot, 2016), team performance (Kim et al., 2020), and burnout (Rothbard, 2001). The findings of the aforementioned studies generally signified that at the core of the skills necessary for successful learning, work, and life in general, is the ability of an individual to work in group or team settings (Truong & Laura, 2015; Nusrat & Sultana, 2019). This was achieved by demonstrating the capacity for self-management, creativity and innovation (GMAC, 2016; Saunders & Zuzel, 2010). The findings of some of these studies, similar to that of Edmondson and Lei (2014), indicated that *psychological safety* could have a negative impact on individual, team and organisational learning and performance outcomes. This, the researchers revealed, was due to the existence of teams in which all members may not share similar beliefs about *psychological safety*; a fact they reported to be commonly overlooked.

The above narratives demonstrate that over time, researchers have used several, well-established theories, methodologies, and analytical approaches to gain critical insights into the *psychological safety* scholarship. This has happened in various individual and team settings, particularly in adult organisational contexts. Now, how is this evidence relevant in today's business world?

2.3 The Relevance of Psychological Safety in Today's World of Business

Our world today is complex, having moved on from the industrial age into the digital age, information era, knowledge age or fourth industrial revolution, whichever term we choose to use. As introduced in **Chapter One**, this era is characterised by human mobility and artificially intelligent

systems. These characterisations have given rise to the emergence of complex and competitive business systems (Whysall et al., 2019), which have birthed fierce competition in the business world (Koster & Wittek, 2016; Scheepers & Whelpton, 2018). To deal with the universal competition, organisations are now dependent on talented and high-performing teams (Dionne et al., 2004; Liu & Lin, 2021) of individuals with creative minds who exhibit responsive adaptability, communicate effectively, think critically and creatively, and solve problems in collaboration with others (Ackerman, 2020; Conarc Soft Skills Training Conference, 2020; OECD, 2014; Robles, 2012).

Despite this huge demand, creative people who are wired differently (Wells, 2022), are often exposed to misunderstandings and interpersonal conflicts in groups (Runco & Johnson, 2002). These interpersonal conflicts which arise may be due to the risk-taking and status quo-challenging dispositions of creative people (Stenberg, 1985b). Creative people are often stereotyped (Hermawan et al., 2022) because they see similarities and differences, have aesthetic taste, are unorthodox, and question societal norms (Stenberg, 1985b). Resultantly, they are prone to being labelled as adversaries in team situations (Batey & Furnham, 2008). According to Torr (2008), some of the stereotypical thoughts of others about people they considered to be creative were described as follows:

> The problem with creative people is that they're unpredictable and unreliable…they're morose, arrogant and impossible to manage…they think they're always right…you can't rely on them to get things done…you can't tell if they're any good until it's too late…you can't replace them with machines…that they think they're indispensable…they don't know the meaning of money…they won't listen, they won't cooperate and they won't toe the line… they're impulsive, hostile and out of control…they live in a dream world…they think they're so different from the rest of us…they think they're the only people who can be creative…most of them can't even tie their own shoelaces…they're anxious, unreasonable and antisocial…they would rather be living on a different planet…they have to be stimulated

> all the time…there are so many bad ones and so few good ones. The problem with creative people is that they think they can change the world. (pp. 15 - 16)

The words of Torr (2008) above indicate that individuals who demonstrated high, creative capacities were sometimes perceived to be "dangerous" because they seemed "…to be original or different…" (Rogers, 1954, p. 249). Establishing a climate of *psychological safety*, therefore, in a diversified team with creative people was reported to be supported by promoting an environment that focused on a feeling of inclusion to enable productive discussions that facilitated the early prevention of destructive conflict and the achievement of communal objectives (Edmondson & Mogelof, 2006).

Social influences have been reported to impact creative efforts in collaborative contexts described as "intimate partnership" (Katz et al., 1993). The impact of social influences (Greenacre, 1957; Hunter et al., 2007; Wallace, 1991) on the creativity of individuals in collaborative contexts was perceived as repressive or motivating depending on the individual's expectations and interpretations (Carson & Runco, 1999; Millward & Freeman, 2002; Nicol & Long, 1996; Runco, 2012). It is noted that being passive and culture-bound did not enable humans to deal efficaciously with problems (Rogers, 1954) although a social environment that generated conflict was reported to be fatal for some creative people. This was as such in the case of Brian Wilson of the Beach Boys who was driven to depression through intimidatory competition among bands (Clydesdale, 2006). Conversely, other creative minds thrive in social situations characterised by conflict, drama, and challenges (Runco, 2014) as in the case of John Lennon and Paul McCartney of the Beatles (Clydesdale, 2006; Spurling, 1998). A further example is the reported collaborative relationship of the Wright brothers [Orville and Wilbur] whose work strategy involved arguments; regular yelling and screaming while testing their ideas, not because they were angry with each other, but to express their conflicting viewpoints on their creative beliefs (John-Steiner, 1997). Nonetheless, no matter how social grappling impacted a creative mind, it could be debated that creative people required a collaborative context they perceived as safe to enhance their psychological capital (Robusto et al.,

2019). Psychological capital is perceived as an individual's state of positive psychological development (Luthans & Youssef-Morgan, 2017), and their *psychological safety* (Kim et al., 2020). So, what is the significance of *psychological safety* in today's world?

Clark (2020), Edmondson (1999) and Kahn's (1990) definitions of *psychological safety* demonstrate that *psychological safety* is the shared belief that team members were willing to engage in learning behaviours that promoted creativity and innovation such as speaking up, sharing concerns, challenging others' viewpoints, and voicing opinions. *Psychological safety* has been shown to influence communication (Gong & Li, 2019), learning behaviours (van Emmerik et al., 2011), problem-solving (Carmeli et al., 2014), relationships (Carmeli et al., 2012), leadership (Liu et al., 2014), team cohesion (Zhang et al., 2010), employee wellbeing (Kessel et al., 2012), team performance (Martins et al., 2013), trust (De Jong & Elfring, 2010), as well as creativity and innovation (Gu et al., 2013). However, it has been identified that a lack of supportive group member interactions due to status conflict posed a serious challenge in fostering team creativity because the social environment was deemed to be unsafe for group members to share their creative ideas (Sung & Choi, 2021). There were, nonetheless, misconceptions about *psychological safety* that needed clarification.

In the organisational environment, research evidence indicated that *psychological safety* was not considered to be about *trust* (Kramer, 1999; McAllister, 1995; Robinson, 1996) where it was believed that the future actions taken by others will favour an individual's interest to the extent where vulnerability could be expressed (Frazier et al., 2017). Rather, *psychological safety* had an emotional carrying capacity (Carmeli et al., 2009), but it was not *emotional safety* where one was confident of adequate mental security and comfort to communicate a range of feelings. *Psychological safety* was not *team cohesion* (Janis, 2008; Sunstein & Hastie, 2015) where team members engaged in groupthink and were unwilling to disagree or offer divergent perspectives on a matter at hand. *Psychological safety*

did not indicate *an absence of conflict*, but rather an opportunity for any disagreements that occurred, to be managed constructively with productive outcomes (Barsade, 2000; Edmondson, 2002). *Psychological safety* was not *a lack of accountability* (Carmeli et al., 2008) but inspired team actions aimed at achieving communal objectives; not for individual satisfaction where one felt very pleased with their personal achievements. *Psychological safety* was consequently not *intrinsic motivation* (Amabile, 2001) where it was believed that task engagements were innately rewarding. When interviewed by Morra Aarons-Mele, the host of 'The Anxious Achiever', Harvard University's Professor Amy Edmondson who investigated *psychological safety* in a work environment in 1999 had this to say about *psychological safety*:

> So it's not being nice. It's not safe space. It's not a trigger free environment. It's not a guarantee that everything you do will get a round of applause, right? And I feel badly about the term, which I didn't coin. I certainly brought it to wide attention, but the term was in the literature already and with the following observation, that when you want to do organizational change, people need to have psychological safety to take the risks, the behavioural risks they need to take to change. Change is hard. So, I thought that was the right term to use for the thing I had discovered. But what it is, is a sense of permission for candour. What it is, is the belief that you can be yourself. You can speak up, ask for help, disagree with an idea, admit a mistake and you won't be rejected or punished in some way. So it's that an environment? It's an environment where your focus is on the task or on other people. Not on yourself. Not on how do I look? How am I coming across? Am I okay? Will I get rejected? So it's an environment that's relatively free of those worries. It's the opposite of social anxiety. It's the opposite of fear or at least social fear, which I think is maybe the same thing. And it's really important for teamwork and knowledge related work of any kind that forces us to take risks and get some things wrong on the way to discovery and advances. (Harvard Business Review, 2021)

Having heard Amy Edmondson's clarification on *psychological safety* in the work environment of adults, this review of literature turns to critically examine how soft skills including *psychological safety* for younger people have been represented and positioned in the field of education across the K-12 schooling, and specifically secondary school systems both in practice, policy, and empirical studies.

2.3.1 The Occupational Outlook for Today's Tertiary Graduates

Global competitiveness in a complex business world dictated an economic future that relied on creativity and innovation in organisations (Schwab, 2018). Effective communication and teamwork skills were considered by 86% of employers as vital 'soft' skills that are more important than 'hard' skills (Archer & Davison, 2008; BATEC, 2007, Heckman & Kautz, 2012). According to the National Centre on Education and the Economy (NCEE), the Confederation of British Industry (CBI), the Conference Board of Canada, the Business Council of Australia (BCA), the Business, Industry and Higher Education Collaboration Council (BIHECC), employers from the US and the UK, Canada and

Efforts have, therefore, been made by collaborative global education frameworks to address the reported global skills deficiency. The World Economic Forum (WEF, 2016, 2018) reported ten crucial proficiencies: "complex problem-solving, critical thinking, creativity, people management, coordinating with others, emotional intelligence, judgment and decision-making, service orientation, negotiation and cognitive flexibility" that will be perceived as most important in this Knowledge Era known as the "fourth industrial revolution" (Bast, 2019, p. 15). The Organisation for Economic Cooperation and Development (OECD) forwarded a core competencies list to include communication, problem-solving, enterprise skills, emotional judgement, teamwork, and critical thinking (OECD, 2014). The Programme for International Student Assessment (PISA) added collaborative problem-solving and creativity to existing tests for English, Maths and Science recognising this capability as being both vital and assessable (OECD, 2017, 2022).

Nations have also embarked on agendas to put in place reforms to address the reported career skills gap. Education and training reforms were initiated for the youth in India to equip them with the necessary soft skills for international competition (Wats & Wats, 2009). In Malaysia, the

Ministry of Higher Education proclaimed the introduction of the incorporation of soft skills into their public Universities' undergraduate syllabi (Shakir, 2009). In the field of accounting, graduates in South Africa were identified for lacking soft skills (Barac 2009; Coetzee & Oberholzer, 2009; Stainbank, 2009). Accounting graduates in the US were also recognised by Albrecht and Sack (2000) for similar shortcomings, as well as those in Ghana (Awayiga et al., 2014), the UK (Gammie et al., 2002) and Australia (Howieson, 2003). In 2007, the National Leadership Program for Liberal Education and America's Promise (LEAP) negotiated that tertiary education must provide a balanced curriculum such as the knowledge of human cultures to combat the complex and fluid nature of contemporary, competitive workplaces. (LEAP, 2007). 'City' and Scottish employers in the UK communicated their dissatisfaction with universities offering overly specialised technical qualifications and unimpressive, graduate, soft skill levels, but UK Universities rebutted by asking employers to contribute specific solutions (Merrill et al., 2020; Moore, 2009). Now, let us look at some of the notable national perspectives on transferable skills at the location of this research, which is Australia.

Australians have raised concerns with the transferable or soft skills that graduates brought to the workplace (BCA, 2006; BIHECC, 2007; Casner-Lotto & Barrington, 2006; CBI, 2008a; Conference Board of Canada, 2000; Bowers-Brown & Harvey, 2004; NCEE, 2007). A survey of 450 people in Western Sydney, Australia who worked as business executives and managers named communication skills (95%), time management (97%) and teamwork (98%) as the most important skills they required their job applicants to have (TAFE NSW, 2015). Employers hoped that students could develop these tangible, transferable skills during their tertiary education due to the immediate value of transferable skills to organisations (Francis-Smythe, 2008). Recognising that some secondary school students enter the workforce directly after graduating from high school, globally, policies were implemented to skill the students in the K-12 school environment with transferable skills. Some universities like Deakin University also included soft skills in their curriculum design and

recognised their students who excelled in soft skills capabilities via 'hallmark' awards just like for those who excelled in hard skills (Deakin Business School, 2016).

Australia, in 2007, initially adopted the Bologna model from the Bologna Declaration (van der Wende, 2000) to advance graduate employability even though the UK had not recorded positive advancements in their graduate soft skill development (Dunning, 2002; Harvey et al., 2002) with the Bologna model. The Australian Industry Group (AIG) asserted that the existing skills gap had contributed to the decrease in the production of contemporary processes and products that impacted organisational competitiveness (AIG, 2006a). The Melbourne Declaration on Education Goals for Young Australians acknowledged major world changes including globalisation, internationalisation and technologies that were "placing new demands on Australian education" (MCYEETYA, 2008, p. 5) hence the development of general capabilities in the curriculum. In 2019, the revised national educational goals were endorsed with the Alice Springs (Mparntwe) Education Declaration (Education Council, 2019) advocating for education to "position young people to live fulfilling, productive and responsible lives" (p. 4) by enabling them to "...relate well to others and form and maintain healthy relationships" (p. 6), "collaborate, work in teams and communicate ideas" through engaging "in respectful debate on a diverse range of views" (p. 7) that "...promotes and contributes to a socially cohesive society that values, respects and appreciates different points of view and cultural, social, linguistic and religious diversity" (p. 5).

The Australian Curriculum, the first national curriculum ratified in 2012, has undergone numerous versions aiming to promote the national educational goals and provide a world-class education in Australia by setting out the knowledge, understanding, and skills needed for life and work in the 21st century and by setting high standards of achievement across the country (ACARA, 2021). The three-dimensional design of the Australian Curriculum included cross-curriculum priorities (such as Sustainability, Asia and Australia's engagement with Asia, and Aboriginal and Torres Strait Islander histories and cultures), learning areas (such as the year or band level descriptions, achievement standards, content descriptions, and content elaborations of the

subjects), and general capabilities (such as intercultural understanding, digital literacy, personal and social capability, ethical understanding, numeracy, literacy, as well as critical and creative thinking) (ACARA, 2021). The Australian Government report titled, "*Australia 2030: Prosperity through innovation*" emphasised that the future Australian workforce must combine disciplinary knowledge with skills in complex problem-solving, group work, as well as interdisciplinary and intercultural awareness (Australian Government, 2017) to perform changing roles (AlphaBeta, 2017; Stanwick et al., 2014). These national goals and curriculum aimed to ensure that education in the changing world equips future-ready learners including secondary school students with the transferable or soft skills they need to give them a competitive edge. Some of these skills were cognitive skills (critical and creative thinking), socio-emotional skills (resilience and empathy), and physical and practical skills underpinned by respectful and open-mindedness attitudes, as incorporated within the Organisation for Economic Cooperation and Development (OECD) learning framework 2030 (OECD, 2019). This learning framework was, in part, responding to employers' expectations of career-ready graduates being prepared with the needed soft skills and team values such as *psychological safety*.

Given the argument that *psychological safety* is the engine for organisational performance (Edmondson, 2018), its mounting prominence in the workplace indicated its benefits to tertiary students to minimise the repercussions they could face due to changing business scenarios at every level (Sharma, 2018). In 2019, the World Development Report by the World Bank argued that the increasing function of technology in value chains and the future of work make tertiary education even more relevant for the competitive labour market. There have been notable studies in the tertiary sector about *psychological safety* especially in the fields of Health Sciences and Medicine such as: leadership and surgical team performance (Barling et al., 2018); bullying and nursing students' safety (Courtney-Pratt et al., 2018); Clinical teachers' leadership behaviours and clinical students' learning (McClintock et al., 2022); fear of judgement and learning engagement of medical students (McLeod & Gupta, 2023); and leadership and medical education (Torralba et al., 2020). The findings of the studies about *psychological safety* in tertiary education are similar to those of the adult teams in

workplaces, (i.e., leadership, safety, non-judgemental environment) debatably due to tertiary or post-secondary students being generally considered legally, as adults, having reached an age of majority (Hamilton, 2016). What was yet to be revealed, however, was how *psychological safety* manifested in the K-12 school environment and specifically for secondary school students, the focus for this thesis, given the national educational goals prioritising the need to support their skill development for successful transition to the workplace and/or further study and society (Education Council, 2019).

2.3.2 Occupational Outlook for Today's Secondary Graduates

Students undertaking secondary school studies are confronted with a growing array of decisions concerning their future learning and career pathways, with most transitioning from secondary school to university level or vocationally oriented, tertiary education. Despite the international championing agenda for the composite science, technology, engineering, and mathematics (STEM) advancement, some researchers encouraged STEM graduates to seriously consider the career-enhancing value of soft skills in order to blaze trails in the global, liberal economy of today and the future (Bridgstock, 2011; Hissey, 2000; Munir, 2022; Whitcomb & Whitcomb, 2012). As the global economic landscape changed, many schools considered and implemented strategic directions to include transferable or soft skills to support their students in being sufficiently equipped for tertiary education, future careers, and life success (Jayaram & Musau, 2017; Rao, 2018; Ritter et al., 2018; Rongraung et al., 2014).

Many inferences that have been made by educators seemingly simulate *psychological safety* as ambiguous terminology used across varied sectors such as mental health, wellbeing, and teamwork. For example, resilience-building, coping with challenging situations, improved wellbeing, and increased attainment (Baeva & Bordovskaia, 2015; Delizonna, 2017; Gavin et al., 2020; Kislyakov et al., 2014; Wanless, 2016). However, as identified in **Chapter One**, *psychological safety* and wellbeing are related concepts but have been described as not necessarily synonymous. For example, *psychological safety* has been described as a conduit that assisted with trust-building between students and their peers and their teachers to foster a strong sense of belonging *(*Baeva &

Bordovskaia, 2015). *Psychological safety* has been considered an influential factor in student wellbeing but questions as to how *psychological safety* revealed itself from a student perspective and how it could be assessed have been raised. Information about *psychological safety* indicators in the primary and secondary school environments have, however, been based on grey literature including opinion pieces and non-peer-reviewed assessments. For instance, in 2022, Nita Creekmore, an educator, and Michael Creekmore, a counsellor, documented in Association for Supervision and Curriculum Development (ASCD) (https://www.ascd.org that creating an inclusive environment was one of four ways to achieve *psychological safety* in a K-12 environment. Other educators have presented non-experimental approaches for measuring or assessing *psychological safety* in the K-12 environment such as Abby Dale-Bates in 2022 through Komodo (https://www.komodow) who suggested staff observations of student interactions and self-reports. Evidence-based research about *psychological safety* in the K-12 student environment was therefore deemed necessary, hence the purpose of this review sought to understand the representation of *psychological safety* in schooling and within the scope of a PhD, specifically to identify the observed indicators and how to measure *psychological safety* in secondary school student team contexts.

2.3.2.1 Why is Psychological Safety Relevant in Secondary School Student Contexts?

Secondary school level education caters for adolescent learners aged between 10 – 19 years (UNICEF, 2011) who exhibit personal and social characteristics reflective of the culture of the society they grow up in (Mayes & Moon, 2013). At the secondary schooling age, adolescents experience rapid social, psychological, and biological changes; a period where an optimistic social support network was perceived as a protective factor (Coleman, 2022). The secondary school education period is considered a timely opportunity for adolescents to learn to communicate contextually in terms of their relationships at school, at home and in their communities to establish life-long behaviours (Hagell et al., 2013). It has been well evidenced that during this period, adolescents learn to develop autonomy, firm up their self-esteem and their sense of personal identity, learning coping strategies that they will need to deal with life events and challenges (APA,

2002). At this stage, adolescents learn to handle interpersonal relationships, develop a balanced attitude and emotional intelligence, and other personal attributes such as integrity and tolerance that are crucial for a good work ethic and career success (Heckman & Kautz, 2012). At this age, where secondary school students learn to socialise, even though their families continue to play a significant role in their developments, peer influences from their peer groups are perceived to be powerful, and of paramount importance (Laursen & Veenstra, 2021).

Secondary schools are learning environments where students are prepared as the human capital base for countries (Jain & Prasad, 2018). The secondary school curriculum is designed to prepare students academically and socio-emotionally for direct entry into tertiary education, post-secondary vocational education and training, or the workforce. For better educated individuals, "…educational attainments signal their inherent abilities to employers" (OECD, 2002, p. 64) hence the demand for more education and a heightened enrolment in tertiary education (Blöndal et al., 2003). Despite the increased demand for the acquisition of tertiary-level disciplinary knowledge and skills by the global populace [10% in 1970 to 40% in 2020] (Global Education Statistics, 2023), Pereira & Raposo (2019) reported findings that employers generally felt there was a discordancy. This lack of harmony is shown between the employability skills expected by job markets and that possessed by new graduates or secondary school learners who transition straight into the workforce. Young people who demonstrated an ability to self-manage, get along with others, meet deadlines and deal positively with setbacks were known to be able to have successful transitions from high school to college (Greene, 2018). The findings of the study of Ellah and Azmi (2023), however, indicated that "high school students are not highly aware of the importance of soft skills on their personal and later on professional life" (p. 205). The secondary schooling phase is, therefore, an important time and conducive environment for the development of desirable, transferable skills required for collaborative communication such as *psychological safety*. Progress, however, has not been made in the valid and reliable assessment of these transferable skills (Krahn et al., 2002) as it has been

reported that while hard [technical] skills can be taught, learned, assessed, measured, and verified, the same cannot be said for soft skills (Saddington, 2017; Taylor, 2015).

In scoping the literature with the traditional (narrative) review, the findings indicated that empirical studies of *psychological safety* have been primarily conducted in the organisational context of adults in the workplace and some, in tertiary education. There was also evidence of some opinion pieces focused on the K-12 student context although critics assert that a traditional review is not objective (Zawacki-Richter et al., 2020) and lacks rigour (Snyder, 2019). It was critical, therefore, to move the focus of the literature review to objectively identify, synthesise, and critically evaluate empirical evidence about *psychological safety* in secondary school student contexts. A systematic literature review (SLR) was chosen for this targeted purpose rather than a rapid or scoping review. This is due to its high regard in terms of its reliability and its current consideration as a gold standard in evidence synthesis, especially for guiding education policy, practice, and decision-making (Timmermans & Berg, 2003; Hammersley, 2020). An SLR is also a gold standard for guiding and shaping future research (Zawacki-Richter et al., 2020). The conduct and findings of the SLR which is phase one of this research, is elucidated.

2.4 The Systematic Literature Review (SLR): Phase One

A range of review types have been used in education research such as traditional (narrative) reviews, scoping reviews, rapid reviews, systematic literature reviews, and meta-analyses (Grant & Booth, 2009). An SLR, which has its origins in medicine and is associated with evidence-based practice, enabled replicable, transparent, comprehensive, and reproducible searches in several databases within a stated timeframe (Linares-Espinós et al., 2018). The strength and precision of a systematic literature review (SLR) placed it at the top of the pyramid of evidence (Okoli, 2015; Snyder, 2019). An SLR, is additionally, reported to provide more explicit methods and decrease the risk of bias (Brennan et al., 2020). Following a clearly defined protocol with predetermined criteria, the SLR identified, selected, and critically appraised extant literature (Dewey & Drahota, 2016) to answer a clearly defined research question (Gurevitch et al., 2018) by the researcher and another

reviewer. For these reasons, and as tabulated in **Table CRT2.1** (**Appendix F**), despite requiring more human resources and being comparably slower to complete, an SLR was chosen as the best pathway for the scholarly exploration of *psychological safety* in the targeted student context.

2.4.1 Objectives of the Systematic Literature Review

The SLR was adopted with the aim of exploring the existing literature on what secondary schools have been doing to address *psychological safety.* Although it initially explored *psychological safety* at the primary, secondary, and tertiary education levels, its primary targeted focus was the secondary school student context. This review conceptualised secondary school students as young adolescents in Years 7–12, and sought to find answers to the overarching research question (RQ1): "*How is psychological safety addressed in secondary school students*?" and its two sub-questions: "*Does psychological safety influence collaborative communication in secondary school students*?" (RQ1a); and "*Does psychological safety influence high performance in secondary school students*?" (RQ1b).

2.4.2 Methodology of the Systematic Literature Review

The SLR methodology involved a structured and transparent process designed to comprehensively identify, evaluate and synthesise relevant empirical evidence on *psychological safety* in secondary school students.

2.4.2.1 Transparency and Openness. The researcher and her colleague independently conducted the selection, evaluation, and data extraction in this SLR, so the risk of information bias, selection bias, and analytical bias was reduced. A time-stamped protocol [CRD42021240005] that reported this SLR's methodology (Page et al., 2021) was registered publicly in the database of the International Prospective Register of Systematic Reviews (PROSPERO) (NIHR, 2017). Protocol registration safeguarded this SLR from duplication, publication bias and outcome switching such as [cherry-picking] selectively reporting favourable findings (Hardwicke & Ioannidis, 2018), and [opaque HARKing] speculating after the results were known (Hardwicke et al., 2020). The registration also

enabled the demonstration of enhanced research rigour, transparency, and replicability (Nosek et al., 2018), ensuring outcome measures were not going to be shaped by the review's emerging data (Reich, 2021). The data and materials needed for the replicability of this SLR on *psychological safety* in the secondary school student context were made available in Covidence (www.covidence.org).

2.4.2.2 Eligibility Criteria. All primary studies regardless of design, language or publication date about *psychological safety* involving primary, secondary, and tertiary students were initially considered, as it was important to the research gap identification process. During the final extraction process, however, only studies that had been conducted focusing on secondary school students, the purpose of this review, were considered. Studies that involved teaching staff, non-teaching staff, parents/caregivers/guardians were excluded from the review to explore *psychological safety* directly related to secondary school students. Studies about psychological safety in clinical and organisational settings, work, health and safety matters, mental health difficulties, wellbeing and wellness, healthcare, medicine, nursing and general health, and performance management were excluded from the review. Grey literature was considered but systematic literature reviews and meta-analyses were excluded from the review. The full texts of studies without abstracts were screened for comprehensiveness because they might contain valuable data and insights and also capture the full range of available evidence for precision and to minimise publication bias (PRISMA, 2020). **Table LTR2.1** summarised the pre-specified inclusion and exclusion criteria for the searches in the selected databases.

Table LTR2.1

Inclusion and Exclusion Criteria for the Title and Abstract Screening

Inclusion criteria	Exclusion criteria
All languages	Literature/dataset review or analysis
Global - all countries	The intervention is not *psychological safety*
Peer-reviewed publications	The setting is not about teamwork, group work or collaboration
Theses and dissertations	The outcomes are not about collaboration, communication, or performance
Students/learners with diverse learning needs/learning disabilities	*The participants are not secondary school students
Psychological safety	The study did not use valid methods to address its research question(s)
Primary, secondary, and tertiary education	*The participants are or include schoolteachers, lecturers, non-teaching staff, school administration staff, parents, caregivers, guardians, and schools as organisations
Collaborative communication	The study does not address a clearly focused question(s)
Individual performance	
Group or Team performance	

*Excluded in the extraction stage

2.4.2.3 Information Sources. Although this review had an education focus, Ovid databases were searched because of the psychological factors that may have been reflected in investigations concerning *psychological safety*. Ovid databases like Embase, Medline and PsycINFO allowed for search terms to be adjusted and mapped extensively to medical subject headings (MeSH) (Booth, 2010). Unlike keyword searches, which provided many irrelevant results to the search, MeSH offered results, which were most relevant to the search and were beneficial for the identification of additional concept terms for inclusion (Considine et al., 2017; Thompson et al., 2014). Even though their inclusion was documented in the protocol, the search of the websites of

key organisations and the hand-searching of reference lists and citations of included studies were omitted. Contacting key authors and expert colleagues in the *psychological safety* field to check for any unpublished studies was disregarded. **Table LTR2.2** showed the EndNote 20 library extract of the databases that were accessed between 31 March 2021 – 6 April 2021.

Table LTR2.2

Searched Electronic Databases and the Retrieved Citations for the Systematic Literature Review

Electronic database	Number of retrieved citations
MEDLINE [Ovid]	83
Embase [Ovid]	456
PsycINFO [Ovid]	141
Web of Science	150
Scopus [Elsevier]	12
ERIC [EBSCO]	1
Prospero	43
A+ Education [Informit]	0
ProQuest Central	31
ProQuest Dissertations and Theses	55
Indigenous Database [Informit]	0
iPortal: Indigenous Studies Portal	0
SAGE journals: Education	11
The Cochrane Library	22
Social Care Online (UK)	0
The Campbell Collaboration Library	0
OpenDoar	0
The Grey Literature Report	0
Analysis and Policy Observatory (APO)	0

2.4.2.4 Search Strategy. The searches occurred within 16 multidisciplinary databases as shown in **Table LTR2.2** above and three grey literature databases (**Figures SLR2.1 – SLR2.3** in **Appendix B**) across a variety of podia from inception to 6 April 2021. The searches were accomplished with the PIO (Population-Intervention-Outcome) model (Huang et al., 2006, 2011;

Miller & Forrest, 2001). The PIO model assisted with the clear delineation of the problem, the intervention, and the outcome relevant to this review (Higgins & Green, 2008) on *psychological safety* in the secondary school student context. The PIO model also aided the selection of the most appropriate keywords that were used to develop the search strategy (Lefebvre et al., 2008) for this review as shown in **Table LTR2.3**.

Table LTR2.3

PIO Model Used as a Search Strategy Tool

Tool	Main concepts	Related keywords (and their synonyms)
P	student; school	student(s), school(s), education, primary school(s), secondary school(s), high school(s), higher education, classroom(s), learning environment(s), learning space(s), learning area(s)
I	*psychological safety*	psychological safety, trust, risk-taking, admitting mistake, admitting mistakes, shared belief(s), interpersonal risk-taking
O	collaborative communication; high performance	collaborative communication, communicate collaboratively, collaborate, collaborative, collaboration(s), collaborating, collaborator(s), communication, communicate, communicator(s), team(s), teamwork, teammate(s), group(s), groupwork, partner(s), partnership(s), interaction(s), interactive, high performance, high individual performance, high team performance

The Boolean operators “OR” and “AND” were used to expand and narrow the searches as required. Truncation (*) was used to search for keyword variations and double quotation marks (“ ”) were used to search for terms as exact phrases. **Table LTR2.4** demonstrated the search string derived from the search strategy.

Table LTR2.4

Search String

*student**
AND
*school** OR *"learn* environ*"*
AND
"psych safe*"* OR *trust** OR *"shared belie*" OR interpersonal*
AND
*collab** OR *commun** OR *group** OR *team**
AND
*outcom** AND *performan**

Figures SLR2.4 – SLR2.6 (**Appendix B**) demonstrated three examples of the full search strategies in the PsychInfo, Scopus [Elsevier] and Indigenous Database [Informit] databases including the filters and limits used.

2.4.2.5 Data Collection Process. The data for this review on psychological safety in the secondary school student context was collected in three stages by two independent reviewers via a screening process from 6 April 2021 – 2 September 2021 in Covidence, a web-based, systematic review streamlining program (Babineau, 2014). EndNote 20, a citation management software (Gotschall, 2021), was used to import and organise the identified bibliographic records from the electronic databases into Covidence, which permitted the collaboration of two independent reviewers in real time. The inter-rater reliability, Cohen's kappa coefficient (k) of the two reviewers was checked at the end of each stage.

2.4.3 Results of the Systematic Literature Review

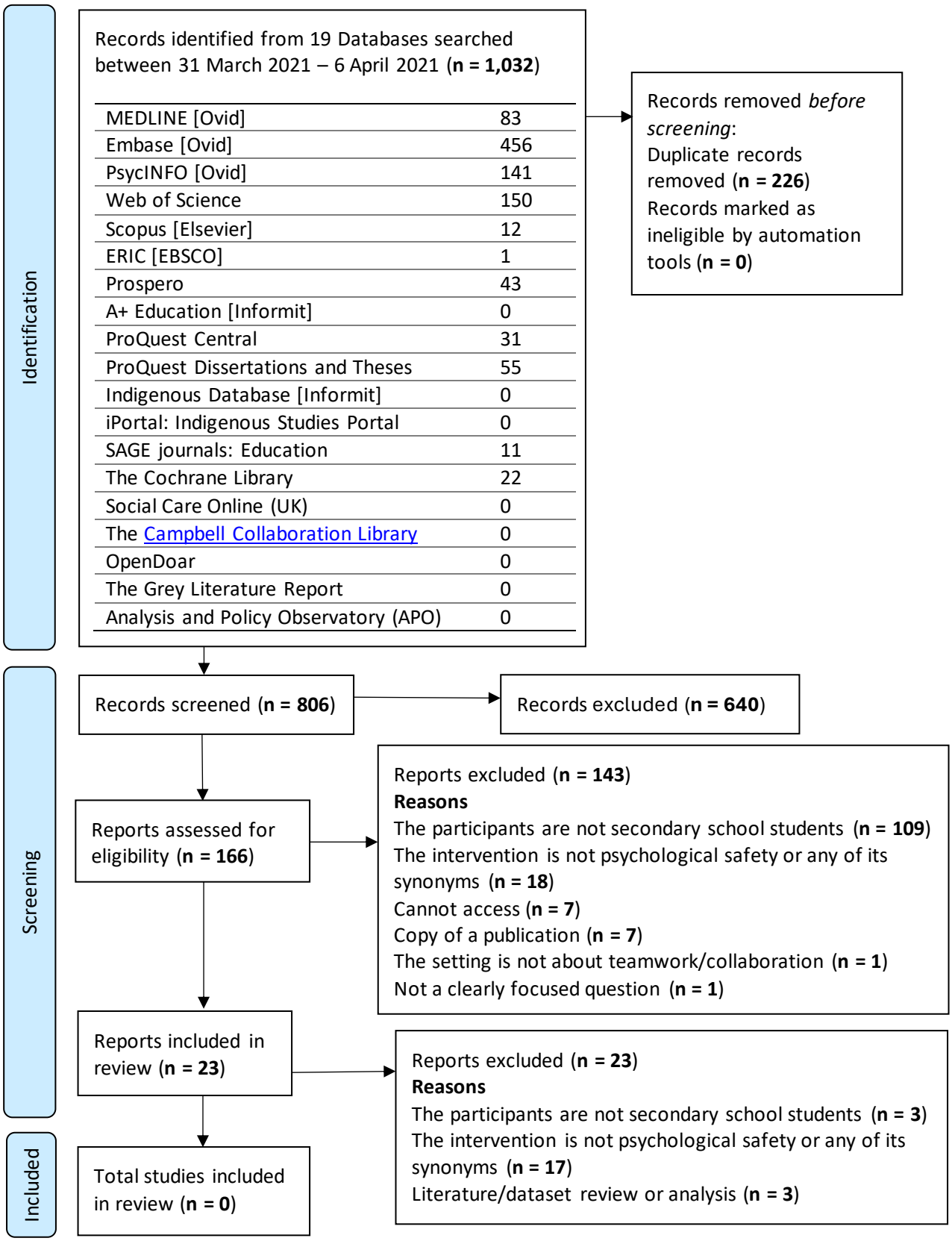
The database searches returned 1,032 citations. These were exported into Covidence from EndNote 20. Following the deduplication process in Covidence, 226 publications were excluded. This left 806 publications eligible for the title and abstract review at stage one. At the completion of the

stage one screening, 640 studies were found to be irrelevant. This left 166 publications eligible for full-text reviews at stage two. At the completion of the stage two screening, a total of 143 studies were excluded at the full-text review stage. This left 23 publications eligible to be included for extraction and quality assessment at stage three.

The kappa statistic, *k* wavered from 0.28 to 0.16 in the first instance and was 0.38 by the end of the title and abstract screening stage. After the full-text screening stage, the proportionate agreement had increased from 0.79 to 0.91 in correlation with an augmented, mutual understanding and agreement of *psychological safety* in the secondary school student context between the two reviewers. **Figure LTR2.1** illustrated a map of the screening process.

Figure LTR2.1

PRISMA Flow Diagram Summarising the Screening Process



Note. Prisma Flow Diagram template is extracted from "The PRISMA 2020 statement: an updated guideline for reporting systematic reviews" by Page, M. J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., et al., 2021. *British Medical Journal, 372*, 6. https://www.doi:10.1136/bmj.n7

2.4.4 Synopsis of the Systematic Literature Review

This systematic review aimed to explore *psychological safety* in the secondary school student context by informing the overarching RQ. "*How is psychological safety addressed in secondary school student teams*?" and its two sub-questions (RQ1a. and RQ1b.). This review identified and screened 1,032 publications, with 166 making it to full-text screening, but none met the inclusion criteria.

An overview of the student participants' educational settings is presented in **Figure LTR2.2** (**Appendix F**) for studies exploring the *psychological safety* construct. The scoping within this review found most of the studies (> 50%) occurred in the US, with a small number of studies undertaken in Australia (*N* = 7), but none to the researcher's knowledge in the state of South Australia, the context of this study. Of the seven Australian studies, four of the conducted studies were in tertiary education; three in primary education, but none, in secondary education. This expressed the need for further research on *psychological safety* in secondary school student contexts in South Australia. The synthesis of the studies in the SLR showed a majority of the studies (*N* = 49) were in the fields of Medicine (*N* = 27) and Health Sciences (*N* = 22), with undergraduate nursing students forming a large part of the participants from the field of Health Sciences. Some of the tertiary education participants also came from the fields of Business, Management, and Education (*N* = 9). Certain studies included primary school student participants (*N* = 13), and others included secondary school student participants (*N* = 19). However, no studies explicitly exploring *psychological safety* in secondary school student contexts with a sole focus on only the students' voices. This highlighted a significant research opportunity regarding empirical evidence in this scholarship. Despite this SLR focusing on

locating targeted, extant literature on *psychological safety* of students in the secondary school student context in Education, the databases that retrieved the highest number of relevant publications were health-related in nature from Embase and PsycINFO, as evidenced in **Figure LTR2.1**. It can be accordingly argued that *psychological safety* is a multidisciplinary concept that has been researched more in health contexts (an excluded criteria) than in the Education context. The reviewers were thus unable to locate or retrieve any eligible studies, so this SLR, an "empty" review (Lang et al., 2007) whose findings were inadequate to answer RQ1, RQ1a., and RQ1b.

Empty reviews are not uncommon, for the Cochrane Database of Systematic Reviews (CDSR) reports a considerable number of empty reviews (Yaffe et al., 2012). Yaffe and her colleagues opined that although empty reviews are likely to seem discouraging for researchers and policymakers, they can manifest in very new or immature research areas and can be an important tool for identifying gaps in research knowledge and new interventions (Yaffe et al., 2012). This "empty" review threw light on the potential lack of explicit research on *psychological safety* in the secondary school context; a clearly identified significant research gap. Nevertheless, to avoid misguiding readers, researchers, and policymakers, it was beneficial for information about the 23 studies (**Table SLR2.1** in **Appendix F**) that went through full-text review but were excluded, to be reported (Green et al., 2007; Lang et al., 2007). This report summary allows for a comprehensive view of the scope of the empirical literature landscape and helps readers to understand the context and rationale behind the inclusion criteria. Furthermore, the report in **Table SLR2.1** (**Appendix F**) enhances the transparency, rigour, reliability, and validity of the SLR process.

The findings of the traditional (narrative) review are confirmed by the findings of the SLR, concluding that there is a clear gap in the literature. These complementary findings demonstrate that *psychological safety* is a construct that has not yet been explicitly investigated in the secondary school student context. This offered a significant justification for this research.

Given the dearth of empirical evidence in the secondary school student context in phase one (SLR) of this research, **Chapter Three** presents a research design that prioritises the self-reported perspectives and spoken voices of secondary school students.

2.5 Summary

Organisational learning is a complex process of knowledge acquisition, sharing and evaluation (Argote et al., 2001) through social interactions (Kozlowski & Bell, 2007). *Psychological safety* has been noted by various research findings as a fundamental enabler of learning behaviours (Clark, 2020; Edmondson, 1999, 2018, 2004; Kahn, 1990, 2001, Kim et al., 2020) that make organisations such as Google, effective and successful (Rovosky, 2015). The literature review informs that learning is enabled when people speak up to share and exchange ideas and insights, voice opinions, and seek feedback that assists with the ongoing evaluation of the tasks at hand (Edmondson, 1999) in order to develop, sustain or grow an organisation's competitive advantage (Nair, 2001). The critical synthesis of the guiding lenses, methodological approaches, findings and recommendations of various *psychological safety* investigations set a firm foundation for situating this research in the scholarly field. The complementary findings of the traditional (narrative) review of literature and the SLR revealed that many studies about *psychological safety* as a mediator for the quality of interpersonal relationships, learning behaviours and the achievement of goals have been undertaken in organisations and some, in the tertiary education sector such as in Health Sciences and Medicine. The findings also showed some opinion pieces on *psychological safety* in schools and students that have been shared by educators, Counsellors, and Psychologists. However, the dearth of notable studies in the K-12 Education sector from the narrative review, and the "empty" review from phase one of this multi-phased research leads to a confident conclusion that *psychological safety* has not yet been explicitly investigated in the secondary school student context. This exposed a clear research gap for further exploration based on critical insights of conceptual relevance and strong theoretical justifications. This knowledge gap was addressed with the evidence-based methodology described in **Chapter Three**.

Chapter Three: Methodology

3.1 Introduction

Chapter Three opens with an elucidation of the conduct and findings of the pilot study which is phase two of this multi-phased research. The quantitative and qualitative analytical approaches that are used to explain the patterns, trends, and associations between the identified observed indicators of *psychological safety* and their accurate measurement are also explained in this chapter. The chapter concludes with a critical discussion of the practical and ethical responsibilities that were applied in this investigation that informed the *psychological safety* construct in secondary school student team contexts, and the overall *psychological safety* scholarship.

3.2 Conceptualising the Research

The foundation for this research was laid on sound philosophical assumptions, and a critically insightful overview with strong conceptual and theoretical justifications from the review of literature in **Chapter Two**. This basis supported the framing of the research's aims, problem, questions and hypotheses. When determining the scope and limitations of this research, careful consideration was given to the ethical responsibilities that supported the shaping of the data collection methods, and the selection of the tools and techniques required for the analyses and interpretation of the collected data. The careful planning of these aspects of this research enabled a structured, coherent, and methodologically sound investigation aimed at contributing actionable insights to the field of *psychological safety* in secondary school student team contexts and the overall *psychological safety* scholarship.

3.3 The Pilot Study: Phase Two

As identified in **Chapter Two**, Edmondson (1999) conducted preliminary interviews and observations at her study site with professional adults, as an approach for selecting the participant teams for her study. This pilot was conducted as a feasibility study to contribute to the richness and

depth of this multi-phased research's theoretical understanding. It was aimed at gaining insights on how to conceptualise the main study, focus on important data, and sample theoretically (Nunes et al., 2010). The conduct and findings of the pilot study are reported, below.

3.3.1 Background of the Pilot Study

The pilot study was, initially, part of a broader study in selected South Australian schools by the Centre for Change and Complexity (C3L), one of the research centres of the University of South Australia (UniSA). This study was approved by UniSA Human Research Ethics Committee (HREC) [Protocol No: 204417]. The C3L study aimed to identify instrument feedback processes to augment the development of students' capabilities to solve complex problems in groups. It aimed to explore opportunities to integrate artificial intelligence (AI) as a partner in group problem-solving. To this end, the C3L study had various researchers exploring different aspects of complex problem-solving such as group environment (Carron et al., 1985), perceived cohesion (Bollen & Hoyle, 1990), achievement emotions for pre-adolescents (Pekrun et al., 2011), metacognitive awareness (Schraw & Dennison, 1994) and *psychological safety* (Edmondson, 1999). After collecting the data, this pilot study was no longer a part of the C3L study. It branched off into a study of its own, which was phase two of this research on exploring *psychological safety* in secondary school student team contexts.

3.3.1.1 Pilot Study Procedures. The ethics application for this pilot study was spearheaded by the lead investigator of the research team from C3L. Being a part of a larger C3L project, the initial discussions about the pilot study's data collection such as research tools, and participants' consents were undertaken by other members of the C3L research team. There was therefore no opportunity for the *psychological safety* researcher to send participants timed reminders to encourage participation and reduce attrition rates. This is because the researcher had no access to monitor responses to the pilot study's online survey. The researcher also had no opportunity to engage with the data collection site leaders or the pilot study's participants before the administration of the survey or the day of the focus group discussions.

For the broader C3L study, in teams of four-five, participants were set a task in their STEM (Science, Technology, Engineering and Mathematics) learning spaces to collaboratively build AI automation [robots] that could manoeuvre constructed, exo-planetary surfaces. To receive their STEM grade, in their teams, participants were required to present their research on their constructed exo-planets although participation in the pilot study's online survey and focus groups was voluntary. Being the first time that the researcher had been at the site for the purpose of this study, it is fair to say that there was no established relationship between the participants and the researcher. The brief provided to the participants by their STEM educator about the attending C3L researchers' backgrounds and the purpose of their attendance at their school, however, was beneficial for researcher-participant relationship building. The focus groups had two moderators due to the multi-purpose nature of the C3L study.

It was important for the researcher to acknowledge her positionality, experiences and biases that influenced the research processes (Nind et al., 2015). For instance, unconscious biases based on her cultural and career diversity may have influenced the pilot study's methodology such as the choice of focus group questions. This reflexive position, however, was not frowned upon by the guiding, 'constructivist' grounded theory that permitted the inclusion of the researcher's personal perspectives and constructs to form a part of the qualitative analysis. The researcher, nonetheless, managed any unconscious biases through conscientiousness and verbal acknowledgements to the focus group participants throughout the discussions.

3.3.1.2 Purpose of the Pilot Study. The pilot study's purpose was to test the viability, meaningfulness, stability, and consistency of the research tools and processes (Creswell & Creswell, 2005). The findings of the pilot study were applied to inform the methodology of phases three and four (main study) of this multi-phased research.

3.3.1.3 Research Questions of the Pilot Study. Though aiming to test the research tools and processes, the pilot study used the afforded feasibility opportunity to explore the students' perspectives and experiences on *psychological safety* by addressing two research questions (RQ),

"*What are the observed indicators that determine psychological safety in secondary school student team contexts*?" (RQ1); and "*How can psychological safety be measured in secondary school student teams*?" (RQ2).

3.3.2 Methodology of the Pilot Study

Underpinned by the theoretical lenses of 'constructivist' grounded theory (Charmaz, 2014), social learning theory (Bandura, 1977), and symbolic interactionism (Blumer, 1969), the approaches for collecting and analysing data are discussed, below.

3.3.2.1 Research Design for the Pilot Study. The pilot study employed a sequential, convergent, mixed methods design (**Figure PSD3.1** in **Appendix H**) to check the viability of the recruitment protocols (Van Wijk & Harrison, 2013). Quantitative data were collected with an Omnibus (also known as a multi-purpose) online survey that was comprised of grouped items on the diverse but interconnected phenomena i.e. group environment, perceived cohesion, achievement emotions for pre-adolescents, metacognitive awareness, and *psychological safety* of the C3L broader study. Focus groups were used to collect qualitative data (in a multi-topic format) for the C3L project. The quantitative and qualitative data were collected sequentially for the *psychological safety* part [convergent, mixed methods pilot study] of the multi-purpose C3L project. The *psychological safety* data were analysed separately; away from the C3L project. This data analyses were undertaken by the *psychological safety* researcher after collection, drawing firm conclusions, thereafter, that influenced the conduct of the main study: phases three and four (**3.4.1** and **3.4.2**) of this research on *psychological safety* in secondary school student contexts.

3.3.2.2 Data Collection Site for the Pilot Study. As part of the C3L project, the pilot study was conducted in a Reception (R) to Year 12 [R-12], co-educational, independent school in metropolitan South Australia. The school has a student population of about 1000 [c.2022] with an Index of Community Socio-Educational Advantage (ICSEA) score of 1158. The ICSEA score shows the level of advantage of each Australian school's enrolment (Bonnor et al., 2021). The ICSEA of 1158

indicated the students at this school came from relatively advantaged backgrounds, reflecting a school context with families who have higher educational attainment and skilled occupations. It demonstrates that these families support for high expectations and adequate resources positively influences the higher academic performance of the students on standardised tests and other high stakes assessments.

3.3.2.3 Sampling and Participants for the Pilot Study. The school site's, lead, STEM educator purposively selected (Onwuegbuzie & Collins, 2007) 60 students from a Year 9 cohort who were collaborating on a STEM project for the *psychological safety* part (i.e. this pilot study) of the broader C3L project.

3.3.2.4 Instrumentation for the Pilot Study's Quantitative Data Collection. As reported in **Chapter Two**, there was a dearth of empirical evidence hence no existing instruments were noted to be available for the identification and measurement of *psychological safety* indicators in the secondary school student context.

3.3.2.4.1 Developing the Adapted 35-Item Psychological Safety Scale. From the findings of their SLR in **Chapter Two**, Newton et al. (2017) recommended Edmondson's (1999) *psychological safety* scale (pp. 382-383) and her definition (p. 354) for application by future research on *psychological safety*. Edmondson's (1999) *psychological safety* scale (**Appendix G**) has 54 items spread within 13 constructs. Eleven of the constructs are described as "Team Survey Item": supportiveness of organisation context, task design, clear direction, team composition, team efficacy, team psychological safety, team leader coaching, team learning behaviour, team performance, internal motivation, and job involvement. Two of the constructs are described as "Observer Survey Items": team learning behaviours, and team performance.

Edmondson's (1999) scale was designed to measure *psychological safety* in professional working adults. For use in the adolescent schooling context, the scale was adapted to a 35-item scale of eight Team constructs: supportiveness of organisation context, task design, clear direction, team composition, team efficacy, team psychological safety, team learning behaviours, and team

performance (**Table MSM3.4** in **Appendix H**). After its development, the adapted 35-item scale was examined for its measurement accuracy with face validity.

3.3.2.4.1.1 Face Validity of the Adapted 35-Item Psychological Safety Scale. The adapted 35-item scale (along with the other data collection tools in the broader C3L study) was sent to the relevant school leaders and target respondents at the pilot study's data collection site for the face validity assessment. Face validity was used to superficially assess the adapted scale's suitability and relevance in the adolescent (i.e. secondary school student) context. Following the scale's approval by the data collection site after the face validity, the adapted 35-item scale was embedded into a survey instrument that was designed by the researcher for the pilot study.

It must be noted that face validity is basic and superficial thus insufficient in establishing the accuracy of a measurement scale. Consequently, construct validity was employed for validity assessment following the administration of the scale in collecting data from the 60, Year 9 participants.

3.3.2.4.2 Designing the Online Survey Instrument. The survey instrument was designed, online, on the free Survey Monkey platform (https://www.surveymonkey.com). The adapted 35-item scale which had undergone face validity, was embedded into this survey. The survey was also designed to use three questions to collect demographic data on the participants' identities, year groups and ethnicities. Subsequent to its design, the survey, which took 10 min to complete, was incorporated into the multi-purpose, C3L online survey by its lead investigator, as the *psychological safety* component of the multi-purpose study. The administration of the survey, and the analyses and results of the demographic and quantitative data collected, are discussed below.

3.3.2.5 Quantitative Data Collection and Analysis for the Pilot Study. The C3L's Omnibus, online survey was distributed to the respondents via email by their lead STEM educator. One of the surveys in the Omnibus survey was the pilot study's online survey instrument, which was constituted of the adapted 35-item scale from Edmondson (1999). With this scale, quantitative data on *psychological safety* were collected twice, longitudinally, in Term 1, 2021 (**Figure PSD3.1** in

Appendix H) from the participants. Hard copies of the survey were also offered to be administered to participants with diverse learning needs, where required.

The collected demographic and quantitative data with the online survey were examined to draw meaningful conclusions to answer RQ1 and RQ2 (**3.3.1.3**), and to inform the efficacy of the research tools and processes for the main study (phases three and four). The International Business Machines Corporation's (IBM) Statistical Package for the Social Sciences (SPSS) – version 26 (IBM SPSS, v26) was used to clean and transform the data before the conduct of descriptive and inferential analyses. The participants' responses to the three demographic questions about their year of schooling, identity and ethnicity in the online survey were statistically described in an organised and simplified summary.

The construct validity of the adapted 35-Item scale (i.e. its factor structure) was examined with principal components analysis (PCA) (Pallant, 2020). The Kaiser-Meyer-Olkin (KMO) coefficient (Kaiser, 1974) was used to assess the scale's adequacy for factorability (Shrestha, 2021) and as an evaluation of its accuracy (validity) in measuring *psychological safety* in secondary school student contexts. For further assessment of its sampling adequacy, Bartlett's Test of Sphericity was used to examine the confidence in the correlations among the 35 items of the scale (Netemeyer et al., 2003).

3.3.2.5.1 Results of the Descriptive Analysis of the Quantitative Data. In IBM SPSS (v26), descriptive statistics were used to describe the sample's characteristics. Out of the 60 Year 9 students, 38 responded to the online survey on *psychological safety* (**Table PSD3.1** in **Appendix H**). Some respondents did not disclose their identity (*N* = 1), some identified as male (*N* = 20), female (*N* = 14), and other identities (*N* = 3) (**Table PSD3.1** in **Appendix H**) that were disclosed as "Omnidimentional Vampire", "A straight white man" and "basketball" (**Table PSD3.2** in **Appendix H**). Most of the respondents were Australian (*N* = 28) with others acknowledging their ethnicities as European (*N* = 6), Aboriginal and Torres Strait Islander (*N* = 1), Asian (*N* = 2), British (*N* = 2) and mixed ethnicities (*N* = 2) (**Tables PSD3.3** in **Appendix H**). Some participants disclosed their ethnicities as

different (*N* = 3) describing themselves as "Italian", "Latvian", and "Indian" (**Table PSD3.4** in **Appendix H**).

3.3.2.5.2 Results of the Inferential Analysis of the Quantitative Data. The removal of missing data by default options (i.e. listwise deletion) in IBM SPSS (v26) left valid data from 36 respondents for inferential statistical analyses (**Table PSD3.5** in **Appendix H**). The internal consistency of the adapted 35-item scale was good [$\alpha = 0.84$] (Cronbach, 1951) and reliable (Cortina, 1993; DeVellis & Thorpe, 2021) (**Table PSD3.6** in **Appendix H**). The adapted 35-item scale, however, had unacceptable validity [KMO = .35] (Kaiser, 1974) (**Table PSD3.7** in **Appendix H**). This showed that the scale was unable to produce sufficient correlating items for the prediction of each factor, indicating the dataset was not adequate for factor analysis (Shrestha, 2021). Nonetheless, the measure of a dataset's adequacy for factorability is supported by other indicators such as the scree plot and Bartlett's test of sphericity. The scree plot (**Figure PSD3.2** in **Appendix H**) indicated the possibility of the extraction of a minimum of three principal components by showing a corresponding bend on the graph. This visual aid as well as the statistically significant Bartlett's Test of Sphericity [$\chi^2(465) = 781.65$, $p < .001$] (**Table PSD3.7** in **Appendix H**) offered the confidence that patterned relationships existed amongst the items in the adapted 35-item scale (Snedecor & Cochran, 1998). This result deemed it acceptable to submit the scale for further factor analysis (Field, 2000; Pallant, 2013).

Eleven, principal components with eigenvalue of 1.0 or more that explained 81% of the total variance in the dataset (Hoffman & Kunze, 1971) were extracted (**Table PSD3.8** in **Appendix H**). **Table PSD3.8** (**Appendix H**) showed that fifty percent [49.62%] of the total variance was explained by the first, four principal components as visually demonstrated by the scree plot too (**Figure PSD3.2** in **Appendix H**). Varimax rotation of the extracted principal components was selected with accompanying default options to improve the fit of the factors in the underlying framework to the data (Jennrich & Sampson, 1966) (**Table PSD3.10** in **Appendix H**). The rotations showed that 12 items may have been unable to discriminate sufficiently because they either did not load on any

principal component or cross-loaded on more than one principal component. The 12 items were removed from the 35-item scale via the step-by-step item reduction technique to stabilise the factor structure of the scale. The unstable factor structure was likely due to the small sample [38 respondents]. At this stage, it was noted that there was a need to increase the sample size for future research.

Following the removal of the 12 items, four principal components with eigenvalue of 1.0 or more that explained 61% of the total variance in the dataset (Hoffman & Kunze, 1971) were extracted (**Table PSD3.11** in **Appendix H**). This revealed the adapted 23-item scale (from the validation of the adapted 35-item scale) (**Table PSD3.12** in **Appendix H**) with mediocre validity [KMO = .62] (Kaiser, 1974) (**Table PSD3.13** in **Appendix H**) yet acceptable reliability [$\alpha = 0.79$] (Cronbach, 1951) (**Table PSD3.14** in **Appendix H**). Bartlett's Test of Sphericity was statistically significant [χ^2 (253) =477.84, $p < .001$] thus indicating the data's adequacy for sampling hence its viability for collecting data in phase three (online survey) of the main study.

3.3.2.6 Instrumentation for the Pilot Study's Qualitative Data Collection. In **Chapter Two**, Newman et al. (2017) qualitative data approaches to gain a better understanding of the manifestation of *psychological safety* in team contexts. In the same chapter, the findings of the literature review revealed that few researchers like Edgar (2012) and Scott (2009) collected qualitative data on *psychological safety* with focus groups (**Table SLR2.1** in **Appendix F**). Qualitative data were thus collected with focus groups to provide rich, complementary data to facilitate a deeper understanding of *psychological safety* in secondary school student contexts. The administration of the focus groups, the analyses and results of the collected data are discussed in **3.2.2.7**, below.

3.3.2.6.1 Framing the Guiding Questions for the Qualitative Data Collection. The eight questions that guided the focus group discussions (**Table MSM3.3** in **Appendix H**) were framed to encourage the participants to reflect on the social context within which their individual and collective views on *psychological safety* were formed. Guided by symbolic interactionism (Blumer, 1969), some

questions were framed to explore the meanings that the participants attached to their experiential, social interactions and how their learning behaviours were shaped by these meanings. Some of the questions that explored how the participants adopted socially inspired learning behaviours from vicarious observations were guided by social learning theory (Bandura, 1977). To prompt the participants to co-construct meanings by reflecting on the experiences they shared with each other about their backgrounds and learning context, Charmaz's (2014) 'constructivist' grounded theory was applied. Staying true to the underpinning theoretical perspective of Charmaz (2014, 2017), the researcher's experiential knowledge of diverse, global secondary schooling contexts, as an educator was consulted during the formulation of the guiding questions.

When the questions were ready, they were incorporated into the C3L's multi-topic focus groups of 24 questions. The 24 questions were delineated for four different aspects of the broader C3L study (as described in **3.2.1** above) on artificial intelligence [AI] (six questions), team cohesion (six questions), creativity (four questions), and *psychological safety* (eight questions as framed in **Table MSM3.3** in **Appendix H**).

3.3.2.7 Qualitative Data Collection and Analysis for the Pilot Study. Moderated by the *psychological safety* researcher and one of her C3L colleagues (i.e., the *perceived cohesion* researcher), in Term 4, 2021, seven focus groups were used to collect qualitative data (**Figure PSD3.1** in **Appendix H**), once. The focus groups that we moderated as part of the C3L broader study engaged 26 participants in 20 min discussions about team cohesion, AI, creativity, and *psychological safety*. The focus groups which were made up of five groups of four students, one group of three students, and one group of five students took place in a well-lit classroom with entry and exit points that could be closed for meeting privacy and confidentiality. Participants were reassured that the research team would only have access to the audio recordings of the focus groups to capture whole dialogues and to aid accurate transcription. The researcher reminded participants about confidentiality, data storage and the anonymous reporting of their findings as per the broader C3L participant information sheet (PIS). Eight of the 24 questions focused on *psychological safety* in the secondary

school student team context. Field notes were not taken to afford the moderator an opportunity to give participants her full, undivided attention.

The audio records were stored securely on the UniSA server and de-identified during transcription by the second focus group moderator (*perceived cohesion* researcher). After the transcribed data was transferred to the *psychological safety* researcher, open, axial, and selective coding approaches (Glasser, 1965) were employed for thematic analyses that were managed in Microsoft Word (Microsoft Corporation, 2018). The transcribed information was organised into codes, concepts, and themes to interpret the personal and social meanings of *psychological safety* in the secondary school student team context.

3.3.2.7.1 Findings of the Thematic Analysis of the Qualitative Data. Some of the implicit and explicit meanings of *psychological safety* in the secondary school student team context that emerged from the students' voices in seven focus groups (*N* = 28] are demonstrated in **Table PSD3.15** (**Appendix H**).

The eight emergent themes were familiarity, friendship, communication, reliability, trust, social skills, creative problem-solving, and empathy (**Table PSD3.15** in **Appendix H**). The themes showed a pattern that identified seven observed indicators (friendship, familiarity, working with others, information sharing, empathy, understanding, and having desirable soft skills) that enable *psychological safety* in the secondary school student context. Eight indicators (lack of focus, lack of organisation, lack of information sharing, lack of collective efficacy, lack of time to accomplish tasks, not being understood, lack of participation, and lack of support) that hinder *psychological safety* in the secondary school student context were also revealed. These patterns were visually demonstrated by a thematic tree diagram (**Figure PSD3.3** in **Appendix H**) to aid comprehension.

3.3.3 Integrated Findings of the Pilot Study

The findings of the analysis of the focus groups' data [*N* = 28] were used to enhance inferences stemming from the results of the statistical analysis of the online survey data from the adapted 35-item scale [*N* = 38], and vice versa (Glass, 1976; Sandelowski & Barroso, 2003). The key

findings in **Table PSD3.16** (**Appendix H**) were used to comprehensively inform the pilot study's RQs. The integrated findings provide critical insights of the research problem that contributed meaning to the research design (**Figure PSD3.1** in **Appendix H**), leading to refined actions that improved the efficacy of the main study's methodology.

3.3.4 Implications of the Integrated Findings of the Pilot Study for the Main Study

The pilot study's (phase two) integrated findings assisted with the refinement of the research protocols and the development of the research tools for the main study (phases three and four). Four refinements were needed to improve the efficacy of the research tools and the operative procedures for the research conduct of the main study (phases three and four):

1. The redesign of the survey instrument for the main study was proposed thus a different software programme, Qualtrics (https://www.qualtrics.com) was used for that purpose. The wordings used for the items of the adapted 23-item scale were developed to be more relatable to the secondary school student cohort. Some of the scale items were removed from the scale to decrease participant burden by making it more time friendly. A qualitative item was built into the end of the adapted 23-item scale to measure the psychographic characteristics of the respondents. This concluding qualitative item, "*I feel safe to admit errors, seek feedback, and speak up as a member of the team without fear of embarrassment, rejection and punishment because ... (choose all that applies)*", offered participants a multiple choice of *psychological safety* observed indicators that had been identified by the pilot study's focus group discussions. An open-ended prompt, "*Something else makes me feel psychologically safe in this team (please specify) …"* was included to offer participants an opportunity to explain their thoughts and opinions.

2. The review of the survey engagement invitation numbers and response times was recommended. A respondent rate of 63% was achieved with 38 participants (out of 60) who engaged with the online survey (**Table PSD3.1** in **Appendix H**). This provided a beneficial indication of the

expected respondent rate for the main study, indicating that for the main study, to gain for instance, 200 participants about 315 secondary school students needed to be invited to complete the survey. Resultantly, the survey invitations had to be sent to about 160 participants to obtain 100 responses; a 63% response rate. The respondents also needed at least 4-5 weeks per school Term to complete the survey at each data collection point. Resultantly, the two-termly data collection points for the main study were reduced to one per Term. Quantitative data collection via the online survey, therefore, occurred longitudinally, at three time points across three Terms.

3. The refinement of the guiding questions used for the focus groups was suggested. The guiding questions were therefore reduced from eight to five to enable more time for participants to elaborate on their responses. The questions were also developed to focus on drawing on responses that confirmed or rejected the *psychological safety* observed indicators that had emerged from the pilot study's qualitative analysis. The questions were also framed to gain insights into students' contextual implementation ideas regarding *psychological safety* in secondary school student team contexts.

4. Confirmatory factor analysis (CFA) (Brown & Moore, 2012) and item level analysis with the Rasch model (Andrich, 1978; Rasch, 1960) were advised for the scale validation of the adapted 23-item scale to be used in collecting data within the main study's online survey instrument. CFA was recommended for testing the existence of a hypothesised relationship between the observed factors and their underlying latent constructs (Ben, 2010) in the adapted 23-item scale. Rasch analysis was proposed to enable the further identification and removal of poorly functioning items to make the emergent, adapted scale more robust (Fox & Jones, 1998) for its intended purpose.

3.4 Research Design for the Main Study: Phase Three and Phase Four

Psychological safety is deemed a complex, multifaceted construct that is considered by Morse & Niehaus (2009) to be "beyond the reach of a single method" (p. 15). Combining

quantitative and qualitative data collection and analytical methods presented an opportunity for the provision of stronger inferences from a multiplicity of divergent perspectives emanating from the phases three and four (Teddlie & Tashakkori, 2012; Cameron et al., 2012). Theoretical sensitivity was developed through contextual sensitivity (Williams-McBean, 2019) with the benefit of these two, interconnected and complementary phases (Maxwell, 2016). **Chapter One** reported that multi-phased, mixed methods data collection approaches (three phases; three methods) were used by Edmondson in her 1999 study on *psychological safety* in work teams in the US. **Chapter Two** evidenced that multi-method and mixed methods designs have been employed by other researchers of *psychological safety* in the work and education environments such as Hulse (2017), Lee et al. (2015), Kahn (1990) and Rogers (1954). Edmondson and Lei (2014) *proposed "*…Hybrid methods that mix qualitative and quantitative data, as well as studies that blend field and laboratory research to illuminate the phenomena and assess causality simultaneously…" (p. 40) to future researchers. Later on in **Chapter Two,** Frazier et al. (2017) recommended that data be collected from different sources despite a threat of decreasing of the true validities of the variables of interest (Frese & Zapf, 1988).

Thus, to explore students' understandings of *psychological safety,* the observed indicators associated with *psychological safety* in secondary school student team contexts, and how its latent variables can be measured, phases three and four of this multi-phased research employed a convergent, parallel, mixed methods design (Creswell & Plano Clark, 2011; Tashakkori & Creswell, 2007). Giving equal weight to both methods, this study employed quantitative (QUAN) and qualitative (QUAL) approaches for data collection and analysis.

3.4.1 Main Study – Online Survey: Phase Three

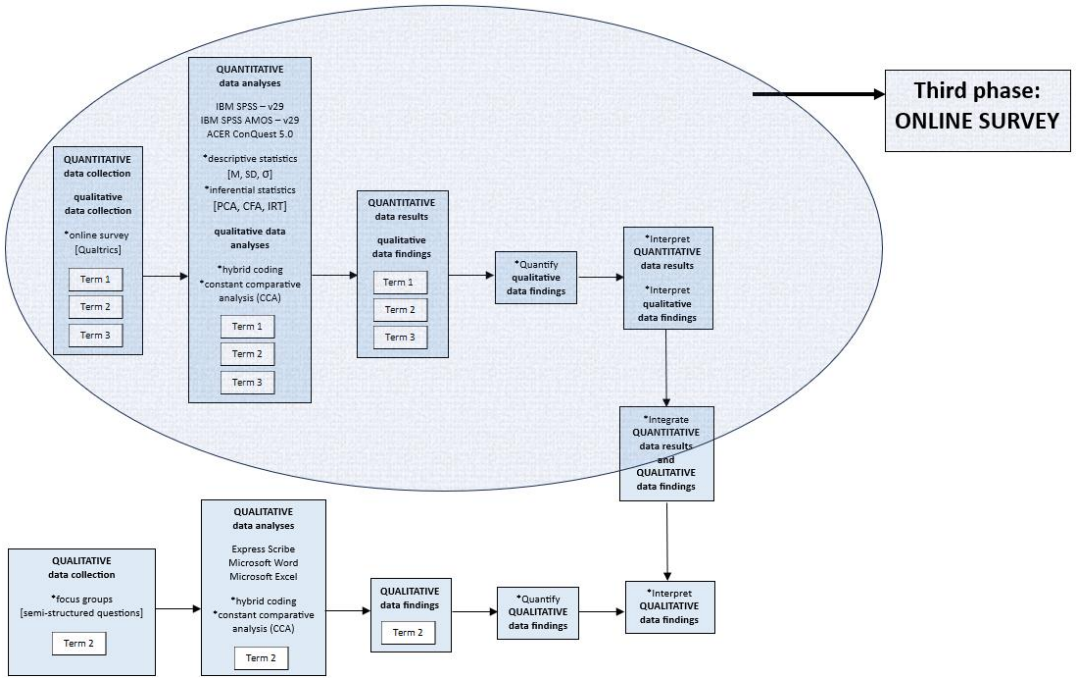
Demographic, quantitative (QUAN) and qualitative (qual) data were collected at the same time with the online survey in phase three. with integration (i.e., convergent) of the data happening at various points such as during the framing of the research questions, data collection, data analyses and data interpretation (Greene, 2015; Guest, 2013; Teddlie & Tashakkori, 2009). The concurrent data collection approach was more practical because two data forms were collected at the same

time (Creswell, 2021). With this approach, the findings of the analyses of the qualitative data collected with the psychographic item in the online survey supported the exploration of the statistical results from the analyses of the quantitative data collected with the adapted 23-item scale from Edmondson (1999) online survey to enable complementary, richer, and more vigorous findings (Denzin et al., 2023; 2011; Greene et al., 1989). The integration of the quantitative and qualitative data in the online survey offered increased confidence in this research's findings (Coyle & Williams, 2000) and the interpretations (Tashakkori & Teddlie, 2003). Inferences that were drawn from this research informed relevant, actionable implications for practice, policy and future research (O'Cathain et al., 2010).

Figure MSD3.1 shows the research design for phase three [major quantitative (QUAN) and minor qualitative (qual)] of this research on *psychological safety* in secondary school student team contexts. The design shows the data collection times, instruments and processes, as well as the times, software and approaches used for the QUANqual data analyses.

Figure MSD3.1

Convergent, Parallel, Mixed Methods Design for the Main Study Highlighting the Quantitative (QUAN) and Qualitative (qual) Data Collection and the Analytical Approaches for Phase Three



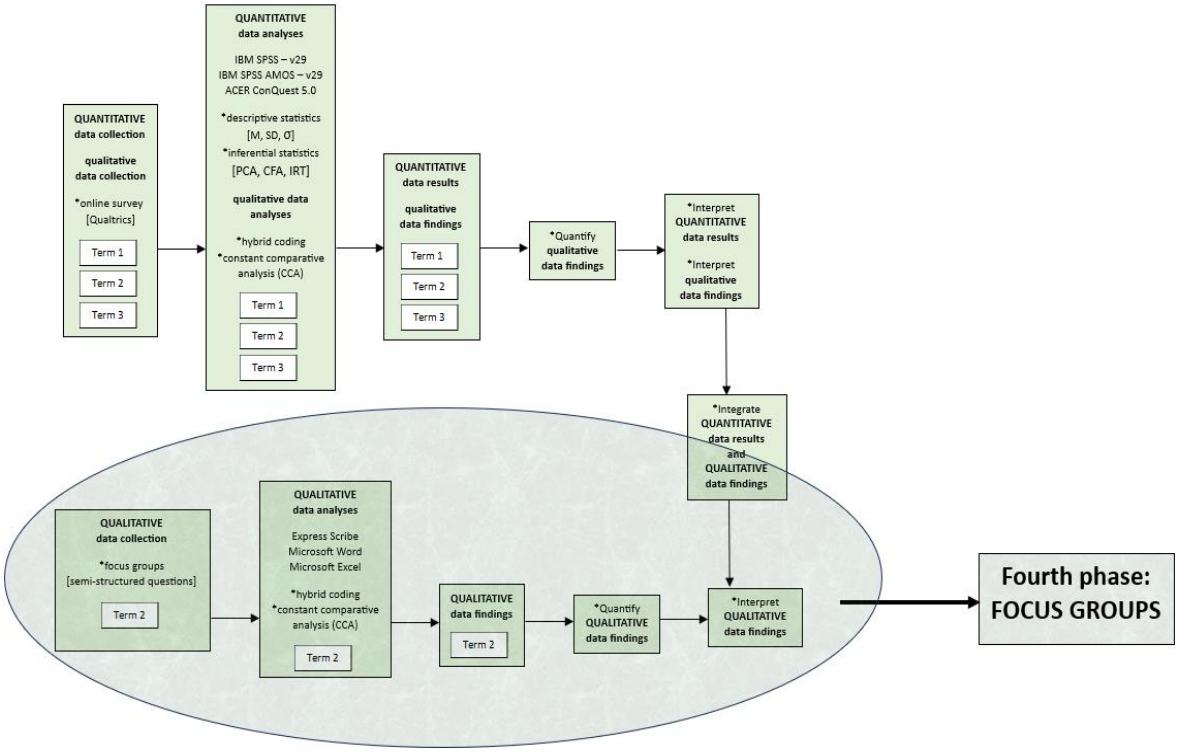
3.4.2 Main Study – Focus Groups: Phase Four

Combining quantitative and qualitative data collection methods presented an augmented opportunity for the provision of stronger inferences from a multiplicity of divergent perspectives emanating from the two different phases (Teddlie & Tashakkori, 2012; Cameron et al., 2012). Consequently, in addition to the quantitative (QUAN) and qualitative (qual) data collected concurrently with the online survey in phase three of the main study, qualitative data (QUAL) were collected through focus groups in phase four. Focus groups were used to collect lots of information from different perspectives, experiences and opinions from different groups of secondary school students. The discussions allowed participants to develop meanings from their interactions, observe vicariously, co-construct each other's responses (Beyea & Nicoll, 2000; McKim, 2017).

Figure MSD3.2 shows the main study's research design for phase four [major qualitative (QUAL)] of this research on *psychological safety* in secondary school student team contexts. The design shows the data collection times, instruments and processes, as well as the times, software and approaches used for the QUAL data analyses.

Figure MSD3.2

Convergent, Parallel, Mixed Methods Design for the Main Study Highlighting the Qualitative (QUAL) Data Collection and the Analytical Approaches for Phase Four



3.4.3 Overall Research Design

The overall design for all the complementary four phases is summarised in **Table RDS3.1**, below. It shows the timeframes and data collection methods used to answer the research questions for each of the four interrelated phases.

Table RDS3.1

Overall Research Design

Research Phase	Phase One	Phase Two	Phase Three	Phase Four
Design	Structured and rigorous approach	Sequential, convergent, mixed methods (QUANQUAL)	Parallel, convergent, mixed methods (QUANqualQUAL)	
Inquiry type	**Systematic literature review (SLR)**	**Pilot study: feasibility study**	**Main study: online survey**	**Main study: focus groups**
Overarching research question (RQ)	**RQ1.** How is psychological safety addressed in secondary schools?	**RQ1.** What are the observed indicators that determine psychological safety in secondary school student team contexts?	**RQ1.** What are the observed indicators of psychological safety in secondary school student team contexts?	**RQ1.** What are the observed indicators of psychological safety in secondary school student team contexts?
		RQ2. How can psychological safety be measured in secondary school student teams?	**RQ2.** How can psychological safety be measured in collaborating secondary school students?	
Sub research question (RQ)	**RQ1a.** Does psychological safety influence collaborative communication in secondary school students?		**RQ2a.** Does a student's feeling of efficacy in the team [TEF] influence their feelings of psychological safety in the team [TPS]?	**RQ1a.** What is the secondary school student's understanding of psychological safety in their team context?
				RQ1b. How is psychological safety enabled in secondary school student teams?
	RQ1b. Does psychological safety influence high performance in secondary school students?		**RQ2b**. To what extent does a student's feeling of psychological safety in a team predict their learning behaviours in that team?	**RQ1c.** What are the barriers to psychological safety in secondary school student teams?

			RQ2c. How can a student's attitude to learning in a team affect the team's efficacy?	**RQ1d.** How can psychological safety be implemented in secondary school student team contexts?
Data collection method	Online search of extant empirical evidence	Online survey Focus groups	Online survey	Focus groups
Data collection source	19 online bibliographic databases	Secondary school students [Year 9]	Secondary school students [Years 10 – 12]	Secondary school students [Years 10 - 12]
Time of data collection	February 2021 – September 2021	Term 1a, 2021 – online survey Term 1b, 2021 – online survey Term 4, 2021 – focus groups	Term 1, 2022 – online survey Term 2, 2022 – online survey Term 3, 2022 – online survey	Term 2, 2022 – focus groups

Note. The research design for investigating *psychological safety* in secondary school student team contexts in the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts".

3.5 Identification and Recruitment of Participants for the Main Study: Phases Three and Four

With a sole focus on students' voices and perspectives, this parallel, convergent, mixed methods main study sought to recruit only secondary school students for the investigation of *psychological safety*.

3.5.1 Study Sites

There were two data collection sites for the main study of this mixed methods research. Out of the 70 schools invited to participate, these were the two schools who opted to collaborate on this research.

The first was a Kindergarten to Year 12 (K-12), Diocesan, co-educational, independent school in semi-rural, regional South Australia. The student population was approximately 3600 students [c.2022] across its five sub-schools with an Index of Community Socio-educational Advantage (ICSEA) score of 1061.

The second data collection site was a specialist, co-educational, public senior [Year 10–12] secondary school with a STEM focus in metropolitan South Australia. The school has a student population of about 369 students [c.2022] with an Index of Community Socio-educational Advantage (ICSEA) of 1100.

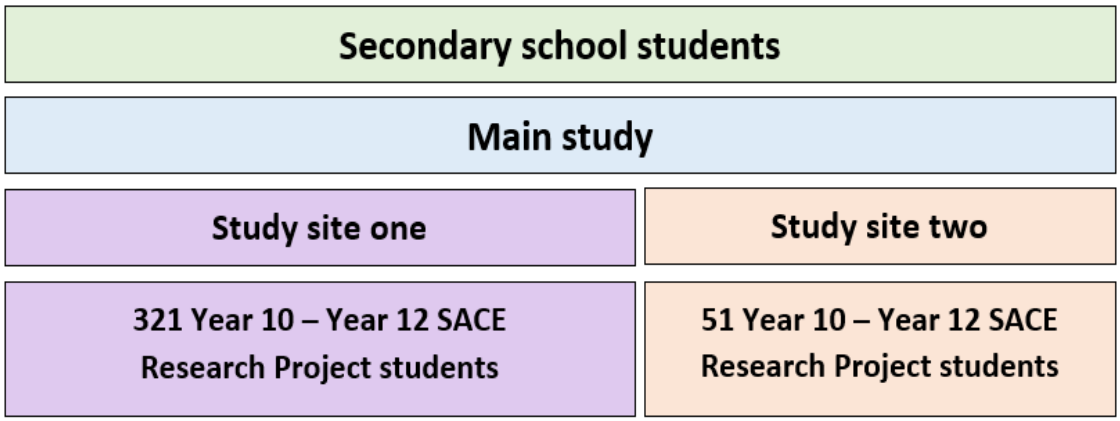
3.5.2 Sampling

School leaders employed purposive sampling (Onwuegbuzie & Collins, 2007; Teddlie & Yu, 2007) to recruit participants. Participants were intentionally invited according to specific student characteristics and the students' unique perspectives on teamwork in pre-existing subject-specific groups that were relevant to the research questions. The participant inclusion criteria were secondary school students in Years 10 - 12 who were engaged in teams working on their South Australian Certificate Examination (SACE) Research Project (RP) aiming for responses to the online survey from

probable, shared perspectives. **Figure MSD3.3** provides a snapshot of the purposively sampled participants for the main study (phases three and four) of this research.

Figure MSD3.3

Research Participants



3.5.3 Participant Recruitment

The researcher met with school leaders of both sites as well as potential participants to discuss the project, share and explain the tools, processes, and implications of this research for their contextual feedback and input. The researcher's points of contact were the Director of Research for data collection site one and the Deputy Principal for data collection site two.

To support relationship building, informed consent, and support for SACE RPs, the school leaders of data collection site one invited the researcher to speak to secondary school students commencing Week 4 of Term 1, 2022. The researcher delivered five seminars via timetabled group sessions over a fortnight to the secondary school students and their [research project] teachers at data collection site one. The researcher also used the afforded seminar opportunities to provide personalised support to the secondary school students [and their teachers] with their own SACE RPs. This enhanced buy-in from the secondary school students, their parents/caregivers, and their teachers. To further support recruitment, the Principal [site leader] of the school publicly shared blurbs and visual representations of the researcher's site engagement in the school's newsletter and on the school's social media pages [Facebook and Instagram] to inspire the school community about

the positive significance of this research on secondary school students as well as the school's vision and purpose.

The participants were young adolescents (a majority under 18 years), and it was therefore ethically required to seek the consent of their parents/caregivers in the first instance before the young adolescents could also give their personal consent to participate in this research. The administrators of both data collection sites sent emails inviting participants to engage with the research through their parents/caregivers. The parents/caregivers were provided with the research tools including the participant information sheet (PIS) to enable them to make an informed decision about their child's participation in this research. The distribution of the tools for this research were facilitated by the site leaders' assigned administrators. The tools that were shared with the participants and their parents/caregivers included:

- a detailed participant information sheet (PIS) for the participants with information for mental health services (**Appendix A**);
- a consent form (CF) for participants (**Appendix B**);
- a detailed participant information sheet (PIS) for the parents and caregivers (**Appendix C**);
- a consent form (CF) for parents and caregivers (**Appendix D**); and
- a focus distress protocol (**Appendix E**).

Parental/caregiver consent was taken as an indication of agreeable secondary school student participation by the data collection sites.

3.6 Instrumentation for the Main Study: Phases Three and Four

In **Chapter Two**, Frazier et al. (2017) reported a significant difference between objective and subjective measures of task performance where higher effect sizes resulted when the nature of the measures was subjective and *psychological safety* was rated by the perceiving source, so they urged future researchers to collect data for subjective measures when investigating *psychological safety*. As postulated by Blumer's (1969) symbolic interactionism theory in **Chapter One**, quantitative

methods were used to explore and co-construct the meanings that secondary school students ascribe to the observed indicators and latent variables of *psychological safety* in their team contexts (Creswell, 2013b) through a 23-item scale adapted from Edmondson (1999). Qualitative methods were used to gather in-depth personal opinions, beliefs, attitudes, and experiences about the observed indicators of *psychological safety* in secondary school student team contexts through the co-constructions of the meanings of their social interactions (Bandura, 1977) via focus groups. In this situation, grounded theory (Charmaz, 2014) posited the consideration of the researcher's personal perspectives (Sandelowski, 1995a) to inform the data to be collected. Acting on the recommendation of Edmondson and Lei (2014) in **Chapter Two**, and as used in the pilot study (phase two), "Hybrid methods that mix qualitative and quantitative data" (p. 40) were employed for data collection in the main study.

An online, self-report, survey instrument was used to collect demographic, qualitative (qual) and quantitative (QUAN) data. Five guiding questions were used to collect additional qualitative (QUAL) data from focus groups. These instruments were developed based on the key learnings from the key findings of the pilot study (phase two) in **3.3.3** – **3.3.4**.

3.6.1 Online Survey Instrument for the Quantitative (QUAN) and Qualitative (qual) Data Collections for the Main Study: Phase Three

Surveys are common ways to measure perceived team performance (Pearce & Herbik, 2004; Pearce & Sims, 2002). There were, however, no existing scales available to measure *psychological safety* in secondary school student team contexts as identified by the "empty" review findings of the SLR (phase two) in **Chapter Two**.

For phase three of the main study of this research, the key learnings from the pilot study (phase two) proposed the redesign of the survey instrument thus Qualtrics (https://www.qualtrics.com) was used for the redesign. With Qualtrics, a 3 min, multidimensional,

self-report, online survey instrument was developed to prioritise the experiences and perspectives of the students about *psychological safety* in their context.

The online survey instrument used in the main study of this research had a commencing demographic part with three questions: question one to question three (Q1 - Q3). The instrument comprised of an adapted 23-item scale from Edmondson (1999) as question four (Q4) (**Table MSM4.2** in **Appendix J**). This is the adapted scale from that emerged from the validation of the pilot study's, 35-item scale adapted from Edmondson's (1999) *psychological safety* scale in **3.3.2.5.2**, above. It also had a concluding psychographic part as question five (Q5) that was used to collect qualitative (qual) data. Q5 had two parts: a multiple-choice item ["*I feel safe to admit errors, seek feedback, and speak up as a member of the team without fear of embarrassment, rejection and punishment because… (choose all that applies)*"], and an open-ended prompt ["*Something else makes me feel psychologically safe in this team (please specify)…*"].

The adapted 23-item scale [Q4] in the online survey instrument collected quantitative data from 372 participants with six "Team" constructs: clear team direction (CTD); team composition (TCO); team efficacy (TEF); team psychological safety (TPS); team learning behaviours (TLB); and team performance (TPE), all on a 5-point Likert scale from "Strongly disagree to Strongly agree". It is worth mentioning that while the adapted 23-item scale had mediocre validity [KMO = .62], this did not prevent its administration in phase three of the main study. Scientifically, while a KMO value below 0.6 typically raises concerns about the suitability of data for factor analysis (Kaiser, 1974), there are circumstances under which a scale with a mediocre KMO coefficient such as this can be administered, as briefly mentioned in **3.3.2.5.2**, above. These circumstances include exploratory research contexts (such as this research), strong theoretical justification (such as from Edmondson, 1999), complementary data (such as focus groups), sample size (such as the *N* increase from 60 to 372), and post-analysis refinements (such as theme/variable merging).

Nevertheless, the adapted 23-item scale was validated by the researcher in a couple of subjective ways (content validity and face validity) before its use in data collection for phase three of this research.

3.6.1.1 Examining the Content Validity of the Adapted 23-Item Scale. Content validity is a judgement on whether the scale's items contain the right questions that cover the relevant aspects of the *psychological safety* construct being investigated (Bolarinwa, 2015). This can be undertaken by the *psychological safety* experts in the field (Oluwatayo, 2012), but on this occasion, for the purpose of this research, the researcher undertook this assessment. The researcher was assured of the contents of the adapted 23-item scale because they were adapted from Edmondson's (1999) *psychological safety* scale. This scale was empirically and contextually validated for Edmondson's (1999) study, so there was confidence in the existing items that were maintained and adapted by the researcher for the 23-item scale. The adapted 23-item scale was consequently formed on an established knowledge base hence a strong theoretical foundation as posited by Newman et al. (2017) in **Chapter Two**. However, being administered in a different context to what Edmondson (1999) built it for, it was important for its quality, trustworthiness, and relevance to be established. Resultantly, the adapted 23-item scale was examined in various subjective and objective ways to ensure that it was constructed well to consistently measure psychological safety in secondary school student team contexts in a reliable and accurate way (Benson & Clark, 1982; Taherdoost, 2016).

Before the online survey instrument was administered to the sample population. However, it was important for it to undergo face validity, though superficial, for its clarity and contextual relevance. This was undertaken by the relevant stakeholders at the study site including leaders, teachers, parents/caregivers and the target participants. By engaging in the face validity of the adapted 23-item scale in the online survey instrument this way before data collection, user acceptance was enhanced.

3.6.1.2 Examining the Face Validity of the Adapted 23-Item Scale. Face validity is a subjective assessment of the adapted 23-item scale's contextual suitability (Zhang & Garcia, 2023),

which was undertaken by the relevant stakeholders such as the instructional staff and target respondents at the data collection sites that helps with user acceptance. The adapted 23-item scale was, therefore, emailed to the teachers and relevant school leaders of the potential secondary school student participants to read and check for the clarity and relevance of the scale's items. The researcher was informed that a couple of parents/caregivers assessed the scale as well before giving parental/caregiver consent. Afterwards, presentations were given by the researcher at one of the data collection sites for the secondary school students, their teachers, and some school leaders. Information about this mixed methods research on *psychological safety* in secondary school student team contexts was shared with the audience and clarifying questions were answered to help them understand the purpose of this research, and the representativeness of the item pools. Coupled with the participant information sheet (PIS), consent form (CF) and other research tools that were administered subsequently, the secondary school students were supported with making informed participatory decisions following the review of the scale items. The combined information placed the secondary school students, their teachers and school leaders in a better position to provide critical feedback on the designed survey for this research. It must be noted that face validity is an insufficient method to determine the scale's internal consistency (reliability) or accuracy (validity). Resultantly, other assessment methods such as construct validity and item response theory (IRT) were used for further examination of the adapted 23-item scale's validity following its administration in quantitative (QUAN) data collection in phase three of this research.

3.6.2 Guiding Questions for the Qualitative (QUAL) Data Collection for the Main Study: Phase Four

Informed by the findings of **Chapter Two,** and as recommended by Edmondson (1999) and Newman et al. (2017), focus groups were used to better understand and explain the beliefs, cultures, and opinions that were based on the assigned meanings of interactions that influenced the feelings, attitudes, and behaviours of secondary school student team members (Barbour, 2010; Cyr, 2016;

Rabiee, 2004). Focus groups were used to collect qualitative data as they were considered to be a better choice than interviews because they involved the use of in-depth group interviews where social interactions were encouraged between participants (Thomas et al., 1995) who built on each other's responses. The data gained from focus groups were therefore richer and deeper than one-to-one interviews (Krueger & Casey, 2000). A large quantity of data that focused on the group interactions about the topic at hand (Harrell & Bradley, 2009) – *psychological safety* in secondary school student team contexts - was also produced in a short time.

The five, guiding questions (**Table MSM5.7** in **Appendix I**) used in phase four of the main study of this research were framed based on the key findings (**Table PSD3.16** in **Appendix H**) and key learnings from the pilot study. The refinement of the number of questions from eight to five aimed to enable more time for deeper discussions that further clarified the participants' responses. The guiding questions were also reframed to draw out the participants' ideas about implementing *psychological safety* in their school context. Underpinned by symbolic interactionism (Blumer, 1969), social learning theory (Bandura, 1977), and 'constructivist' grounded theory (Charmaz (2014, 2017), the questions were reframed to explore the co-constructed meanings the participants attached to their social interactions which shaped their learning behaviours based on their contextual, individual experiences, and perspectives. The five guiding questions that were reframed to prioritise the students' shared understandings, experiences, and voices about *psychological safety* in their context were:

Q1. What is *psychological safety*?

Q2. How do you perceive the presence of *psychological safety* in [your] teams?

Q3. What are the enablers of *psychological safety* in [your] teams?

Q4. What will make it easier for you to work and thrive in [your] teams?

Q5. How would you like to see [your] identified *psychological safety* dimensions implemented in the learning spaces in your school?

Along with the developed online survey instrument that was constituted of the adapted 23-item scale, these reframed guiding questions were also delivered to the data collection sites for a face validity assessment by the stakeholders of this research. Similarly, its face validity may or may not have enhanced user acceptance thereby most likely impacting the number of participants who volunteered to engage with the focus groups.

3.7 Data Collection Methods for Main Study: Phases Three and Four

Quantitative and qualitative data were collected with the developed instruments in **3.6**, above for phase three (online survey) and phase four (focus groups) of the main study.

3.7.1 Quantitative (QUAN) and Qualitative (qual) Data Collection for Phase Three

Following parental/caregiver consent, email invitations were sent to 372 secondary school students (**Figure MSD3.3**) by the researcher from the Qualtrics platform (https://www.qualtrics.com) along with the designed online survey instrument. The first part of the online survey instrument included a section with instructions and a part for the survey respondents to sign as a further confirmation of their willingness to participate in the study in addition to parental/caregiver consent. Where participants did not sign, their completion of the online survey and/or engagement in focus groups were taken as a reflection of their personal consent. Four teachers of the respondents were also sent email invitations for their support in reminding the respondents to complete the online survey. It must be noted that this was for informative support only as teachers were not participants in this research. To develop an understanding of how *psychological safety* develops or erodes with changes in membership, leadership, or context" (Edmondson, 1999, p. 380), and to "allow a better assessment of cause and effect and an examination of changes in psychological safety over time…" (Edmondson & Lei, 2014, p. 40), longitudinal research was recommended. To inform these recommendations, phase three of this research was designed to collect data longitudinally from 372, Years 10 – 12, South Australian,

secondary school student participants (**Figure MSD3.3**) across the three data collection points (DCP) described below:

3.7.1.1 Data Collection Point One (DCP1). Data were collected via the Qualtrics software platform (https://www.qualtrics.com) in Term 1, 2022 from 298 students in Year 10 – Year 12. The respondents were given four weeks to complete the online survey. The survey remained open for these four weeks and the respondents were sent three, weekly reminders to gently prompt and encourage their responses. Of the 355 surveys that were started, 298 were completed, with an 89% response rate.

3.7.1.2 Data Collection Point Two (DCP2). Data were collected via the Qualtrics software platform (https://www.qualtrics.com) in Term 2, 2022 from 198 students in Year 10 – Year 12. The respondents were given five weeks to complete the online survey. The survey remained open for these five weeks and respondents were sent four, weekly reminders to gently prompt and encourage increased responses. Of the 199 surveys that were started, 190 were completed, with a 95% response rate.

3.7.1.3 Data Collection Point Three (DCP3). Data were collected via the Qualtrics software platform (https://www.qualtrics.com) in Term 3, 2022 from 151 students in Year 10 – Year 12. The respondents were given six weeks to complete the online survey. The survey remained open for these six weeks and respondents were sent five, weekly reminders to gently prompt and encourage increased responses. Of the 163 surveys that were started, 151 were completed, with a 93% response rate.

3.7.2 Qualitative (QUAL) Data Collection for Phase Four

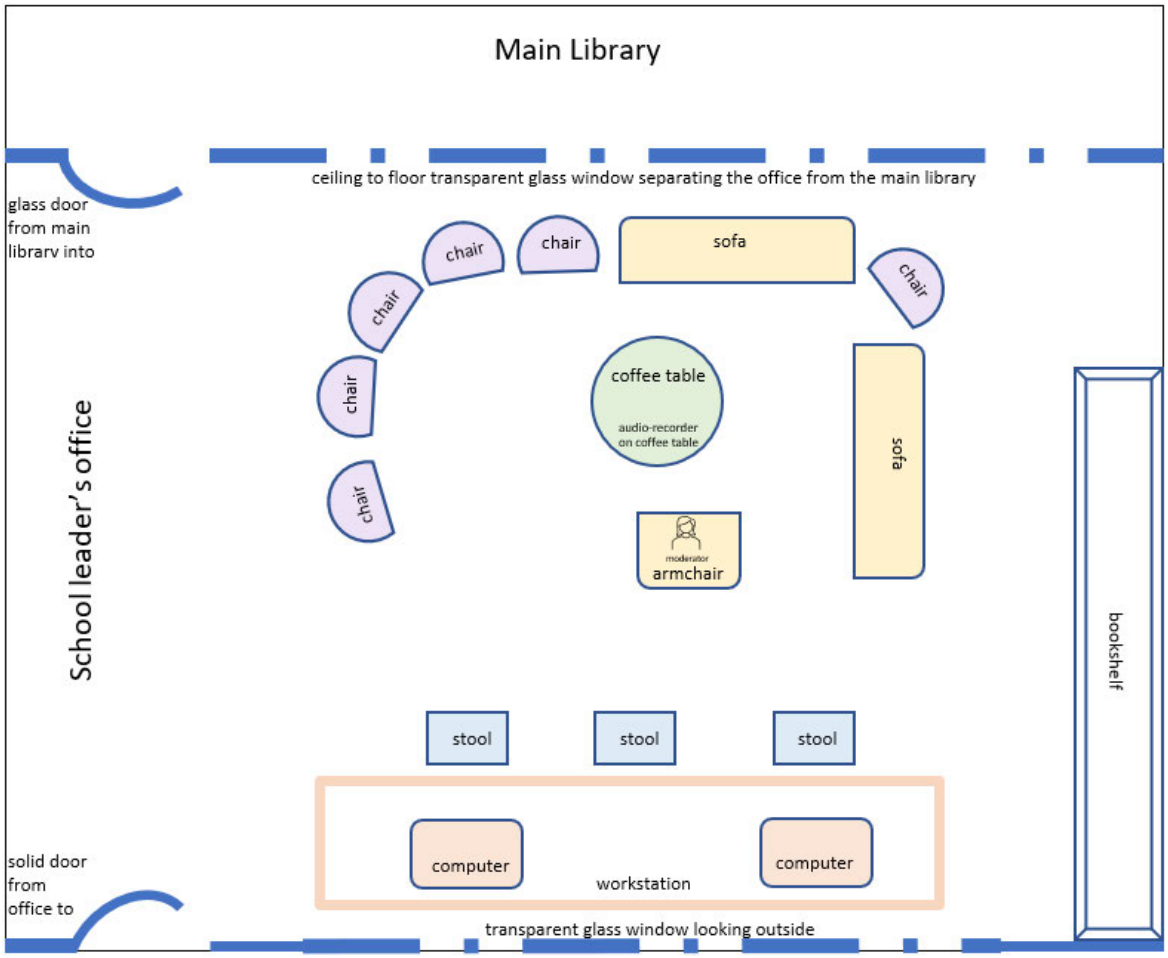
In addition to the qualitative data collected with the psychographic item in Q5 of the online survey, further qualitative data were collected from 52 participants in Years 10 – 12 from data collection site one (**Figure MSD3.3**). The participants volunteered to engage in focus group discussions upon the researcher's public invitation during school visits to deliver seminars and

support them with their SACE RP projects as noted in **3.5.3**. The participants at data collection site two (**Figure MSD3.3**) did not participate in the focus groups because the scheduled focus groups' times were unsuitable for their school calendar.

3.7.2.1 Location and Room Set-Up for Focus Groups. The focus groups for the main study were conducted in two well-lit locations at study site one. Both rooms had access to appropriate furniture and could be closed for meeting privacy and confidentiality. The audio recorder was set in full view of participants in both rooms. The discussions for focus group one [FG1] (*N* = 6), focus group two [FG2] (*N* = 9), focus group three [FG3] (*N* = 6), focus group four [FG4] (*N* = 7), focus group five [FG5] (*N* = 7) occurred in the school leader's office inside the main library of the data collection site. The participants sat on sofas and chairs around a centred, coffee table on which the audio recorder was placed. The researcher who moderated the discussions sat on an armchair by the audio recorder. The location and room set-up for focus groups one to five is illustrated in **Figure QLA3.1**, below.

Figure QLA3.1

Location and Set-up for Focus Groups One, Two, Three, Four and Five



Not drawn to scale

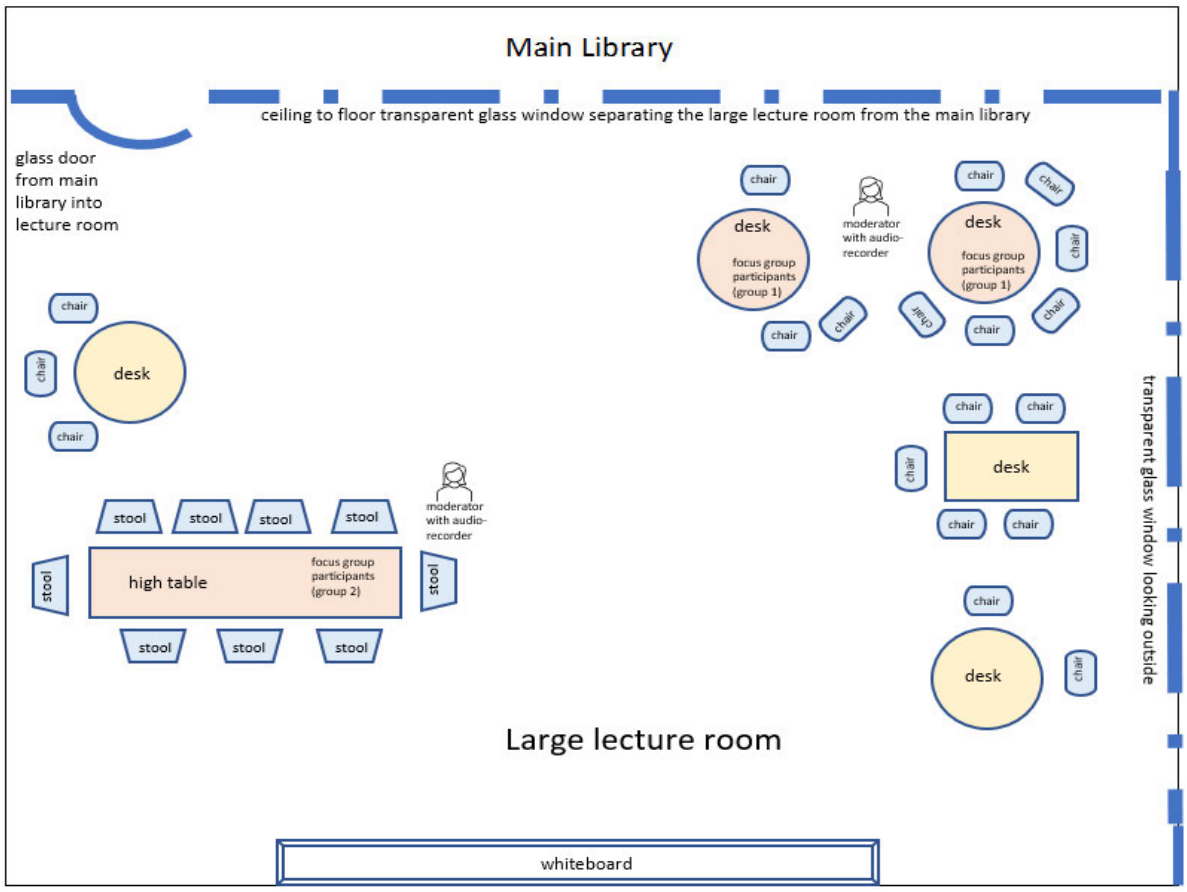
Note: Diagrammatic representation of the set-up for focus groups one, two, three, four and five for collecting qualitative data in the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts".

Focus group six (FG6) was a large group (*N* = 17) after more secondary school students volunteered to join the discussions. The additional students were added to form two groups in a large, lecture room inside the main library of the data collection site because there was no other time available in the negotiated schedule to conduct the focus groups. this was mainly due to

timetabled school activities such as assessment deadlines and examinations. Group one of FG6 had nine participants who sat on swivel chairs at two desks in the left-hand corner of the room. Group two of FG6 had eight participants who sat on bar stools at one high table in the far right-hand corner of the room by the whiteboard. The location and room set-up for focus group six is illustrated in **Figure QLA3.2**, below.

Figure QLA3.2

Location and Set-up for Focus Group Six



Not drawn to scale

Note: Diagrammatic representation of the set-up for focus group six for collecting qualitative data in the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts".

3.7.2.2 Administration of the Focus Groups. The focus groups occurred concurrently [i.e., parallel data collection] with data collection point two (DCP2) in Term 2, 2022 when the online survey data were collected (**Table RDS3.1** in **3.4.3**). The six focus groups took place during the participants' SACE Research Project lesson times over two days in a fortnight. The five guiding questions outlined in **3.7.2** above were discussed with the participants to gather in-depth, personal opinions, beliefs, attitudes, and experiences about *psychological safety* in secondary school student team contexts. The researcher moderated each of the six focus groups. The participants spent an average of 23 min in each focus group. With participants' consent, the researcher audio-recorded all focus groups. **Table QLA3.1** (**Appendix H**) illustrates the number of participants who engaged in the focus groups and the time spent in each. In focus group two (FG2), participants six (P6) and seven (P7) offered no verbal accounts of their beliefs, experiences, and opinions of *psychological safety* in secondary school student team contexts. P6 and P7 of FG2, however, were very pleasant and depicted positive, non-verbal, communication attitudes that enhanced the discussions. Although very pleasant and depicting a positive, non-verbal, communication attitude, participant five (P5) in focus group six (FG6) offered no verbal accounts of their beliefs, experiences, and opinions of *psychological safety* in secondary school student team contexts. It is worth noting that there were students in this room who were not part of the focus group six (FG6) but opted to remain in the room, with the researcher's permission, to listen to the discussions (**Figure QLA3.2** in **Appendix I**). The data from the two groups were combined for data analysis because the discussions unintentionally amalgamated at various points in the 21:10 min discussion. **Tables CCA5.3 - CCA5.7** (**Appendix I**) reflect the coded data for focus groups one - five (FG1 – FG5), respectively. **Table CCA5.8** (**Appendix I**) illustrates the coded data for focus group six (FG6).

3.8 Analytical Methods for Data Collected in the Main Study: Phases Three and Four

Data analyses for the main study (phases three and four) were accomplished with multiple software packages and approaches as shown in **Table MSD3.1**.

Table MSD3.1

Software Packages and Approaches Used for the Analyses of the Data Collected in Phases Three and Four with the Online Survey Instrument and Focus Groups

	QUANTITATIVE (QUAN) data analyses for phase three	
	Software package	**Analytical approach**
Online survey instrument	**Descriptive statistics for the dataset**	
	International Business Machines Corporation's Statistical Package for the Social Sciences – version 29 (IBM SPSS – v29)	❖ Characteristics of the sample population *measures of central tendency *measures of dispersion *measures of frequency distribution
	Inferential statistics for the validation of the adapted 23-item	
	International Business Machines Corporation's - Statistical Package for the Social Sciences – Analysis of Moment Structures – version 29 (IBM SPSS Amos - v29)	❖ Factor analysis (FA) *Principal Components Analysis (PCA) ❖ Structural equation modelling (SEM) *Confirmatory Factor Analysis (CFA) *Path analysis
	Microsoft Excel (Microsoft Corporation, 2018)	❖ Convergent validity ❖ Divergent validity

	Australian Council for Educational Research's ConQuest - version 5 ACER ConQuest 5.0 (Adams et al., 2020)	❖ Item Response Theory (IRT) *Rasch Analysis - Rating Scale Model (RSM)
	Qualitative (qual) data analyses for phase three	
	Constant Comparative Analysis (CCA) with a hybrid coding approach	
	Microsoft Word (Microsoft Corporation, 2018)	• Organisation of the transformed qualitative data in IBM SPSS (v29)
	Microsoft Excel (Microsoft Corporation, 2018)	• Quantification of the qualitative data
Focus groups	**QUALITATIVE (QUAL) data analyses for phase four**	
	Constant Comparative Analysis (CCA) with a hybrid coding approach	
	Software package	**Analytical approach**
	Express Scribe Transcription Free (Unlicensed) Non-commercial home use only [v12.03] NCH software (https://www.nch.com.au/scribe)	• Playback of clear audio recordings to support accurate, manual, 'live' transcription of aural accounts
	Microsoft Word (Microsoft Corporation, 2018)	• Documentation and organisation of the transcribed aural accounts
	Microsoft Excel (Microsoft Corporation, 2018)	• Quantification of the qualitative data

3.8.1 Dealing with Missing Data

Missing data is deemed to be a common phenomenon in Psychology and Education studies (Enders, 2003, 2006) due to the ethical code of respect for voluntary participation (NHMRC, 2007 [updated 2018]). Not uncommon in a longitudinal study (Liang & Zeger, 1986; Prentice & Zhao, 1991) that used a survey with subsets of items (Graham et al., 2006), individual participants for this research naturally dropped out or were not available at certain data collection time points (DCP1, DCP2, DCP3). These dropouts, absences and personal distractions during the survey completion caused wave non-responses such as attrition (Deeg, 2002; Kaplan & Atkins, 1987) that produced

missing data. The large amount of missing data in this research [42%] was more than 10% (Bennett, 2001) and could not be ignored as it threatened the integrity of the findings (Barry, 2005) by affecting the responses at the item level (Allison, 2003) known as item non-response (Schafer & Graham, 2002).

Different methods are used to manage different levels of missing data (Parent, 2013). The missing data in the main study were not different to the data of the complete cases. Thus, the missing data were treated as a random subset of the dataset (Schafer, 1997), referred to as data that was missing completely at random (MCAR) (Little & Rubin, 1987). The missing data could have been handled by deletion or imputation (Bland & Altman, 2007) before statistical data analyses through pairwise deletion, single imputation, maximum likelihood (ML), listwise deletion and multiple imputation (Newman, 2014). The statistical techniques that were considered for treating data missing completely at random (MCAR) in this research were multiple imputation (MI) (Rubin, 1987; Schafer & Graham, 2002) and listwise deletion (Enders & Peugh, 2004). The MI method would have substituted the missing values in the main with a set of plausible values predicted from the available data for the specified variable without reducing the sample size (Carpenter & Kenward, 2012).

However, firstly, known as the most popular and unbiased method for managing MCAR (Newman, 2009), listwise deletion was selected as a default IBM SPSS (v29) technique to manage missing data in this research. Secondly, the employment of listwise deletion may have had large, standard errors that decreased its statistical power, but it was chosen over MI, which is known to experience more non-convergences when used with structural equation modelling (SEM) and encounters difficulties with item-level missingness (Graham, 2009). Thirdly, even though listwise deletion reduced this research's original sample size for statistical analyses from 639 to 372 online survey respondents and may have omitted some sensitive data that was not missing completely at random, the technique still had adequate power to detect meaningful effects that produced unbiased estimates of means, variances, and regression weights (Little & Rubin, 2002). Finally, listwise deletion has been perceived as violating an ethical imperative (Rosenthal, 1994) because of

its failure to use all available data thus a waste of the partial respondents' valuable time and energy. Listwise deletion was, nonetheless, deemed the most appropriate to handle missing data in the main study of this mixed methods research on *psychological safety* in secondary school student team contexts.

3.8.2 Demographic Data Analyses for Phase Three

Following the default listwise deletion of missing data in IBM SPSS (v29), the analyses of the valid responses (N = 348) of the demographic data collected with Q1 – Q3 of the online survey were undertaken with descriptive statistics in IBM SPSS (v29). The analyses led to the discovery and summary of the characteristics of the population from which the 372 secondary school students were drawn for phase three of this research. Estimates of confidence intervals and parameters such as central tendencies (mean, median, mode), variability and spread (standard deviation, variance), symmetry (skewness) and peakedness (kurtosis) of the dataset (Wetcher-Hendricks, 2011) were advised following tests of normality of the data. These estimates and tests confirmed the population's distribution by revealing trends, patterns, and outliers that informed decision-making in the secondary school student context. It also set baselines and made the data accessible for more complex inferential analyses. The summary of the demographic characteristics within the dataset were represented by tables, figures, graphs, and statistical commentary to aid enhanced comprehension.

3.8.3 Quantitative (QUAN) Data Analyses for Phase Three

After each DCP, the responses from the online Qualtrics platform (https://www.qualtrics.com) were exported directly into IBM SPSS (v29). After combining DCP1 – DCP3, and managing the missing data to ensure data accuracy, 372 valid cases were transformed and cleaned for statistical analyses. In IBM SPSS (v29), the imported data files (.sav file) were verified and coded for appropriate numerical interpretations of the scale items. For DCP1, the scale items were measured on a 7-point Likert scale: "Strongly disagree", "Somewhat disagree", "Disagree", "Neither disagree nor agree", "Agree", "Somewhat agree", and "Strongly agree". However, the scale

items for DCP2 and DCP3 were measured on a 5-point Likert scale: “Strongly disagree”, “Disagree”, “Neither disagree nor agree”, “Agree”, and “Strongly agree”. The imported data files (.sav file) for DCP1 were therefore recoded from a 7-point Likert scale to match the 5-point Likert scales of the second (DCP2) and third (DCP3) collection points, as illustrated in **Table MSD3.2**.

Table MSD3.2

Recoded Values of Scale Items in the DCP1 Survey for the Main Study

7-point Likert Scale of DCP1		**[recoded] 5-point Likert Scale of DCP1**	
“Strongly disagree”	1	“Strongly disagree”	1
“Somewhat disagree”	2	“Disagree”	2
“Disagree”	3		
“Neither disagree nor agree”	4	“Neither disagree nor agree”	3
“Agree”	5	“Agree”	4
“Somewhat agree”	6		
“Strongly agree”	7	“Strongly agree”	5

Following the default listwise deletion of missing data in IBM SPSS (v29), and recoding of the values of the scale items by the researcher, the analyses of the valid responses (N = 372) of the quantitative data collected with Q4 of the online survey were undertaken. Q4 constituted the students’ responses to the scale items of the adapted 23-item scale from Edmondson (1999).

3.8.3.1 Validating the Adapted 23-Item Scale Used for Collecting Quantitative Data in Phase Three. Data from 372 valid responses to Q4 i.e., the adapted 23-item scale from Edmondson (1999) were analysed using inferential statistical approaches in various software as indicated in **Table MSD3.1** (**3.8** above). Following its subjective and basic face validity and content validity before its use in quantitative (QUAN) data collection, it was now time to objectively examine the adapted 23-item scale’s construct validity.

3.8.3.1.1 Examining the Construct Validity of the Adapted 23-Item Scale. Used together, principal components analysis (PCA), and confirmatory factor analysis (CFA) were employed for examining the adapted 23-item scale's construct validity. and

3.8.3.1.1.1 Assessing the Factor Structure of the Adapted 23-Item Scale. *PCA* was used in IBM SPSS (v29) to provideinitial (or exploratory) information about the stability of the factor structure (Marsh et al., 2009) of the adapted 23-item scale. to achieve this, PCA, firstly, tested the sampling adequacy of the dataset for factorability using the Kaiser-Meyer-Olkin (KMO) coefficient (Kaiser, 1974). Secondly, the amount of variance in the dataset due to random guessing or 'noise', known as eigenvalue, was used to provide information about the observed variance in the dataset (Hoffman & Kunze, 1971).

Thirdly, orthogonal and oblique rotations were used to adjust the interpretation of the relationship between the extracted factors by improving the fit of the factors to the data (Castro et al., 2015; Grieder & Steiner 2022). Afterwards, the Cronbach's Alpha test (Cronbach, 1951) offered useful information in making decisions about the adapted 23-item scale's internal consistency that rendered the instrument, consistent and stable (Creswell, 2005).

Now, the model fit of the adapted 23-item scale was examined with CFA in IBM SPSS AMOS (v29) to ensure that the chosen model of *psychological safety* in secondary school student team contexts adequately captured and described the underlying factor structure of the data it intended to explain.

3.8.3.1.1.2 Assessing the Model Fit of the Adapted 23-Item Scale. Model fit refers to how well the statistical model of the adapted 23-item scale represented the relationships among the items of the four, latent variables (TLB, TPS, TCO, TEF) used for collecting data for measuring *psychological safety* in secondary school student team contexts (Marsh et al., 1996). Confirmatory factor analysis (CFA), an SEM method (Teo et al., 2013), was used to "test whether a hypothesised relationship between the observed factors and their underlying latent constructs exists" (Ben, 2010, p. 81) in the adapted 23-item scale. CFA was used to permit the emergence of a holistic

measurement model (Perry, 1996), and to create structural models (Byrne, 2001), using a path model. The path model was used to examine how well the latent variables represented the *psychological safety* construct in secondary school student team contexts (Kline, 2023).

To establish the magnitude of the associations between the latent variables of *psychological safety* in the model and overcome the limitations of an individual index (Jaccard & Wan, 1996). Two fit indices were used by CFA to provide complementary information (Gerbing & Anderson, 1992) about the model's fit to the data (Marsh et al., 1996). According to Bentler and Bonett (1980) and Kenny et al. (2020), being generally less sensitive to sample size, root mean square error of approximation (RMSEA), and comparative fit index (CFI)were used as fit indices to evaluate the model fit of the adapted 23-item scale for measuring *psychological safety* in secondary school student team contexts. The chosen indices for this role were root mean square error of approximation (RMSEA), and comparative fit index (CFI). RMSEA is an absolute fit index that determined how far the hypothesised model of the adapted 23-item scale was from a perfect model (Kenny et al., 2020). CFI is an incremental fit index that compared the hypothesised model of the adapted 23-item scale with the baseline model (Xia & Yang, 2019). Adequate cutoff criteria were applied to the fit indices to reduce Type I error rates (i.e., the probability of rejecting H_{01}, H_{02}, H_{03} when they were significant and true) and Type II error rates (i.e., the probability of accepting H_{01}, H_{02}, H_{03} when they were insignificant and false) (Bentler, 1989; Bentler & Bonett, 1980; Hu & Bentler, 1999). The best-fitting model was presumed to have an RMSEA index closer to zero (Hu & Bentler, 1998), and a CFI value closer to one (Byrne, 1994). Apart from illustrating these structural models visually via path diagrams, CFA evaluated error variance parameters after specifying and identifying the model of *psychological safety* in secondary school student team contexts (Bollen & Long, 1993). CFA's capacity to construct pictorial models, estimate variance and then test and modify the data's fit to the model set it apart from other multivariate approaches (Byrne, 2013) thus providing rich structural-level and model fit details (Lei & Wu, 2007; Teo et al., 2013) of the adapted 23-item scale.

To further assess the validity of the adapted 23-item scale, discriminant validity and convergent validity (Campbell & Fiske, 1959) were computed in Microsoft Excel (Microsoft Corporation, 2018) from the standardised factor loadings (λ) of the items of the latent variables in the pictorial, path model that resulted from the CFA.

3.8.3.1.1.3 Path Analysis of the Adapted 23-Item Scale. Path analysis was used to examine and quantify the direct and indirect associations among the latent variables in the specified structural or theoretical model of *psychological safety* in secondary school student team contexts. This was based on prior knowledge of Edmondson's (1999) model and on the hypothesised relationships (i.e., from testing $H_{o1,}$ $H_{o2,}$ H_{o3}) among the manifesting latent variables (Land, 1969) of *psychological safety*.

3.8.3.1.1.4 Assessing the Convergent Validity of the Adapted 23-Item Scale. Convergent validity was used to examine the extent to which different measures of the same construct in the adapted 23-item scale produced converging or similar results (Stober, 2001). This was determined by composite reliability (CR) and average variance extracted (AVE) (Fornell-Larcker, 1981). CR assesses the internal consistency of the adapted 23-item scale and is reported to be less biased (Alarcón et al., 2015) than the Cronbach's Alpha coefficient (Cronbach, 1951). CR is computed in Microsoft Excel with the formula:

$CR = \frac{\sum(\lambda)^2}{(\sum\lambda^2) + \sum(1-\lambda^2)}$ (Fornell-Larcker, 1981) where:

- λ is the standardised factor loading of each observed indicators on the latent variable; and

- θ is the error variance of each observed indicator = $1-\lambda^2$.

A CR value of 0.70 or higher was considered to be acceptable, indicating that the observed indicators in the adapted 23-item scale measured the latent variable (Fornell-Larcker, 1981) of *psychological safety* in secondary school student team contexts, accurately.

AVE was used to measure the amount of variance in the adapted 23-item scale that was captured by the latent variables of *psychological safety* in secondary school student team contexts,

which was relative to the amount of variance in the scale due to measurement error (Alarcón et al., 2015). AVE was calculated in Microsoft Excel with the formula:

AVE = $\frac{\sum(\lambda)^2}{n}$ (Fornell-Larcker, 1981) where:

- λ is the standardised factor loading of each observed indicators on the latent variable; and

- n is the number of observed indicators of the latent variables.

An AVE value of 0.50 or higher was considered to be acceptable, indicating convergent validity (Fornell-Larcker, 1981) of the adapted 23-item scale.

3.8.3.1.1.4 Assessing the Discriminant Validity of the Adapted 23-Item Scale. Discriminant validity was used to determine whether two, dissimilar variables in the adapted 23-item scale that were not supposed to be correlated were easily differentiated (Lucas et al., 1996). This was determined by maximum shared variance (MSV) and average shared variance (ASV). MSV was computed by squaring the highest correlation between the latent variables in the adapted 23-item scale's model. ASV was computed by the squared average of the sum of the correlations between the latent variables in the adapted 23-item scale's model. Where MSV and ASV values were less than the AVE value (MSV < AVE; ASV < AVE) discriminant validity was indicated.

3.8.3.1.2 Examining the Quality and Performance of the Adapted 23-Item Scale. High quality items in the adapted 23-item scale ensure the reliability and validity of the measurement instrument. This in turn, further influences the accuracy and credibility of the data collected for investigating *psychological safety* in secondary school student team contexts thus the items in the adapted 23-item scale were examined for quality.

3.8.3.1.2.1 Assessing the Quality of the Items in the Adapted 23-Item Scale. Item Response Theory (IRT) is a statistical framework used in Educational and Psychological measurements such as in this research, to analyse the relationships between the individual secondary school students' responses to the online survey items and the respondents' abilities (De Ayala, 2009; Lord, 1980). The rating scale model (RSM) (Andrich, 1978) and partial credit model (PCM) (Masters, 1982) are both frameworks of the Rasch Model (Rasch, 1960), which are used in IRT for analysing responses to test

items especially when the items have a polytomous or multi-category response options RSM (Andrich, 1978) is specifically tailored for items with ordered response categories like the adapted 23-item scale (i.e., “Strongly disagree”, Disagree”, “Neither disagree or agree”, “Agree” and “Strongly agree”). PCM (Masters, 1982) can be used for items with any number of response categories (Wright & Masters, 1982). RSM (Andrich, 1978) was used for the analyses in this research instead of PCM (Masters, 1982) because RSM best fits the data and the measurement objectives of this research (Wright & Masters, 1982).

In ACER ConQuest 5.0 (Adams et al., 2020), the Rasch RSM model (Andrich, 1978; Rasch, 1960) was used to examine the quality of the items in the adapted 23-item scale instead of the partial credit model (PCM) (Masters, 1982). This is because it recognised the ordinal character of the 5-point Likert scale. With this Likert scale, the attitudinal options presented to its respondents did not lie on an interval (Harwell & Gatti, 2001), meaning that each item in the adapted 23-item scale used five, fixed, response alternatives: “Strongly disagree”, “Disagree”, “Neither disagree or agree”, “Agree”, and “Strongly agree”. The employment of PCM (Masters, 1982) would have meant that each item or item group of the *psychological safety* latent variables in the adapted 23-item scale had its own distinctive rating scale structure. With RSM (Andrich, 1978) however, an assumption was made that the response alternatives in the adapted 23-item scale yielded the same pattern for all items except the measurement of item difficulty (Chong et al., 2022). This meant that all the items or item groups of the latent variables of *psychological safety* in the adapted 23-item scale shared the same rating scale structure.

The information about the scale’s reliability was afforded by a separation index for person measurement and a reliability index for item measurement (Wright & Master, 1982). The weighted mean squared scaled residual (MNSQ) is a statistic that is used by IRT to measure the fit of the individual items of the adapted 23-item scale to the underlying *psychological safety* measurement model (Franchignoni et al., 2010). A range of 0.6 – 1.4 (Tesio, 2003) was chosen for this purpose where a weighted MNSQ value less than 0.6 indicated an overfitting item, and a value more than 1.4

indicated an underfitting item. Both types of items were considered to be ill-fitting for the scale's model. These items were then remedied with either wording revisions or complete removal until a good fit for the items in the scale's model was obtained. IRT, therefore, provided extensive item-level details that informed the adapted 23-item scale's modifications until they were fit for purpose (Lord, 1952; Lord & Novick, 1968) of measuring *psychological safety* in secondary school student team contexts.

3.8.3.1.2.2 Build the Structural Model of the Adapted 23-Item Scale. To build the path model that explains the associations among the latent variables that measure *psychological safety* in secondary school student team contexts, raw data scores were transformed in the first instance to weighted measures (Schaefer 2008). The transformation of the raw data scores in statistical data analyses can be achieved with a variety of ability estimation methods such as maximum likelihood estimate (MLE) (Lord, 1980), weighted likelihood estimation (WLE) (Warm, 1989), marginal maximum likelihood (MML) (Bock & Aitkin, 1981), expected a-posteriori (EAP) (Ferrando & Lorenzo-Seva, 2016), and Bayes modal estimation (BME) (Mislevy, 1986).

The WLE method was designed by Warm (1989) to minimise the estimation biases associated with the other methods (Chen & Paloheimo, 1998). WLE is a preferred method used by the Programme for International Student Assessment (PISA), a large-scale international study (Adams & Wu, 2002). Considered, therefore, to be the best estimation method in this case, the raw data scores collected in phase three of this research were transformed into standard measures (logits) with the WLE method in ACER ConQuest 5.0 (Adams et al., 2020) and Microsoft Excel (Microsoft Corporation, 2018). To enable the interpretation of the participants' comparable performances (and the elimination of the negative data values), the logits were further converted into weighted scores (*W*) in Microsoft Excel (Microsoft Corporation, 2018) with the formula:

$W = 9.1024 \times \text{logits} + 500$ (Woodcock & Dahl, 1971) where:

- 9.1024 is the multiplicative scaling constant that eliminates the negative and decimal values in the scores; and

- 500 is the centring constant that creates an equal, interval scale recommended for statistical analysis.

The Microsoft Excel data file of *W* measures was subsequently exported to the existing PsycheSafety_Students.sav file in IBM SPSS (v29) for transformation, and then to IBM SPSS AMOS (v29) where the analysis to confirm and build the structural model of *psychological safety* in secondary school student team contexts took place.

3.8.4 Qualitative (qual) Data Analyses for Phase Three

The qualitative (qual) data collected with the responses (*N* = 372) to the psychographic item [Q5] in the online survey instrument for phase three of this research were exported from the Qualtrics platform (https://www.qualtrics.com) to IBM SPSS (v29) for cleaning and transformation.

Microsoft Word (Microsoft Corporation, 2018) was then used for the organisation and of the responses from IBM SPSS (v29). Here, the frequency of utterance of the participants' responses was employed in the thematic analysis where the hybrid coding approach of the Constant Comparative Analysis (CCA) method was undertaken. It purposed to identify the observed indicators of *psychological safety* in secondary school student team contexts, informing RQ1.

Microsoft Excel (Microsoft Corporation, 2018) was used for the generation of graphical representations of the identified categories of observed indicators from their counts or frequencies to aid better comprehension of the extensive data. The quantification of the findings of the thematic analysis of Q5 in Microsoft Excel enabled its alignment with the rest of the analytical results of the responses to the quantitative data collected with Q4, the adapted 23-item scale.

3.8.5 Qualitative (QUAL) Data Analyses for Phase Four

The qualitative (QUAL) data collected with six focus groups (*N* = 52) were transcribed using Express Scribe (v12.03), and thematically analysed with a hybrid coding approach using Constant Comparative Analysis (CCA) in Microsoft Word and Microsoft Excel. The findings of the qualitative (QUAL) data analyses informed RQ1 and RQ2.

3.8.4.1 Transcribing the Audio Records of the Focus Groups. Guided by the lenses of symbolic interactionism (Blumer, 1969), and social learning theory (Bandura, 1977), the lived experiences, extant beliefs, and expressed opinions of the 52 participants of the six focus groups in the phase four of this research were audio-recorded by the researcher. The audio recordings were transcribed 'live' with the support of Express Scribe (v12.03) (https://www.nch.com.au/scribe). With the capacity of the Express Scribe software to play back clear aural records at the pace set by the transcriber, the researcher was able to vary the play-back speed of the audio recordings by choosing to make it faster or slower, so she could simultaneously code manually while listening to the audio tapes (Saldana, 2016). "The point, then, was not to conform to existing standards for representing speech nor to iron out its wrinkles but to listen first to speakers' voices and then work out how to register what was hearable in order to reveal the orderliness of those wrinkles" (Laurier & Back, 2022, p. 246). This 'live coding' enabled the researcher to capture the often-missed, non-verbal behaviours such as nodding of heads, body posture, eye contact, tone of voice, body posture, smiles, facial expressions, and even silence to provide richer, and in-depth information that supported the voiced beliefs, opinions, and perspectives of the participants (Mondana, 2018; Parameswaran et al., 2020). During the 'live' transcribing process, the researcher de-identified the 52 participants by assigning a number to each participant during the 'live coding' process to analyse the aural accounts into experiences, perspectives, perceptions, patterns, categories and themes (Eaton, 2017). Guided by 'constructivist' grounded theory (Charmaz, 2014), the researcher's personal perspectives that were shared in the focus groups were considered and transcribed too, informing the focus groups' data for thematic analyses.

The researcher documented the discussions that were listened to and transcribed them in six Microsoft Word documents; one for each focus group. The transcribed, aural accounts were then ready to be examined further for the patterns in the students' voices. They contained the students' voices through their shared experiences, perspectives, and perceptions (Eaton, 2017). These

accounts were then thematically analysed with the hybrid coding approach using Constant Comparative Analysis (CCA) (Glaser, 1965;).

3.8.4.2 The Hybrid Coding Approach Using Constant Comparative Analysis (CCA).

Finding a predominance towards quantitative methodology in *psychological safety* research, Frazier et al. (2017), in **Chapter Two**, encouraged the use of "qualitative comparative analysis which is better suited to address multifaceted behavioural and social issues than standard regression approaches" (Ragin, 2000, p. 145). According to Glaser (1965), to examine the raw data towards theory generation, Constant Comparative Analysis (CCA) must encompass the following stages: "(1) comparing incidents applicable to each category, (2) integrating categories and their properties, (3) delimiting the theory, and (4) writing the theory" (p. 439) (**Table CCA5.1** in **Appendix I**).

3.8.4.2.1 CCA Stage One of Phase Four: Comparing Incidents Applicable to Each Category.

The analyses of the transcriptions of the aural accounts of the data collected with the focus groups (phase four) in this research were organised with a coding framework (**Table CCA5.8** in **Appendix I**) constructed by the researcher. This was informed by Frazier et al.'s (2017) adoption of a hybrid coding method of data-driven and theory-driven approaches to create a coding framework for the qualitative analysis in their meta-analysis as presented in **Chapter Two**.

During the open coding and axial coding processes, the theoretically deduced, priori codes from the work of Edmondson (1999) were used eclectically with emergent codes that were induced from the participants' in-vivo accounts in the focus groups. The codes were described, colour-coded and compartmentalised into priori codes and emergent codes that were based on participants' accounts. The six priori codes were: safety, speaking up, mutual trust and respect, acceptance, approval, and acknowledgement. The eighteen emergent codes were: professional relationships, body language, personal relationships, empathy, mental health challenge, friendship, humour, familiarity, personality, getting along, support, inclusivity, diversity, student leadership, adult leadership, information sharing, shared focus, and conflict resolution.

These codes were presented by the focus group number (FG) and the participant's allocated number (P). For instance, in focus group one (FG1), participant one (P1) stated, "The more comfortable you are, the better you will be in a group. To know there's no danger. You can trust everyone. Mmmm....just cos I know them at school...but...you know?....theeeee...ummm... it's just the environment...really...just cos you are at school... you know...that everyone's here...trustworthy...at least..." This account in focus group one by participant one was represented as FG1P1 with the assigned codes: *acknowledgement*, *mutual trust and respect*, *safety*, *familiarity*, *inclusivity*, and *personal relationships*.

Guided by 'constructivist' grounded theory approaches (Charmaz, 2014) in **Chapter One**, constant cross-comparisons of the similarities and differences between all accounts of the participants' beliefs, attitudes, perspectives, and experiences were important to conceptualise, refine, and interpret the data with a view to generating a theoretical framework of *psychological safety* in secondary school student team contexts. Referring back and forth to the transcribed data many times, the meanings in the focus groups' data were continually reviewed and refined. The codes were compared to codes; codes to concepts; and codes to themes to realise the story the focus groups' data were really telling and explaining about *psychological safety* in secondary school student team contexts. (Glaser, 1998). The coding framework consequently made room for additional codes such as psychological safety enabler, psychological safety barrier, and site implementation strategies.

3.8.4.2.2 CCA Stage Two of Phase Four: Integrating Categories and their Properties. The assigned codes in CCA stage one were used for repeated comparisons to co-construct meanings and discover patterns in the data collected with focus groups (Tesch, 2013). The repeated patterns were pieced together to create categories. The categories were used to make connections that described the associations between the identified themes of *psychological safety* in secondary school student team contexts (Strauss & Corbin, 1998). During selective coding, moving between inductive and deductive reasoning, the codes were categorised, and the categories were pieced together to make

thematic connections. The site implementation strategies discovered as an additional code in CCA stage one, was further categorised as enhancing psychological safety, and participant feedback. The transcribed aural accounts of each of the six focus groups were categorised, and themed separately (**Tables CCA5.3** – **CCA5.8** in **Appendix I**) and combined afterwards (**Table CCA5.9** in **Chapter Five**) before further analyses with the hybrid thematic approach (Swain, 2018).

3.8.4.2.3 CCA Stage Three of Phase Four: Delimiting the Theory. To delimit the theory, comparisons of key categories with other categories were undertaken until a core category was obtained from careful observation of the similarities in the associations of the categories. This process resulted in a reduction of the "original list of proposed categories for coding" (Glaser, 1965, p. 441). Inductive reasoning [grounded 'emergent' theory] was also used to generate ideas from the data (Thomas, 2003) to confirm or reject existing ideas (Creswell, 1994; Holloway, 2005), and in-vivo coding was employed to make sense of the transcribed data. This approach permitted the contemplation of the researcher's personal beliefs, experiences, opinions, and biases while conscientiously managing the co-construction of the implicit and explicit meanings from the group interactions. Edmondson's (1999) definitions and theories as well as all the transcribed data were tested in its cross comparisons; not only new data (Thorne, 2000).

3.8.4.2.4 CCA Stage Four of Phase Four: Writing the Story. According to Morse (2001), the theory-driven, deductive approach that was used permitted the consideration of predetermined themes that were founded on existing knowledge and theory derived from Edmondson's (1999) work. Inductive reasoning was also used to generate ideas from the focus groups' data (Thomas, 2003) while applying the data to confirm or reject existing ideas (Creswell, 1994; Holloway, 2005) via CCA (Glaser, 1965). The researcher's cognitive processes, perspectives, experiences, and beliefs were acknowledged within the focus groups, contributing to the production of new knowledge, and potentially, creating a theoretical framework of *psychological safety* in secondary school student team contexts (Glaser, 1992; Strauss, 1987). The researcher's personal biases were also conscientiously managed while the "mutual construction of knowledge by the researcher and [the]

participants [provided] the ability to develop subjective understandings of [the] participants' meanings" (Charmaz, 2000, p. 510) to inform RQ1.

3.8.4.3 Quantification of the Qualitative (QUAN) Findings of the Analyses of the Focus Groups.

The transcribed aural accounts of each of the six focus groups were categorised, and themed separately as shown in **Tables CCA5.3** – **CCA5.8** (**Appendix I**) and **Table CCA5.9** (**Chapter Five**). The minimal organisation of the findings of the analyses of the six focus groups in Microsoft Word (Microsoft Corporation, 2018) and simple, quantitative methods in Microsoft Excel (Microsoft Corporation, 2018) were used to streamline the extensive qualitative information to support better comprehension of *psychological safety* in secondary school student team contexts. The qualitative findings of the analyses of the focus groups were presented by figures and narratives, and the quantified, qualitative findings were represented by tables, figures, graphs, and statistical commentary. The findings of the analyses of the focus groups were used to inform RQ1.

3.9 The Findings of the Main Study: Integrating the Results of Phase Three and the Findings of Phase Four to Inform the Research Questions

According to Onwuegbuzie & Leech (2004a), the integrated findings of the valid interpretations of the analyses of the online survey data and the trustworthiness of the analyses of the focus groups' data offered depth to enrich the quantitative results. The synthesis of the qualitative findings of the focus groups [QUAL] and Q5 of the online survey instrument [qual] enhanced inferences stemming from the analytical results of the quantitative data from the adapted 23-item scale [QUAN], and vice versa (Glass, 1976; Sandelowski & Barroso, 2003). The qualitative findings of the focus groups [QUAL] added descriptive illustrations from the focus groups participants' personalities, behaviours, emotions, and accounts that provided critical information to strengthen the quantitative results survey [QUANqual]. The integrated findings offered

complementarity and triangulated an augmented, contextual lens of *psychological safety* in secondary school student team contexts. The information derived from the answering of RQ1 and RQ2 and the testing of H_{o1}, H_{o2}, and H_{o3} supported the policy and decision-making value of the integrated findings of this research (Greene et al., 1989).

3.9.1.5 Responding to Research Question One (RQ1). The items of the resulting scale from the validation of the adapted 23-item scale and the responses to Q5 of the online survey by the secondary school students contributed to the identification of observed indicators of *psychological safety* that inform RQ1. ("*What are the observed indicators of psychological safety in secondary school student team contexts?*").

3.9.1.6 Responding to Research Question Two (RQ2). The online survey data for this research were collected from secondary school students (N = 372) assumed to be from a population of secondary school students in South Australia that was close to the normal or Gaussian distribution (D'Agostino, 2017; Kitchen, 2009; Krithikadatta, 2014). The sample size for this research was adequate for parametric tests to be used to detect whether significant differences truly existed in the dataset by offering greater statistical power than non-parametric tests (Freidlin & Gastwirth, 2000; Hodges & Lehmann, 1956, 2005; Tanizaki, 1997). This is because the parametric tests required fewer data than non-parametric tests to enable the drawing of firm conclusions (Edgington, 2015; Kaur & Kumar, 2015) about psychological safety in secondary school student team contexts.

Using IBM SPSS (v29), parametric tests which are inferential, statistical procedures (Harwell, 1988; Yu, 2012) were used to test the three hypotheses: (H_{o1}, H_{o2}, H_{o3}) (Zimmerman & Zumbo, 2014), and to provide evidence to answer the three sub-questions (RQ2a., RQ2b., RQ2c.).

3.9.1.6.1 Pearson's Correlation Coefficient (r). Pearson's correlation coefficient was used to measure the strength and direction of the association between the latent variables of *psychological safety* in secondary school student team contexts (Sedgwick, 2012).

3.9.1.6.2 Linear Regression. Linear regression was used to identify the variables that influenced the *psychological safety* of collaborating secondary school students and assessed the

predictive impact of the predictor variables on the criterion variable too. Linear regression was used to test hypotheses about the relationships between the variables (Montgomery et al., 2021).

3.10 Ethical Considerations

Prior to this research on *psychological safety* in secondary school student team contexts proceeding, ethics approval was required to collect data for the pilot study and the main study. The ethics application for the pilot study was made separately by C3L to the University of South Australia's (UniSA) Human Research Ethics Committee (HREC). For the main study, ethics approval was obtained from UniSA HREC on 20 March 2020 (Protocol No: 203086). For ethics approval, risk management processes were established including a list of relevant and available mental health services (**Appendix A**) that was provided to the respondents and their parents/caregivers as part of the participant information sheet (PIS) to support their "emotional and psychological security, and wellbeing" (NHMRC, 2007, p. 56; [updated 2018], p. 66). A distress protocol (**Appendix E**) was also made available during data collection with the focus groups to support participant's emotional and mental wellbeing.

Ethics approval required a data management plan on the collection, storage, organisation and sharing of data obtained during this research project. Quantitative data were collected securely via Qualtrics (https://www.qualtrics.com), an online software platform, which protects its password-protected data that is collected from eavesdropping, attacks, and session hijacking by encrypting all the data in transit using hypertext transfer protocol secure (HTTPS) and also enforces HTTP strict transport security (HSTS) (https://www.qualtrics.com/au/platform/security/). The data on the Qualtrics platform was stored securely until the collecting account of the researcher is deleted or cancelled, or the entire survey or responses data are deleted, which will be after five years. The online survey data from the Qualtrics platform was exported to IBM SPSS (v29) to be transformed, cleaned, and de-identified before analyses. Qualitative data were collected with audio records, which were confidentially transcribed with anonymity. The identifiable, de-identifiable and anonymised data were analysed with software suites developed by reputable organisations such as

Qualtrics, International Business Management (IBM) and Australian Council for Educational Research (ACER). During data analyses, the identifiable, online survey responses, and the de-identifiable and anonymised focus groups' data were stored in secure, password-protected files with automated back-ups on the researcher's assigned password-protected drive at UniSA. The de-identified and anonymised data will be stored securely for five years on UniSA's information and communications technology (ICT) system.

As narrated in **Chapter One** (**1.2**), with prior lived experiences, beliefs, opinions, and attitudes in her background as a student, parent, employee, educator, school leader, and a member of the minority ethnic group, the researcher's personal assumptions and biases may have influenced this research's processes. The researcher's biases may have influenced the paradigm and theoretical lenses' considerations, framing of the research questions, item wordings for the adapted 23-item scale, data collection procedures, participant, and focus group engagement. To mitigate the acknowledged potential assumptions and biases, the researcher engaged in regular discussions with the supervisory team. This positional recognition enhanced reflexivity, promoted transparency, and increased the credibility and trustworthiness of this mixed methods research.

This mixed methods research involved adolescent human participants and was, therefore, justifiably assessed to have some risks. There were ethical concerns about the secondary school students' capacity to understand the demands of this research, whether they were pressured by adults such as researchers and parents to participate in the research, and whether the young people's consent to participate was enough for their participation and in their best interests (NHMRC, 2007 [updated 2018]). To minimise these risks, measures were implemented to protect participants such as anonymity of their identity in reports, parental consent, voluntary participation, their ability to withdraw at any point during the collection of data (NHMRC, 2007 [updated 2018]), and regard for their "emotional and psychological security, and wellbeing" (NHMRC, 2007, p. 56; [updated 2018], p. 66).

To remain compliant with the National Statement on Ethical Conduct in Human Research (NHMRC, 2007 [updated 2018]), annual progress reports were provided to UniSA HREC before the expiry of the ethics approval. A project completion report was also required for submission to UniSA HREC and the Department for Education and to the study site leader(s). The annual progress reports were submitted to UniSA HREC in May 2022 and March 2023. UniSA HREC's approval for this research on *psychological safety* in secondary school student team contexts was contingent on the further approval of the:

- Department for Education; and
- study site leader

3.10.1 Department for Education Approval

To ensure that this research adhered to ethical standards and guidelines designed to protect the secondary school students, maintain the integrity of this research's process, and uphold the reputation of the Department for education, ethics approval was required to be granted by the Education department in addition to that of UniSA HREC.

3.10.1.1 Department for Education Western Australia (DfEWA). An application was made to the Department for Education Western Australia (DfEWA) on 16 March 2021, subject to UniSA HREC approval. The application sought to conduct this study in collaboration with three researchers at Curtin University. The latter was already involved in an "Epic Challenges" study [similar to the Centre for Change and Complexity in Learning (C3L) study in South Australia] in Western Australia in collaboration with a co-educational, public high school in Perth, the capital city of Western Australia. On 22 March 2021, following the UniSA HREC approval of 20 March 2021, DfEWA was contacted with further information regarding the primary ethics approval. On 31 March 2021, the application was acknowledged by DfEWA. The researcher was, however, informed by DfEWA that it would take three months for the application to be reviewed for feedback purposes.

As time is of the essence in a doctoral study, the researcher decided to change direction and focus this convergent, parallel, mixed methods research in South Australia only. Six months after the

DfEWA acknowledgement, on 22 September 2021, an email was received from DfEWA asking the researcher to express sustained interest in progressing the research application towards approval. The email was responded to affirmatively on 24 September 2021. DfEWA communicated further with the researcher [4 October 2021; 1 November 2021; 17 December 2021; 2 February 2022; 15 February 2022] towards approval. On 18 February 2022, the researcher requested for DfEWA to pause the application's consideration to enable the researcher to focus on the data collection process that was commencing at South Australian school sites. The DfEWA project approval was consequently not received.

3.10.2 Protocol Variation Request

Subsequently, on 22 April 2021, a protocol variation request was made to UniSA HREC to change the location of this research from Western Australia to South Australia, remove the collaborating researchers from Curtin University and the public high school in Perth, Western Australia, and increase the sample size from 20-30 to 300-600 participants. This increase in sample size increased the statistical power of this research, which enhanced the quality, reliability and credibility of the findings as well as the likelihood of identifying meaningful associations between variables. The increased sample size was also pertinent for the generalisability of this research's findings. UniSA HREC granted approval for the protocol variation on 27 April 2021 [Application ID: 203086].

3.10.2.1 Department for Education South Australia (DfESA). On 22 April 2021, the same day the protocol variation request was submitted to UniSA HREC, an organisational ethics application was submitted to the DfESA. DfESA granted the organisational approval for the varied protocol for the main study on 29 July 2021 [Reference no. 2021-0028] to be undertaken in South Australian schools and education sites.

3.10.3 Study Site Leader Approval

Between August 2021 to February 2022, the researcher contacted 70 South Australian school leaders at government/public, independent, Catholic, and special schools, requesting their permission to conduct this research with secondary school students in their school sites. The survey tools were emailed to the site leaders for their information, consideration, and approval. The prevailing Covid-19 pandemic and its Omicron variant of 2021 had destabilised school site operations, thereby causing unforeseen delays to site leader's responses. Research participation did not seem to be the priority of school sites at this challenging time, so many site leaders did not respond to emails. Two site leaders, however, requested further information and face-to-face meetings, which the researcher honoured just before the end-of-year break in Term 4, 2021 in November and December. The site leaders who declined to participate in this research offered reasons that highlighted the difficulties that their competing priorities posed. At this phase, out of the 70 sites that had been written to, seeking permission, only four had opted to collaborate in this research. The potential sites were:

1. Regional, co-educational, public secondary school;
2. Regional, Diocesan, co-educational, independent K-12 school;
3. Metropolitan, co-educational, public senior high school; and
4. Rural, co-educational, public secondary school.

After gaining organisational and site approvals participants' informed consent was sought before this study proceeded. In cases where participants were below the age of 18 years, the informed consent of their parents/caregivers was sought. This information formed part of the research tools, which were provided to sites for distribution to participants (**Appendices A - E**).

Thereafter, the general tools for this research were sent to the relevant representatives at each of the four data collection sites for their information and distribution to participants and their parents/caregivers. By the first data collection point in Week 3 of Term 1, 2022, the rural, co-

educational, public secondary school (#4) had not been in contact. When the other three school site representatives were gently prompted about the data collection, they communicated unique circumstances that had become barriers to their active participation in this research. Only the regional, Diocesan, co-educational, independent K-12 school (#2) and the metropolitan, co-educational, public senior high school (#3) remained firm collaborating schools by the end of February 2021.

3.11 Summary

Chapter Three communicated the justified decisions made regarding the governance of this multi-phased, mixed methods [QUANqualQUAL] research on p*sychological safety* in the secondary school student team context. The chapter considered the practical and ethical responsibilities and discussed the chosen methodological approaches of the research design, in light of the researcher's personal biases. The theoretical lenses of symbolic interactionism (Blumer, 1969), social learning theory (Bandura, 1977) and 'constructivist' grounded theory (Charmaz, 2014) guided each of the four phases in a unique way to answer different, but complementary research questions (RQ). The "empty" review finding of the SLR (phase one) resulted in the revision of the RQ for the sequential, convergent, mixed methods pilot study (phase two). The key learnings from the pilot study led to the refinement of the research tools and protocols that informed the efficacy of the parallel, convergent, mixed methods main study (phases three and four). The quantitative (QUAN) and qualitative (QUAL and qual) data collection methods were explicated, and the chosen analytical approaches were elucidated to support the understanding of the research processes and its replicability. The inferential statistical approaches discussed included parametric tests such as Pearson's correlation and linear regression, construct validity tests such as PCA and CFA and item-level tests such as Rasch RSM analysis. The thematic analytical strategies of employing a hybrid coding approach with the Constant Comparative Analysis (CCA) were also discussed. The techniques for the synthesis of the different data streams at the different integration points were communicated. The chapter shared the approaches that were used to triangulate the data to provide an amplified, contextual lens of

the manifestation and decision-making value of *psychological safety* in secondary school student team contexts. The extended discourse of the analyses and results of the online survey data [QUANqual] and those of the analyses and findings of the focus groups [QUAL], are reported in **Chapters Four** and **Five**, respectively.

Chapter Four: Discussion of the Analyses Procedures and Outcome Results for the Data Collected with the Online Survey

4.1 Introduction

Chapter Four discusses the analyses and results of the data collected with the online survey, which is phase three of this research. Using an adapted scale from Edmondson's (1999) study in an adult workplace to collect quantitative data from adolescents in a school, the chapter details the validation processes of the employed adapted 23-item scale. Synthesising the quantitative results of Q4, and the qualitative findings of Q5, **Chapter Four** discourses the integrative and convergent analyses that resulted in the evidence for informing RQ1., RQ2., RQ2a., RQ2b., RQ2c., Ho_1, Ho_2, and Ho_3. The approaches used for the identification of the observed indicators of *psychological safety*, the development of the Situational Human Connection© Skills Scale (abbreviated as "The SHuCoS© Scale"), the emergence of "The SHuCoS© Model", and the formulation of the emergent theoretical framework of *psychological safety*, are also discussed. The chapter demonstrates the trustworthiness and authenticity of the analytical processes by presenting the relevant statistical treatments within the main body of text. **Chapter Four** concludes with a summary of how the results of the analyses of the data collected with the online survey inform original and significant contributions to existing knowledge on *psychological safety* in secondary school student team contexts, and the overall *psychological safety* scholarship.

4.2 Refining the Adapted 23-item Scale

As outlined within the reviewed literature presented in **Chapter Two**, and the findings of the SLR (phase one) in the same chapter, there appeared to be no evidence of an available scale for collecting data for measuring the *psychological safety* of collaborating students in secondary schools.

In **Chapter Two**, the findings of Newman et al.'s (2017) systematic literature review noted the good internal consistency and strong psychometric properties of Edmondson's (1999) psychological safety scale, as well as its consistent reliability across diverse samples. In the same chapter, Newman et al. (2017) recommended that future studies choose to apply Edmondson's (1999) psychological safety scale in preference to "proxy or "in-house" measures of psychological safety" (p. 4).

In light of this recommendation, Edmondson's (1999) psychological safety scale was employed in this exploratory research, as explicated in the pilot study (phase two) of this research in **Chapter Three**. There, the construct validation of the pilot study's, 35-item scale [KMO = .35; α = .84] resulted in its calibration to 23 items spread within six, latent team variables [KMO = .62; α = .79]. The findings of the pilot study advised the redesign of the survey instrument for the main study with a different software programme. **Table MSM4.1** shows the online survey instrument that was designed in Qualtrics (https://www.qualtrics.com), therefore, and the items of the scale were reworded to make the adapted 23-item scale more suitable for collecting quantitative data in the secondary school student team context.

This online survey instrument is a significant and original contribution of this research to existing knowledge on *psychological safety* in secondary school student team contexts and the overall *psychological safety* scholarship.

Table MSM4.1

The Developed Online Survey Instrument Used for Collecting Demographic, Quantitative and Qualitative Data in the Main Study

PSYCHOLOGICAL SAFETY IN SECONDARY SCHOOL STUDENT TEAMS

Instructions

Place your name in the box provided below to indicate your consent to participate in the study. Please note that your parent/caregiver has been given information about this research and has been offered a Consent Form too. Provided your parent or caregiver has provided their consent, with your name or signature, you indicate your consent to be a participant. Please note that you may withdraw your participation at any time during the research project, as explained in the Participant Information Sheet.

Participant's name or signature

Part 1: Demographic items

Q1. How do you identify?	Female	Male	Different identity (please specify)	Prefer not to answer									
Q2. Which year are you in?	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12							
Q3. Please specify your ethnicity.	First Nation person	African	Asian	Australian	British	Canadian	Caribbean	European	North American	South American	Mixed ethnicity (please specify)	Different ethnicity (please specify)	Prefer not to answer

Part 2: Quantitative items [adapted 23-item scale from Edmondson (1999)]

Q4. Your answers to the following 23 statements tell us what you think, feel, or perceive psychological safety in your team, is. Answer each question as accurately as you can.

1. All the team members are clear about what this team is supposed to accomplish.	1 = Strongly
2. This team has spent time making sure every team member understands the team's objectives.	disagree

3. Achieving this team's goals is well within our reach.	
4. In this team, we often speak up to test assumptions about the issues we have under discussion.	
5. This team gets all the information it needs to plan our work schedule.	
6. This team lacks access to useful instruction/teaching to complete a task.	2 = Disagree
7. It is easy for this team to obtain expert assistance when something comes up that we are not sure of how to handle.	
8. Team members go out to get all the information they possibly can from others to accomplish a task such as peers, parents/caregivers, and teachers.	
9. All members of this team have adequate teaching/instruction and understanding for the kind of task they have to do.	
10. Most people in this team have the ability to solve the problems that come up in our tasks.	
11. Certain individuals in this team lack the special skills needed for good team collaboration.	3 = Neither disagree nor agree
12. With focus and effort, this team can do anything we set out to accomplish.	
13. If you make a mistake on this team, it is often held against you.	
14. Members of this team are able to bring up problems and tough issues.	
15. People on this team sometimes reject others for being different.	
16. It is safe to take a risk on this team.	
17. It is difficult to ask other members of this team for help.	4 = Agree
18. We regularly take time to figure out ways to improve our team's collaborative processes.	
19. Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments.	
20. This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group.	
21. This team frequently seeks new information that leads us to make important changes.	5 = Strongly agree
22. Others in the school community who interact with this team often complain about how it functions.	
23. We invite people from outside the team to present information or have discussions with us.	

Part 3: Qualitative items	
Q5a. I feel safe to admit errors, seek feedback, and speak up as a member of the team without fear of embarrassment, rejection, and punishment because ... (choose all that applies)	
I know one member of this team	I know some of the members of this team
I can trust some of my team members	I can trust all my team members
I have friends in this team	There is somebody on the team who understands me that I can talk to

I can be myself with my team members without worrying	I have support from other team members when I find tasks challenging
I feel like a valued member of this team	I feel safe, and I also believe that everyone in this team feels safe
I feel all members of this team are confident that we can achieve our team goals	I can seek and share information without worrying about what other team members think about my abilities or capacity
I get along with one member of this team	I get along with most members of this team
I get along with everyone in this team	**Q5b.** Something else makes me feel psychologically safe in this team … (please specify)

Note. The adapted 23-item scale in Q4 of the online survey instrument that was used to collect quantitative data was sourced from "Psychological safety and learning behaviour in work teams" by Edmondson, A. C., 1999. *Administrative Science Quarterly*, *44,* 354. https://dx.doi.org/10.2307/2666999

The adapted 23-item scale (Q4) in **Table MSM4.1** allowed the participating secondary school students to indicate their level of agreement (from "Strongly disagree" to "Strongly agree") with 23 statements (or items). Rather than ordering the items in a listed, fixed order under the six, latent variables (CTD, TEF, TCO, TLB, TPS, TPE), the items were presented in a randomised order in the scale for a number of reasons. Firstly, the randomised item order decreased patterned responses by the respondents thereby minimising acquiescence (i.e., compliance) bias where the respondents tend to agree with everything listed under a variable (Baumgartner & Steenkamp 2001; Bogner & Landrock, 2016; Krosniek, 1991). Secondly, mixing up the items also made the scale less predictable, reduced careless responses and sustained the engagement of the respondents (Baumgartner & Steenkamp 2006; Sedgwick, 2013). Thirdly, the mixed items mitigated halo effects where disproportionate influences of initial items on later items in the scale caused response biases (Lüttin, 2012; Murphy et al., 1993). The randomised item order ensured that the respondents' sincere attitudes, experiences, behaviours, opinions, and feelings were sincerely reflected in an accurate measure of their *psychological safety* (Schaeffer, 2000; Tourangeau & Yan, 2007).

As explained in **Chapter Three**, confirmatory factor analysis (CFA) was employed to test the existence of a hypothesised relationship between the observed indicators of the adapted 23-item scale, and their underlying latent variables (Ben, 2010). **Figure MSM4.1** shows the resulting path model that examines how well the eight, latent variables of the adapted 23-item scale represented the observed indicators of *psychological safety* in secondary school student team contexts (Kline, 2023).

Figure MSM4.1

Path Diagram of the Adapted 23-Item Scale

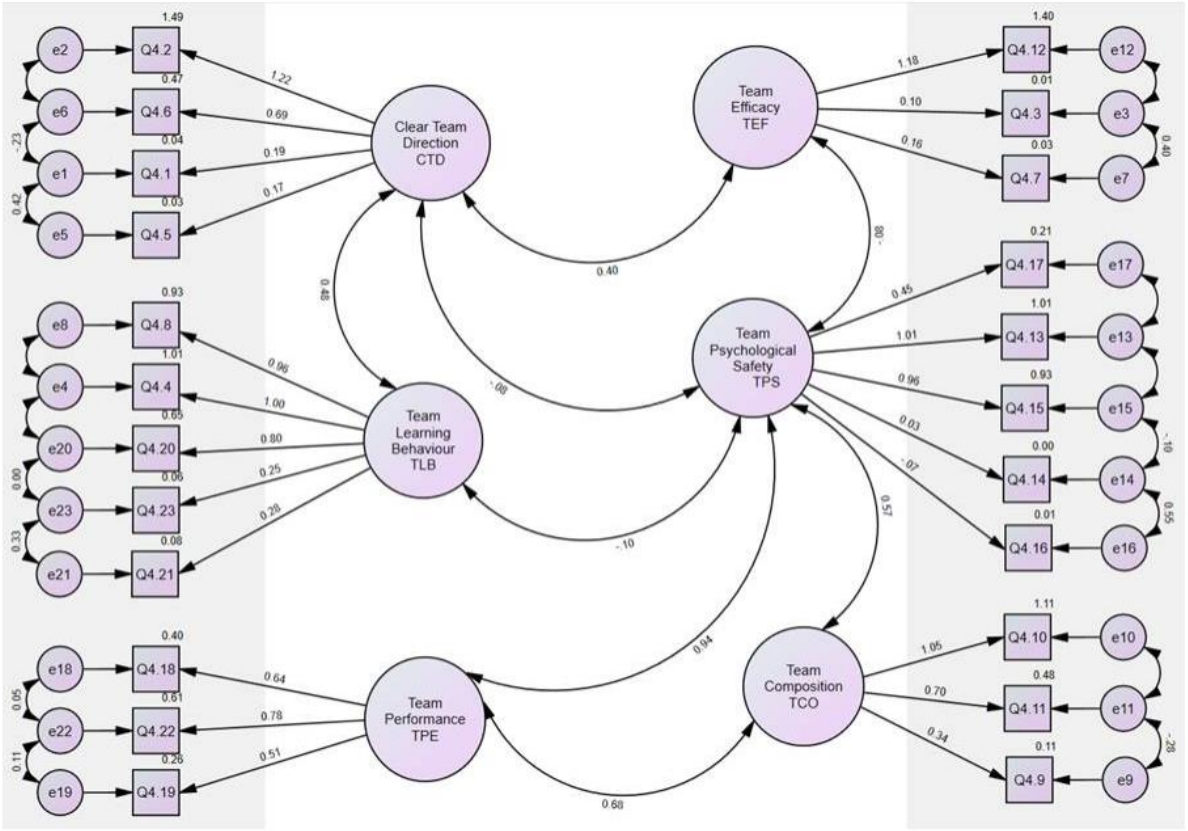


Figure MSM4.1 showed the mix of the six, latent variables and their items in the adapted 23-item scale as:

Clear Team Direction (CTD):

Q4.1. All the team members are clear about what this team is supposed to accomplish;

Q4.2. This team has spent time making sure every team member understands the team's objectives;

Q4.5. This team gets all the information it needs to plan our work schedule; and

Q4.6. This team lacks access to useful instruction/teaching to complete a task.

Team Efficacy (TEF):

Q4.3. Achieving this team's goals is well within our reach;

Q4.7. It is easy for this team to obtain expert assistance when something comes up that we are not sure of how to handle; and

Q4.12. With focus and effort, this team can do anything we set out to accomplish.

Team Composition (TCO):

Q4.9. All members of this team have adequate teaching/instruction and understanding for the kind of task they have to do;

Q4.10. Most people in this team have the ability to solve the problems that come up in our tasks; and

Q4.11. Certain individuals in this team lack the special skills needed for good team collaboration.

Team Learning Behaviours (TLB):

Q4.4. In this team, we often speak up to test assumptions about the issues we have under discussion;

Q4.8. Team members go out to get all the information they possibly can from others to accomplish a task such as peers, parents/caregivers and teachers;

Q4.20. This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group;

Q4.21. This team frequently seeks new information that leads us to make important changes; and

Q4.23. We invite people from outside the team to present information or have discussions with us.

Team Psychological Safety (TPS):

Q4.13. If you make a mistake on this team, it is often held against you;

Q4.14. Members of this team are able to bring up problems and tough issues;

Q4.15. People on this team sometimes reject others for being different;

Q4.16. It is safe to take a risk on this team; and

Q4.17. It is difficult to ask other members of this team for help.

Team Performance (TPE):

Q4.18. We regularly take time to figure out ways to improve our team's collaborative processes;

Q4.19. Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments; and

Q4.22. Others in the school community who interact with this team often complain about how it functions.

To establish the magnitude of the associations between the latent variables of *psychological safety* in the model above (**Figure MSM4.1**), CFA showed the adapted 23-item scale had a poor fitting model [RMSEA = .14; CFI = .57] (Browne & Cudeck, 1993; Kenny et al., 2020) (**Table MSD.3** in **Appendix J**). The adapted 23-item scale was, therefore, examined further for its relevance and accuracy in measuring *psychological safety* in secondary school student team contexts. Before then, the characteristics of the sample population, the online survey respondents, are described.

4.3 Describing the Characteristics of the Respondents of the Online Survey

The features of a particular population such as socio-economic status, ethnicity, age, identity, level of education, ethnicity, disability, and employment are captured from demographic data. Some of this data may be considered protected or perceived as detrimental to participants particularly those belonging to minority groups (Andrus et al., 2021; Call et al., 2023; Sanders et al., 2013). For this mixed methods research, reporting the year groups, identity, and ethnicity of the Year 10–12 secondary school students with Q1 - Q3 of the online survey was considered to be potentially important for exploring any relationships between *psychological safety* and demographic data to inform decision-making and effective resource allocation in schools and local authorities, and for policy making and future research (NACE, 2018a; NASEM, 2022). The demographic data collected

with Q1 - Q3 of the survey were analysed in IBM SPSS (v29). To check the transparency, integrity, and completeness of the dataset before proceeding with statistical analyses, **Table DST4.1** summarises information about the total number of processed cases, missing data and valid cases used for the analysis in this research, stating the default technique used for dealing with the missing data (Enders, 2003, 2006).

Table DST4.1

An Overview of the Data Collected with the Adapted 23-Item Online Survey

Case Processing Summary			
		N	%
Cases	Valid	372	58.2
	Excluded[a]	267	41.8
	Total	639	100.0

a. Listwise deletion based on all variables in the procedure

Data on the respondents' year groups were collected to provide insights into societal trends of the secondary school student population to enable the tailoring of appropriate services and infrastructures, supportive resource allocation and education policies that advance *psychological safety* in secondary school student team contexts (Armstrong & Anthes, 2001; Lett & Everhart, 2022). After the listwise deletion of missing data (Kline, 1998) as a default in IBM SPSS (v29), 348 complete cases of the dataset for demographic analysis were examined. The reported percentages are based on the exclusion of the listwise-deleted missing data to ensure the accurate reflection of the distribution of the valid responses in the dataset. Although missing data was removed by default in IBM SPSS (v29), the way in which missing data is dealt with has been explained in **Chapter Three**.

Table DST4.2 showed the online survey respondents were in Year 10 [*N* = 22; 6%], Year 11 [*N* = 115; 33%], and Year 12 [*N* = 211; 61%]. The current year of schooling of the respondents was used as an indication of the respondents' approximate ages; estimated to be 14–18 years.

Table DST4.2

Year of Schooling for the Survey Respondents

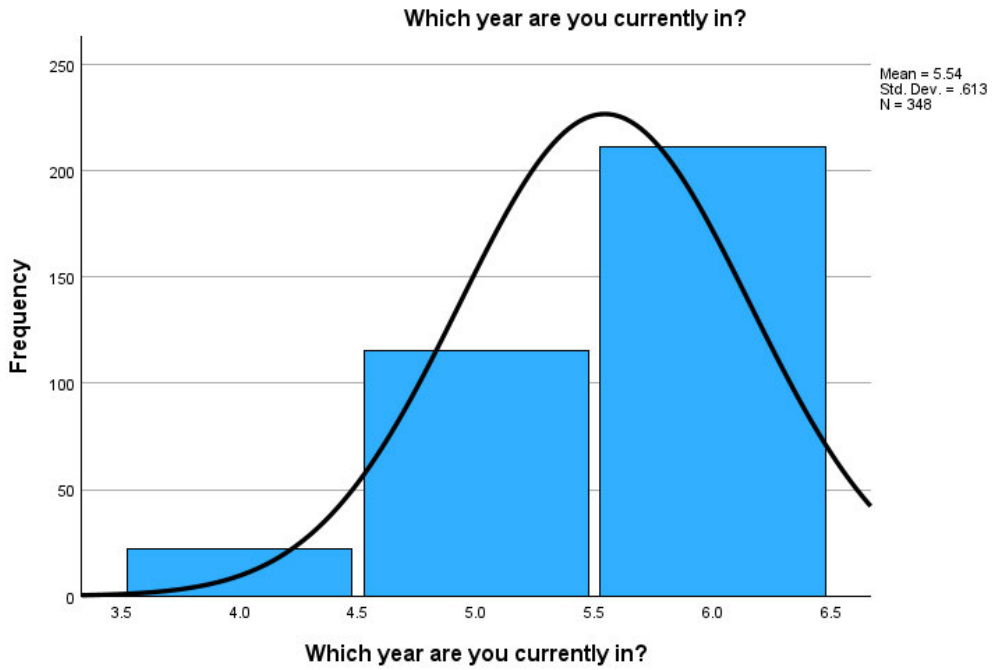
Which year are you currently in?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Year 10	22	3.4	6.3	6.3
	Year 11	115	18.0	33.0	39.4
	Year 12	211	33.0	60.6	100.0
	Total	348	54.5	100.0	
Missing	System	291	45.5		
Total		639	100.0		

The histogram below in **Figure DST4.1** provides a graphical representation of the negatively skewed, mesokurtic distribution of the data on the current year of schooling collected from the respondents [N = 348]. It shows the data points were fairly spread out from the mean [M = 5.54] indicating moderate variability [SD = 0.61] within the indicated current year of schooling for the respondents. This shows there was some diversity in the students' ages within the sample population but not to an extreme degree.

Figure DST4.1

Histogram Showing the Frequency Distribution of the Current Year of Schooling of the Survey Respondents



Collecting demographic data on sensitive features such as identity, nationality and ethnicity are mostly regulated (McKane et al., 2021). Nonetheless, data on the respondents' identities (**Table DST4.3**) and ethnicities (**Table DST4.5**) were collected in this research to potentially provide insights into any identified demographic relationships to inform targeted interventions in secondary school student teams, policy implications and further research (see recommendations in **Chapter Six**). These include future research in terms of monitoring equality and discrimination challenges faced by secondary school students (Cogua et al., 2019) to bridge identity disparities (Roberts et al., 2020) and offer opportunities to further promote the inclusion of diverse student groups within secondary school teams (Moody et al., 2019). **Table DST4.3** showed more females [*N* = 186; 53%] than males [*N* = 150; 43%] engaged with the online survey.

Table DST4.3

The Identities of the Survey Respondents

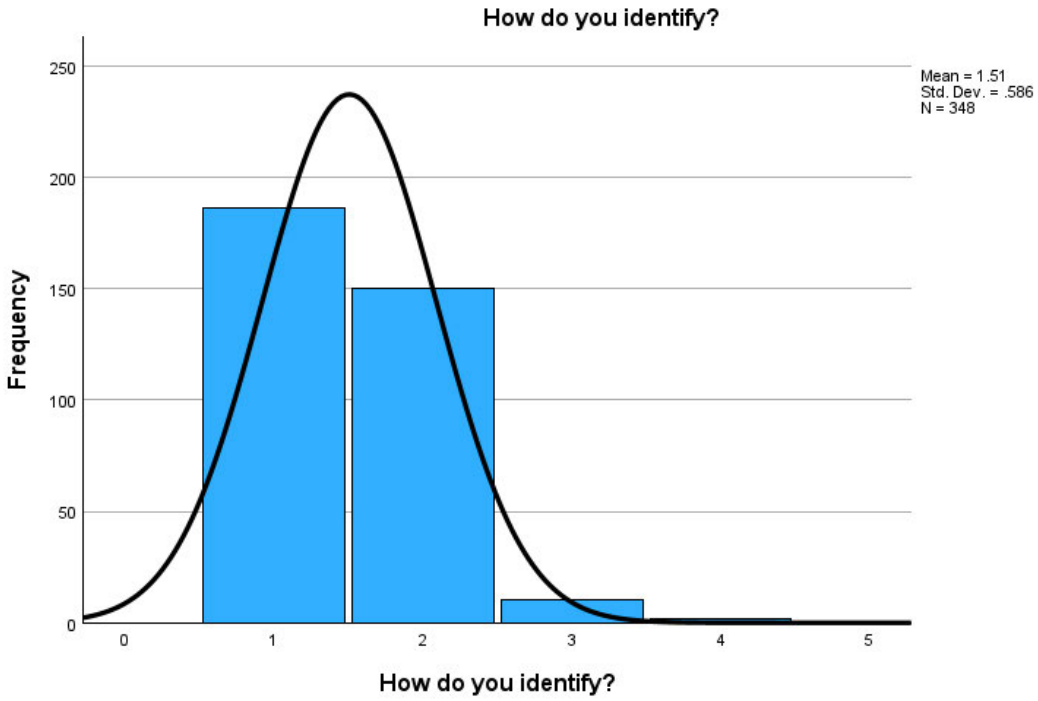
How do you identify?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	186	29.1	53.4	53.4
	Male	150	23.5	43.1	96.6
	Different identity (please specify)	10	1.6	2.9	99.4
	Prefer not to answer	2	.3	.6	100.0
	Total	348	54.5	100.0	
Missing	System	291	45.5		
Total		639	100.0		

Table DST4.3 showed some respondents of the online survey preferred to not disclose their identity [*N* = 2], others specified different identities [*N* = 10; 3%] as "Agender" [*N* = 3], "Cabbage" [*N* = 1], "Male" [*N* = 1] and "Non-binary" [*N* = 5] as shown in **Table DST4.4** (**Appendix J**). The histogram below in **Figure DST4.2** provides a graphical representation of the positively skewed, leptokurtic distribution of the data on identity collected from the respondents [*N* = 348]. It shows that while the data points may have been clustered around the mean [*M* = 1.51], indicating low variability [*SD* = 0.59], the data accounted for the presence of some outliers within the identity of the respondents.

Figure DST4.2

Histogram Showing the Frequency Distribution of the Identities of the Survey Respondents



In **Chapter Two**, systematic reviews, and meta-analysis of over 200 studies by Edmondson and Lei (2014), Frazier et al. (2017) and Newman et al. (2017) recommended the exploration of *psychological safety* in non-Western cultures to enable a more rigorous assessment of the predictive validity of *psychological safety* of teams. To identify whether this finding held true for secondary school student team contexts, as well as for the reasons outlined above, in this mixed methods research, data were collected on the respondents' ethnicities. **Table DST4.5** describes the ethnicities of the respondents of the online survey.

Table DST4.5

The Ethnicities of the Respondents

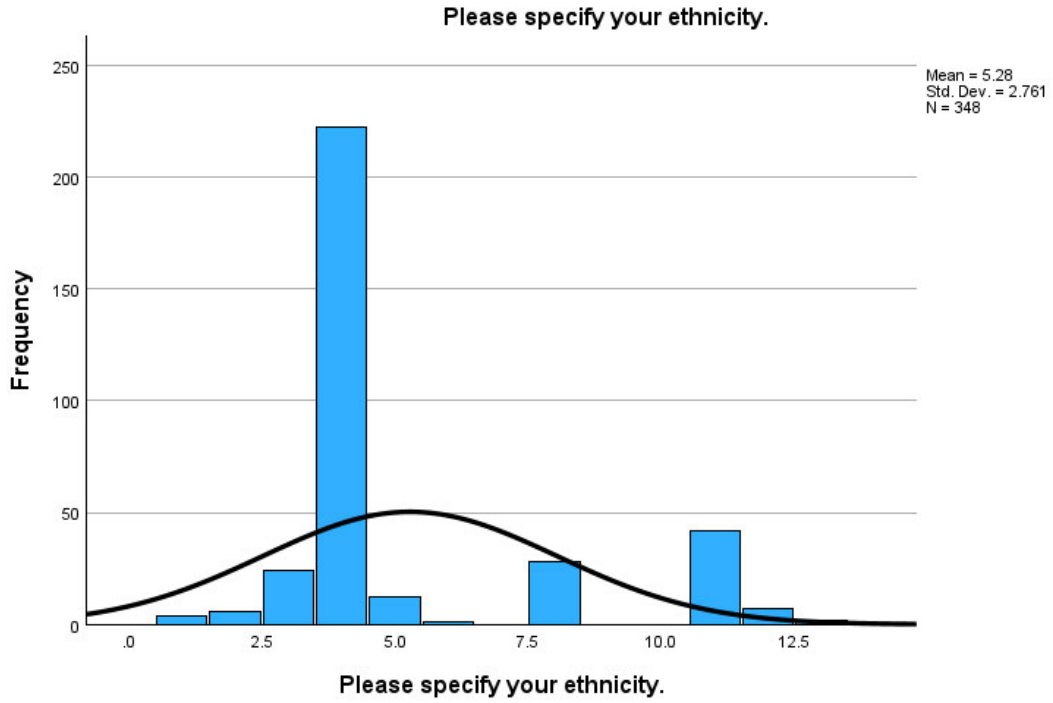
Please specify your ethnicity.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	First Nations person	4	.6	1.1	1.1
	African	6	.9	1.7	2.9
	Asian	24	3.8	6.9	9.8
	Australian	222	34.7	63.8	73.6
	British	12	1.9	3.4	77.0
	Canadian	1	.2	.3	77.3
	European	28	4.4	8.0	85.3
	Mixed ethnicity (please specify)	42	6.6	12.1	97.4
	Different ethnicity (please specify)	7	1.1	2.0	99.4
	Prefer not to answer	2	.3	.6	100.0
	Total	348	54.5	100.0	
Missing	System	291	45.5		
Total		639	100.0		

Table DST4.4 showed that the respondents acknowledged their cultural backgrounds as Australian [*N* = 222; 64%], First Nation (Aboriginal and Torres Strait Islander) [*N* = 4; 1%], African [*N* = 6; 2%], Asian [*N* = 24; 7%], British [*N* = 12; 3%], Canadian [*N* = 1], European [*N* = 28; 8%], mixed ethnicity [*N* = 42; 12%] and different ethnicity [*N* = 7; 2%]. Some respondents preferred not to disclose their ethnicity [*N* = 2]. Other respondents explicated their mixed ethnicities (**Table DST4.6** in **Appendix J**). The respondents who identified their ethnicity as being different acknowledged their heritage as Indian [*N* = 3], "Middle Easterner" [*N* = 1], "Italian" [*N* = 1], "Portuguese" [*N* = 1] and "Gypsy" [mixed heritage] [*N* = 1] (**Table DST4.7** in **Appendix J**). The histogram below in **Figure DST4.3** provides a graphical representation of the positively skewed, platykurtic distribution of the data on ethnicity collected from the respondents [*N* = 348]. It shows the data points were more spread out from the mean [*M* = 5.28] indicating greater variability [*SD* = 2.8] within the ethnicity of the respondents of the online survey on *psychological safety* in secondary school student team contexts.

Figure DST4.3

Histogram Showing the Frequency Distribution of the Ethnicities of the Survey Respondents



The described year groups, identities and ethnicities showed the survey respondents were from diverse backgrounds hence their traditions, beliefs and cultural leanings may have influenced how the survey items were interpreted and responded to. The number of complete cases that were analysed descriptively were 348 out of 372 valid responses proving that not all respondents participated in the provision of sensitive data such as identity and ethnicity. It is recommended that future research clarifies the intended use of the demographic data to improve response rates (Andrus et al, 2021; Nulty, 2008). A list of identities and ethnicities was provided for the respondents to select however it is posited by some researchers that compelling respondents to select from listed identities or ethnicities that are not applicable to them can be considered as an act of oppression and disrespect for their diversity (Moody et al. 2019; Strunk & Hoover, 2019). So, in order not to unintentionally compound existing inequities and discriminatory feelings, for both identity and ethnicity, free-text options were provided in this research for respondents to be able to state and

clarify (or not) their chosen identity and ethnicity if the provided list was non-applicable (Hughes et al., 2016).

To summarise the characteristics of the surveyed population, the above analysis showed that a large number of the secondary school students who engaged with the online survey were in Year 12 [61%] at the time of this research with more female secondary school students [53%] than males and a majority specifying Australian cultural backgrounds [64%]. Subsequent to the description of the characteristics of the online survey respondents of this research, the construct of the adapted 23-item scale in Q4 of the online survey instrument used for collecting quantitative data were validated for its relevance and accuracy for measuring *psychological safety* in secondary school student team contexts.

4.4 Construct Validation of the Adapted 23-item Scale

In **Chapter Two**, Edmondson (1999) is reported to have validated her original *psychological safety* scale using the statistical procedures of factor analysis, factor analysis, regression analyses, and generalised linear model (GLM). Drawing conclusions on the validation of her *psychology safety* scale from her study in adult work teams, Edmondson (1999) recommended, "Further research is needed to establish construct validity…" (p. 380). Subsequently, Dollard and Bakker (2010) validated their PSC measurement instrument with principal components analysis (PCA) and confirmatory factor analysis (CFA). In this mixed methods research, as part of the scale validation process, the 23-item scale adapted from Edmondson's (1999) scale was analysed for its factor structure and model fit to ensure its validity.

4.4.1 Examination of the Factor Structure of the Adapted 23-item Scale

In IBM SPSS (v29), principal components analysis (PCA) was used to test whether the anticipated factor structure of the adapted 23-item scale that is based on the original framework of the *psychological safety* scale by Edmondson (1999) holds true. PCA used principal components (underlying factors) to identify and explain the latent variables (factors) among the items (observed

indicators) (Hoyle, 1995; Smith, 2002). PCA was also used to investigate the capacity of the 23 statements that represent the items to generate hidden factors or latent variables that measured *psychological safety* in secondary school student team contexts from the sampled population (Bollen, 2002). The factorability (i.e., the ability to place the 23 items onto factors) of the data had to be determined before the application of PCA for the examination of the factor structure of the 23-item scale for measuring *psychological safety* in secondary school student team contexts.

To begin with, using IBM SPSS (v29), Kaiser-Meyer-Olkin (KMO) coefficient (Kaiser, 1974) and Bartlett's test of Sphericity (Bartlett, 1951) were used to determine sampling adequacy in this research (Shrestha, 2021). A significant measure [< .001] of the Bartlett's test of Sphericity (Snedecor & Cochran, 1998) and a KMO coefficient [> 0.8] were considered factorable with KMO = 0.6 being an acceptable cut-off value (Beavers et al., 2013). **Table PCA23.1** shows the factorability of the data collected with the adapted 23-item scale following its use for collecting data in the phase three of the main study from 372 respondents.

Table PCA23.1

Test of Sampling Adequacy for the Adapted 23-Item Scale

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.921
Bartlett's Test of Sphericity	Approx. Chi-Square	6086.646
	df	253
	Sig.	<.001

Table PCA23.1 shows the sampling adequacy of the adapted 23-item scale had improved from mediocre [KMO = .62] in phase two [**3.3.2.5.2**]. It was now marvellous [KMO = .92] (Kaiser, 1974), and the observed correlation matrix diverged significantly from the identity matrix [χ^2 (253) = 6086.65, p < .001] (Snedecor & Cochran, 1998). **Table PCA23.1** confirmed the latent variables (factors) of the 23-item scale that was used to collect data for measuring *psychological safety* in 372 collaborating secondary school students were sufficiently correlated to enable a meaningful extraction of distinct and reliable factors for adequate analysis (Silva et al., 2014).

"When communality values (h^2) are high (> .6) and the latent variables (factors) are well defined (have many large loadings), sample sizes of 100 are often adequate" for factor analysis (Reise et al., 2000, p. 290). So, with a sample size greater than 100 in this research [*N* = 372], it was important to assess h^2 of the items to determine whether the latent variables were accounted for by the item correlations (Brown, 2015; Tabachnik & Fidell, 2013). The acceptable cut-off values for h^2 are between 0.25 – 0.4, indicating the confidence that the items of the adapted 23-item scale were correlated substantially to make the data factorable (Beavers et al., 2013). **Table PCA23.2** showed h^2 for all the items of the adapted 23-item scale were acceptable [$0.35 \geq h^2 \geq 0.70$] (Beavers et al., 2013). The item, "*We invite people from outside the team to present information or have discussions with us*" was considered low [$h^2 \geq 0.347$] therefore required further investigation for revision or removal from the adapted 23-item scale.

Table PCA23.2

Communalities of the Items (Observed Indicators) in the Adapted 23-Item Scale

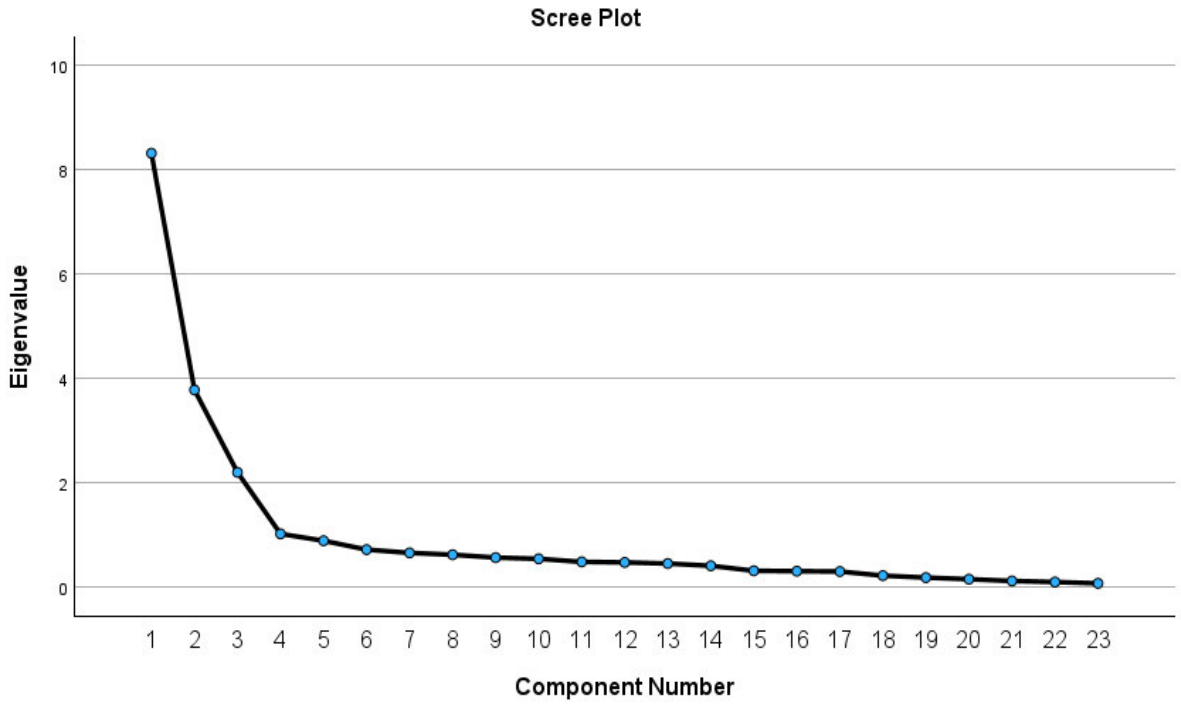
Items (Observed indicators of psychological safety)	Initial	Extraction
All the team members are clear about what this team is supposed to accomplish.	1.000	.596
This team has spent time making sure every team member understands the team's objectives.	1.000	.852
Achieving this team's goals is well within our reach.	1.000	.558
In this team, we often speak up to test assumptions about the issues we have under discussion.	1.000	.848
This team gets all the information it needs to plan our work schedule.	1.000	.518
This team lacks access to useful instruction or training to complete a task.	1.000	.682
It is easy for this team to obtain expert assistance when something comes up that we are not sure of how to handle.	1.000	.518
Team members go out and get all the information they possibly can from others to accomplish a task such as peers, parents and teachers.	1.000	.867
All the members of this team have more than enough training and experience for the kind of task they have to do.	1.000	.536
Most people on this team have the ability to solve the problems that come up in our tasks.	1.000	.869
Certain individuals in this team lack the special skills needed for good team collaboration.	1.000	.615
With focus and effort, this team can do anything we set out to accomplish.	1.000	.886
If you make a mistake on this team, it is often held against you.	1.000	.797
Members of this team are able to bring up problems and tough issues.	1.000	.660
People on this team sometimes reject others for being different.	1.000	.763
It is safe to take a risk on this team.	1.000	.662
It is difficult to ask other members of this team for help.	1.000	.564
We regularly take time to figure out ways to improve our team's collaborative processes.	1.000	.675
Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments.	1.000	.545
This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group.	1.000	.763
This team frequently seeks new information that leads us to make important changes.	1.000	.509
Others in the school community who interact with this team often complain about how it functions.	1.000	.704
We invite people from outside the team to present information or have discussions with us.	1.000	.347

Extraction Method: Principal Component Analysis

Following the confirmation of the communality values (h^2) of the items in the dataset for factorability, the variance explained by the items in the adapted 23-item scale was indicated by the extraction of the principal components (underlying factors) of the data (Costello & Osborne, 2005; Thompson, 2004). The principal components signified the dimensionality (relationship patterns) of the data by showing the existence of a common relationship pattern among the latent variables (factors) (Belkin & Niyogi, 2003). The principal components indicated interpretability by suggesting the existence of a coherent, latent variable underlying the items (observed indicators) captured by the first principal component (Hasan & Abdulazeez, 2021). Eigenvalue of 1.0 was applied to extract the principal components in the dataset perceived to be above the 'noise' (i.e., > 1.0) and not guessed randomly (Abdi & Williams, 2010; Hoffman & Kunze, 1971). **Figure PCA23.1** shows the distribution of the principal components that explained the total variance in the adapted 23-Item scale (Cattell, 1978).

Figure PCA23.1

Graph (Scree Plot) Showing the Number of Significant Components that Explained the Total Variance in the Adapted 23-Item Scale



Furthermore, apart from its utility for subsequent analytical interpretations, the predictive power of the principal components in the adapted 23-item scale was used to model relationships or make predictions about *psychological safety* in secondary school student team contexts based on the identified factor structure of the adapted 23-item scale (Yong & Pearce, 2013). **Table PCA23.3** shows the variance in the dataset that is explained by the extracted principal components.

Table PCA23.3

Total Variance Explained by the Factors (Components) of the Adapted 23-Item Scale

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.320	36.174	36.174	8.320	36.174	36.174	6.949	30.212	30.212
2	3.785	16.454	52.628	3.785	16.454	52.628	3.314	14.409	44.621
3	2.205	9.586	62.214	2.205	9.586	62.214	3.110	13.521	58.142
4	1.026	4.459	66.673	1.026	4.459	66.673	1.962	8.531	66.673
5	.894	3.886	70.559						
6	.724	3.147	73.706						
7	.661	2.873	76.579						
8	.626	2.720	79.299						
9	.571	2.481	81.780						
10	.548	2.381	84.161						
11	.489	2.127	86.288						
12	.478	2.080	88.368						
13	.457	1.987	90.355						
14	.414	1.798	92.152						
15	.318	1.383	93.535						
16	.310	1.350	94.885						
17	.304	1.322	96.207						
18	.225	.978	97.185						
19	.187	.815	98.000						
20	.157	.683	98.683						
21	.123	.534	99.218						
22	.103	.446	99.664						
23	.077	.336	100.000						

Extraction Method: Principal Component Analysis

Table PCA23.3 showed four principal components (underlying latent variables) with eigenvalue ≥ 1 (Guttman, 1954; Kaiser, 1960) explained 67% of variance in the relationship patterns

(dimensions) in the latent variables (factors) that contributed significantly to the overall structure of the adapted 23-item scale (Beaver, et al., 2013; Streiner, 1994). The four principal components were extracted and retained for rotation (Tataryn & Gorsuch, 1996) with the first principal component capturing the maximum of the data's total variance [36%]. Varimax rotation and Kaiser normalisation were used post-hoc to uncorrelate the principal components in order to maintain their orthogonality (i.e., independence) in the measurement scale to simplify their interpretations (Grieder & Steiner, 2022). This rotation maximises the captured variance of each principal component by establishing the strongest relationships among the principal components that measure *psychological safety* in secondary school student team contexts (Bartholomew et al., 2011; Kline 2014). **Table PCA23.4** shows the factor loadings for the 23 items spread within the four principal components (Gorsuch, 1983).

Table PCA23.4

Rotated Component Matrix Resulting from the Varimax (Orthogonal) Rotations of the Factor Loadings for the Adapted 23-Item Scale

Items (Observed indicators of psychological safety)	Component			
	1	2	3	4
All the team members are clear about what this team is supposed to accomplish.			.750	
This team has spent time making sure every team member understands the team's objectives.	.899			
Achieving this team's goals is well within our reach.			.731	
In this team, we often speak up to test assumptions about the issues we have under discussion.	.892			
This team gets all the information it needs to plan our work schedule.			.672	
This team lacks access to useful instruction or training to complete a task.	.657	.445		
It is easy for this team to obtain expert assistance when something comes up that we are not sure of how to handle.			.665	
Team members go out and get all the information they possibly can from others to accomplish a task such as peers, parents and teachers.	.911			
All the members of this team have more than enough training and experience for the kind of task they have to do.			.681	
Most people on this team have the ability to solve the problems that come up in our tasks.	.916			
Certain individuals in this team lack the special skills needed for good team collaboration.		.774		
With focus and effort, this team can do anything we set out to accomplish.	.926			
If you make a mistake on this team, it is often held against you.	.518	.727		
Members of this team are able to bring up problems and tough issues.				.761
People on this team sometimes reject others for being different.	.520	.697		
It is safe to take a risk on this team.				.757
It is difficult to ask other members of this team for help.		.740		
We regularly take time to figure out ways to improve our team's collaborative processes.	.731			
Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments.		.710		
This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group.	.825			
This team frequently seeks new information that leads us to make important changes.			.323	.620
Others in the school community who interact with this team often complain about how it functions.	.657	.521		

We invite people from outside the team to present information or have discussions with us.	.438	.341

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
a. Rotation converged in 5 iterations

Items with factor loadings of 0.40 and above were considered adequate (Nunally, 1978) indicating their capacity to sufficiently reflect the principal component or the *psychological safety* latent variable intended for measurement. The Varimax-rotated component matrix in **Table PCA23.4** showed an interpretable solution where principal component 1 is related to 11 items, principal component 2 is related to seven items, principal component 3 is related to seven items, and principal component 4 is related to four items. **Table PCA23.4** also showed that with Varimax rotation, the convergent validity of the adapted 23-item scale was met because all the items loaded on at least one component indicating that the 23 items reflected or measured the identified four, latent variables or principal components (TLB, TPS, TCO, TEF) of *psychological safety* in secondary school student team contexts. The discriminant validity of the adapted 23-item scale was however not met because six items: (1) "*This team lacks access to useful instruction or training to complete a task*"; (2) "*If you make a mistake on this team, it is often held against you*"; (3) "*People on this team sometimes reject others for being different*"; (4) "*This team frequently seeks new information that leads us to make important changes*"; (5) "*Others in the school community who interact with this team often complain about how it functions*"; and (6) "*We invite people from outside the team to present information or have discussions with us*", cross-loaded on two components, 1 and 2 as well as 3 and 4 (Asparouhov & Muthen, 2009; Costello & Osborne, 2005). The cross-loadings were most likely due to multicollinearity where two or more items are strongly correlated with each other (Asparouhov et al., 2015; Lucas et al., 1996) thereby causing them to become redundant and associated simultaneously with multiple variables or constructs of *psychological safety* in secondary school student team contexts (Shrestha, 2020).

The cross-loadings indicated in the data compromised the stability of the adapted 23-item scale's factor structure (Li et al., 2020). Promax rotation, an oblique rotation was thus employed to eliminate the cross-loadings in order to recover the underlying factor structure of the adapted 23-item scale to improve the model fit to the data (Finch, 2011). **Table PCA23.5** shows the factor loadings for the 23 items spread within the four, principal components (Gorsuch, 1983) following the Promax rotation.

Table PCA23.5

Pattern Matrix Resulting from the Promax (Oblique) Rotations of the Factor Loadings for the Adapted 23-Item Scale

Items (Observed indicators of psychological safety)	Component			
	1	2	3	4
All the team members are clear about what this team is supposed to accomplish.			.778	
This team has spent time making sure every team member understands the team's objectives.	.966			
Achieving this team's goals is well within our reach.			.759	
In this team, we often speak up to test assumptions about the issues we have under discussion.	.933			
This team gets all the information it needs to plan our work schedule.			.659	
This team lacks access to useful instruction or training to complete a task.	.593	.322		
It is easy for this team to obtain expert assistance when something comes up that we are not sure of how to handle.			.655	
Team members go out and get all the information they possibly can from others to accomplish a task such as peers, parents and teachers.	.953			
All the members of this team have more than enough training and experience for the kind of task they have to do.			.704	
Most people on this team have the ability to solve the problems that come up in our tasks.	.989			
Certain individuals in this team lack the special skills needed for good team collaboration.		.860		
With focus and effort, this team can do anything we set out to accomplish.	1.006			
If you make a mistake on this team, it is often held against you.	.370	.683		
Members of this team are able to bring up problems and tough issues.				.808
People on this team sometimes reject others for being different.	.391	.651		
It is safe to take a risk on this team.				.805
It is difficult to ask other members of this team for help.	-.338	.826		
We regularly take time to figure out ways to improve our team's collaborative processes.	.701			
Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments.		.729		
This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group.	.817			

This team frequently seeks new information that leads us to make important changes.				.629
Others in the school community who interact with this team often complain about how it functions.	.579	.428		
We invite people from outside the team to present information or have discussions with us.			.368	

Extraction Method: Principal Component Analysis
Rotation Method: Promax with Kaiser Normalization
a. Rotation converged in 5 iterations

Table PCA23.5 showed that Promax rotation did not improve the discriminant validity of the adapted 23-item scale. This is because five of the six items continued to cross-load on components 1 and 2 (Schmitt & Sass, 2011). This lack of proper loading of the items was likely due to the five items not having enough variance to measure *psychological safety* in collaborating secondary school students. This could have been due to a lack of clarity and ambiguity in their wordings leading to interpretive difficulty for the respondents (Bond & Fox, 2015) or participant characteristics (Braeken & van Assen, 2017). The four, extracted and retained principal components in **Table PCA23.5** showed the dimensionality of the adapted 23-item scale that was reduced from six factors i.e., latent variables (CTD, TEF, TCO, TLB, TPS, TPE) in **Figure MSM4.1** in **4.2**, to a smaller set of four factors i.e., latent variables (TLB, TPS, TCO, TEF).

Capturing 66.7% of the total variance in the dataset, the four latent variables still contained most of the essential information in the six, latent variables following the discard of the less informative features which were likely to cause an overfitting model as well as reduced interpretability of the model (Joliffe & Cadima, 2016) to predict the *psychological safety* of collaborating secondary school students. Principal component 1, which accounted for the team learning behaviours (TLB) latent variable is defined by nine items with eigenvalue of 8.3 that captured 36.2% of the variance in the data. Principal component 2, which accounted for the team psychological safety (TPS) latent variable is defined by five items with eigenvalue of 3.8 that captured 16.5% of the variance in the data. Principal component 3, which accounted for the team composition (TCO) latent variable is defined by six items with eigenvalue of 2.2 that captured 9.6%

of the variance in the data. Principal component 4, which accounted for the team efficacy (TEF) latent variable is defined by three items with eigenvalue of 1.0 that captured 4.5% of the variance in the data.

Table PCA23.6 (**Appendix J**) showed the reliability [$\alpha = .91$] of the adapted 23-item scale with four, latent variables (TLB, TPS, TCO, TEF) for collecting data for measuring *psychological safety* in secondary school student team contexts was excellent (Cronbach, 1951). To further establish the scale's construct validity, it was necessary to confirm whether the 23 items spread within the four, latent variables in the scale were loading onto the four principal components as expected and measuring *psychological safety* in secondary school student team contexts as intended. For this purpose, the model fit of the adapted 23-item scale was examined with structural equation modelling (SEM) using confirmatory factor analysis (CFA) and path analysis.

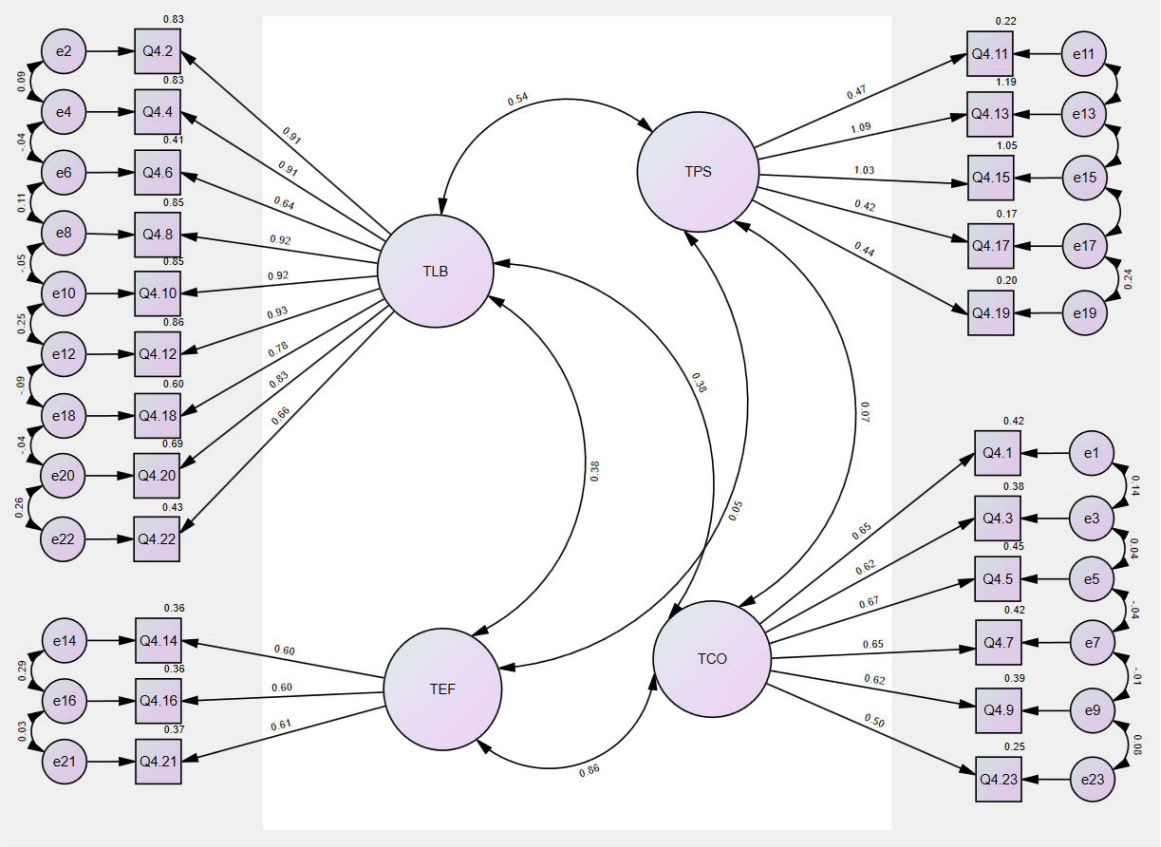
4.5 Examination of the Model Fit of the Adapted 23-Item Scale

In IBM SPSS AMOS (v29), confirmatory factor analysis (CFA) was used to examine the model fit of the adapted 23-item scale (Tabachnik & Fidell, 2013). As reported in **Chapter Three**, model fit refers to how well the statistical model of the adapted 23-item scale represented the relationships among the items of the four, latent variables (TLB, TPS, TCO, TEF) used for collecting data for measuring *psychological safety* in secondary school student team contexts (Marsh et al., 1996).

To test the three hypotheses (H_{01}, H_{02}, H_{03}) of RQ2, address multicollinearity (**Table PCA23.5** in **4.4.1**), and improve model fit, one item of each of the four, latent variables (TLB, TPS, TCO, TEF) was constrained to 1.0 in the estimation to ensure model identification and meaningful parameters for interpretability (Brown & Moore, 2012; Hu & Bentler, 1999). **Figure CFA23.1** offers a pictorial analysis of the relationship patterns among the four, latent variables of the adapted 23-item scale for measuring *psychological safety* in secondary school student team contexts (Bowen & Guo, 2011).

Figure CFA23.1

Path Diagram of the Adapted 23-Item Scale



Note. TEF – team efficacy; TLB – team learning behaviours; TPS – team psychological safety; TPE – team performance; e - error; Q - question

According to Bentler and Bonett (1980) and Kenny et al. (2020), being generally less sensitive to sample size, root mean square error of approximation (RMSEA), and comparative fit index (CFI)were used as fit indices to evaluate the model fit of the adapted 23-item scale for measuring *psychological safety* in secondary school student team contexts. Adequate cutoff criteria were applied to the fit indices to reduce Type I error rates (i.e., the probability of rejecting H_{01}, H_{02}, H_{03} when they were significant and true) and Type II error rates (i.e., the probability of accepting H_{01}, H_{02}, H_{03} when they were insignificant and false) (Bentler, 1989; Bentler & Bonett, 1980; Hu & Bentler, 1999). Providing a comprehensive assessment of the adapted 23-item scale's model fit, **Table CFA23.1** (**Appendix J**) showed. CFI [.87] was not acceptable (Bollen, 1989; Kenny, 2015) but RMSEA

[0.077] was acceptable (Browne & Cudeck, 1993; Hu & Bentler, 1998). This indicated the 'a priori' model reproduced the sample data fairly well (Kenny et al., 2020; MacCallum et al., 1986; Wheaton, 1987). This specified that the proposed model of *psychological safety* in secondary school student team contexts captured a significant amount of variance and covariance, and adequately reproduced the relationships among the latent variables (TLB, TCO, TEF, TPS) in the observed data (Xia & Yang, 2019). The Chi-square statistic [CMIN) [911.978] (**Table CFA23.1** in **Appendix J**) was however significant [$p < .001$] indicating the presence of possible differential item functioning (DIF) in the data (Dorans & Holland, 1992; Lord, 1980).

To resolve the DIF, a more detailed item-level examination of the structure and performance of the adapted 23-item scale was necessary (Penfield & Camilli, 2006). This was to ensure that the psychometric properties of the 23-item scale made the scale more robust and stable and accurately represented the underlying data, was interpretable, and performed when measuring *psychological safety* in secondary school student team contexts (Borsboom et al., 2002). Hence, the adapted 23-item scale was subjected to item-level analysis employing the Rasch model (Rasch, 1960), particularly the rating scale model (RSM) (Andrich, 1978).

4.6 Item-Level Analysis of the Adapted 23-Item Scale

In ACER Conquest 5.0 (Adams et al., 2020), the rating scale model (RSM) (Andrich, 1978), a polytomous type of the Rasch model (Rasch, 1960; Wright & Stone, 1979) was used to analyse the psychometric properties of the individual items of the adapted 23-item scale, and revise the scale if necessary. The scale revision was to "improve the psychometric properties and ultimately the validity of individual-differences measures" (Reise et al., 2000, p. 287) and to ensure the *psychological safety* construct was represented adequately in secondary school student team contexts (West & Finch, 1997).

Necessary command syntaxes for use in ACER ConQuest 5.0 (Adams et al., 2020) were created for the data (dat.txt) file, label (lab.txt) file and the command (cqc) statement for analysing each item within the adapted 23-item scale. These command syntaxes were used to execute RSM

(Andrich, 1978) analysis in ACER ConQuest 5.0 (Adams et al., 2020). The outputs displayed on the output interface include graphical and tabulated representations of the results of the Rasch analysis such as the item parameter estimates (shw.txt), the traditional item statistics (itn.txt) the population parameter estimates, and the item difficulty map of the scales deemed suitable for measuring *psychological safety* in secondary school student team contexts. The mean square fit statistic (MNSQ) provides information about how well each item in the 23-item scale fits the Rasch model (Rasch, 1960). The weighted MNSQ, which is the information-weighted fit, is used for this fit assessment because it is targeted to the respondents' abilities and gives more weight to responses that are closest to a respondent's ability. With an acceptable, weighted MNSQ value range of 0.6 to 1.4 (Tesio, 2003), overfitting, weighted MNSQ values (< 0.6) and underfitting, weighted MNSQ values (> 1.4) indicated that an item may not have the acceptable discrimination properties to measure the *psychological safety* construct being measured and required revisions or removal from the scale (Boone et al., 2014; Malec et al., 2007). The psychometric properties of the adapted 23-item scale for measuring *psychological safety* in secondary school student team contexts were examined.

4.6.1 Assessment of the Psychometric Properties of the Adapted 23-Item Scale

Table RSM23.1 shows the characteristics and quality of all the items spread within four identified latent variables (TLB, TPS, TCO, TEF) and the overall, adapted 23-item scale used for collecting data for measuring *psychological safety* in secondary school student team contexts, as assessed by the item response theory (IRT) model.

Table RSM23.1

Response Model Parameter Estimates for All Items of the Adapted 23-Item Scale with Four Latent Variables

TERM 1: item

	VARIABLES			UNWEIGHTED FIT			WEIGHTED FIT		
	item	ESTIMATE	ERROR^	MNSQ	CI	T	MNSQ	CI	T
1	TLB1	-1.154	0.079	1.13	(0.86, 1.14)	1.7	1.09	(0.83, 1.17)	1.0
2	TLB2	0.324	0.064	0.77	(0.86, 1.14)	-3.3	0.81	(0.87, 1.13)	-3.1
3	TLB3	-1.336	0.082	0.96	(0.86, 1.14)	-0.5	0.98	(0.82, 1.18)	-0.2
4	TLB4	0.473	0.064	0.64	(0.86, 1.14)	-5.7	0.66	(0.87, 1.13)	-5.8
5	TLB5	-0.745	0.072	0.94	(0.86, 1.14)	-0.7	0.95	(0.85, 1.15)	-0.7
6	TLB6	1.083	0.068	0.71	(0.86, 1.14)	-4.4	0.75	(0.86, 1.14)	-3.9
7	TLB7	-1.072	0.077	0.98	(0.86, 1.14)	-0.3	0.98	(0.84, 1.16)	-0.2
8	TLB8	0.452	0.064	0.57	(0.86, 1.14)	-7.1	0.61	(0.87, 1.13)	-6.8
9	TLB9	-0.955	0.075	0.74	(0.86, 1.14)	-3.9	0.75	(0.84, 1.16)	-3.4
10	TPS1	0.268	0.064	0.75	(0.86, 1.14)	-3.7	0.82	(0.87, 1.13)	-2.9
11	TPS2	0.059	0.064	1.42	(0.86, 1.14)	5.1	1.44	(0.87, 1.13)	5.9
12	TPS3	0.149	0.064	0.93	(0.86, 1.14)	-0.9	0.96	(0.87, 1.13)	-0.6
13	TPS4	1.244	0.070	0.81	(0.86, 1.14)	-2.8	0.85	(0.86, 1.14)	-2.2
14	TPS5	-0.624	0.070	0.95	(0.86, 1.14)	-0.7	0.97	(0.86, 1.14)	-0.5
15	TCO1	1.234	0.070	1.10	(0.86, 1.14)	1.4	1.13	(0.86, 1.14)	1.8
16	TCO2	-0.785	0.072	1.16	(0.86, 1.14)	2.1	1.17	(0.85, 1.15)	2.1
17	TCO3	0.279	0.064	1.93	(0.86, 1.14)	10.0	1.92	(0.87, 1.13)	11.2
18	TCO4	0.428	0.064	0.73	(0.86, 1.14)	-4.0	0.75	(0.87, 1.13)	-4.2
19	TCO5	0.245	0.064	1.09	(0.86, 1.14)	1.3	1.10	(0.87, 1.13)	1.5
20	TCO6	0.629	0.065	0.65	(0.86, 1.14)	-5.4	0.69	(0.87, 1.13)	-5.2
21	TEF1	-0.743	0.072	0.88	(0.86, 1.14)	-1.7	0.93	(0.85, 1.15)	-1.0
22	TEF2	1.004	0.067	0.80	(0.86, 1.14)	-2.9	0.85	(0.86, 1.14)	-2.3
23	TEF3	-0.458*	0.068	1.07	(0.86, 1.14)	1.0	1.11	(0.87, 1.13)	1.6

An asterisk next to a parameter estimate indicates that it is constrained
^ Empirical standard errors have been used
Term is a fixed effect
Separation Reliability=0.993
Chi-square test of parameter equality=2673.88, df=22, Sig. Level=0.000

Item 23 [TEF3] was constrained to improve estimation and ensure model identification to augment the robustness and interpretability of the 23-item scale (Brown & Moore, 2012). The high separation reliability [.993] in **Table RSM23.1** showed the hierarchy of item difficulty was significant in confirming the adapted 23-item scale's measurement precision (Wu et al., 2007). The significant Chi-square statistic [χ^2 (22) = 2673.88, p < .001] indicated potential differential item functioning (DIF), which means the items in the adapted 23-item scale are not likely to behave in the same way for comparable groups, showing the presence of potential bias that can impact the overall fairness and validity of the 23 items in measuring *psychological safety* in secondary school student team contexts (Borsboom et al., 2002).

Table RSM23.1 showed item 17 [TCO3] "*This team gets all the information it needs to plan our work schedule*" [weighted MNSQ = 1.92], fell out of the acceptable fit range [0.6 ≤ MNSQ ≤ 1.4]

of the underlying model (Wright & Masters, 1982). It was considered that item 17 [TCO3] was misplaced in a student learning environment and misunderstood by the respondents who work on tasks or exercises in learning spaces, not work schedules, as in an organisational environment. To resolve the DIF, item 17 [TCO3] was removed from the scale, leaving 22 items which were further assessed for their fairness and validity in measuring *psychological safety* in secondary school student teams.

4.6.2 Assessment of the Psychometric Properties of the Adapted 22-Item Scale

Table RSM22.1 shows the characteristics and quality of all the items spread within four identified latent variables (TLB, TPS, TCO, TEF) and the overall, adapted 22-item scale used for collecting data for measuring *psychological safety* in secondary school student team contexts, as assessed by the IRT model.

Table RSM22.1

Response Model Parameter Estimates of All Items for the Adapted 22-Item Scale with Four Latent Variables

TERM 1: item

	VARIABLES			UNWEIGHTED FIT			WEIGHTED FIT		
	item	ESTIMATE	ERROR^	MNSQ	CI	T	MNSQ	CI	T
1	TLB1	-1.187	0.079	1.17	(0.86, 1.14)	2.2	1.12	(0.83, 1.17)	1.4
2	TLB2	0.289	0.064	0.76	(0.86, 1.14)	-3.6	0.79	(0.87, 1.13)	-3.3
3	TLB3	-1.368	0.082	0.99	(0.86, 1.14)	-0.1	1.01	(0.83, 1.17)	0.2
4	TLB4	0.439	0.064	0.64	(0.86, 1.14)	-5.7	0.66	(0.87, 1.13)	-5.7
5	TLB5	1.051	0.068	0.68	(0.86, 1.14)	-4.8	0.72	(0.86, 1.14)	-4.3
6	TLB6	-1.107	0.077	0.99	(0.86, 1.14)	-0.1	0.98	(0.84, 1.16)	-0.2
7	TLB7	0.417	0.064	0.56	(0.86, 1.14)	-7.1	0.61	(0.87, 1.13)	-6.7
8	TLB8	-0.990	0.075	0.76	(0.86, 1.14)	-3.5	0.77	(0.84, 1.16)	-3.1
9	TLB9	0.233	0.064	0.74	(0.86, 1.14)	-3.8	0.81	(0.87, 1.13)	-3.1
10	TPS1	0.023	0.064	1.38	(0.86, 1.14)	4.7	1.41	(0.87, 1.13)	5.6
11	TPS2	0.113	0.064	0.91	(0.86, 1.14)	-1.2	0.95	(0.87, 1.13)	-0.8
12	TPS3	1.213	0.070	0.79	(0.86, 1.14)	-3.1	0.83	(0.86, 1.14)	-2.4
13	TPS4	-0.660	0.070	0.99	(0.86, 1.14)	-0.2	0.99	(0.86, 1.14)	-0.1
14	TPS5	1.203	0.070	1.06	(0.86, 1.14)	0.9	1.10	(0.86, 1.14)	1.4
15	TCO1	-0.820	0.072	1.18	(0.86, 1.14)	2.3	1.17	(0.85, 1.15)	2.2
16	TCO2	0.245	0.064	1.90	(0.86, 1.14)	9.8	1.92	(0.87, 1.13)	11.0
17	TCO4	0.394	0.064	0.72	(0.86, 1.14)	-4.2	0.74	(0.87, 1.13)	-4.2
18	TCO5	0.211	0.064	1.06	(0.86, 1.14)	0.8	1.08	(0.87, 1.13)	1.2
19	TCO6	0.597	0.065	0.63	(0.86, 1.14)	-5.8	0.67	(0.87, 1.13)	-5.4
20	TEF1	-0.778	0.072	0.89	(0.86, 1.14)	-1.5	0.93	(0.85, 1.15)	-0.9
21	TEF2	0.973	0.067	0.78	(0.86, 1.14)	-3.2	0.83	(0.86, 1.14)	-2.5
22	TEF3	-0.493*	0.068	1.09	(0.86, 1.14)	1.2	1.13	(0.87, 1.13)	1.8

An asterisk next to a parameter estimate indicates that it is constrained
^ Empirical standard errors have been used
Term is a fixed effect
Separation Reliability=0.993
Chi-square test of parameter equality=2537.59, df=21, Sig. Level=0.000

Item 22 [TEF3] was constrained to improve estimation and ensure model identification to augment the robustness and interpretability of the 22-item scale for measuring *psychological safety* in secondary school student teams (Brown & Moore, 2012). The high separation reliability [0.993] in **Table RSM22.1** showed the hierarchy of item difficulty was significant in confirming the adapted 22-item scale's measurement precision (Wu et al., 2007). The significant Chi-square statistic [χ^2 (21) = 2537.59, $p < .001$] indicated potential DIF. **Table RSM22.1** showed item 16 [TCO2], *"Achieving this team's goals is well within our reach"* was considered unsuitable for measuring *psychological safety* in secondary school student teams [weighted MNSQ = 1.92] (Wright & Masters, 1982). It was considered that item 16 [TCO2] may have lacked clarity regarding goal setting in a secondary school instructional environment for this is usually done by their teachers making it difficult for the respondents to endorse this item comfortably (Bond & Fox, 2015). To resolve the DIF bias, item 16

[TCO2] was removed from the scale, leaving 21 items which were further assessed for their fairness and validity in measuring *psychological safety* in secondary school student teams.

4.6.3 Assessment of the Psychometric Properties of the Adapted 21-Item Scale

Table RSM21.1 shows the characteristics and quality of all the items spread within four identified latent variables (TLB, TPS, TCO, TEF) and the overall, adapted 21-item scale used for collecting data for measuring *psychological safety* in secondary school student team contexts, as assessed by the IRT model.

Table RSM21.1

Response Model Parameter Estimates of All Items for the Adapted 21-Item Scale with Four Latent Variables

TERM 1: item

	VARIABLES			UNWEIGHTED FIT			WEIGHTED FIT		
	item	ESTIMATE	ERROR^	MNSQ	CI	T	MNSQ	CI	T
1	TLB1	-1.259	0.079	1.20	(0.86, 1.14)	2.6	1.15	(0.84, 1.16)	1.7
2	TLB2	0.223	0.064	0.75	(0.86, 1.14)	-3.7	0.79	(0.87, 1.13)	-3.4
3	TLB3	0.374	0.065	0.62	(0.86, 1.14)	-6.0	0.65	(0.87, 1.13)	-6.0
4	TLB4	0.994	0.068	0.68	(0.86, 1.14)	-4.9	0.71	(0.86, 1.14)	-4.4
5	TLB5	-1.176	0.077	1.02	(0.86, 1.14)	0.3	1.01	(0.84, 1.16)	0.1
6	TLB6	0.355	0.065	0.56	(0.86, 1.14)	-7.3	0.61	(0.87, 1.13)	-6.8
7	TLB7	-1.058	0.075	0.77	(0.86, 1.14)	-3.4	0.79	(0.85, 1.15)	-2.8
8	TLB8	0.170	0.064	0.74	(0.86, 1.14)	-3.9	0.81	(0.87, 1.13)	-3.1
9	TLB9	-0.042	0.065	1.40	(0.86, 1.14)	4.8	1.41	(0.87, 1.13)	5.6
10	TPS1	0.049	0.064	0.89	(0.86, 1.14)	-1.5	0.94	(0.87, 1.13)	-0.9
11	TPS2	1.160	0.070	0.79	(0.86, 1.14)	-3.1	0.83	(0.86, 1.14)	-2.5
12	TPS3	-0.729	0.070	0.99	(0.86, 1.14)	-0.1	1.00	(0.86, 1.14)	0.1
13	TPS4	1.149	0.070	1.06	(0.86, 1.14)	0.8	1.09	(0.86, 1.14)	1.3
14	TPS5	-0.891	0.072	1.19	(0.86, 1.14)	2.4	1.19	(0.85, 1.15)	2.4
15	TCO1	0.179	0.064	1.93	(0.86, 1.14)	10.1	1.94	(0.87, 1.13)	11.2
16	TCO4	0.329	0.064	0.73	(0.86, 1.14)	-4.0	0.76	(0.87, 1.13)	-3.8
17	TCO5	0.144	0.064	1.08	(0.86, 1.14)	1.1	1.09	(0.87, 1.13)	1.4
18	TCO6	0.533	0.065	0.62	(0.86, 1.14)	-6.0	0.66	(0.87, 1.13)	-5.6
19	TEF1	-0.851	0.072	0.91	(0.86, 1.14)	-1.2	0.94	(0.86, 1.14)	-0.8
20	TEF2	0.912	0.068	0.77	(0.86, 1.14)	-3.4	0.82	(0.86, 1.14)	-2.7
21	TEF3	-0.566*	0.068	1.11	(0.86, 1.14)	1.5	1.15	(0.87, 1.13)	2.1

An asterisk next to a parameter estimate indicates that it is constrained
^ Empirical standard errors have been used
Term is a fixed effect
Separation Reliability=0.992
Chi-square test of parameter equality=2216.38, df=20, Sig. Level=0.000

Item 21 [TEF3] was constrained to improve estimation and ensure model identification to augment the robustness and interpretability of the 21-item scale for measuring *psychological safety* in secondary school student teams (Brown & Moore, 2012). The high separation reliability [0.992] in

Table RSM21.1 showed the hierarchy of item difficulty was significant in confirming the adapted 21-item scale's measurement precision (Wu et al., 2007). The significant Chi-square statistic [χ^2 (20) = 2216.38, p < .001] indicated potential DIF. **Table RSM21.1** showed item 15 [TCO1], *"All the team members are clear about what this team is supposed to accomplish"* was considered unsuitable for measuring *psychological safety* in secondary school student teams [weighted MNSQ = 1.94] (Wright & Masters, 1982). It was considered that item 15 [TCO1] was most likely misunderstood or misconstrued by the respondents due to the instructional style of their teachers in their learning spaces. If the learning is not visible for learners where learning objectives and success criteria of tasks are negotiated and clarified (Hattie, 2012), this item may have been difficult for the respondents to endorse comfortably (Bond & Fox, 2015). To resolve the potential DIF, item 15 [TCO1] was removed from the scale. With the intention of encouraging "challenge, commitment, confidence, high expectations, and conceptual understanding" (Hattie, 2012, p. 3) in a secondary school learning environment where differentiated learning objectives and success criteria for collaborative work are visibly shared, item 15 [TCO1] was not removed from the scale even though its removal would have resolved the potential DIF bias. Consequently, for the 21-item scale, the weighted MNSQ value range of 0.61 – 1.4 indicated the data of the 21-item scale fit the Rasch model (Rasch, 1960; Tesio, 2003). There was consequently no unexplained randomness to distort or degrade the measurement tool for measuring *psychological safety* in secondary school student teams (Linacre, 2002). The factor structure and model fit of the 21-item scale were consequently assessed to determine the scale's stability, quality, and relevance in measuring *psychological safety* in secondary school student teams.

4.6.4 Assessment of the Psychometric Properties of the Adapted 20-Item Scale

Table RSM20.1 shows the characteristics and quality of all the items spread within four identified latent variables (TLB, TPS, TCO, TEF) and the overall, adapted 20-item scale used for

collecting data for measuring *psychological safety* in secondary school student team contexts, as assessed by the IRT model.

Table RSM20.1

Response Model Parameter Estimates of All Items for the Adapted 20-Item Scale with Four Latent Variables

TERM 1: item

	VARIABLES			UNWEIGHTED FIT			WEIGHTED FIT		
	item	ESTIMATE	ERROR^	MNSQ	CI	T	MNSQ	CI	T
1	TLB1	0.160	0.065	0.76	(0.86, 1.14)	-3.5	0.81	(0.87, 1.13)	-3.0
2	TLB2	0.313	0.065	0.63	(0.86, 1.14)	-5.8	0.66	(0.87, 1.13)	-5.6
3	TLB3	0.943	0.069	0.66	(0.86, 1.14)	-5.2	0.70	(0.86, 1.14)	-4.6
4	TLB4	-1.254	0.078	1.05	(0.86, 1.14)	0.7	1.04	(0.84, 1.16)	0.5
5	TLB5	0.292	0.065	0.57	(0.86, 1.14)	-7.1	0.62	(0.87, 1.13)	-6.5
6	TLB6	-1.136	0.075	0.80	(0.86, 1.14)	-3.0	0.82	(0.85, 1.15)	-2.5
7	TLB7	0.105	0.065	0.73	(0.86, 1.14)	-4.0	0.81	(0.87, 1.13)	-3.0
8	TLB8	-0.110	0.065	1.37	(0.86, 1.14)	4.6	1.41	(0.87, 1.13)	5.6
9	TLB9	-0.017	0.065	0.90	(0.86, 1.14)	-1.4	0.96	(0.87, 1.13)	-0.6
10	TPS1	1.114	0.070	0.76	(0.86, 1.14)	-3.5	0.80	(0.86, 1.14)	-3.0
11	TPS2	-0.802	0.070	1.03	(0.86, 1.14)	0.4	1.05	(0.86, 1.14)	0.7
12	TPS3	1.104	0.070	1.03	(0.86, 1.14)	0.5	1.06	(0.86, 1.14)	0.9
13	TPS4	-0.964	0.073	1.21	(0.86, 1.14)	2.7	1.22	(0.85, 1.15)	2.8
14	TPS5	0.118	0.065	1.92	(0.86, 1.14)	10.0	1.94	(0.87, 1.13)	11.1
15	TCO1	0.271	0.065	0.73	(0.86, 1.14)	-4.0	0.77	(0.87, 1.13)	-3.7
16	TCO4	0.083	0.065	1.05	(0.86, 1.14)	0.6	1.08	(0.87, 1.13)	1.2
17	TCO5	0.478	0.066	0.61	(0.86, 1.14)	-6.1	0.66	(0.86, 1.14)	-5.6
18	TCO6	-0.923	0.072	0.96	(0.86, 1.14)	-0.6	0.99	(0.86, 1.14)	-0.2
19	TEF1	0.863	0.068	0.75	(0.86, 1.14)	-3.7	0.80	(0.86, 1.14)	-2.9
20	TEF2	-0.637*	0.068	1.12	(0.86, 1.14)	1.6	1.18	(0.87, 1.13)	2.5

An asterisk next to a parameter estimate indicates that it is constrained
^ Empirical standard errors have been used
Term is a fixed effect
Separation Reliability=0.992
Chi-square test of parameter equality=1936.86, df=19, Sig Level=0.000

Item 20 [TEF2] was constrained to improve estimation and ensure model identification to augment the robustness and interpretability of the 20-item scale for measuring *psychological safety* in secondary school student teams (Brown & Moore, 2012). The high separation reliability [0.992] in **Table RSM20.1** showed the hierarchy of item difficulty (i.e., item discrimination) was significant in confirming the adapted 20-item scale's measurement precision (Wu et al., 2007). The significant Chi-square statistic [χ^2 (19) = 1936.86, p < .001] indicated potential DIF. **Table RSM20.1** showed item 14 [TPS5], *"Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments"* was considered unsuitable for measuring *psychological safety* in secondary school student teams [weighted MNSQ = 1.94] (Wright & Masters, 1982). It was considered that item 14 [TPS5] was contextually misplaced because in a school environment, students' "performance" and

"accomplishments" are not appraised as in a work environment. To resolve the DIF bias, item 14 [TPS5] was removed from the scale, leaving 19 items which were further assessed for their fairness and validity.

4.6.5 Assessment of the Psychometric Properties of the Adapted 19-Item Scale

Table RSM19.1 shows the characteristics and quality of all the items spread within four identified latent variables (TLB, TPS, TCO, TEF) and the overall, adapted 19-item scale used for collecting data for measuring *psychological safety* in secondary school student team contexts, as assessed by the IRT model.

Table RSM19.1

Response Model Parameter Estimates of All Items for the Adapted 19-Item Scale with Four Latent Variables

TERM 1: item

	VARIABLES			UNWEIGHTED FIT			WEIGHTED FIT		
	item	ESTIMATE	ERROR^	MNSQ	CI	T	MNSQ	CI	T
1	TLB1	0.164	0.065	0.71	(0.86, 1.14)	-4.3	0.76	(0.87, 1.13)	-3.9
2	TLB2	0.318	0.065	0.58	(0.86, 1.14)	-6.8	0.61	(0.87, 1.13)	-6.6
3	TLB3	0.953	0.069	0.69	(0.86, 1.14)	-4.8	0.73	(0.86, 1.14)	-4.1
4	TLB4	-1.252	0.077	1.06	(0.86, 1.14)	0.8	1.04	(0.84, 1.16)	0.5
5	TLB5	0.297	0.065	0.52	(0.86, 1.14)	-8.0	0.58	(0.87, 1.13)	-7.2
6	TLB6	-1.134	0.075	0.80	(0.86, 1.14)	-2.8	0.82	(0.85, 1.15)	-2.5
7	TLB7	0.108	0.065	0.69	(0.86, 1.14)	-4.8	0.77	(0.87, 1.13)	-3.7
8	TLB8	-0.108	0.065	1.48	(0.86, 1.14)	5.7	1.50	(0.87, 1.13)	6.5
9	TLB9	-0.015	0.065	0.85	(0.86, 1.14)	-2.2	0.90	(0.87, 1.13)	-1.5
10	TPS1	1.125	0.071	0.77	(0.86, 1.14)	-3.3	0.82	(0.86, 1.14)	-2.6
11	TPS2	-0.801	0.070	1.06	(0.86, 1.14)	0.9	1.07	(0.86, 1.14)	0.9
12	TPS3	1.115	0.071	1.06	(0.86, 1.14)	0.8	1.09	(0.86, 1.14)	1.2
13	TPS4	-0.963	0.073	1.25	(0.86, 1.14)	3.1	1.23	(0.86, 1.14)	2.9
14	TCO4	0.121	0.065	2.03	(0.86, 1.14)	10.9	2.03	(0.87, 1.13)	11.9
15	TCO5	0.275	0.065	0.71	(0.86, 1.14)	-4.3	0.75	(0.87, 1.13)	-4.0
16	TCO6	0.484	0.066	0.59	(0.86, 1.14)	-6.5	0.64	(0.86, 1.14)	-5.9
17	TEF1	-0.922	0.072	0.95	(0.86, 1.14)	-0.6	0.99	(0.86, 1.14)	-0.2
18	TEF2	0.873	0.068	0.75	(0.86, 1.14)	-3.7	0.81	(0.86, 1.14)	-2.9
19	TEF3	-0.636*	0.068	1.15	(0.86, 1.14)	2.0	1.19	(0.87, 1.13)	2.6

An asterisk next to a parameter estimate indicates that it is constrained
^ Empirical standard errors have been used
Term is a fixed effect
Separation Reliability=0.992
Chi-square test of parameter equality=1946.93, df=18, Sig. Level=0.000

Item 19 [TEF3] was constrained to improve estimation and ensure model identification to augment the robustness and interpretability of the 19-item scale (Brown & Moore, 2012). The high separation reliability [0.992] in **Table RSM19.1** showed the hierarchy of item difficulty was

significant in confirming the adapted 19-item scale's measurement precision (Wu et al., 2007). The significant Chi-square statistic [χ^2 (18) = 1946.93, $p < .001$] indicated potential DIF. **Table RSM19.1** showed that item 14 [TCO4], "*It is easy for this team to obtain expert assistance when something comes up that we are not sure of how to handle*" was considered unsuitable for measuring *psychological safety* in secondary school student teams [weighted MNSQ = 2.03] (Wright & Masters, 1982). It was considered that item 14 [TCO4] was most likely difficult for the respondents to endorse comfortably because apart from their teachers and support staff, they may not necessarily have the need to seek the assistance of other experts external to the school site, so the item possibly lacked clarity (Bond & Fox, 2015). The weighted MNSQ of item 14 [TCO4] was also greater than 2.0 indicating unexplained randomness that may have distorted the adapted 19-item measurement scale (Linacre, 2002). To resolve the DIF and the distortion of the scale, item 14 [TCO4] was removed from the scale, leaving 18 items which were further assessed for their fairness and validity in measuring *psychological safety* in secondary school student teams.

4.6.6 Assessment of the Psychometric Properties of the Adapted 18-Item Scale

Table RSM18.1 shows the characteristics and quality of all the items spread within four identified latent variables (TLB, TPS, TCO, TEF) and the overall, adapted 18-item scale for measuring *psychological safety* in secondary school student team contexts, as assessed by the IRT model.

Table RSM18.1

Response Model Parameter Estimates of All Items for the Adapted 18-Item Scale with Four Latent Variables

TERM 1: item

	VARIABLES			UNWEIGHTED FIT			WEIGHTED FIT		
	item	ESTIMATE	ERROR^	MNSQ	CI	T	MNSQ	CI	T
1	TLB1	0.097	0.065	0.71	(0.86, 1.14)	-4.5	0.76	(0.87, 1.13)	-3.8
2	TLB2	0.254	0.065	0.59	(0.86, 1.14)	-6.5	0.63	(0.86, 1.14)	-6.1
3	TLB3	0.896	0.069	0.67	(0.86, 1.14)	-5.1	0.72	(0.86, 1.14)	-4.3
4	TLB4	0.234	0.065	0.51	(0.86, 1.14)	-8.2	0.57	(0.86, 1.14)	-7.3
5	TLB5	-1.204	0.075	0.83	(0.86, 1.14)	-2.5	0.84	(0.85, 1.15)	-2.1
6	TLB6	0.041	0.065	0.68	(0.86, 1.14)	-4.8	0.77	(0.87, 1.13)	-3.7
7	TLB7	-0.178	0.065	1.50	(0.86, 1.14)	5.9	1.51	(0.87, 1.13)	6.6
8	TLB8	-0.087	0.065	0.82	(0.86, 1.14)	-2.5	0.88	(0.87, 1.13)	-1.8
9	TLB9	1.062	0.071	0.78	(0.86, 1.14)	-3.3	0.82	(0.86, 1.14)	-2.5
10	TPS1	-0.883	0.071	1.07	(0.86, 1.14)	0.9	1.08	(0.86, 1.14)	1.1
11	TPS2	1.049	0.071	1.05	(0.86, 1.14)	0.8	1.09	(0.86, 1.14)	1.2
12	TPS3	-1.045	0.073	1.25	(0.86, 1.14)	3.2	1.24	(0.86, 1.14)	3.0
13	TPS4	0.046	0.065	2.06	(0.86, 1.14)	11.2	2.07	(0.87, 1.13)	12.1
14	TCO5	0.203	0.065	0.72	(0.86, 1.14)	-4.2	0.76	(0.86, 1.14)	-3.8
15	TCO6	0.415	0.066	0.58	(0.86, 1.14)	-6.7	0.63	(0.86, 1.14)	-6.0
16	TEF1	-0.999	0.072	0.96	(0.86, 1.14)	-0.5	0.99	(0.86, 1.14)	-0.2
17	TEF2	0.811	0.068	0.74	(0.86, 1.14)	-3.9	0.80	(0.86, 1.14)	-3.0
18	TEF3	-0.710*	0.069	1.16	(0.86, 1.14)	2.1	1.19	(0.87, 1.13)	2.7

An asterisk next to a parameter estimate indicates that it is constrained
^ Empirical standard errors have been used
Term is a fixed effect
Separation Reliability=0.991
Chi-square test of parameter equality=1652.90, df=17, Sig. Level=0.000

Item 18 [TEF3] was constrained to improve estimation and ensure model identification to augment the robustness and interpretability of the 18-item scale (Brown & Moore, 2012). The high separation reliability [0.991] in **Table RSM18.1** showed the hierarchy of item difficulty was significant in confirming the adapted 18-item scale's measurement precision (Wu et al., 2007). The significant Chi-square statistic [χ^2 (17) = 1652.90, p < .001] indicated potential DIF. **Table RSM18.1** showed that item 13 [TPS4], "*It is difficult to ask other members of this team for help*" was deemed as unsuitable for measuring *psychological safety* in secondary school student teams [weighted MNSQ = 2.07] (Wright & Masters, 1982). It was considered that although item 13 [TPS4] was suited to a student learning environment, it may have been the case that for the context of this research's participants, item 13 [TPS4] was misplaced or misunderstood by the respondents (Bond & Fox, 2015). The weighted MNSQ of item 13 [TPS4] was also greater than 2.0 indicating unexplained randomness that may have distorted the adapted 18-item measurement scale (Linacre, 2002). To

resolve the DIF and the distortion of the scale, item 13 [TPS4] was removed from the scale, leaving 17 items which were further assessed for their fairness and validity in measuring *psychological safety* in secondary school student teams.

4.6.7 Assessment of the Psychometric Properties of the Adapted 17-Item Scale

Table RSM17.1 shows the characteristics and quality of all the items spread within four identified latent variables (TLB, TPS, TCO, TEF) and the overall, adapted 17-item scale used for collecting data for measuring *psychological safety* in secondary school student team contexts, as assessed by the IRT model.

Table RSM17.1

Response Model Parameter Estimates of All Items for the Adapted 17-Item Scale with Four Latent Variables

TERM 1: item

	VARIABLES			UNWEIGHTED FIT			WEIGHTED FIT		
	item	ESTIMATE	ERROR^	MNSQ	CI	T	MNSQ	CI	T
1	TLB1	0.103	0.068	0.69	(0.86, 1.14)	-4.8	0.74	(0.86, 1.14)	-3.9
2	TLB2	0.273	0.068	0.56	(0.86, 1.14)	-7.1	0.60	(0.86, 1.14)	-6.5
3	TLB3	0.970	0.072	0.71	(0.86, 1.14)	-4.4	0.76	(0.86, 1.14)	-3.5
4	TLB4	0.252	0.068	0.50	(0.86, 1.14)	-8.5	0.56	(0.86, 1.14)	-7.3
5	TLB5	-1.290	0.078	0.86	(0.86, 1.14)	-1.9	0.87	(0.85, 1.15)	-1.8
6	TLB6	0.042	0.067	0.64	(0.86, 1.14)	-5.6	0.73	(0.86, 1.14)	-4.2
7	TLB7	-0.195	0.068	1.81	(0.86, 1.14)	9.0	1.77	(0.86, 1.14)	9.0
8	TLB8	-0.097	0.067	0.82	(0.86, 1.14)	-2.6	0.87	(0.86, 1.14)	-2.0
9	TLB9	1.148	0.074	0.87	(0.86, 1.14)	-1.8	0.93	(0.86, 1.14)	-0.9
10	TPS1	-0.947	0.073	1.16	(0.86, 1.14)	2.1	1.14	(0.86, 1.14)	2.0
11	TPS2	1.137	0.074	1.18	(0.86, 1.14)	2.3	1.20	(0.86, 1.14)	2.6
12	TPS3	-1.117	0.075	1.33	(0.86, 1.14)	4.2	1.29	(0.86, 1.14)	3.7
13	TCO5	0.221	0.068	0.74	(0.86, 1.14)	-3.9	0.78	(0.86, 1.14)	-3.3
14	TCO6	0.452	0.069	0.59	(0.86, 1.14)	-6.6	0.65	(0.86, 1.14)	-5.4
15	TEF1	-1.069	0.075	1.04	(0.86, 1.14)	0.5	1.05	(0.86, 1.14)	0.7
16	TEF2	0.879	0.071	0.82	(0.86, 1.14)	-2.7	0.87	(0.86, 1.14)	-1.8
17	TEF3	-0.762*	0.071	1.29	(0.86, 1.14)	3.7	1.31	(0.87, 1.13)	4.2

An asterisk next to a parameter estimate indicates that it is constrained
^ Empirical standard errors have been used
Term is a fixed effect
Separation Reliability=0.992
Chi-square test of parameter equality=1776.16, df=16, Sig. Level=0.000

Item 17 [TEF3] was constrained to improve estimation and ensure model identification to augment the robustness and interpretability of the 17-item scale for measuring *psychological safety* in secondary school student teams (Brown & Moore, 2012). The high separation reliability [0.992] in

Table RSM17.1 showed the hierarchy of item difficulty was significant in confirming the adapted 17-item scale's measurement precision (Wu et al., 2007). The significant Chi-square statistic [χ^2 (16) = 1776.16, p < .001] indicated potential DIF. **Table RSM17.1** showed that item 7 [TLB7], "*We regularly take time to figure out ways to improve our team's collaborative processes*" was considered unsuitable for measuring *psychological safety* in secondary school student teams [weighted MNSQ = 1.77] (Wright & Masters, 1982). It was considered that although item 7 [TLB7] was suited to a student learning environment, it may have been the case that for the context of this research's participants, item 7 [TLB7] was misplaced or misunderstood by the respondents (Bond & Fox, 2015) because in a school environment, students often rely on teachers for feedback for improvement more than their team members. To resolve the DIF, item 7 [TLB7] was removed from the scale, leaving 16 items which were further assessed for their fairness and validity in measuring *psychological safety* in secondary school student teams.

4.6.8 Assessment of the Psychometric Properties of the Adapted 16-Item Scale

Table RSM16.1 shows the characteristics and quality of all the items spread within four identified latent variables (TLB, TPS, TCO, TEF) and the overall, adapted 16-item scale for measuring *psychological safety* in secondary school student team contexts, as assessed by the IRT model.

Table RSM16.1

Response Model Parameter Estimates of All Items of the Adapted 16-Item Scale with Four Latent Variables

TERM 1: item

	VARIABLES			UNWEIGHTED FIT			WEIGHTED FIT		
	item	ESTIMATE	ERROR^	MNSQ	CI	T	MNSQ	CI	T
1	TLB1	0.114	0.067	0.71	(0.86, 1.14)	-4.5	0.75	(0.86, 1.14)	-3.8
2	TLB2	0.281	0.067	0.59	(0.86, 1.14)	-6.6	0.62	(0.86, 1.14)	-6.2
3	TLB3	0.967	0.072	0.71	(0.86, 1.14)	-4.4	0.76	(0.86, 1.14)	-3.6
4	TLB4	0.261	0.067	0.51	(0.86, 1.14)	-8.3	0.57	(0.86, 1.14)	-7.2
5	TLB5	-1.270	0.078	0.85	(0.86, 1.14)	-2.1	0.86	(0.85, 1.15)	-1.9
6	TLB6	0.058	0.067	0.66	(0.86, 1.14)	-5.2	0.74	(0.86, 1.14)	-4.0
7	TLB8	-0.175	0.067	1.74	(0.86, 1.14)	8.3	1.71	(0.87, 1.13)	8.6
8	TLB9	-0.075	0.067	0.83	(0.86, 1.14)	-2.5	0.87	(0.86, 1.14)	-1.9
9	TPS1	1.152	0.073	0.85	(0.86, 1.14)	-2.2	0.91	(0.86, 1.14)	-1.2
10	TPS2	-0.917	0.073	1.16	(0.86, 1.14)	2.1	1.15	(0.86, 1.14)	2.1
11	TPS3	1.140	0.073	1.13	(0.86, 1.14)	1.7	1.17	(0.86, 1.14)	2.2
12	TCO5	-1.090	0.075	1.34	(0.86, 1.14)	4.2	1.29	(0.86, 1.14)	3.7
13	TCO6	0.462	0.068	0.59	(0.86, 1.14)	-6.6	0.64	(0.86, 1.14)	-5.7
14	TEF1	-1.047	0.075	1.08	(0.86, 1.14)	1.1	1.07	(0.86, 1.14)	1.0
15	TEF2	0.880	0.071	0.79	(0.86, 1.14)	-3.1	0.85	(0.86, 1.14)	-2.2
16	TEF3	-0.742*	0.071	1.26	(0.86, 1.14)	3.3	1.29	(0.87, 1.13)	3.9

An asterisk next to a parameter estimate indicates that it is constrained
^ Empirical standard errors have been used
Term is a fixed effect
Separation Reliability=0.993
Chi-square test of parameter equality=1746.31, df=15, Sig. Level=0.000

Item 16 [TEF3] was constrained to improve estimation and ensure model identification to augment the robustness and interpretability of the 16-item scale (Brown & Moore, 2012). The high separation reliability [0.993] in **Table RSM16.1** showed the hierarchy of item difficulty was significant in confirming the adapted 16-item scale's excellent measurement precision (Wu et al., 2007). The significant Chi-square statistic [χ^2 (15) = 1746.31, p < .001] indicated potential DIF. **Table RSM16.1** showed item 7 [TLB8], "*This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group*" was deemed unsuitable for measuring *psychological safety* in secondary school student teams [weighted MNSQ = 1.71]. Item 7 [TLB8] was most likely misconstrued by the respondents as this generation of secondary school students tend to use digital apps such as Instagram, Snapchat, and TikTok for varied communication purposes instead of face-to-face meetings or even emails. Item 7 [TLB8] was, therefore, left in the scale but flagged for rewording.

Consequently, for the adapted 16-item scale with four latent variables (TLB, TPS, TCO, TEF), the weighted MNSQ value range for the items did not fall within the acceptable range of 0.57 – 1.71 (Tesio, 2003). This indicated the adapted 16-item scale fit the Rasch model (Rasch, 1960) but had some likely randomness that distorted the measurement scale (Linacre, 2002). This distortion caused by Item 7 [TLB8] is, however, explained. The 16-item scale also had the TCO variable ending up with two items that could also present significant validity and reliability challenges for the adapted 16-item scale. For SEM statistics, the default model fit assessment from the results of the CFA in IBM SPSS AMOS (v29) for the adapted 16-item scale with four latent variables (TLB, TPS, TCO, TEF) was unavailable. This model's identification was not achieved despite constraining at least one factor loading to 1 for each of the four latent variables (TLB, TPS, TCO, TEF) to set the scale. Each latent variable in the model requires at least three items to achieve identification, however TCO had only two items, which most probably made the model under-identified. To address these issues, a composite latent variable could be created, but first, a principal components analysis (PCA) was performed in IBM SPSS (v29) to ensure that the item removals had not affected the factor structure of the adapted 16-item scale (Stevens, 1992).

4.7 Examination of the Factor Structure of the Adapted 16-Item cale

PCA used principal components (underlying factors) to identify and explain the relationship patterns (factors) among the items (observed indicators) (Hoyle, 1995; Smith, 2002) of the adapted 16-item scale for measuring *psychological safety* in secondary school student team contexts. The results of the factor structure examination in **Table PCA16.1** (**Appendix J**) indicated the data collected with the adapted 16-item scale for measuring *psychological safety* in secondary school student team contexts was marvellous [KMO = .912] (Kaiser, 1974) and the observed correlation matrix diverged significantly from the identity matrix [χ^2 (120) = 4710.539, $p < .001$] (Snedecor & Cochran, 1998). This confirmed the latent variables (factors) of the 16-item scale were sufficiently correlated to enable a meaningful extraction of distinct and reliable factors for adequate analysis (Silva et al., 2014).

The dimensionality of the four principal components in the adapted 23-item scale in **Table PCA23.3** (**4.4.1**) was reduced in the scale validation process to three principal components in the adapted 16-item scale for a more parsimonious and interpretable scale (Joliffe & Cadima, 2016). These three, extracted principal components with eigenvalue ≥ 1 (Guttman, 1954; Kaiser, 1960) explained 70% of the total variance in the relationship patterns among the three principal components that contributed significantly to the overall structure of the adapted 16-item scale (**Table PCA16.2** in **Appendix J**). **Table PCA16.2** (**Appendix J**) showed the first principal component explained 46% of the data's total variance.

Varimax rotation was used to establish each item's behaviour in relation to measuring the three latent variables within the adapted 16-item scale (Grieder & Steiner, 2022). Varimax rotation also evaluated the validity and reliability of the scale (Bartholomew et al., 2011; Kline 2014). **Table PCA16.3** (**Appendix J**) shows the factor loadings for the Varimax-rotated, 16 items in the dataset (Gorsuch, 1983). **Table PCA16.3** (**Appendix J**) showed that with Varimax rotation, the convergent validity of the adapted 16-item scale was confirmed because all the items loaded on at least one component indicating that the items reflected or measured the three, identified latent variables or principal components or factors of *psychological safety* in secondary school student team contexts. The discriminant validity of the adapted 16-item scale was not confirmed because five items: (1) "*This team lacks access to useful instruction or training to complete a task*"; (2) "*If you make a mistake on this team, it is often held against you*"; (3) "*People on this team sometimes reject others for being different*"; (4) "*This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group*"; and (5) "*Others in the school community who interact with this team often complain about how it functions*" cross-loaded on two components, 1 and 2 (Costello & Osborne, 2005; Asparouhov & Muthen, 2009). The cross-loading was most likely due to collinearity of items where two or more items are correlated (Asparouhov et al., 2015; Lucas et al., 1996), methodological issues, or participant characteristics (Braeken & van Assen, 2017). The three, listed items may have been worded in a manner that was confusing to the respondents making them

ambiguous and potentially highly correlated and thereby causing them to become associated simultaneously with more than one concept (Shrestha, 2020).

The cross-loadings indicated in the data compromised its stability in determining the factor structure (Li et al., 2020), so an oblique rotation, Promax rotation was employed to eliminate the cross-loadings in order to recover the underlying factor structure of the adapted 16-item scale to improve the fit of the correlated factors to the data (Finch, 2006). **Table PCA16.4** showed the three principal component loadings of the 16-item scale had a mix of items that did not align with the items that distinctly represented each of the original, six variables (CTD, TEF, TCO, TLB, TPS, TPE) Edmondson (1999) as well as from the previous, four variables (TLB, TPS, TCO, TEF) of *psychological safety* in secondary school student team contexts, as detailed by the adapted 23-item scale from Edmondson (1999). After the PCA results revealed the factor structure with the extraction of three components with eigenvalues greater than 1 (**Table PCA16.2** in **Appendix J**), the two redundant TCO items were combined with the TEF items (**Table PCA16.4**), leading to a 16-item scale with three latent variables (TLB, TPS, TEF). This justified the need to re-establish the validity and reliability of the adapted 16-item scale.

Table PCA16.4

Pattern Matrix Resulting from the Promax (Oblique) Rotations of the Factor Loadings for the Adapted 16-Item Scale

Items (Observed indicators of psychological safety)	Component		
	1	2	3
This team has spent time making sure every team member understands the team's objectives.	.959		
In this team, we often speak up to test assumptions about the issues we have under discussion.	.905		
This team lacks access to useful instruction or training to complete a task.	.435	.495	
Team members go out and get all the information they possibly can from others to accomplish a task such as peers, parents and teachers.	.914		
All the members of this team have more than enough training and experience for the kind of task they have to do.			.549
Most people on this team have the ability to solve the problems that come up in our tasks.	.993		
Certain individuals in this team lack the special skills needed for good team collaboration.	-.429	.919	
With focus and effort, this team can do anything we set out to accomplish.	1.013		
If you make a mistake on this team, it is often held against you.		.819	
Members of this team are able to bring up problems and tough issues.			.786
People on this team sometimes reject others for being different.		.807	
It is safe to take a risk on this team.			.708
This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group.	.736		
This team frequently seeks new information that leads us to make important changes.			.692
Others in the school community who interact with this team often complain about how it functions.	.417	.570	
We invite people from outside the team to present information or have discussions with us.			.656

Extraction Method: Principal Component Analysis
Rotation Method: Promax with Kaiser Normalization
a. Rotation converged in 6 iterations

Table PCA16.4 showed that Promax rotation did not improve the discriminant validity of the adapted 16-item scale because three items continued to cross-load on components 1 and 2 (Schmitt & Sass, 2011). This lack of proper loading could be due to the aforementioned items not having enough variance to measure *psychological safety* in collaborating secondary school student teams or

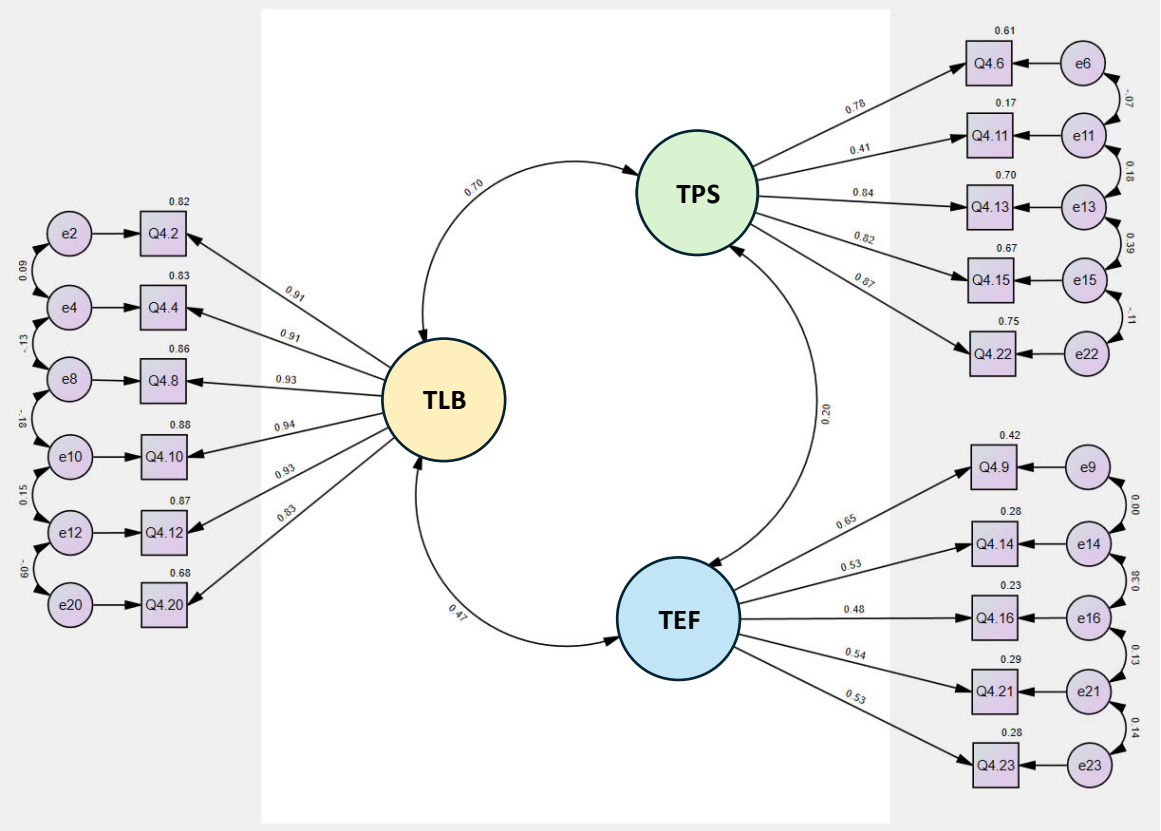
a lack of clarity and ambiguity in their wordings leading to interpretive difficulty for the respondents (Bond & Fox, 2015). **Table PCA16.5** (**Appendix J**) showed the excellent reliability [α = .907] (Cronbach, 1951) of all the items of the adapted 16-item scale. To further establish its construct validity, however, it was necessary to confirm whether the 16 items in the scale were loading onto the three components as expected and measuring *psychological safety* in secondary school student team contexts as intended. For this purpose, the model fit of the adapted 16-item scale was examined with confirmatory factor analysis (CFA).

4.8 Examination of the Model Fit of the Adapted 16-Item Scale

In IBM SPSS AMOS (v29), CFA was used to confirm whether the data supports the hypothesised model of the of the 16-item scale. To scale the latent variables (TLB, TPS, TEF) based on the variance and fixed loading of one of the latent variable's items, test the hypotheses (H_{01}, H_{02}, H_{03}), improve model fit, address multicollinearity, ensure model identification and meaningful parameters for interpretability, TLB1 [Q4.2], TPS5 [Q4.22], and TEF5 [Q4.23] were constrained to 1, as a reference point for interpreting other factor loadings in the three, identified, latent variables (TLB, TPS, TEF) (Brown & Moore, 2012; Hu & Bentler, 1999). **Figure CFA16.1** shows a highly flexible and comprehensive extension of multiple regression that offered a pictorial analysis of the factor framework of the adapted 16-item scale with three latent variables (TLB, TPS, TEF) used for collecting data for measuring *psychological safety* in secondary school student team contexts (Bowen & Guo, 2011).

Figure CFA16.1

Model Structure Showing the Path Diagram of 16 Items Spread Within Three Latent Variables of the Adapted 16-Item Scale



Note. TEF – team efficacy; TLB – team learning behaviours; TPS – team psychological safety; TPE – team performance; e- error; Q - question

Providing a comprehensive assessment of the adapted 16-item scale's model fit, **Table CFA16.1** (**Appendix J**) showed RMSEA [0.077] was considered good (Hu & Bentler, 1998), indicating the adapted 16-item scale's model fit the data well (Browne & Cudeck, 1993; Kenny et al., 2020). CFI [.929] was considered good (Bollen, 1989; Kenny, 2015), indicating the proposed model of *psychological safety* in secondary school student team contexts captured a significant amount of variance and covariance, and adequately reproduced the relationships among the latent variables (TLB, TPS, TEF) in the observed data (Xia & Yang, 2019). With the model fit values, overall, the adapted 16-item *psychological safety* model was deemed a good fit (Browne & Cudeck, 1993; Kenny

et al., 2020). The Chi-square statistic (CMIN) [417.56] (**Table CFA16.1** in **Appendix J**) was however significant [$p < .001$] indicating the presence of DIF. To resolve the DIF, the adapted 16-item scale required revision to improve its fit by evaluating the quality of its items to ensure they accurately represented the underlying data, were interpretable, and performed when measuring *psychological safety* in secondary school student team contexts.

4.9 Item-Level Analysis of the Adapted 16-Item Scale with Three Latent Variables

To ensure that the structure and operation of the 16-item scale was robust and stable in measuring *psychological safety* in the secondary school student team contexts, Rasch RSM analysis (Andrich, 1978; Rasch, 1960; Wright & Stone, 1979) was used to analyse the psychometric properties of the individual items of the adapted 16-item scale in ACER ConQuest 5.0 (Adams et al., 2020). Command syntaxes were created for the data (dat.txt) file, label (lab.txt) file and command (cqc) statement for analysing each item within the three latent variables (TLB, TPS, TEF) of the adapted 16-item scale. The command statements were run through an executed command on the ACER ConQuest 5.0 (Adams et al., 2020) input interface.

After the iterations, the graphical and tabulated representation of the results such as the item parameter estimates (shw.txt), the traditional item statistics (itn.txt) the population parameter estimates, the discrimination of the items as well as their levels of difficulty for the respondents to endorse comfortably (De Ayala, 2009; Edelen & Reeve, 2007; Lord, 1952; Lord & Novick, 1968) were displayed on the ACER ConQuest 5.0 (Adams et al., 2020) output interface. Items with weighted MNSQ values that fell outside the acceptable value range of 0.6 to 1.4 (Tesio, 2003) indicated overfitting or redundant items (Boone et al., 2014; Malec et al., 2007), which were flagged for revision or removal from the 16-item scale.

4.9.1 Assessment of the Psychometric Properties of the Adapted 16-Item Scale with Three Latent Variables

Table RSM16.2 shows the characteristics and quality of all the items spread within three identified latent variables (TLB, TPS, TEF) and the overall, adapted 16-item scale used for collecting data for measuring *psychological safety* in secondary school student team contexts, as assessed by Rasch RSM (Andrich, 1978; Rasch, 1960).

Table RSM16.2

Response Model Parameter Estimates of All Items Spread Within Three Identified Latent Variables for the Adapted 16-Item Scale

TERM 1: item

VARIABLES				UNWEIGHTED FIT			WEIGHTED FIT		
	item	ESTIMATE	ERROR^	MNSQ	CI	T	MNSQ	CI	T
1	TLB1	0.114	0.067	0.71	(0.86, 1.14)	-4.5	0.75	(0.86, 1.14)	-3.8
2	TLB2	0.281	0.067	0.59	(0.86, 1.14)	-6.6	0.62	(0.86, 1.14)	-6.2
3	TLB3	0.967	0.072	0.71	(0.86, 1.14)	-4.4	0.76	(0.86, 1.14)	-3.6
4	TLB4	0.261	0.067	0.51	(0.86, 1.14)	-8.3	0.57	(0.86, 1.14)	-7.2
5	TLB5	-1.270	0.078	0.85	(0.86, 1.14)	-2.1	0.86	(0.85, 1.15)	-1.9
6	TLB6	0.058	0.067	0.66	(0.86, 1.14)	-5.2	0.74	(0.86, 1.14)	-4.0
7	TPS1	-0.175	0.067	1.74	(0.86, 1.14)	8.3	1.71	(0.87, 1.13)	8.6
8	TPS2	-0.075	0.067	0.83	(0.86, 1.14)	-2.5	0.87	(0.86, 1.14)	-1.9
9	TPS3	1.152	0.073	0.85	(0.86, 1.14)	-2.2	0.91	(0.86, 1.14)	-1.2
10	TPS4	-0.917	0.073	1.16	(0.86, 1.14)	2.1	1.15	(0.86, 1.14)	2.1
11	TPS5	1.140	0.073	1.13	(0.86, 1.14)	1.7	1.17	(0.86, 1.14)	2.2
12	TEF1	-1.090	0.075	1.34	(0.86, 1.14)	4.2	1.29	(0.86, 1.14)	3.7
13	TEF2	0.462	0.068	0.59	(0.86, 1.14)	-6.6	0.64	(0.86, 1.14)	-5.7
14	TEF3	-1.047	0.075	1.08	(0.86, 1.14)	1.1	1.07	(0.86, 1.14)	1.0
15	TEF4	0.880	0.071	0.79	(0.86, 1.14)	-3.1	0.85	(0.86, 1.14)	-2.2
16	TEF5	-0.742*	0.071	1.26	(0.86, 1.14)	3.3	1.29	(0.87, 1.13)	3.9

An asterisk next to a parameter estimate indicates that it is constrained
^ Empirical standard errors have been used
Term is a fixed effect
Separation Reliability=0.993
Chi-square test of parameter equality=1746.31, df=15, Sig. Level=0.000

Item 16 [TEF5] was constrained to improve estimation and ensure model identification to augment the robustness and interpretability of the 16-item scale (Brown & Moore, 2012). The high separation reliability [0.993] in **Table RSM16.2** showed the hierarchy of item difficulty was significant in confirming the adapted 16-item scale's measurement precision (Wu et al., 2007). The significant Chi-square statistic [χ^2 (15) = 1746.31, p < .001] indicated potential DIF. **Table RSM16.2** showed that item 7 [TPS1], "*This team lacks access to useful instruction or training to complete a*

task" was considered unsuitable for measuring *psychological safety* in secondary school student teams [weighted MNSQ = 1.71] (Wright & Masters, 1982). It was considered that although item 7 [TPS1] was suited to a student learning environment, it may have been the case that for the context of this research's participants, item 7 [TPS1] was misconstrued by the respondents (Bond & Fox, 2015) because in their school context, students may not be as familiar with the keywords in item 7 [TPS1]'s such as "instruction" and "training"; but rather the keyword, 'teaching'. For the purposes of teaching and learning in the school environment (Hattie, 2012), item 7 [TPS1] was left in the 16-item scale but flagged for rewording to resolve the DIF bias.

This may have also been the case for item 7 [TLB8], "*This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group*" (**Table RSM16.1** in **4.6.8**)**.** With a 'high' weighted MNSQ of 1.71, item 7 [TLB8], which was most likely misconstrued by the respondents as this generation of secondary school students increasingly tend to use digital apps such as Instagram, Snapchat, and TikTok for varied communication purposes instead of face-to-face meetings or even emails, was left in the 16-item scale and flagged for rewording too. Item 7 [TLB8] (**Table RSM16.1** in **4.6.8**) now item 6 [TLB6] in **Table RSM16.2,** fit the Rasch model (Andrich, 1978; Rasch, 1960) [weighted MNSQ = 0.74].

For the adapted 16-item scale with three latent variables (TLB, TPS, TEF), the weighted MNSQ value range for the items fell within 0.57 – 1.71, which was considered to be outside the weighted MNSQ range of 0.6 – 1.4 (Tesio, 2003). This indicated the adapted 16-item scale fit the Rasch model but had some likely randomness from the misfitting item 7 [TPS1] [weighted MNSQ = 1.71] that distorted the measurement scale for *psychological safety* in secondary school student team contexts (Linacre, 2002). The potential distortion in the adapted 16-item scale caused by the potential DIF bias from item 7 [TPS1] in **Table RSM16.2**, which was considered to have functioned differently for different participant groups (i.e., ethnicity, identity, year group in **Tables DST.2 - DST.4**), required further investigation. It was expected that with future testing, the reworded items would eliminate the detected DIF bias by performing equivalently across the researched participant

groups where all participants would have an equal opportunity to demonstrate their true ability. To maintain the fairness, quality, equity and content validity of the adapted 16-item scale, item 7 [TLB8] in **Table RSM16.1** and item 7 [TPS1] in **Table RSM16.2** were reworded to ensure that they still contextually measured team learning behaviours (TLB) and team psychological safety (TPS), respectively, in secondary school student team contexts without bias.

The rewording of item 7 [TLB8] in **Table RSM16.1** and item 7 [TPS1] in **Table RSM16.2** also permitted for minimal disruption to the scale's overall content coverage and factor structure thereby contributing to its overall internal consistency and reliability (Clark, & Watson, 2016).

1. Original item 7 [TLB8] in **Table RSM16.1**:

- "*This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group.*"

Identified nature of bias:

- The context of collaborative communication for this research's participants who are of the Generation Z era [2000 -] (Berkup, 2014) is an adaptable use of text-savviness for effective communication through social media (Turner, 2015).

Reworded item 7 [TLB8] in **Table RSM16.1**:

- "*This team tends to handle differences of opinion with social media rather than addressing them directly through face-to-face meetings.*"

2. Original item 7 [TPS1] in **Table RSM16.2**:

- "*This team lacks access to useful instruction or training to complete a task.*"

Identified nature of bias:

- Teaching and learning for this research's adolescent participants involve teaching by teachers who facilitate their motivation to learn (Ayers, 2015; Johnson, 2017), and not necessarily termed as "instruction" and "training" in the Australian secondary school education context. "Training" for this research's participants' context was most likely

perceived as being an apprentice-based teaching method such as for students in vocational education and training (VET).

Reworded item 7 [TLB8] in **Table RSM16.1**:

- "*This team lacks access to helpful teaching, instruction or support that helps us to complete a task properly.*"

4.10 Justifying the Adapted 16-Item Scale with Three Latent Variables

The validation process of the adapted 23-item scale used for collecting data to measure *psychological safety* in secondary school student team contexts involved a scale revision process that resulted in an adapted 16-item scale of three latent variables (TLB, TPS, TEF), assessed as the most plausible used for collecting data for measuring *psychological safety* in secondary school student team contexts. **Table MSM4.2** shows the summarised comparison of the relevance and quality of the items in the seven, adapted measurement scales that resulted from the statistical analyses techniques of PCA, CFA and Rasch RSM.

Table MSM4.2

Comparison of the Measurement Properties of Seven Adapted Scales Resulting from the Scale Revision Process of the Adapted 23-Item Scale

Statistical analysis		Measurement	23 items	22 items	21 items	20 items	19 items	18 items	17 items	16 items
PCA		Sampling adequacy	.921							.912
		Internal consistency	.907							.908
CFA	Model fit statistics	CMIN/DF	4.80							4.75
		RMSEA	.077							.077
		CFI	.869							.929
Population distribution		Mean	74.81	71.10	67.13	63.24	60.12	56.26	53.16	50.15
		Standard deviation	11.98	11.68	11.51	11.35	10.94	10.71	10.50	9.70
		Variance	143.45	136.47	132.42	128.85	119.62	114.77	110.33	94.07
Rasch RSM	Item fit statistics	Chi-square statistic	2673.88	2537.59	2216.38	1936.86	1946.93	1652.90	1776.16	1746.31
		Significance level	< .001	< .001	< .001	< .001	< .001	< .001	< .001	< .001
		Separation reliability	.993	.993	.992	.992	.992	.991	.992	.993
		Coefficient alpha	.91	.91	.91	.91	.91	.91	.92	.91
		Weighted MNSQ range	0.61 - 1.92	0.61 – 1.92	0.61 - 1.94	0.62 – 1.94	0.58 – 2.03	0.57 – 2.07	0.56 – 1.77	0.57 – 1.71

Note. PCA – principal component analysis; CFA – confirmatory factor analysis; RSM – rating scale model; CMIN – Chi-square; DF – degrees of freedom; CMIN/DF – normed chi-square; RMSEA – root mean square error of approximation; CFI – comparative fit index; MNSQ – mean square fit statistic.

Table MSM4.2 confirmed the 16-item scale with three latent variables (TLB, TPS, TEF) shown in **Table PLS4.1** was, for now, the most plausible scale used for collecting data validly, and effectively measuring *psychological safety* in secondary school student team contexts.

Table PLS4.1

The Plausible 16-Item Scale with Three Latent Variables, TLB, TPS and TEF

#	Latent variable		Item	Weighted MNSQ
1	Team Learning Behaviours (TLB)	TLB1	This team has spent time making sure every team member understands the team's objectives.	0.75
2		TLB2	In this team, we often speak up to test assumptions about the issues we have under discussion.	0.62
3		TLB3	Team members go out and get all the information they possibly can from others to accomplish a task such as peers, parents and teachers.	0.76
4		TLB4	Most people on this team have the ability to solve the problems that come up in our tasks.	0.57
5		TLB5	With focus and effort, this team can do anything we set out to accomplish.	0.86
6		TLB6	This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group.	0.74
7	Team Psychological Safety (TPS)	TPS1	This team lacks access to useful instruction or training to complete a task.	1.71
8		TPS2	Certain individuals in this team lack the special skills needed for good team collaboration.	0.87
9		TPS3	If you make a mistake on this team, it is often held against you.	0.91
11		TPS4	People on this team sometimes reject others for being different.	1.15
11		TPS5	Others in the school community who interact with this team often complain about how it functions.	1.17
12	Team Efficacy (TEF)	TEF1	All the members of this team have more than enough training and experience for the kind of task they have to do.	1.29
13		TEF2	Members of this team are able to bring up problems and tough issues.	0.64
14		TEF3	It is safe to take a risk on this team.	1.07
15		TEF4	People on this team sometimes reject others for being different.	0.85
16		TEF5	We invite people from outside the team to present information or have discussions with us.	1.29

A critical analysis of the properties and qualities of the individual items of the adapted 16-item scale and the scale's overall performance was undertaken in terms of the examination of their

discrimination capacity, item difficulty and measurement suitability to ascertain that the scale was justifiably appropriate for measuring *psychological safety* in secondary school student teams. The generalised item analysis of the adapted 16-item scale with three latent variables (TLB, TPS, TEF) provided valuable insights that may assist education practitioners and future researchers with the interpretation and use of the scale for measuring *psychological safety* in secondary school student team contexts.

4.11 Results for the Generalised Item Analysis of the Adapted 16-Item Scale

Having discovered the adapted 16-item scale's model fit [0.6 ≤ MNSQ ≤ 1.4] was good overall, and the scale's model captured the underlying patterns in the data well, confidence was offered that the statistical model represented the data it was built upon. A generalised item analysis was thereby conducted to ensure the reliability, validity, effectiveness, and overall performance of the adapted 16-item scale. The item-level analysis provided valuable insights into the properties of the 16 items spread within the three latent variables (TLB, TPS, TEF) such as item discrimination and item difficulty.

4.11.1 An Overview of the Psychometric Properties of the Item Groups of the Adapted 16-Item Scale

The latent TLB variable was measured using six items, TLB1 – TLB6, the latent TPS variable was measured using five items, TPS1 – TPS5, and the latent TEF variable was measured using five items, TEF1 – TEF5. Each item was rated using a 5-point Likert scale ranging from "Strongly disagree" to "Strongly agree" (**Table MSM4.1** in **4.2**). **Table RSM16.3** (**Appendix J**) graphically represents the measurement precision for all the items in the adapted 16-item scale that determine the degree of information the latent TLB, TPS and TEF variables contribute to the measurement of *psychological safety* in secondary school student team contexts.

The tabulated, summarised results of the Rasch RSM analyses (Andrich, 1978; Rasch, 1960) in **Table MSM4.3** provides information about the precision of the adapted 16-item scale in terms of the 372 respondents' abilities, the 16 items' difficulties, their capacities to discriminate between high and low performing respondents, their fit to the Rasch RSM model (Andrich, 1978; Rasch, 1960), and their relationships among the three latent variables (TLB, TPS, TEF) that measure *psychological safety* in secondary school student team contexts

Table MSM4.3

Summary of the Measurement Properties for All Items of the TLB, TPS and TEF Latent Variables of the 16-Item Scale

Team Learning Behaviour (TLB) latent variable				
Item		**Item difficulty**	**Item discrimination**	**Item fit**
1	This team has spent time making sure every team member understands the team's objectives.	High difficulty	High discrimination item-total correlation coefficient [0.84]	Under fit (>1.4)
TLB1		Suitable difficulty deltas [3.37 0.32 -0.16 3.66]	Moderate discrimination	Good fit (.6 – 1.4) weighted MNSQ [0.75]
		Low difficulty	Poor discrimination	Over fit (< .6)
Reliability		**Strong** contribution to the scale's internal consistency - item-rest correlation [0.80]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-3.40 -0.28 0.45 3.68]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [3.37 0.32 -0.16 3.66]		
Item		**Item difficulty**	**Item discrimination**	**Item fit**
2	In this team, we often speak up to test assumptions about the issues we have under discussion.	High difficulty	High discrimination item-total correlation coefficient [0.86]	Under fit (> 1.4)
TLB2		Suitable difficulty deltas [-3.20 0.49 0.01 3.83]	Moderate discrimination	Good fit (.6 – 1.4) weighted MNSQ [0.62]
		Low difficulty	Poor discrimination	Over fit (< .6)
Reliability		**Strong** contribution to the scale's internal consistency - item-rest correlation [0.83]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-3.23 -0.11 0.61 3.85]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-3.20 0.49 0.01 3.83]		
Item		**Item difficulty**	**Item discrimination**	**Item fit**
3	Team members go out and get all the information they possibly can from others to accomplish a task such as	High difficulty deltas [-2.52 1.18 0.70 4.51]	High discrimination item-total correlation coefficient [0.73]	Under fit (> 1.4)
TLB3		Suitable difficulty	Moderate discrimination	Good fit (.6 – 1.4) weighted MNSQ [0.76]

	peers, parents and teachers.	Low difficulty	Poor discrimination	Over fit (.6)
Reliability		**Strong** contribution to the scale's internal consistency - item-rest correlation [0.68]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-2.54 0.58 1.30 4.53]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-2.52 1.18 0.70 4.51]		
Item		**Item difficulty**	**Item discrimination**	**Item fit**
4	Most people on this team have the ability to solve the problems that come up in our tasks.	High difficulty	High discrimination item-total correlation coefficient [0.87]	Under fit (> 1.4)
TLB4		Suitable difficulty deltas [-3.22 0.47 -0.01 3.81]	Moderate discrimination	Good fit (.6 – 1.4) weighted MNSQ [0.57]
		Low difficulty	Poor discrimination	Over fit (< .6)
Reliability		**Strong** contribution to the scale's internal consistency - item-rest correlation [0.84]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-3.25 -0.13 0.59 3.83]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-3.22 0.47 -0.01 3.81]		
Item		**Item difficulty**	**Item discrimination**	**Item fit**
5	With focus and effort, this team can do anything we set out to accomplish.	High difficulty	High discrimination	Under fit (> 1.4)
TLB5		Suitable difficulty	Moderate discrimination item-total correlation coefficient [0.43]	Good fit (.6 – 1.4) weighted MNSQ [0.86]
		Low difficulty deltas [-4.75 -1.06 -1.54 2.28]	Poor discrimination	Over fit (< .6)
Reliability		**Acceptable** contribution to the scale's internal consistency - item-rest correlation [0.37]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-4.78 -1.66 -0.94 2.30]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-4.75 -1.06 -1.54 2.28]		
Item		**Item difficulty**	**Item discrimination**	**Item fit**
6	This team tends to handle differences of opinion	High difficulty	High discrimination item-total correlation coefficient [0.84]	Under fit (> 1.4)

TLB6	privately or offline, rather than addressing them directly as a group.	Suitable difficulty disordered deltas [-3.43 0.27 -0.21 3.60]	Moderate discrimination	Good fit (.6 – 1.4) weighted MNSQ [0.74]
		Low difficulty	Poor discrimination	Over fit (< .6)
Reliability		**Strong** contribution to the scale's internal consistency - item-rest correlation [0.81]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-3.45 -0.33 0.39 3.62]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-3.43 0.27 -0.21 3.60]		
Team Psychological Safety (TPS) latent variable				
Item		**Item difficulty**	**Item discrimination**	**Item fit**
7 **TPS1**	This team lacks access to useful instruction or training to complete a task.	High difficulty	High discrimination	Under fit (> 1.4) weighted MNSQ [1.71]
		Suitable difficulty deltas [-3.66 0.04 -0.45 3.37]	Moderate discrimination item-total correlation coefficient [0.30]	Good fit (.6 – 1.4)
		Low difficulty	Poor discrimination	Over fit (< .6)
Reliability		**Weak** contribution to the scale's internal consistency - item-rest correlation [0.21]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-3.68 -0.56 0.16 3.39]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-3.66 0.04 -0.45 3.37]		
Item		**Item difficulty**	**Item discrimination**	**Item fit**
8 **TPS2**	Certain individuals in this team lack the special skills needed for good team collaboration.	High difficulty	High discrimination item-total correlation coefficient [0.84]	Under fit (> 1.4)
		Suitable difficulty deltas [-3.56 0.13 -0.35 3.47]	Moderate discrimination	Good fit (.6 – 1.4) weighted MNSQ [0.87]
		Low difficulty	Poor discrimination	Over fit (< .6)
Reliability		**Strong** contribution to the scale's internal consistency - item-rest correlation [0.80]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-3.58 -0.47 0.26 3.49]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-3.56 0.13 -0.35 3.47]		

Item 9	If you make a mistake on this team, it is often held against you.	**Item difficulty**	**Item discrimination**	**Item fit**
		High difficulty deltas [-2.33 1.36 0.88 4.70]	High discrimination item-total correlation coefficient [0.71]	Under fit (> 1.4)
TPS3		Suitable difficulty	Moderate discrimination	Good fit (.6 – 1.4) weighted MNSQ [0.91]
		Low difficulty	Poor discrimination	Over fit (< .6)
Reliability		**Strong** contribution to the scale's internal consistency - item-rest correlation [0.65]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-2.36 0.76 1.49 4.72]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-2.33 1.36 0.88 4.70]		
Item 10	People on this team sometimes reject others for being different.	**Item difficulty**	**Item discrimination**	**Item fit**
		High difficulty	High discrimination	Under fit (> 1.4)
		Suitable difficulty	Moderate discrimination item-total correlation coefficient [0.33]	Good fit (.6 – 1.4) weighted MNSQ [1.15]
TPS4		Low difficulty deltas [-4.40 -0.71 -1.19 2.63]	Poor discrimination	Over fit (< .6)
Reliability		**Acceptable** contribution to the scale's internal consistency - item-rest correlation [0.26]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-4.43 -1.31 -0.58 2.65]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-4.40 -0.71 -1.19 2.63]		
Item 11	Others in the school community who interact with this team often complain about how it functions.	**Item difficulty**	**Item discrimination**	**Item fit**
		High difficulty deltas [-2.34 1.35 0.87 4.69]	High discrimination item-total correlation coefficient [0.68]	Under fit (> 1.4)
TPS5		Suitable difficulty	Moderate discrimination	Good fit (.6 – 1.4) weighted MNSQ [1.17]
		Low difficulty	Poor discrimination	Over fit (< .6)
Reliability		**Strong** contribution to the scale's internal consistency - item-rest correlation [0.62]		

Design of response categories by researcher		Well-designed response categories - ordered thresholds [-2.37 0.75 1.47 4.71]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-2.34 1.35 0.87 4.69]		
Team Efficacy (TEF) latent variable				
Item		**Item difficulty**	**Item discrimination**	**Item fit**
12	All the members of this team have more than enough training and experience for the kind of task they have to do.	High difficulty	High discrimination	Under fit (> 1.4)
		Suitable difficulty	Moderate discrimination item-total correlation coefficient [0.32]	Good fit (.6 – 1.4) weighted MNSQ [1.29]
TEF1		Low difficulty deltas [-4.57 -0.88 -1.36 2.46]	Poor discrimination	Over fit (< .6)
Reliability		**Acceptable** contribution to the scale's internal consistency - item-rest correlation [0.25]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-4.60 -1.48 -0.76 2.48]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-4.57 -0.88 -1.36 2.46]		
Item		**Item difficulty**	**Item discrimination**	**Item fit**
13	Members of this team are able to bring up problems and tough issues.	High difficulty	High discrimination item-total correlation coefficient [0.85]	Under fit (> 1.4)
		Suitable difficulty deltas [-3.02 0.67 0.19 4.01]	Moderate discrimination	Good fit (.6 – 1.4) weighted MNSQ [0.64]
TEF2		Low difficulty	Poor discrimination	Over fit (< .6)
Reliability		**Strong** contribution to the scale's internal consistency - item-rest correlation [0.81]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-3.05 0.07 0.80 4.03]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-3.02 0.67 0.19 4.01]		
Item		**Item difficulty**	**Item discrimination**	**Item fit**
14	It is safe to take a risk on this team.	High difficulty	High discrimination	Under fit (> 1.4)
		Suitable difficulty	Moderate discrimination item-total correlation coefficient [0.35]	Good fit (.6 – 1.4) weighted MNSQ [1.07]
TEF3		Low difficulty	Poor discrimination	Over fit (< .6)

		deltas [-4.53 -0.84 -1.32 2.50] contribution to the scale's		
Reliability		**Acceptable** contribution to the scale's internal consistency - item-rest correlation [0.28]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-4.56 -1.44 -0.71 2.52]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-4.53 -0.84 -1.32 2.50]		
Item		**Item difficulty**	**Item discrimination**	**Item fit**
15	This team frequently seeks new information that leads us to make important changes.	High difficulty deltas [-2.60 1.09 0.61 4.43]	High discrimination item-total correlation coefficient [0.75]	Under fit (> 1.4)
TEF4		Suitable difficulty	Moderate discrimination	Good fit (.6 – 1.4) weighted MNSQ [0.85]
		Low difficulty	Poor discrimination	Over fit (< .6)
Reliability		**Strong** contribution to the scale's internal consistency - item-rest correlation [0.71]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-2.63 0.49 1.21 4.45]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - disordered deltas [-2.60 1.09 0.61 4.43]		
Item		**Item difficulty**	**Item discrimination**	**Item fit**
16	We invite people from outside the team to present information or have discussions with us.	High difficulty	High discrimination	Under fit (> 1.4)
TEF5		Suitable difficulty deltas [-4.23 -0.53 -1.01 2.80]	Moderate discrimination item-total correlation coefficient [0.38]	Good fit (.6 – 1.4) weighted MNSQ [1.29]
		Low difficulty	Poor discrimination	Over fit (< .6)
Reliability		**Acceptable** contribution to the scale's internal consistency - item-rest correlation [0.30]		
Design of response categories by researcher		Well-designed response categories - ordered thresholds [-4.25 -1.13 -0.41 2.83]		
Interpretation of response categories by respondents		Not used as intended in a logically increasing manner - dis disordered deltas [-4.23 -0.53 -1.01 2.80]		

4.12 Establishing the Adapted 16-Item Scale

The roles of the item thresholds and deltas as well as the Wright map in the refinement of the 16-item scale are discussed below.

4.12.1 The Role of the Item Thresholds and the Item Deltas in Refining the Adapted 16-Item Scale

The ordered thresholds for the items in **Table RSM16.3** (**Appendix J**) and **Table MSM4.3** indicated well-ordered response categories and data compatibility with the underlying intention of measuring *psychological safety* in secondary school student team contexts (Andrich, 1978, 2005). The ordered, item thresholds for all the 16 items also indicated the respondents with high ability levels (i.e., more able students) more likely responded correctly to the items with high difficulty. This demonstrated the scale's substantive, measurement validity, better model fit, consistent reliability and easier interpretability of item scores (Linacre, 1999; Tennant & Conaghan, 2007; Wolfe & Smith, 2007). Some of the categories were however not useful in the scale e.g., category 1 [Strongly disagree] and category 5 [Strongly agree], as very few respondents used them. All the items had fewer responses in category 1 ("Strongly disagree") and category 5 ("Strongly agree"), which were rarely chosen by the respondents for all the items e.g., items 4 and 5 had one response each for the "Strongly disagree" category, and item 9 had two responses for the "Strongly agree" category. This indicated sparse data mainly within categories 1 and 5 affecting the certainty, stability, and reliability of the derived data estimates for model fit and item discrimination parameters. To address this issue, the categories with low observation frequencies (i.e., category 1 and category 5) were collapsed leaving the adapted 16-item scale with a 3-point Likert scale (Disagree, Neutral, Agree).

Based on the results of the generalised item analysis in **4.11** and **Table MSM4.3** above, all the items in the adapted 16-item scale had disordered deltas for categories 3 and 4 indicating inconsistencies in some aspects of the measurement properties of the items that required revision. The item deltas also known as taus or discrimination parameters were used to discriminate the

respondents' difficulties in discriminating between response categories because there were possibly too many options (DeVellis, 2017; Thanasegaran, 2009). It can be argued, however, that the disordered deltas were not necessarily an indicator of an error in the adapted 16-item scale, an underlying category disorder, or an outfit of the data to the model (Linacre, 1991; Masters, 1982). The disordered deltas also confirmed the revision of the five response categories to three in the adapted 16-item scale.

The separation reliability of 0.993 indicated the adapted 16-item scale had the ability to separate respondents into distinct ability levels. Coefficient alpha of the adapted 16-item scale was 0.91 indicating the adapted 16-item scale's excellent reliability (Cronbach, 1951) in distinguishing between the three constructs or variables (TLB, TPS, TEF) that measured *psychological safety* in secondary school student team contexts, was acceptable (Hellstrom & Hagquist, 2019). To reveal patterns in the structure of the adapted 16-item scale, an item-person map, known as a Wright map (Wright & Stone, 1979; Wright & Masters, 1982) was used to graphically represent the abilities of the respondents and the difficulty of the items that were spaced along a scaled continuum.

4.12.2 The Role of the Wright Map in Refining the Adapted 16-Item Scale

Figure RSM16.1 shows the results of the analysis of the latent distributions of the difficulties of the 16 items mapped against the abilities (i.e., proficiency) of the 372 respondents whose *psychological safety* were measured in secondary school student team contexts.

Figure RSM16.1

Item Difficulty Map of All Items for the Adapted 16-Item Scale

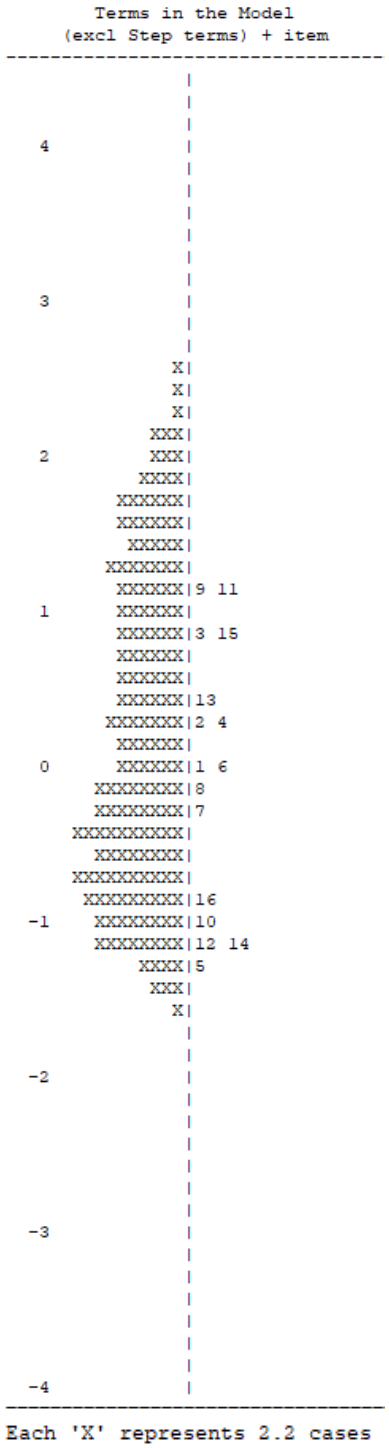


Figure RSM16.1 showed that about 107 (29%) respondents were more able or had high ability (≥ 1 logit of ability) with two of them being the highest performing students, and about 59 (16%) respondents were less able or had low ability (≤ -1 logit of ability) with two, being the lowest

performing students. **Figure RSM16.1** showed that the respondents found most of the items suitably comfortable to endorse with items 11 and 15 as the most difficult to endorse comfortably and item 5, the easiest to endorse comfortably. The logits of items 5, 7, 8, 10, 13 and 16 in **Figure RSM16.1** represented about 168 respondents whose *psychological safety* was well measured by its latent traits (TLB, TPS, TEF) in the adapted 16-item scale. The evidence for response dependency was observed in some items such as 9 and 11, 3 and 15, 2 and 4, 1 and 6, as well as 12 and 14, measuring the same level of difficulty of the latent traits of *psychological safety* in secondary school student team contexts (Bond & Fox, 2015; Osterlind & Everson, 2009; Smith, 2008). This could have been due to misinterpretations impacted by correlated items or items that were too similar, contextually misplaced, or endorsed from biased responses based on respondent-developed response patterns affected by earlier responses (Bond & Fox, 2015). The observed assessment gaps such as between items 16 and 7, and between item 13 and items 3 and 15 were also of concern, requiring further investigation. To resolve this potential weakness or degradation of the measurement function of the scale caused by the item redundancy and assessment gaps, future research must consider removing redundant items, collecting more data, or writing additional items to measure the latent traits of *psychological safety* in collaborating secondary school student teams. On the other hand, the ten redundant items (9 and 11; 3 and 15; 2 and 4; 1 and 6; 12 and 14) could be reworded to improve the measurement function of the adapted 16-item scale used for collecting data for measuring *psychological safety* in secondary school student team contexts. To improve the overall internal consistency and validity of the adapted 16-item scale, therefore, 14 items (including the ten redundant items indicated by **Figure RSM16.1** were reviewed qualitatively and reworded (Clark & Watson, 2016). They were:

1. Item 1 [TLB1], "*This team has spent time making sure every team member understands the team's objectives*" was reworded to "This team has dedicated time to ensure that all members understand the team's objectives."

2. Item 2 [TLB2], "*In this team, we often speak up to test assumptions about the issues we have under discussion*" was reworded to "In this team, we regularly speak up to challenge assumptions about the issues under discussion."
3. Item 3 [TLB3], "*Team members go out and get all the information they possibly can from others to accomplish a task such as peers, parents and teachers*" was reworded to "Team members make the effort to seek support from others in the school community such as peers, parents and teachers to get all the information they possibly can to accomplish a task."
4. Item 4 [TLB4], "Most people on this team have the ability to solve the problems that come up in our tasks" was reworded to "Most team members are capable of solving the problems that arise in our tasks."
5. Item 5 [TLB5], "*With focus and effort, this team can do anything we set out to accomplish"* was reworded to "With dedication and hard work, this team can achieve anything we aim for."
6. Item 6 [TLB6], "*This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group*" was reworded to "This team tends to handle differences of opinion on social media apps rather than addressing them directly through face-to-face meetings."
7. Item 7 [TPS1], "*This team lacks access to useful instruction or training to complete a task*" was reworded to "This team lacks access to helpful teaching, instruction or support that helps us to complete a task properly."
8. Item 9 [TPS3], "*If you make a mistake on this team, it is often held against you*" was reworded to "Mistakes people make on this team are often held against them."
9. Item 10 [TPS4], "*People on this team sometimes reject others for being different*" was reworded to "People on this team sometimes exclude others for being different."

10. Item 11 [TPS5], "*Others in the school community who interact with this team often complain about how it functions*" was reworded to "Members of the school community who interact with this team often express dissatisfaction with how it operates."
11. Item 12 [TEF1], "*All the members of this team have more than enough training and experience for the kind of task they have to do*" was reworded to "All members of this team are well-equipped with the skills, knowledge and understanding necessary for the tasks they have to do."
12. Item 14 [TEF3], "*It is safe to take a risk on this team*" was reworded to "Taking interpersonal risks on this team is safe because I am confident that I will not be embarrassed, judged, or excluded for speaking up, voicing my opinions and sharing my ideas."
13. Item 15 [TEF4], "*This team frequently seeks new information that leads us to make important changes*" was reworded to "This team consistently seeks new information that drives important changes."
14. Item 16 [TEF5], "*We invite people from outside the team to present information or have discussions with us*" was reworded to "We welcome external experts to present information or engage in discussions with us that help us to complete tasks."

For the adapted 16-item scale, the redundant items could be removed to resolve the potential scale degradation if the item removal does not compromise the construct validity of the scale through item under-representation (Penfield & Camilli, 2006). To ensure the content validity of the scale and capture the true core of *psychological safety* in secondary school student team contexts, a minimum of three items are needed to represent each latent variable of the scale (Viswanathan, 2010). So, if the latent variable of *psychological safety* with the redundant item will have three items (observed indicators) or more following the removal of the redundant item, then the redundant item may be removed.

To avoid item redundancy in the adapted 16-item scale, item 1 [TLB1], item 2 [TLB2], item 11 [TPS5], item 12 [TEF1], and item 15 [TEF4] were removed from the scale in favour of items 3 [TLB3],

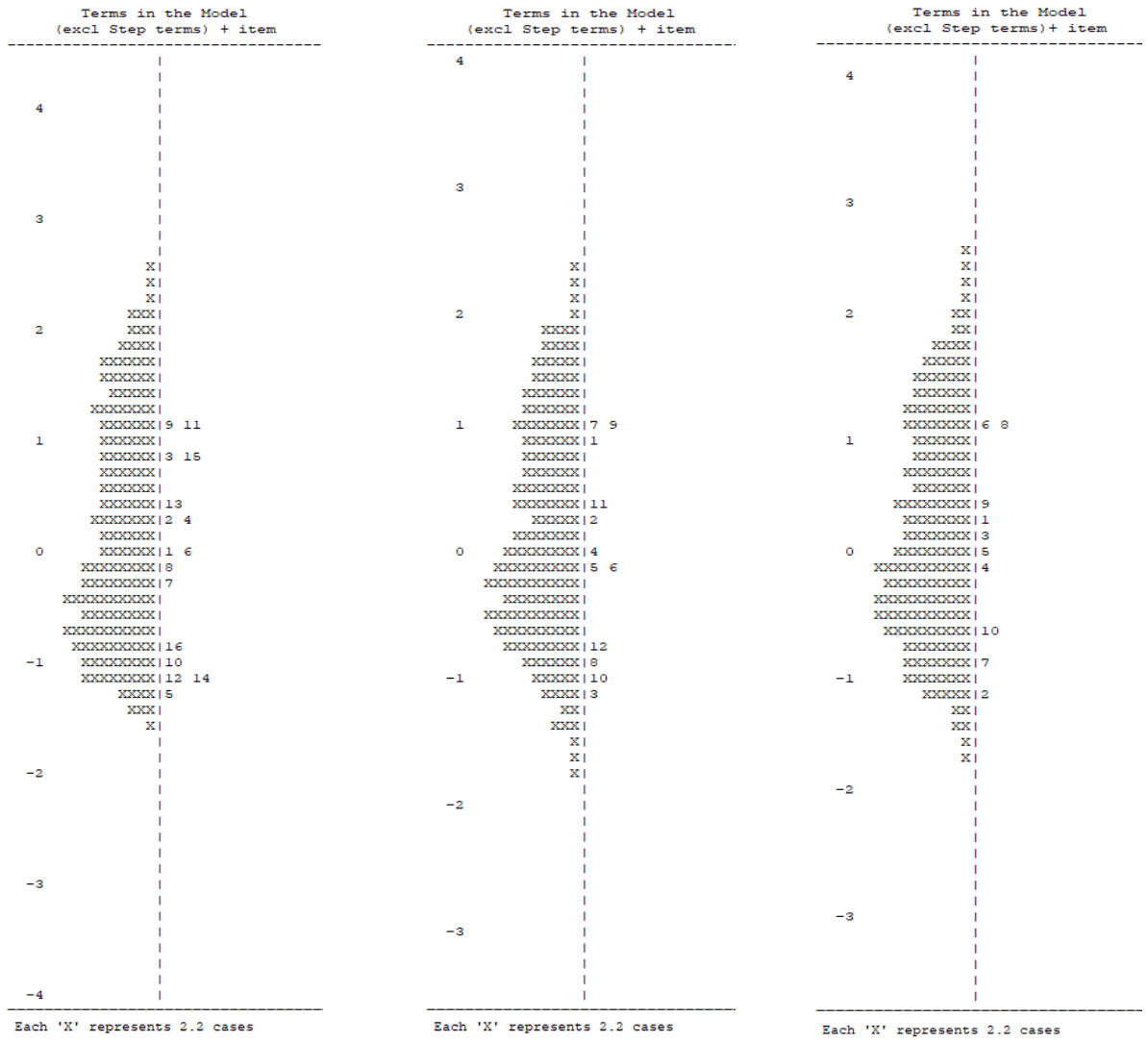
item 4 [TLB4], item 6 [TLB6], item 9 [TPS3], and item 14 [TEF3]. When this was done, an adapted 12-item scale for measuring *psychological safety* in secondary school student team contexts, resulted. The items of the adapted 12-item scale used for collecting data were analysed with IRT in ACER ConQuest 5.0 (Adams et al., 2020), and the results of the Rasch RSM analyses (Andrich, 1978; Rasch, 1960). The results showed the adapted 12-item scale was a more parsimonious scale than the adapted 16-item scale with the elimination of most of the redundant items although the assessment gaps remained.

The adapted 12-item scale (**Table RSM12.3** in **Appendix J**) was, therefore, refined further with Rasch RSM analysis (Andrich, 1978; Rasch, 1960) to eliminate the redundant items (7 and 9; and 5 and 6) until an adapted 10-item scale with less redundant items, emerged. The latent variables (TLB, TPS, TEF) of the 10-item scale needed three or more items per variable to provide stable and reliable estimates. The removal of one of the redundant items i.e., item 6 [TPS2] or item 8 [TEF1] from the adapted 10-item scale will thus compromise the 10-item scale's construct validity. This is because their removal will cause the TPS and TEF latent variables to be measured by only two items, which may not capture the full depth and breadth of the latent variables leading to incomplete measurements, low statistical power, internal consistency issues, and higher measurement errors in the 10-item scale. With only two items measuring the TPS and TEF latent variables, goodness-of-fit indices for model estimation using CFA may not be reliable, as the model will be unidentifiable. It was hoped that the revision of the wordings of item 6 [TPS2] or item 8 [TEF1] would offer delineation to their clarity and relevance. **Figure RSM16.2** shows a comparison of their items' relationships through their Wright maps to ascertain the abilities of the respondents and the difficulty of the items that were spaced along scaled continua.

Figure RSM16.2

Item Difficulty Map Comparison for All Items for the Adapted 16-Item, 12-Item and 10-Item Scales

Adapted 16-Item Scale	Adapted 12-Item Scale	Adapted 10-Item Scale



To ensure the items in the scales adequately represented the latent variables (TLB, TPS, TEF), the factor structures, model fits and item fits of the adapted 16-item, 12-item, and 10-item scales for measuring *psychological safety* in secondary school student team contexts were undertaken in IBM SPSS (v29), IBM SPSS AMOS (v29) and ACER ConQuest 5.0 (Adams et al., 2020). **Table MSM4.4** reports the results of the comparative analyses.

Table MSM4.4

Comparison of the Measurement Properties of the Three Adapted Scales Resulting from the Scale Revision Process of the Adapted 23-Item Scale

Statistical analysis		Measurement	23 items	16 items	12 items	10 items
PCA		Sampling adequacy	.921	.912	.855	.840
		Internal consistency	.907	.908	.862	.850
CFA	Path model fit	CMIN/DF	4.80	4.75	11.11	4.72
		RMSEA	.077	.077	.165	.100
		CFI	.869	.929	.848	.962
		IFI	.871	.930	.849	.962
		TLI	.824	.891	.772	.932
	Structural model fit	RMSEA		.000		.173
		PCLOSE		.897		.006
		AIC		16.042		28.137
	Validity	Discriminant validity [MSV < AVE] [ASV < AVE]		Met	Met	Met
	Reliability	[AVE ≥ 0.5] Convergent validity [CR ≥ 0.7]		*TEF: CR = 0.59	*TPS: AVE = 0.45 *TEF: CR = 0.58	**TPS: AVE = 2.25 **TPS: CR = 1.32 *TEF: CR = 0.62
Population distribution		Mean	74.81	50.15	37.75	31.42
		Standard deviation	11.98	9.70	7.03	6.16
		Variance	143.45	94.07	49.48	38.00
Rasch RSM	Rasch model fit	Chi-square statistic	2673.88	1746.31	1300.93	930.91
		Significance level	< .001	< .001	< .001	< .001
		Separation reliability	.993	.993	.993	.992
		Coefficient alpha	.91	.91	.86	.85
		Weighted MNSQ range	0.61 - 1.92	0.57 – 1.71	0.57 – 1.43	0.62 – 1.46

Note. ** evidence of multicollinearity; * compromised internal consistency

The further revision of the adapted 16-item scale resulted in an adapted 12-item scale and an adapted 10-item scale, both with three latent variables (TLB, TPS, TEF). Although, as shown in **Figure RSM16.2**, the 10-item scale has fewer redundant items (i.e., 2) than the 12-item scale (i.e., 4)

and the 16-item scale (i.e., 10), the TPS latent variable of the 10-item scale has two items [6 and 7] which are highly correlated (**Figure CFA10.1** in **Appendix J**). The multicollinearity of the two items in the TPS latent variable in the 10-item scale "unfortunately, contributes to difficulty in the specification as well as in the estimation of economic relationships" in the model (Farrar & Glauber, 1967, p. 14). Coupled with the item rewordings proposed in **4.12.2**, the evidence from the evaluative comparisons above in **Figure RSM16.2** and **Table MSM4.4** provide adequate statistical support for using the adapted 16-item scale as the most plausible scale for measuring *psychological safety* in secondary school student team contexts. This evidence provides an answer for **RQ2**, "*How can psychological safety be measured in collaborating secondary school students?*".

4.13 Results for the Test of Normality of the 16-Item Scale

In ACER ConQuest 5.0 (Adams et al., 2020), the data's distribution for the 16-item scale was generated from the results of the Rasch RSM analysis (Andrich, 1978; Rasch, 1960) and visually represented by **Figure RSM16.3**.

Figure RSM16.3

Item Information Function Map and the Latent Distribution Map of All Items on the 16-Item Scale

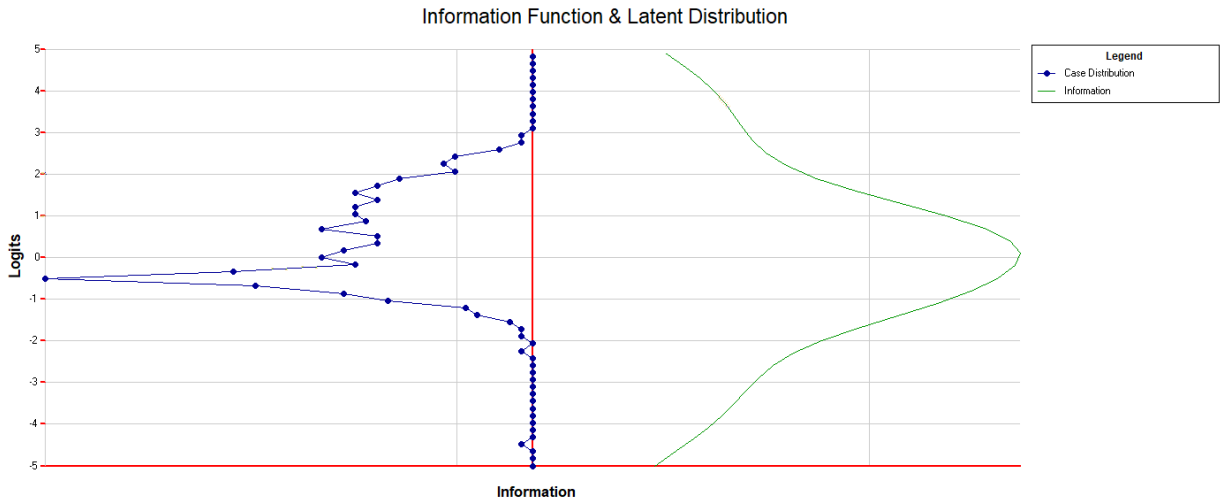


Table MSM4.1 provides critical insights into the distribution of the dataset by showing the amount of missing data for the sample size, and the measures of central tendency, dispersion and

distribution of the 16-item scale (i.e., "The SHuCoS© Scale") for measuring *psychological safety* in secondary school student team contexts.

Table MSM4.1

Distribution Summary for the Dataset of the Adapted 16-Item Scale

Missing data	0.00%
Sample size	372
Mean	50.15
Standard Deviation	9.70
Variance	94.07
Skewness	0.05
Kurtosis	-1.07
Standard error of mean	0.50
Standard error of measurement	2.94
Coefficient Alpha	0.91

The coefficient alpha (α = 0.91) in **Table MSM4.1** showed the adapted 16-item scale's internal consistency was excellent (Cronbach, 1951) and reliable (Cortina, 1993; DeVellis & Thorpe, 2021). The high reliability and variance [94.07] of the dataset indicated that the latent TLB, TPS and TEF variables of the 16-item scale were sufficiently correlated with each other and were consistently measuring the same unobservable underlying construct of *psychological safety* in secondary school student team contexts despite the likelihood of the existence of some minor inconsistencies (Amirrudin et al., 2021). **Table MSM4.1** suggested the collected data from the responses [*N* = 372] were complete with minimal missing values [0.00%] that were generally not clustered around the mean [*M* = 50.15] indicating lower variability [SD = 9.70] within the dataset despite some extreme values (Barde & Barde, 2012). **Table MSM4.1** showed the data points in the slightly, positively, skewed [skewness = 0.05], platykurtic [kurtosis = -1.07] distribution (Westfall, 2014) indicated the presence of fewer outliers or extreme values in the data (Kline, 1998) which can distort relationships and tests of significance (Osborne & Waters, 2002) leading to type 1 errors (Blair & Lawson, 1982). This evidence indicated the data did not violate the normality assumption of a Gaussian distribution (Zuur et al., 2009) and was, therefore, not perceived as a problem to be concerned about for

impaired hypothesis testing (Warton et al., 2016), biased regression coefficients (Bishara & Hittner, 2012) or parameter estimation (Knief & Forstmeier, 2021). It is also conventionally accepted that the sampled population of secondary school students (N = 372) in this research is theoretically normally distributed (Curran-Everett, 2017).

The evidence in **Figure RSM16.3** and **Table MSM4.1**, above, confirm that the data follows a Gaussian distribution as indicated in **4.3** (**Figures DST4.1, DST4.2** and **DST4.3**). This justifies the application of parametric testing for answering RQ2a., RQ2b., and RQ2c., and for testing Ho_1, Ho_2, and Ho_3.

4.14 Presenting and Naming "The SHuCoS© Scale"

The result of the validation of the adapted 23-item scale's (**Table MSM4.1** in **4.2**) is a trimmed, valid, and reliable, 16-item scale with a 3-point Likert scale (following the collapse of categories 1 and 5) with three, latent variables (TLB, TPS, TEF) for measuring *psychological safety* in secondary school student team contexts. This is a significant and original contribution of this research to knowledge within *psychological safety* scholarship and secondary school education.

The revised, 16 items spread within three, latent variables (TLB, TPS, TEF) in the scale are grounded in the data (Charmaz, 2014, 2015, 2017) and have wordings that refer to human relationships (Bandura, 1977) and symbolic interactions (Blumer, 1969) that arise due to the connections that are required in specific, collaborative situations in a given context. The human connections are usually temporary or short-lived and are very much dependent on the situation at hand. Every different situation requires humans to apply different relational and interactive skills for effective collaboration and successful outcomes. In the description of his immersive research experience, in **Chapter Two**, Kahn (1990) "emphasized people's expressions, employments, withdrawals, and defences of their personal selves as the mechanisms by which they connect their depths to role performances…" and explained the existence of "a hierarchy [that] relates increasing depths of engagement to the investment of self along physical, then cognitive, and finally emotional dimensions" (p. 719). Situational human connections thereby arise in different circumstances such

as curricular situations and co-curricular situations (e.g., in schools), recreational situations (e.g., sports activities), domestic or pastoral situations (e.g., residential locations), emergency situations (e.g., accidents), travel situations (e.g., vacation), event situations (e.g., conference presentations), and employment situations (e.g., project meetings).

According to the theory of creativity posited by Rogers (1954) in **Chapter Two**, "…the creative process is that it is the emergence in action of a novel relational product, growing out of the uniqueness of the individual on one hand, and the materials, events, people, or circumstances of his life on the other" (p. 251). With the illustrated illumination about the situational reasoning behind the adapted 16-item scale being a "novel construction"[creativity] that "always has [have] the stamp of the individual upon its product" (Rogers, 1954, p. 250), the researcher named this adapted 16-item, 3-point Likert scale, the Situational Human Connection Skills© scale ("The SHuCoS© Scale") for measuring *psychological safety* in secondary school student team contexts. Coining a befitting name for the adapted 16-item, 3-point Likert scale is a significant and original contribution of this research to *psychological safety* scholarship and secondary school education with the design of the first validated tool (to the researcher's knowledge), to measure the *psychological safety* of collaborating students.

Table RSM16.3 shows "The SHuCoS© Scale", an adapted 16-item, 3-point Likert scale from Edmondson (1999) for measuring *psychological safety* in secondary school student team contexts.

Table RSM16.3

"The SHuCoS© Scale"

"The SHuCoS© Scale" for Measuring Psychological Safety in Secondary School Student Team Contexts	Disagree 1	Neutral 2	Agree 3
Team Learning Behaviours (TLB)			
1. This team has dedicated time to ensure that all members understand the team's objectives.			
2. In this team, we regularly speak up to challenge assumptions about the issues under discussion.			
3. Team members make the effort to seek support from others in the school community such as peers, parents, and teachers to get all the information they possibly can to accomplish a task.			
4. Most team members are capable of solving the problems that arise in our tasks.			
5. With dedication and hard work, this team can achieve anything we aim for.			
6. This team tends to handle differences of opinion on social media apps rather than addressing them directly through face-to-face meetings.			
Team Psychological Safety (TPS)			
1. This team lacks access to helpful teaching, instruction or support that helps us to complete a task properly.			
2. Certain individuals in this team lack the special skills needed for good team collaboration.			
3. Mistakes people make on this team are often held against them.			
4. People on this team sometimes exclude others for being different.			
5. Members of the school community who interact with this team often express dissatisfaction with how it operates.			
Team Efficacy (TEF)			
1. All members of this team are well-equipped with the skills, knowledge and understanding necessary for the tasks they have to do.			
2. Members of this team can bring up problems and tough issues.			
3. Taking interpersonal risks on this team is safe because I am confident that I will not be embarrassed, judged, or excluded for speaking up, voicing my opinions and sharing my ideas.			
4. This team consistently seeks new information that drives important changes.			
5. We welcome external experts to present information or engage in discussions with us that help us to complete tasks.			

Note. The adapted 16-item scale from Edmondson (1999) for measuring psychological safety in secondary school student team contexts named by the researcher as the Situational Human Connection Skills© scale; abbreviated as "The SHuCoS© Scale".

4.15 Building "The SHuCoS© Model"

The difference between a person's ability and an item's difficulty determined the probability that a pass or correct response was observed (Linacre, 1999). Rasch analysis (Rasch, 1960) returned the raw scores of the linear measures of the survey respondents' abilities and the items' difficulties. To enable interpretation and comparability, the raw data collected from the survey's respondents were converted into weighted likelihood estimation (WLE) scores (Warm, 1989).

4.15.1 Transforming the Raw Scores to Weighted Measures

The WLE scores, which were derived from the person estimates output file (**Figure RSM16.1** above) described the relationship between a respondent's *psychological safety* level and the precision of the item's measurement. The responses of the survey respondents that occurred at high precision near the item's difficulty level received higher weights, and responses that occurred at low precision received lower weights.

The specification of a more structural model (Perry, 1996) was undertaken after establishing that the model of "The SHuCoS© Scale" captured the underlying patterns in the data by adequately representing the relationships between the latent TLB, TPS and TEF variables for measuring *psychological safety* in secondary school student team contexts. To measure and quantify *psychological safety* in collaborating secondary school students through the observed indicators (items) of the latent TLB, TPS and TEF variables, a statistical model was specified with a path analysis in IBM SPSS AMOS (v29). Before then, the raw scores collected with the adapted 16-item scale (now "The SHuCoS© Scale") that had been converted to WLE scores were converted to weighted measures (*W*) (Woodcock & Dahl, 1971; Woodcock, 1999). This conversion offered knowledge about a participant's position and comparable performance within the cohort. The conversion of the WLE scores to *W* measures occurred in Microsoft Excel (Microsoft Corporation, 2018) and were expressed as a direct transformation of the Rasch logits scale with the formula:

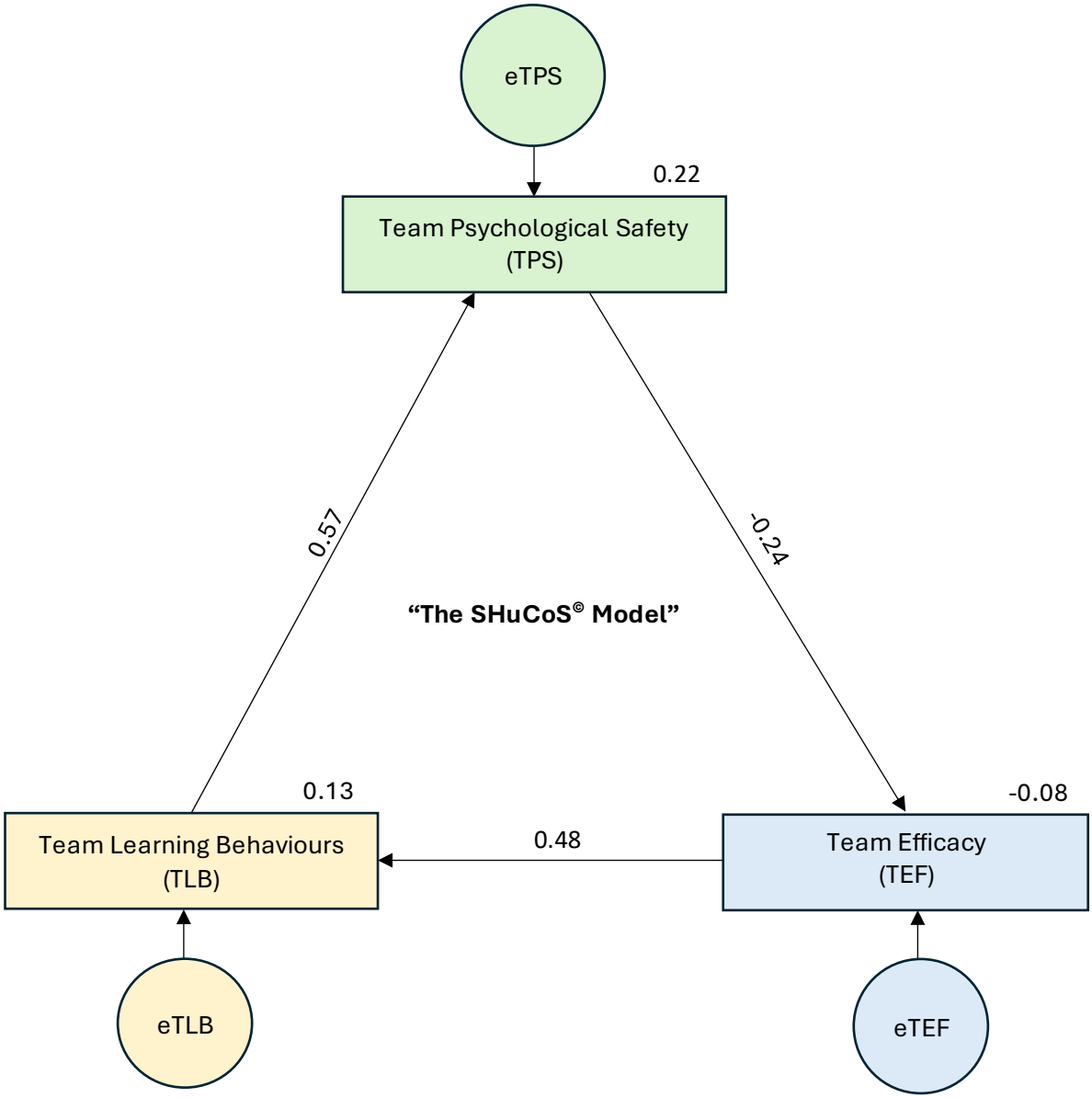
$W = 9.1024 \text{ logits} + 500$ (Woodcock & Dahl, 1971) where:

- 9.1024 is the multiplicative scaling constant that eliminates the negative and decimal values in the scores; and
- 500 is the centering constant, which satisfies the statistical analysis requirement of creating an advantageous, equal interval scale as well as eliminating the negative score values.

Distances along the logits scale are more suitable to use, high *W* measures indicated either high respondent ability (more able student) or high item difficulty and low *W* measures indicated either low respondent ability (less able student) or low item difficulty. The Microsoft Excel data file (Microsoft Corporation, 2018) of *W* measures was subsequently exported to IBM SPSS AMOS (v29) for a path analysis to build the structural model of *psychological safety* in secondary school student team contexts. Path analysis assumes a multivariate distribution to enable the interpretation and communication of the complex relationships among the three, latent variables (TLB, TPS, TEF). **Figure CFA16.2** shows the results of the path analysis that demonstrated "The SHuCoS© Model" (Byrne, 1994; Steiger, 1990) with three, latent variables (TLB, TPS, TEF) that described, explained, and measured *psychological safety* in the two secondary school student team contexts in this research. This model provides a significant and original contribution of this research to the field of *psychological safety* scholarship and specifically a structural model for secondary schools to further explore the relationships among the latent variables (TLB, TPS, TEF) and further inform *psychological safety* of students engaging in teams within their learning.

Figure CFA16.2

"The SHuCoS© Model"



e – error

Note. "The SHuCoS© Model" that explains the associations among the latent variables that measure psychological safety in secondary school student team contexts.

Holding true for the measurement of *psychological safety* in the two South Australian secondary schools from which the researched population was drawn, "The SHuCoS© Model" of *psychological safety* in **Figure CFA10.2** showed team efficacy (TEF) was moderately and positively

correlated [*r* = .5] with team learning behaviours (TLB), which was strongly and positively correlated [*r* = .6] with team psychological safety (TPS). "The SHuCoS© Model" showed team psychological safety (TPS) was weakly and negatively correlated [*r* = -.2] with team efficacy (TEF). The relatively small sample size of South Australian secondary school students (*N* = 372), however, limited the generalisability of the use of "The SHuCoS© Model" in measuring *psychological safety* in other secondary school student team contexts.

With the established normality of the distribution of the model residuals (errors) in the data in **4.13** above, the use of parametric testing (Lumley et al.,2002) for answering research question two (RQ2) was justified with confidence in obtaining reproducible results (Forstmeier et al., 2017; Open Science Collaboration, 2015; Silberzahn et al., 2018).

4.16 Responding to the Research Questions

"The SHuCoS© Scale" and "The SHuCoS© Model" informed RQ1 (**Table MSM1.1** in **1.6**) with a breadth of critical quantitative insights. RQ1 and the four sub-questions (RQ1a., RQ1b., RQ1c., Rq1d.) are further informed by the qualitative depth offered by the findings of the analyses of the focus groups, later in **Chapter Five**.

4.16.1 Responding to Research Question One (RQ1)

The 16 observed indicators (items) of *psychological safety* in secondary school student team contexts that emerged from the validation of the adapted 23-item scale were identified as:

1. This team has dedicated time to ensure that all members understand the team's objectives;
2. In this team, we regularly speak up to challenge assumptions about the issues under discussion;
3. Team members make the effort to seek support from others in the school community such as peers, parents, and teachers to get all the information they possibly can to accomplish a task;

4. Most team members are capable of solving the problems that arise in our tasks;
5. With dedication and hard work, this team can achieve anything we aim for;
6. This team tends to handle differences of opinion on social media apps rather than addressing them directly through face-to-face meetings;
7. This team lacks access to helpful teaching, instruction or support that helps us to complete a task properly;
8. Certain individuals in this team lack the special skills needed for good team collaboration;
9. Mistakes people make on this team are often held against them;
10. People on this team sometimes exclude others for being different;
11. Members of the school community who interact with this team often express dissatisfaction with how it operates;
12. All members of this team are well-equipped with the skills, knowledge and understanding necessary for the tasks they have to do;
13. Members of this team are able to bring up problems and tough issues;
14. Taking interpersonal risks on this team is safe because I am confident that I will not be embarrassed, judged, or excluded for speaking up, voicing my opinions, and sharing my ideas;
15. This team consistently seeks new information that drives important changes; and
16. We welcome external experts to present information or engage in discussions with us that help us to complete tasks.

The 16 categories of the observed indicators (items) that emerged were identified as: inquiring minds, problem-solving capacity, shared focus, technical skills, high cognitive capacity, conflict resolution, information sharing, teamwork, experiential learning, and respect for diversity. The 16 categories of the observed indicators (items) were spread withing three, latent variables (TLB, TPS and TEF). These 16 emergent categories of *psychological safety* are further informed by

the qualitative depth offered by the findings of the analyses of the focus groups, later in **Chapter Five**.

4.16.2 Responding to Research Question Two (RQ2)

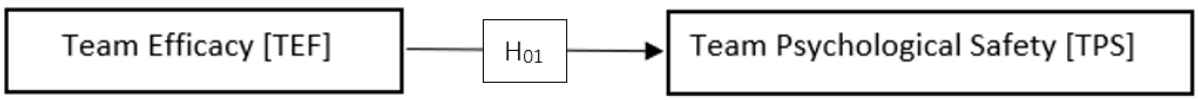
It was reported in **Chapter One** that hypotheses testing is crucial for theory formulation in this research as it provides a structured method for validating or refuting potential explanations for the *psychological safety* phenomena that reflect reality in the secondary school context. Within this research, empirical validation through data analyses determined whether the hypotheses were supported or contradicted, initial assumptions were refined to strengthen the underlying theory, and scientific rigour of objectivity, transparency, reproducibility, and credibility, resulting in an emergent framework that augments the knowledge and understanding of *psychological safety* in secondary school student team contexts.

Parametric tests conducted in IBM SPSS (v29) informed the responses to RQ2's three sub-questions: RQ2a., RQ2b., RQ2c. (**Table MSM1.2** in **1.6**). The tests also provided evidence for supporting or rejecting the three hypotheses (H_{01}, H_{02}, H_{03}) in **Table MSM1.2** (**1.6**).

To answer the first sub-question, **RQ2a.** "*Does a student's feeling of efficacy in the team (TEF) influence their feelings of psychological safety in the team (TPS)?",* **Figure RQA4.1** shows a conceptual model that visually represents the key components of **RQ2a** and the presumed relationships among them that clarifies and guides the answering of **RQ2a**.

Figure RQA4.1

Conceptual Model for Investigating the Relationship between Team Efficacy (TEF) and Team Psychological Safety (TPS)



Note. H_{01} – null hypothesis 1

Computed in IBM SPSS (v29), Pearson's correlation coefficient (*r*) was used to examine the strength and direction of the linear relationship between TEF and TPS in secondary school student team contexts (Wetcher-Hendricks, 2011) is shown in **Table RQA4.1**.

Table RQA4.1

Correlations (Strength and Direction of the Linear Relationship) Between Team Efficacy (TEF) and Team Psychological Safety (TPS)

Correlations[a]			
		Team Efficacy (TEF)	Team Psychological Safety (TPS)
Team Efficacy (TEF)	Pearson Correlation	1	.036
	Sig. (2-tailed)		.490
Team Psychological Safety (TPS)	Pearson Correlation	.036	1
	Sig. (2-tailed)	.490	

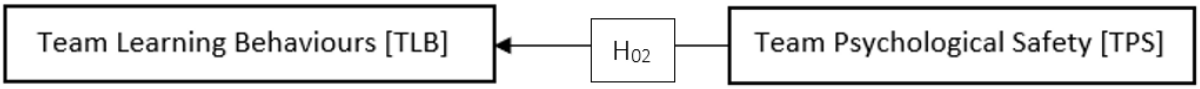
a. Listwise *N* = 372

The results of the correlation analysis [$r(372) = .04$, $p = .50$] in **Table RQA4.1** showed there was no statistically significant difference [$p > .05$] between the means of TEF and TPS. The first null hypothesis, (H_{01}), "*Team psychological safety does not positively influence team efficacy*" was, therefore, not rejected. **Table RQA4.1** indicated that the influence of TPS on TEF was positive and insignificant as the correlation was very weak [$r = .04$]. This relationship revealed that for the researched population of secondary school students, an increase in TPS had very minimal or no influence on TEF in secondary school student team contexts.

Figure RQA4.2 shows a conceptual model that visually represents the key components of the second sub-question, **RQ2b**, and the presumed relationships among them that clarifies and guides the answering of **RQ2b**., "*To what extent does a student's feeling of psychological safety in a team [TPS] predict his/her learning behaviour [TLB] in that team?*"

Figure RQA4.2

Conceptual Model for Investigating the Relationship Between Team Learning Behaviours (TLB) and Team Psychological Safety (TPS)



Note. H_{02} – null hypothesis 2

RQ2b was split into two parts: **RQ2b.1** and **RQ2b.2**. **RQ2b.1** identified the relationship between team learning behaviours (TLB) and team psychological safety (TPS). **RQ2b.2** showed how team psychological safety (TPS) predicted team learning behaviours (TLB).

For **RQ2b.1**, Pearson's correlation coefficient (*r*) was used to examine the relationship between TLB and TPS in secondary school student team contexts. Computed in IBM SPSS (v29), **Table RQA4.2** was used to show the strength and direction of the linear relationship between TLB and TPS (Wetcher-Hendricks, 2011).

Table RQA4.2

Correlations (Strength and Direction of the Linear Relationship) Between Team Learning Behaviours (TLB) and Team Psychological Safety (TPS)

Correlations[b]			
		Team Learning Behaviours (TLB)	Team Psychological Safety (TPS)
Team Learning Behaviours (TLB)	Pearson Correlation	1	.482**
	Sig. (2-tailed)		<.001
Team Psychological Safety (TPS)	Pearson Correlation	.482**	1
	Sig. (2-tailed)	<.001	

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise *N* = 372

The results of the correlation analysis [$r(372) = .48$, $p < .001$] in **Table RQA4.2** showed there was a statistically significant difference [$p < .001$] between the means of TLB and TPS. With a *p* value < 0.05, the second null hypothesis, (H_{02}), "*Psychological safety does not predict team learning behaviour*" was rejected. **Table RQA4.2** indicated TPS influenced TLB through a strong, positive

correlation [*r* = .50]. This relationship revealed that for the researched population of secondary school students, an increase in TPS significantly increased TLB. In a moderate, positive correlation.

To answer **RQ2b.2**, linear regression was used to examine the extent to which TPS predicted TLB (Montgomery, Peck & Vining, 2012). Computed in IBM SPSS (v29), **Table RQA4.3** shows the strength of the predictive relationship between TPS and TLB by the results of the linear regression analysis.

Table RQA4.3

Predictive Relationship Between the Predictor, Team Psychological Safety (TPS) and the Criterion, Team Learning Behaviours (TLB)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	141.398	34.758		4.068	<.001					
	Team Psychological Safety (TPS)	.745	.070	.482	10.573	<.001	.482	.482	.482	1.000	1.000

a. Dependent Variable: Team Learning Behaviours (TLB)

The predictive relationship between TPS and TLB was computed from the results in **Table RQA4.3** given by the equation shown below as:

$Y = \sigma + \beta X + e$ (Gelman & Hill, 2007) where:

β = regression coefficient [standardised] that predicts the change in y for every unit change in x;

σ = intercept (slope) that predicts where the regression line will cross the y-axis;

Y = dependent variable (team learning behaviours);

X = independent or predictor variable (team psychological safety);

e = error; and

the relationship is shown as: TLB = σ + .482 x TPS + error

Table RQA4.3 showed a statistically significant difference [$p < .001$] between the means of TLB and TPS. With a p value < 0.05, the second null hypothesis, (H_{02}), "*Team psychological safety does not predict team learning behaviour*" was rejected. **Table RQA4.3** showed that a change in TPS moderately predicted [$\beta = .482$] a change in TLB, so an increase in TPS indicated an increase in TLB and vice versa. **Figure RQA4.4** summarises the regression model of TPS and TLB.

Table RQA4.4

Linear Regression Model Summary for the Relationship Between the Predictor, Team Psychological Safety (TPS) and the Criterion, Team Learning Behaviours (TLB)

Model Summary[b]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.482[a]	.232	.230	24.69945	.232	111.797	1	370	<.001

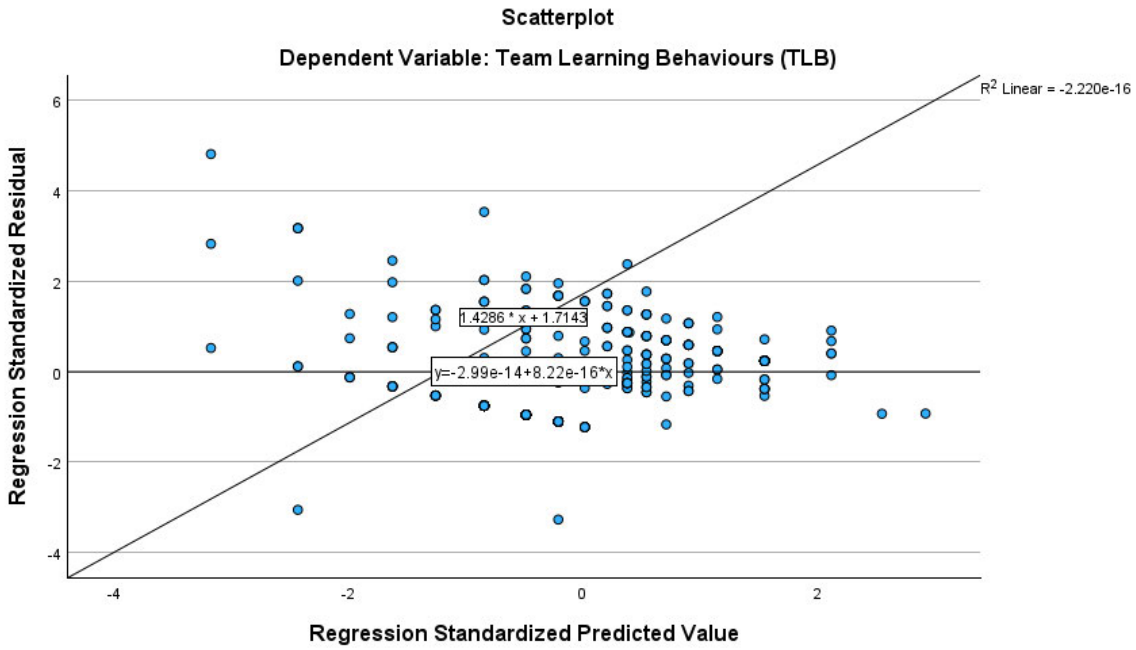
a. Predictors: (Constant), Team Psychological Safety (TPS)

b. Dependent Variable: Team Learning Behaviours (TLB)

Figure RQA4.3 below shows the graphical representation of the regression model, above.

Figure RQA4.3

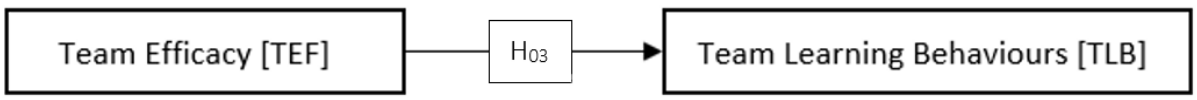
Scatterplot of the Linear Regression Model for the Relationship Between Team Psychological Safety (TPS) and Team Learning Behaviours (TLB)



To answer the third sub-question, **RQ2c**., "*How can a student's attitude to learning in a team [TLB] affect the team's efficacy [TEF]?*", **Figure RQA4.4** shows a conceptual model that visually represents the key components of **RQ2c** and the presumed relationships among them that clarifies and guides the answering of **RQ2c**.

Figure RQA4.4

Conceptual Model for Investigating the Relationship between Team Efficacy (TLB) and Team Learning Behaviours (TLB)



Note. H_{03} – null hypothesis 3

For **RQ2c.**, Pearson's correlation coefficient (*r*) was used to examine the relationship between TLB and TEF in secondary school student teams. Computed in IBM SPSS (v29), the results in

Table RQA4.5 shows the strength and direction of the linear relationship between TLB and TEF (Wetcher-Hendricks, 2011).

Table RQA4.5

Correlations (The Strength and Direction of the Linear Relationship) Between Team Learning Behaviours (TLB) and Team Efficacy (TEF)

Correlations[b]			
		Team Efficacy (TEF)	Team Learning Behaviours (TLB)
Team Efficacy (TEF)	Pearson Correlation	1	.373**
	Sig. (2-tailed)		<.001
Team Learning Behaviours (TLB)	Pearson Correlation	.373**	1
	Sig. (2-tailed)	<.001	

**. Correlation is significant at the 0.01 level (2-tailed).

b. Listwise *N* = 372

The results of the correlation analysis [$r(372) = .37$, $p < .001$] in **Table RQA4.5** showed a statistically significant difference [$p < .001$] between the means of TLB and TEF. With a p value < 0.05, the third null hypothesis, (H_{03}), "*Team learning behaviours do not influence team efficacy*" was rejected. **Table RQA4.5** indicated that TLB significantly influenced TEF through a moderate, positive correlation [$r = .37$]. This relationship revealed that for the researched population of secondary school students, an increase in TLB moderately increased TEF.

Having revealed the quantitative relationships among the latent variables that measured *psychological safety* in secondary school student team contexts from the analytical results, the analysis of the responses to the qualitative item in question five (Q5) of the online survey instrument (**Table MSM4.1** in **4.2**) further informed the understanding of *psychological safety* in secondary school student team contexts.

4.17 The Thematic Analyses of the Responses to the Qualitative Item [Q5] of the Online Survey

The responses to Q5 of the online survey were thematically analysed with Constant Comparative Analysis (CCA) (Glaser, 1965). The emergent categories were counted and tallied. The counts (frequencies) were then quantified and graphed in Microsoft Excel (Microsoft Corporation, 2018) to aid a quicker and comprehensive understanding of the extensive data. The findings of the thematic analysis are represented in a tabulated summary and a graph of the frequencies of the categories of the observed indicators of *psychological safety* in secondary school student team contexts from the thematic analytical findings.

4.17.1 The Responses to the Qualitative Item [Q5] of the Online Survey

The online survey included a demographic section with three questions (Q1-Q3), an adapted 23-item scale for collecting quantitative data for measuring *psychological safety* in secondary school student team contexts, and a concluding psychographic item (Q5) with a multiple-choice item ["*I feel safe to admit errors, seek feedback, and speak up as a member of the team without fear of embarrassment, rejection and punishment because… (choose all that applies)*"] and an open-ended prompt ["*Something else makes me feel psychologically safe in this team (please specify)…*"] that were used to collect qualitative data. Through the open-text prompt, the respondents were able to elaborate on their multiple-choice responses by providing detailed and nuanced information about *psychological safety* in secondary school student team contexts that extended beyond the numerical data collected with the adapted 23-item scale in Q4.

When asked with the open-text prompt, 12 respondents ticked the box to indicate an affirmative response i.e., "yes" but they made no written specifications. The verbatim statements of the respondents made to support their selected observed indicators in the multiple-choice section of Q5, as shown by **Table QLA4.1** below included:

(1) “I have a strong relationship with my team members, greatly ensuring my psychological safety.”

(2) “It’s always close friends.”

(3) “Being able to use teachers and friends as a support net if I am unsure on anything.”

(4) “Friends.”

(5) “Open to all thoughts, not forced to have an opinion on something.”

(6) “support and collaboration.”

(7) “Open Environment.”

(8) “The team is incredibly supporting.”

Some respondents’ statements were also made to indicate the lack of clarity in the item wordings for some respondents and possibly a lack of a sense of belonging for some respondents in their student teams. Examples of such verbatim statements included:

(9) “I [I] have no idea what this team is.”

(10) “I don’t know if there is a feedback area on the next page, so just in case, I wanted to mention that the concept of ‘the team’ wasn’t properly established. This may be because of information I missed during the presentation, and if so I do apologise, however because of this my answers were not related to any specific team or group as I am not particularly part of one and they didn’t seem to match the questions.”

Following the thematic analysis, **Table QLA4.1** showed the tallied frequencies (i.e., counts) of the multiple-choice, item selections and the respondents’ verbatim statements for the open-ended prompt that indicated their beliefs, experiences, cultures, and perspectives of *psychological safety* in secondary school student team contexts.

Table QLA4.1

Summary of the Findings of the Thematic Analysis of the Responses to Q5 of the Online Survey

Q5. MULTIPLE-CHOICE ITEM: I feel safe to admit errors, seek feedback, and speak up as a member of the team without fear of embarrassment, rejection, and punishment because...		
Observed indicators of psychological safety		**Count**
Category	**Familiarity**	**147**
Observed indicator	Knowing someone	
Participant's item choice	I know one member of this team	53
	I know some of the members of this team	94
Category	**Mutual respect and trust**	**219**
Observed indicator	Trusting someone, Risk-taking, Honesty	
Participant's item choice	I can trust some of my team members	149
	I can trust all my team members	70
Category	**Friendship**	**286**
Observed indicator	Having an existing friend	
Participant's item choice	I have friends in this team	286
Category	**Diversity**	**421**
Observed indicator	Being oneself, Not being anxious	
Participant's item choice	I can seek and share information without worrying about what other team members think about my abilities or capacity	206
	I can be myself with my team members without worrying	215
Category	**Non-judgemental support**	**319**
Observed indicator	Not being judged, Having support, Being understood	
Participant's item choice	I have support from other team members when I find tasks challenging	240
	There is somebody on the team who understands me that I can talk to	79
Category	**Acknowledgement**	**228**
Observed indicator	Feeling valued, Credited strength	
Participant's item choice	I feel like a valued member of this team	228
Category	**Shared focus**	**193**
Observed indicator	Collective efficacy	
Participant's item choice	I feel all members of this team are confident that we can achieve our team goals	193
Category	**Safety**	**226**
Observed indicator	Individual safety, Collective safety	
Participant's item choice	I feel safe, and I also believe that everyone in this team feels safe	226
Category	**Congeniality**	**431**

Observed indicator	Getting along, Conflict avoidance	
Participant's item choice	I get along with one member of this team	44
	I get along with most members of this team	222
	I get along with everyone in this team	165
Q5. OPEN-TEXT PROMPT: Something else makes me feel psychologically safe in this team …		
Category	**Environment**	2
Observed indicator	Setting, Atmosphere	
Participant's verbatim statement	"Open Environment"	1
	"stability"	1
Category	**Relationship**	3
Observed indicator	Personal relationship, Professional relationship, Collegiality, Team support, Teamwork	
Participant's verbatim statement	"The team is incredibly supporting"	1
	"support and collaboration"	1
	"I have a strong relationship with my team members, greatly ensuring my psychological safety"	1
Category	**School context support**	6
Observed indicator	Adult care, Peer care, Friends	
Participant's verbatim statement	"Being able to use teachers and friends as a support net if I am unsure on anything"	1
	"Teachers are competent"	1
	"Friends"	1
	"It's always close friends"	1
	"Friends"	1
	"F1" [Friends]	1
Category	**Personality**	2
Observed indicator	Self-esteem, Open-mindedness, Democracy	
Participant's verbatim statement	"Im sigma and don't care about negative opinions of others. I'm here to grind out my work"	1
	"Open to all thoughts, not forced to have an opinion on something"	1
Statement needs clarity		**4**
Participant's verbatim statement	"nothing"	1
	"I don't know if there is a feedback area on the next page, so just in case, I wanted to mention that the concept of 'the team' wasn't properly established. This may be because of information I missed during the presentation, and if so I do apologise, however because of this my answers were not related to any specific team or group as I am not particularly part of one and they didn't seem to match the questions"	1
	"i have no idea what this team is"	1
	"I don't think any of these apply to me but there isn't an option to choose this"	1
Undisclosed reasons		**12**
Participant's verbatim statement	"yes"	1
	Ticked box but did not provide specified reasons	11

Analysing the qualitative responses to Q5 was beneficial in capturing the context behind the respondents' multiple-choice options and written specifications to the open-ended prompt that offered a fuller picture of the contextual insights of *psychological safety* in secondary school student team contexts. The responses to Q5 as shown in **Figure QLA4.1** above were 30, emergent, purposeful, observed indicators spread within 13 categories of *psychological safety* in secondary school student team contexts; some dissimilar to those identified in adult work environments by researchers like Aggarwal et al. (2007), Clark (2020), Edmondson (1999, 2003b, 2018), Edmondson and Lei (2014), Edmondson and Mogelof (2006), Eldor and Gadot (2016), Frazier et al. (2017), Kahn (1990), Kim et al. (2020), Langfred (2004), Lather and Jain (2015), Macey and Schneider (2008), Newman et al. (2017), Pearsall and Ellis (2011), Rothbard, (2001), Roussin et al. (2016), Sanner and Bunderson (2013), and Welch (2011). The 30 observed indicators of *psychological safety* in secondary school student team contexts identified by the Q5 responses were: knowing someone, trusting someone, risk-taking, honesty, having an existing friend, being oneself, not being anxious, not being judged, having support, being understood, feeling valued, credited strength (i.e. acknowledgement of skillset), collective efficacy, individual safety, collective safety, getting along, conflict avoidance, setting, atmosphere, personal relationship, professional relationship, collegiality, team support, teamwork, adult care, peer care, friends, self-esteem, open-mindedness, and democracy.

The 13 categories of the observed indicators of *psychological safety* in secondary school student team contexts identified by the Q5 responses were: congeniality, diversity, non-judgemental support, friendship, acknowledgement, safety, mutual trust and respect, shared focus, familiarity, school context support, relationships, personality, and environment.

4.17.2 Visualisation of the Thematic Analytical Findings of the Qualitative Item [Q5] of the Online Survey

After the thematic analysis of the responses to Q5, the frequencies of the 13 categories that captured the 30 observed indicators of *psychological safety* in secondary school student team contexts were graphed in Microsoft Excel (Microsoft Corporation, 2018). **Figure QLA4.1** visually demonstrates the trends, correlations, and outliers in the dataset to aid quick understanding.

Figure QLA4.1

Scatter Chart Showing a Snapshot of the Categories of Observed Indicators of Psychological Safety in Secondary School Student Team Contexts

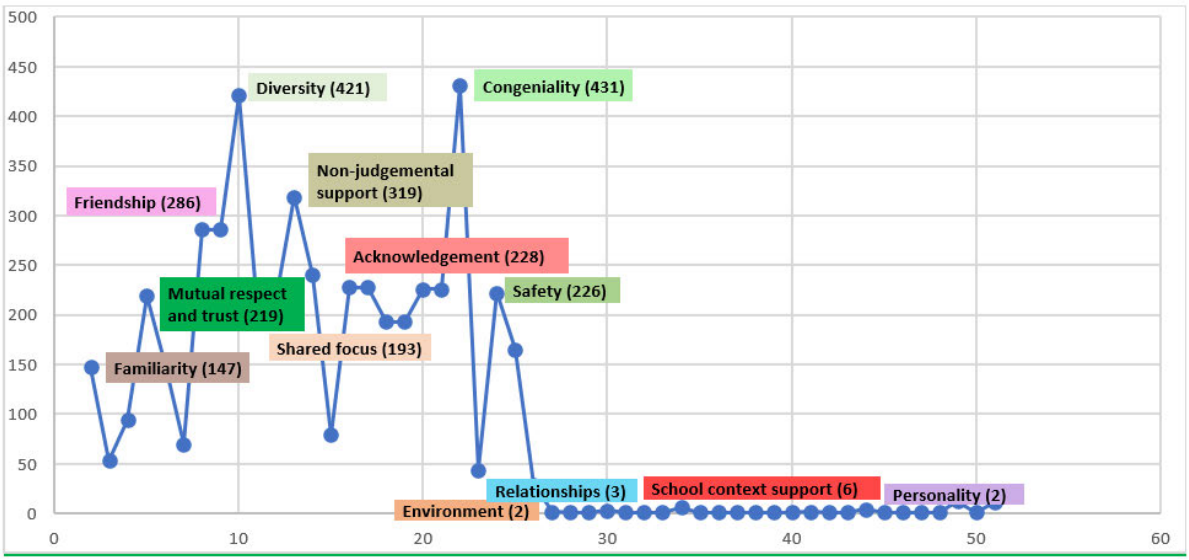


Figure QLA4.1 shows that congeniality, diversity, non-judgemental support, friendship, acknowledgement, safety, mutual trust and respect, shared focus, familiarity, and school context support emerged as ten, major categories of *psychological safety* in secondary school student team contexts from the respondents' perspectives. The categories of mutual trust and respect, acknowledgement, non-judgemental support, shared focus, environment, relationships, [work] school context support, and safety aligned with the findings of Edmondson's (1999) study in the adult work environment. Congeniality, diversity, friendship, and familiarity were discovered as nuanced categories of *psychological safety* for the participants of this mixed methods research when

collaborating in their secondary school student team contexts. These findings further informed the identification of the secondary school students' understandings of *psychological safety* in their team contexts.

4.17.3 The Identified Categories and Themes of Psychological Safety from the Thematic Analysis of Q5 of the Online Survey

Emerging from the analyses of the quantitative data collected with Q4 of the online survey were three, latent variables that measure *psychological safety*, comprising of 16 items captured withing 16 categories that are captured within seven themes of *psychological safety* in secondary school student team contexts as shown in **Table IND4.1**.

Table IND4.1

Observed Indicators of Psychological Safety in Secondary School Student Team Contexts from the Quantitative Analyses of Q4 of the Online Survey

Variables that measure *psychological safety* in secondary school student team contexts	**Observed indicators of *psychological safety* in secondary school student team contexts**		
	Items	**Categories**	**Themes**
Team learning behaviours (TLB)	This team has dedicated time to ensure that all members understand the team's objectives.	Shared and aligned understanding of goals	Goal-aligned candour
	In this team, we regularly speak up to challenge assumptions about the issues under discussion.	Speaking up candidly about task at hand	
	Team members make the effort to seek support from others in the school community such as peers, parents, and teachers to get all the information they possibly can to accomplish a task.	Inquiring minds	Creativity for innovation
	Most team members are capable of solving the problems that arise in our tasks.	Problem-solving capacity	
	With dedication and hard work, this team can achieve anything we aim for.	Shared focus	
	This team tends to handle differences of opinion on social media apps rather than addressing them directly through face-to-face meetings.	Good technical skills	
Team psychological safety (TPS)	This team lacks access to helpful teaching, instruction or support that helps us to complete a task properly.	Constructive instruction	Open communication
	Certain individuals in this team lack the special skills needed for good team collaboration.	Cooperative collaboration	
	Mistakes people make on this team are often held against them.	Experiential learning	Supportive environment

	People on this team sometimes exclude others for being different.	Respect for diversity	Inclusive team culture
	Members of the school community who interact with this team often express dissatisfaction with how it operates.	High team performance	
Team efficacy (TEF)	All members of this team are well-equipped with the skills, knowledge and understanding necessary for the tasks they have to do.	Necessary abilities and proficiencies	Competence
	Members of this team are able to bring up problems and tough issues.	Conflict resolution	Collaborative risk-taking
	Taking interpersonal risks on this team is safe because I am confident that I will not be embarrassed, judged, or excluded for speaking up, voicing my opinions and sharing my ideas.	Safe to take interpersonal risks	
	This team consistently seeks new information that drives important changes.	Lifelong learning	
	We welcome external experts to present information or engage in discussions with us that help us to complete tasks.	Effective information sharing	

Additionally, 30 observed indicators of *psychological safety* in secondary school student team contexts that emerged from the analyses of the qualitative data collected with Q5 of the online survey are captured in 13 categories as shown in **Table IND4.2**.

Table IND4.2

Observed Indicators of Psychological Safety in Secondary School Student Team Contexts from the Qualitative Analyses of Q5 of the Online Survey

Observed indicators of *psychological safety* in secondary school student team contexts	**Categories of *psychological safety* in secondary school student team contexts**
Getting along	Congeniality
Conflict avoidance	
Being oneself	Diversity
Not being anxious	
Not being judged	Non-judgemental support
Having support	
Being understood	
Having an existing friend	Friendship
Feeling valued	Acknowledgement
Credited strength	
Individual safety	Safety
Collective safety	
Trusting someone	Mutual trust and respect
Risk-taking	
Honesty	
Collective efficacy	Shared focus
Knowing someone	Familiarity
Adult care	School context support
Peer care	
Friends	
Personal relationship	Relationships
Professional relationship	
Collegiality	
Team support	
Teamwork	
Setting	Environment
Atmosphere	
Self-esteem	Personality
Open-mindedness	
Democracy	

Some of the observed indicators of *psychological safety* that were discovered from this research's triangulated findings were evident in **Chapter Two**'s reviewed studies about *psychological safety* in adult workplaces such as Edmondson (1999) and Kahn (1990) such as safe risk-taking, being understood, team support, collective efficacy, setting, and environment. There were however 13, nuanced observed indicators of *psychological safety* in secondary school student team contexts that emerged that were not evident in the workplace studies. Seven of the nuanced, observed indicators that emerged from the analysis of the responses to Q5 of the online survey were: being oneself, not being anxious, getting along, conflict avoidance, knowing someone, open-mindedness, and having an existing friend were captured within four categories (diversity, congeniality, familiarity, and friendship); with congeniality (i.e., getting along, and conflict avoidance) being highly rated by the sampled secondary school students. Six, nuanced categories of *psychological safety* in secondary school student team contexts that emerged from the analysis of the responses to Q4 of the online survey were: inquiring minds, problem-solving capacity, good technical skills, necessary abilities and proficiencies, conflict resolution, respect for diversity captured within seven themes (goal-aligned candour, creativity for innovation, open communication, supportive environment, inclusive team culture, competence, collaborative risk-taking).

To answer RQ2, the integrated results of the analyses of the responses to the quantitative item [Q4] and the qualitative item [Q5] of the online survey instrument identified 46 observed indicators of *psychological safety* in collaborating secondary school students. These observed indicators that vary from the findings of adult-focused workplace studies, contributed to the *psychological safety* scholarship specifically focused on secondary school student contexts.

It can be inferred from the online survey items of Q4 and Q5 that the item and multiple-choice offerings may have prompted the responses, indicating response order bias, acquiescence bias, social desirability bias or confirmation bias. These biases may have been mitigated by the open-text prompt and the discussions in the focus groups. **Chapter Five** reveals further knowledge and understanding of *psychological safety* in secondary school student team contexts by providing more

detailed deliberations and further qualitative analyses of the participants' beliefs, feelings, perceptions, opinions, and experiences that were discussed in the focus groups. Before then, as discussed in the introduction in **Chapter One**, the systematic review in **Chapter Two**, and the methodology in **Chapter Three**, being an under-researched topic and guided by the 'constructivist' grounded theory of Charmaz (2014), this research purported to construct a theoretical framework to support the augmented understanding of *psychological safety* in secondary school student team contexts.

4.18 Formulating a Theoretical Framework of Psychological Safety in Secondary School Student Team Contexts

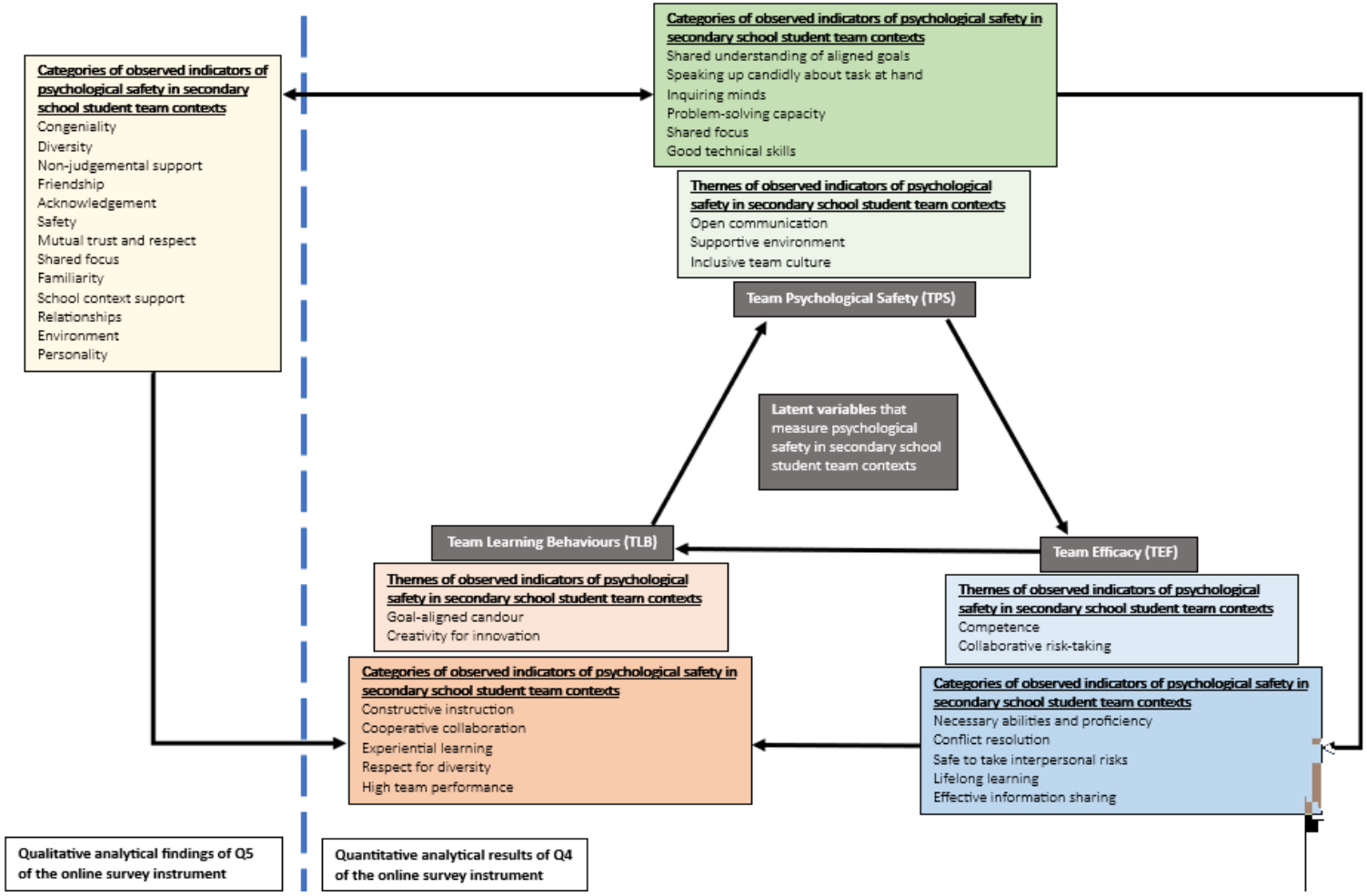
The results of **Chapter Two**'s literature review considered *psychological safety* in secondary school student team contexts an under-researched area. Grounded in the analysed quantitative and qualitative data of the online survey respondents, the observed indicators of *psychological safety* in secondary school student team contexts known as the items of "The SHuCoS© Scale" (**Table RSM16.3** in **4.14**) contributed significantly to the emergence of "The SHuCoS© Model" in **Figure CFA16.2**. Credence is given to "The SHuCoS© Model" of *psychological safety* in secondary school student team contexts by the social learning theory (Bandura, 1977) which explained that humans have complex thought processes that drive their behaviours (Bandura, 2008). The learning behaviours of the survey respondents were captured in the items of "The SHuCoS© Scale" and the responses to the qualitative part [Q5] of the online survey instrument used for collecting data on *psychological safety* in secondary school student team contexts. Emerging from "The SHuCoS© Model" of *psychological safety* presented in **Figure CFA16.2** (**4.15.1)**, a coherent narrative about the reality of *psychological safety* in secondary school student team contexts that was grounded in the analysed data of the online survey respondents, informed the creation of a theoretical framework.

Figure TFW4.1 presents an integrated, emergent, theoretical framework that explains the participants' understandings of the 29 categories [16 from Q4, and 13 from Q5], seven themes [from

Q4] that captured the observed indicators of *psychological safety*, and three latent variables which measure *psychological safety* in secondary school student team contexts that inform the answers to RQ1 and RQ2 (**Tables MSM1.1** and **MSM1.2** in **1.6**) of this research. This theoretical conceptualisation is further refined in **Chapter Five** informed by the qualitative analyses of the data collected with the focus groups.

Figure TFW4.1

Emergent Theoretical Framework



Having articulated the manifestation of *psychological safety* in secondary school student team contexts with an integrated, emergent, theoretical framework based on substantiated evidence grounded in the collected data from 372 valid secondary school student responses and repeated statistical testing, it was important to test and confirm the theory. The findings of the analyses of the focus groups' data in **Chapter Five** contributes to triangulating this integrated, emergent, theoretical framework and is further discussed in section **5.7**. To conclude **Chapter Four**, the key integrated results of the online survey data analyses are shared.

4.19 Highlighting the Triangulated Results of the Integrated Analyses of the Quantitative and Qualitative Data Collected with the Online Survey

Analysing the online survey data resulted in four key results, providing original and significant contributions to the existing knowledge on *psychological safety* in secondary school student team contexts and to the overall *psychological safety* scholarship. The key results are:

1. The development of an online survey instrument used for collecting quantitative and qualitative data on *psychological safety* in secondary school student team contexts (**Table MSM4.1** in **4.2**).

2. An adapted 16-item, 3-point Likert scale for measuring *psychological safety* in secondary school student team contexts was developed and named as the Situational Human Connection Skills© scale known as "The SHuCoS© Scale" for measuring *psychological safety* in secondary school student team contexts by the researcher (**Table RSM16.3** in **4.14**).

3. "The SHuCoS© Model" was revealed, explaining the associations between the three, latent variables (TLB, TPS, TEF) that measured *psychological safety* in secondary school student team contexts, was revealed (**Figure CFA16.2** in **4.15.1**). This information was applied to inform the answering of RQ2.

4. The identification of 46 observed indicators spread within 29 categories and seven themes of *psychological safety* in secondary school student team contexts from the quantitative analysis of Q4 of the online survey instrument and the qualitative analysis of Q5 of the online survey instrument in **4.18** (**Table QLA4.1** and **Figure QLA4.1**). This information was applied to inform the answering of RQ1.

5. An integrated, emergent, theoretical framework of *psychological safety* in secondary school student team contexts that was grounded in the data were formulated (**Figure TFW4.1** in **4.19**). This was achieved through the results of the inferential statistical analyses of the responses to Q4 and Q5 of the online survey, the answers to RQ1 and the three sub-questions of RQ2, and the testing of the three hypotheses of RQ2.

4.20 Summary

Chapter Four presented the individual and integrated versions of the thematic and statistical analyses of the demographic, qualitative and quantitative data collected with the designed, online survey for informing RQ1 and RQ2. Despite 372 valid cases captured for multivariate statistical analyses, 348 complete cases of Years 10-12 [53% females; 43% males; 64% Australians] South Australian secondary school students were descriptively analysed from the Q1-Q3 responses in the online survey. The adapted 23-item scale from Edmondson's (1999) study in working adult environments was used to collect quantitative data in Q4 of the online survey. The adapted scale was thus validated to optimise its measurement accuracy in the adolescent context. This scale validation resulted in the discovery of "The SHuCoS© Scale" for measuring *psychological safety* in secondary school student team contexts, answering RQ2. "The SHuCoS© Scale" comprised of 16 items (observed indicators) spread within three, latent variables: TLB, TPS and TEF, informing RQ1. The associations among the latent variables were captured within "The SHuCoS© Model", answering RQ2a, RQ2b., and RQ2c. The parametric test results provided evidence to support H_{01} but rejected H_{o2}, and H_{o3}, indicating that TPS did not influence TEF, but TPS strongly predicted TLB, which moderately influenced TEF. The thematic analyses of the responses to the qualitative item [Q5]

identified 30 observed indicators of *psychological safety* in secondary school student team contexts, informing RQ1. The data reduction process captured 13 categories of *psychological safety* that included friendship, familiarity, and congeniality. The integrated findings of the analyses of the responses to Q4 and Q5 identified 46 observed indicators of *psychological safety* in secondary school student team contexts that were collapsed into 29 categories. Eleven categories had observed indicators that were nuanced to the adolescent schooling context i.e., friendship, familiarity, congeniality, inquiring minds, problem-solving capacity, good technical skills, necessary abilities and proficiencies, conflict resolution, lifelong learning, constructive instruction, respect for diversity. A theoretical framework of *psychological safety* in secondary school student team contexts that was grounded in the data, also emerged, from the shared perspectives and experiences of the collaborating students in the online survey. However, to further explore their understandings of *psychological safety* and how it can be enabled, hindered and implemented in their learning spaces, focus groups were conducted. The revelations on *psychological safety* from the shared personal experiences of the secondary school students that provided depth to the identified dimensions from the online survey are presented in the focus groups in **Chapter Five.**

Chapter Five: Discussion of the Findings for the Analyses of the Data Collected with Focus Groups

5.1 Introduction

Discussing the analyses of the data collected with the focus groups, the findings revealed in **Chapter Five** provide qualitative depth from the students' co-constructed experiences to the breadth of insightful, student perspectives uncovered in **Chapter Four**. The chapter begins by sharing the researcher's engagement strategies for promoting *psychological safety* in the conducted focus groups. This is followed by the discussion of the analyses of the transcribed focus group discussions, revealing additional critical insights that further informed the RQs. The findings of the hybrid thematic approach with Constant Comparative Analysis (CCA) are synthesised graphically, and diagrammatically communicated to support the interpretations of the extended written narratives from the focus groups. Additionally, the chapter reports the distinguishing features of the similarities and differences of the categories and themes of the identified, observed indicators of *psychological safety* between adult work teams and the researched adolescent teams. Furthermore, findings from the analyses of the focus groups that provided data-grounded evidence for the refinement of the emergent theoretical framework in **Chapter Four**, are discussed. The chapter demonstrates trustworthiness and authenticity by presenting the participants' verbatim statements and the relevant analytical processes. The chapter concludes by sharing the novel definition of *psychological safety* in secondary school student team contexts that was informed by the students' voices.

5.2 Establishing the Psychological Safety of the Focus Groups

The six focus groups were guided by five questions as shown in **Table MSM5.7**.

Table MSM5.7

Guiding Questions Used for Focus Group Discussions in Phase Four of the Main Study

	Focus group guiding questions – main study
Q1.	What is *psychological safety*?
Q2.	How do you perceive the presence of *psychological safety* in [your] teams?
Q3.	What are the enablers of *psychological safety* in [your] teams?
Q4.	What will make it easier for you to work and thrive in [your] teams?
Q5.	How would you like to see [your] identified *psychological safety* dimensions implemented in the learning spaces in your school?

In **Chapter Two**, Newman et al. (2017) made a suggestion for future research on *psychological safety* to employ qualitative data collection approaches to gain a better understanding of the manifestation of *psychological safety* in real life. In light of this recommendation, phase four of this research used focus groups to collect qualitative data.

When conducting the focus groups, the researcher endeavoured to create a psychologically safe, collaborative environment for the participants by modelling psychologically safe behaviours. According to Clark (2020), "Creating psychological safety depends on setting the tone and modeling the behavior. You either show the way or get in the way" (p. 18). In **Chapter Three**, it was learned that the researcher initially offered the participants support with their own South Australian Certificate Examination (SACE) Research Project work through timetabled seminars and hands-on support. During this time, the researcher shared the objectives of the research project with the potential participants and modelled research skills as well as a psychologically safe, instructional space for the secondary school students. Bandura's (1977) social learning theory was dependent on the environmental context and observational learning through modelling the actions, emotional reactions, and attitudinal behaviours of other humans in the setting. **Chapter One** discussed the theoretical perspectives and deliberated that symbolic interactionism (Blumer, 1969) permitted the researcher's experiences, beliefs, and opinions as an educator to be used to support collaborative communication techniques for participant engagement. These real-life snapshots were used as

communication hooks by the researcher to engender openness and the flow of discussions. Using symbols as tools of interaction to maintain, change, or construct new meanings (Mead, 1934, 1959), the participants shared their experiences honestly and disclosed tricky situations they had encountered as student collaborators more openly, often by mimicking the researcher's open model of communication. According to Plester (2009), humour has been found to be positively correlated to building relationships in teams. Thereby the researcher used humour and teenage jargon where necessary to tease out the participants' opinions, particularly about challenging themes of diversity and conflict (Charmaz, 2017; Sandelowski, 1995a).

Rogers (1954), in **Chapter Two**, emphasised that *psychological safety* for a human is established by three, linked processes: (1) "accepting the individual as of unconditional worth", (2) "providing a climate in which external evaluation is absent", and (3) "understanding empathetically" (pp. 257-258). He posited that when humans were given permission by their parents, facilitators, or enablers, to express themselves freely, think freely and feel free, their constructive creativity was fostered because a climate of psychological freedom existed (Engler, 2003; Runco, 2014). In the context of this study, the participants were peers, and from the researcher's observations, they generally felt comfortable with challenging each other and collaborated seemingly effortlessly to produce honest, social interactions during the focus group discussions (Kaplowitz, 2000; Wilkinson, 2004). The researcher was also mindful that some researchers caution against participant homogeneity and recommended that participants should not be familiar with each other in order to discourage biased, set behaviours that are likely to dampen spontaneity in the expression of honest, wide-ranging perspectives during discussions (Thomas et al., 1995). Albert Bandura's social learning theory (Bandura, 1977) similarly contemplated the impact of human personality and the environment on human behaviours, which are influenced by observational learning or vicarious conditioning from the environment (Gioia & Manz, 1985). To be cognisant of any such biased behaviours in the focus group environment, to be present, and to model psychologically safe behaviours during the discussions, the researcher did not take field notes, so their attention was not

divided. Regardless of these techniques, there were occasions where some students [two in focus group 2 and one in focus group 6] offered no significant, verbal accounts during discussions. Through symbolic interactionism (Blumer, 1969), valuable insights were elicited into how individual identities were formed within the social dynamics of the focus groups that were not based on exerted control and competition, or social cohesion and a lack of change. The aforementioned participants were thus not coerced to contribute verbally, nonetheless, they made their presence visible by passively affirming their peers' verbal accounts with their positive body language such as smiles and laughter, and filler words such as "*yeah*" and "*aha*". There was a possibility that despite these reactions, those participants may not have shared the perception that the focus groups' environment was safe for interpersonal risk taking (Chiu et al., 2011; Edmondson, 1999; Edmondson, 2018). It could also be that those participants may not have understood the questions that underpinned the task at hand as reported by one respondent (who may or may not have been a focus group participant) who wrote:

> I don't know if there is a feedback area on the next page, so just in case, I wanted to mention that the concept of 'the team' wasn't properly established. This may be because of information I missed during the presentation, and if so, I do apologise, however because of this my answers were not related to any specific team or group as I am not particularly part of one and they didn't seem to match the questions.

The concept of teams, teamwork and *psychological safety* were discussed in the student seminars at this study site as outlined in **Chapter Three**. Following the seminars, the participant information sheet (PIS) was provided to the participants of this mixed methods research and their parents and caregivers that included an excerpt describing teams and their relationship with *psychological safety* and future careers. The PIS stated:

> Future career and life success require a wide range of skills and attributes. Competencies such as teamwork, creativity, or problem-solving are all needed for you to reach your potential. Communicating effectively in a team is a vital skill that is beneficial to your self-efficacy, your team's collective efficacy as well as your individual and communal success.

> This will advance your successful outcomes as a creative entrepreneur, employer and/or employee. To advance your creativity, you must feel safe in shared environments to communicate and collaborate well to realise high-performance outcomes. This feeling of safety in teams is termed psychological safety. In this research, we aim to measure the observable dimensions of psychological safety as well as your reported level of psychological safety as you work individually and in teams during lessons or in a co-curricular activity. (**Appendix A**)

The written, verbatim expression of the online survey respondent reported in **Chapter Four**, therefore, indicated a lack of clarity in the purpose of this research project for this particular survey respondent and maybe others participating in the focus groups; noted for future research procedural improvement.

5.3 Responding to Research Question One (RQ1)

The findings of the analyses of the focus group discussions were used to inform RQ1 and the four sub-questions (RQ1a., RQ1b., RQ1c., RQ1d.) in **Table MSM1.1** (**1.6**.).

5.3.1 The Secondary School Student's Understanding of Psychological Safety in Their Team Contexts

To further inform **RQ1a.** "*What is the secondary school student's understanding of psychological safety in their team context*?", the 52 participants of the six focus groups contributed voiced insights that reflected their understanding of *psychological safety* in their context. The participants shared their opinions, experiences and perspectives and conveyed attitudes that led to the identification of observed indicators of *psychological safety* in the secondary school student team context. As explained in **Chapter One**, the application of symbolic interactionism in the focus groups facilitated the exploration of meaning, which arose in the process of these micro-level, face-to-face interactions that were fluid, open to review and was altered based on the participants' actions, interactions, and perspectives (Blumer, 1969). Each of the six focus groups focused on

specific, observed indicators of *psychological safety* that were important to the participants, which led to six, emergent definitions of *psychological safety*. These contributed to an evolving overall definition of *psychological safety* that seemed to differ from the existing definitions for adult work teams.

5.3.1.1 Focus Group One. It was important for participants of focus group one (FG1) to work with their friends or familiar people or within a group composed of others with healthy, non-judgemental, social dispositions who made others feel that their contributions were valued and respected. The participants of focus group one felt that it was beneficial to have someone in the team who was prepared to take the lead on tasks at hand. Socio-emotional safety made participant two (FG1P2) feel psychologically safe, describing *psychological safety* as, *"*Ummm…Just the basic one... like if you go into a group...just people... like smiling and that. Like...even coming in and hear them laughing and that...just makes for a chilled, relaxed environment?*"* For participant one (FG1P1), collaborating in a comfortable environment with trustworthy people was important to them. FG1P1 described *psychological safety* as:

> The more comfortable you are, the better you will be in a group. To know there's no danger. You can trust everyone. Mmmm....just cos I know them at school...but...you know?....theeeee...ummm... it's just the environment...really...just cos you are at school... you know...that everyone's here...trustworthy...at least… .

Collaborating with team members who shared divergent points respectfully was appreciated by participant three (FG1P3) who described *psychological safety* as:

> …Like... feeling supported...like... you'll say something and you won't be like... eeww...like...why do you say that...you know…And probably when you say something, everyone's like ...yeah... that's good...I agree...whatever…No...but like...they have to be... able to say that they don't agree in a more positive and respectful way... rather than being like no...like...cos that won't make you wanna talk again... .

Participant one (FG1P1) tried to sum up focus group one descriptions of *psychological safety*, *"*Exactly...group work is amazing if you get the right people…You can talk...you know...you know you can say whatever that you want to them...and you know...what...yeah...*"*. Deliberating on the motivation required for accomplishing team tasks, participant six (FG1P6) shared their ideas for team efficacy by suggesting a leadership strategy as:

> I don't know...it...for me, it always just starts with like...just the one person. Like...even for the start of this group, *** (FG1P6 names FG1P2) was just the first one to say something...and then it all kind of flows in together... I think people just get scared to be like... the first ...person to kinda break into...cos...Yeah...yes....you just need that one person to kinda push... .

Thinking along the same lines as FG1P6, participant four (FG1P4) added:

> I think there could be a lot of times everyone's sitting there silently...then they're like...oh, I wish I had…gone to talk to... but a bunch of other people are actually thinking the exact same thing...so if someone just makes the...Yeah...like an extrovert...just needs to...come out...sometimes that helps… .

The opportunity to communicate in a non-judgemental environment was what was relevant to participant three in focus group one (FG1P3) who described *psychological safety* as, *"*Like...you know...bluuurrhh...being able to speak to someone and not...know that...you are not feeling judged...*"*.

In **Chapter Two**, Schein and Bennis (1965) opined that an individual's anxiety about their worth and communal acceptance was reduced when they felt psychologically safe. Participant four from focus group 1 (FG1P4) demonstrated alignment with Schein and Bennis (1965) by explaining how positive character references about team members can promote *psychological safety* in collaborating secondary school students by enlightening:

> Ummmm... Like... people's reputation... and kind of what you already know about their character is important... like... how safe you feel around them. If you know someone has a

> poor reputation for ...things they choose to do with their time...or like if they [are] mean to people, then you are not going to want to express yourself... probably as much as you would around people you are comfortable with...so, I feel really comfortable with these people (points to some participants) cos I know them... and I like them... (group smiles and laughter) (points to a couple of participants) I mean...I don't...I don't know you guys as well.....but like I haven't heard anything bad about three of them... like ...they're generally...like ...I've heard they're nice people.....so there's nothing I would ...like ....I wouldn't feel unsafe to share ideas… .

Drawing on the various co-constructed viewpoints, the researcher represented the coded intersections in a creative definition of *psychological safety* for focus group one (FG1) as "when one feels their contributions in group work are valued and respected without judgement in an inclusive, understanding environment where friends and peers exhibit healthy social cues such as smiles and humour to make everyone feel comfortable."©

5.3.1.2 Focus Group Two. It was important for the participants of focus group two (FG2) to work with their friends or others they got along with, in an inclusive environment where their strengths are valued, and their opinions are respected. For this group, verbal and non-verbal communication cues were important observed indicators of *psychological safety* in groupwork. Participant one (FG2P1) was keen to explain how the support of a comfortable team environment mattered to them by describing *psychological safety* as, "Eeermmmm....feeling like mentally comfortable in your environment? ...Uummm....aaahhhh...I don't know...being in your surroundings...having a clear head…clear head. Mmm...inevitably, being able to get done what you were set out to get done?...".

Similarly, participant five (FG2P5) remarked about the relevance of comfort and safety for their task outputs in a psychologically safe team by simply stating, "Feeling comfortable and safe...with those you are working with". Speaking up without being [unfairly] judged was what participant two (FG2P2) considered as an indicator of *psychological safety* in a student team by

explaining, "It's just like…like…being able to like…speak up or like…say something like…without being judged and stuff that you need to do". To have your opinions valued when shared was an indicator valued for participant three (FG2P3) who shared, "Basically, ask if they are…what your opinion is… I feel like it depends like if you think that your opinion's gonna be valued or not...in a team? Uummm... I guess…it just depends…if you know the people who you're with…". Participant four (FG2P4) reminded the participants of focus group two about the role of body language in teams as an indicator of acceptance of shared opinions in a psychologically safe team by cautioning, "You don't want to say anything that offends them. Body language? Well...if they...uuuhhmmm...I don't know...they're sitting back and relax...and they're not listening or paying attention?" Acknowledging the social diversity of team members, participant two (FG2P2) commented:

> Aaahh…sometimes, people who are what...shy in a group tend to stand more closed up or sit more closed up and kinda like draw back into themselves? And you can kinda tell that it might take a little bit more to bring them out of their shell, I'd say...You spend all the time trying to get them out of their shell.

Agreeing with FG2P2, participant three (FG2P3) reminded the focus group two participants to be mindful of the proficient strengths and limitations of individual team members by advising:

> I think...uummm...it takes people long...like...for example, if it takes people a long time to come out of their shell...and you have to...like...do this project...like... in a set amount of time...trying to jump on people's strengths...for example, they don't want to do the oral part of the presentation, then they can do more of the writing?...or the planning?

The various co-constructed viewpoints of the discussions in focus group two (FG2) were represented by the researcher in coded intersections. This led to the researcher's creative definition of *psychological safety* for FG2 as "the emotional confidence that one feels when their strengths are valued, and their opinions are respected in an inclusive environment with friends and optimistic people who get along to inspire the motivation for accomplishing the goals of the team." ©

5.3.1.3 Focus Group Three. It was important for the participants of focus group three (FG3) to collaborate comfortably and confidently in a diverse, fun, and non-judgemental environment with people they know and get along with so they can achieve shared objectives. Sharing an opinion about their understanding of *psychological safety,* participant three in focus group three (FG3P3) commented, "I guess it's about trust". Participant three (FG3P3) emphasised the importance of a non-judgemental environment as an indicator of *psychological safety*, "Feeling comfortable? Eeerrrmm…being able to feel comfortable to say…or like…stand up for yourself? Probably, just like…not having anyone like kinda look at you and kinda like…oh…why are you…why are you saying that? Not have any judgemental looks at you?" Wishing to collaborate with team members who valued the attribute of speaking up, participant one (FG3P1) identified, "Freedom of speech, I think will be a big part of it". Participant five (FG3P5) valued teamwork, describing *psychological safety* as, "Like just…like…can work in a group. Like…everyone's doing their part…". Humour and divergent perspectives were important observed indicators of *psychological safety* for participant four (FG3P4) who elaborate on FG3P5's point regarding teamwork by explaining:

> Eerrrmm…is able to take other people's perspective…and to ack…[acknowledge]…I guess like someone just like embarrasses themself…like not like be an embarrassment, but kinda like a little… like says the wrong thing or just makes someone laugh…like laughter kinda breaks…the…Yeah…it breaks it…breaks…[the ice].

From the different co-constructed viewpoints, the researcher represented the coded intersections in a creative definition of *psychological safety* for focus group three (FG3) as "the confidence to collaborate in a friendly, positive, diverse environment where people get along and have their perspectives about the task respected to enable the team to achieve their shared objectives."©

5.3.1.4 Focus Group Four. It was important for the participants of focus group four (FG4) to believe that they felt mentally sound, valued, and comfortable in a well-led environment with a

friend or non-judgemental people where one can speak up about what they have to do. When asked to describe *psychological safety*, participant two (FG4P2) said:

> I guess it's just feeling safe around the people to be yourself… around people that you're with…I guess if something…does go wrong, then it's not going to really…negatively… like impact you… kind of mentally?… like you're not gonna be kind of put down…for it being trouble?…that if something goes wrong, you kinda be…in a way…taken care of… .

This student also included reference to the potential mental/emotional element associated with team *psychological safety*. This reference provided a link to the responses to the online survey's open-ended prompt of Q5, "*Something else makes me feel psychologically safe in this team (please specify)…"* in **Chapter Four**.

There, some students described their understanding of *psychological safety* in collaborating secondary school students in relation to friendships and positive team associations. Three of the verbatim statements made by three [unidentifiable] online survey respondents to Q5 were:

> 1. "I have a strong relationship with my team members, greatly ensuring my psychological safety";
> 2. "It's always close friends"; and
> 3. "Friends".

Participant one (FG4P1) described *psychological safety* by sharing her personal experiences of a psychologically safe environment:

> Aahhm…basically, it's how I interpreted it…it's the idea that…especially if you're doing it in research…it's the idea that you're not making people feel unhappy. So, I was gonna do a bit of like a…mental survey with how busy it was making people feel, but you really need to be careful. If people are comfortable expressing…how they feel about certain things…and for bringing some like discomfort with how they're talking about their emotions…cos some people might be struggling internally and you're not aware of it and it brings it out in your research in a negative way.

FG4P1 further elaborated:

> Aahhmm…I think…pre…so, like…before you even start a conversation, just to make it clear that if they feel uncomfortable. We do it in lessons all the time. We did it in psychology before. We watched a pretty distressing video, and she said before…like…if you feel uncomfortable any point, you can walk out. You can leave…so, it's an ability to…aahhmm…to give them the option…to leave.

Psychological safety for participant two (FG4P2) was suggested as supporting mental health and one's wellbeing, rather than having a negative impact:

> I guess if something…does go wrong, then it's not going to really…negatively…like impact you… kind of mentally? Like you're not gonna be kind of put down…for it being trouble?…that if something goes wrong, you kinda be…in a way…taken care of… .

Participant two (FG4P2) felt that *psychological safety* was indicative when professional staff were on hand to support mental health and wellbeing challenges faced by team members, "Aahhmm…well, just give them…mainly just give them…the resources…like…just like therapists, counsellors… have somebody that they will be able to easily go to…to…that can handle those types of issues*"*. Participant three (FG4P3) wondered if *psychological safety* had anything to do with being a "good person", being friendly or making others feel "safe" by asking:

> Well… I was thinking that…it was like a…what it meant…like what it meant…I thought it meant like…being a good person to other people in life…like…say…you're friends with someone, and like you're creating a safe space for them…but it…and that's being like…safe… psychological safety? Is that like what I think it is?

Seeking clarity on the number of friends required in a group to make one feel psychologically safe by the researcher, participant three (FG4P3) deliberated, "Maybe, at least one? One or two". When the researcher asked about a lack of friends in a team when one turned up at a school as a new student, participant three (FG4P3) who disclosed that they were a member of the African migrant community ["*Aahhmm…no…I came from overseas…as a baby…*"] answered, "It's awkward.

And if you are less comfortable to like…speak…cos you are worried…cos you don't know anything about these other people...so…". The researcher wondered how long it will take for a new student to make friends for collaborative purposes, with participant four (FG4P4) responding:

> …it kinda depends. Yeah…like if you're gonna start a conversation with them…well…expect…them to…show like…whether you speak first… Like…expect them to behave like…show…like…it depends on…Like, it depends on how long it takes you to warm up to other people and start having a conversation with someone.

Participant two (FG4P2) agreed with FG4P4 by affirming, *"*…really based on the individual…whether you are someone that likes making new friends or…you're just happy with friends that you've got… and the environment…which you are actually in…and the circumstances*"*.

From the discussions of focus group four (FG4), the researcher coded the intersections of the various points of view and creatively integrated the viewpoints into a definition of *psychological safety* for FG4 as "the belief that one feels valued, included, comfortable and safe in a well-led, collaborative environment with a friend or non-judgemental people where one can speak up about the task at hand without fear of embarrassment, rejection or punishment." ©

5.3.1.5 Focus Group Five. It was important for the participants of focus group five (FG5) to be able to verbally communicate their opinions in an inclusive environment without fear of feeling uncomfortable, isolated, judged, walking on eggshells, or being disrespected. With feeling included of relevance to them, when describing *psychological safety*, participant seven (FG5P7) remarked, "I dunno...just feeling like...included". Participant two's (FG5P2) expectation of respect from team members during discussions was as an indicator of *psychological safety* from their perspective, "Eerrr...feeling respected...as a team member...will be good. Yah...to discuss your thoughts". For participant four (FG5P4), a non-judgemental environment demonstrated the presence of *psychological safety*, so they added, "Being able to have conversations without feeling judged...or...anything like that". Agreeing with FG5P2 and FG5P4, participant three (FG5P3) added, "Yeah...like...having your opinions respected...uummm...being able to freely speak without being

judged. Also having a sense of belonging". Extending the expressed opinions of FG5P2, FG5P4 and FG5P3, participant five (FG5P5) described *psychological safety* as, "Being able to like...express your feelings...and be open...uummm...and not feel like you're being judged".

Although being able to speak up without judgement was seen by some of the participants of focus group five as an indicator of *psychological safety*, participant one (FG5P1) advised team members against groupthink and forwarded the freedom to express opinions as an indicator of *psychological safety*:

> …Uummm...not feeling pressured to say anything...even...yeah...and even...to just confine...to other peo...other people's opinions. Yeah...so...like...you have your own opinion...you have to be in their opinion. [It's a good idea] to have your own opinion? Yeah...so you don't have to agree with theirs [others in the group].

Yet again, a comfortable atmosphere was forwarded as an indicator of *psychological safety* by participant three (FG5P3):

> I feel like it's just being comfortable...people you're around with. Like...I know a lot of people when they are with their mates, they are totally different. They're like...they speak more...they talk more...they express their opinions. But in a classroom environment...that's sort of set in stone...like...you might not know the rest...a ton of people in your class. But I guess like... with more discussions and stuff, we get more...cos like...I'd say in Term 1, I wasn't conf...confident with people and like my classes (inaudible word) senior and stuff...but as the Term progressed, you get...you know people more...and cos of that you'd be able to express your opinion...a lot more.

Guided by the various co-constructed viewpoints of the participants, the researcher represented the coded intersections of the data in a creative definition of *psychological safety* for focus group five (FG5) as "when one can share their opinions comfortably in an inclusive environment through communicating in a shared language without fear of feeling isolated, judged, walking on eggshells or being disrespected."©

5.3.1.6 Focus Group Six. It was important for the participants of focus group six (FG6) to work with their friends or peers in the presence of supportive adults without fear of judgement. When asked to describe *psychological safety* or name an indicator of *psychological safety* in the secondary school student team context, participant one (FG6P1) expressed, "The teachers". Participant three (FG6P3) offered a reason for FG6P1's choice of "The teachers" as an indicator of *psychological safety*, "Ummm, they [teachers]...they are very good with supporting us students". Participant two (FG6P2) and Participant four (FG6P4) both described friendship in a team as an indicator of *psychological safety* by simply stating, "Friends." Participant two (FG6P2) clarified, "Two [friends]." Participant one (FG6P1) suggested, "One or three friends." Participant four (FG6P4) described, "At least one [friends]. If you have that one pal it makes things a little bit better, um, even when you're in a class. It feels really nice to even have one friend that makes you feel better". The significance of friendship in a team was explained by participant six (FG6P6), "It is best to have good company. They are good to talk to as well". Raising the point of non-judgement again, participant thirteen (FG6P13) reinforced, "Knowing that they are your friends and won't judge you".

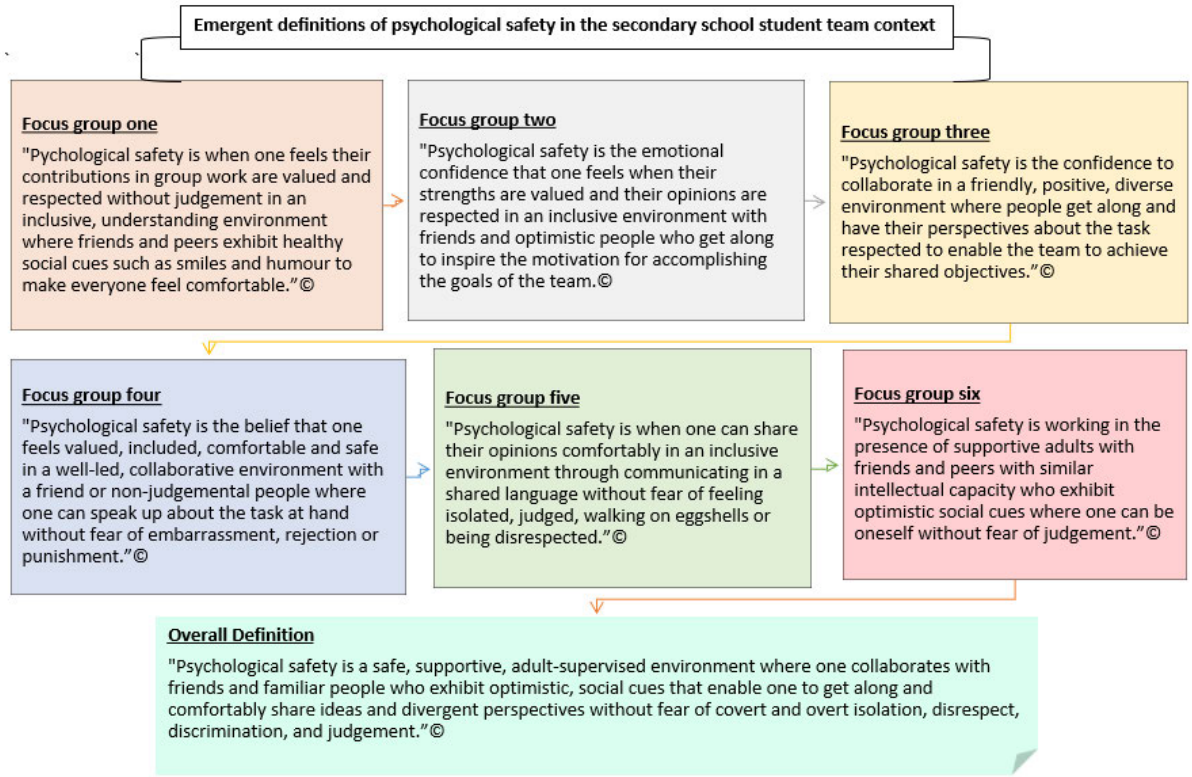
From the creative integration of the different co-constructed viewpoints, the researcher represented the coded data intersections in a definition of *psychological safety* for focus group six (FG6) as "the presence of supportive adults with friends and peers with who exhibit optimistic social cues where one can be oneself without fear of judgement." ©

The coded, significant indicators of *psychological safety* that were important to the participants of each focus group as represented by the six definitions above were subsequently categorised and themed. Applying the CCA approach, the researcher used a creative synthesis of the different definitions to formulate a more comprehensive, nuanced, and robust definition of *psychological safety* that is data grounded, conceptually innovative, and practically relevant in the secondary school student team context. The overall definition provides critical insights into the secondary school students' applicable understanding of *psychological safety*. **Figure DPS5.1** reflects the mapped definitions of *psychological safety* that emerged from each of the six focus groups and

the final emergent, overall definition of *psychological safety* in the secondary school student team context. This is a significant and original contribution of this research that expands the predominant perspectives of adults in organisations within the *psychological safety* scholarship.

Figure DPS5.1

A Mapped Summary of the Pathway to the Emergent Definition of Psychological Safety Pertaining to the Secondary School Student Team Context



This research applied the definition of *psychological safety* by Edmondson (1999), which stated, "Psychological safety is a shared belief held by team members that the team is safe for interpersonal risk taking and captures a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up" (p. 354). In **Chapters One and Two**, *psychological safety* in adult work teams was defined as "a condition in which you feel (1) included, (2) safe to learn, (3) safe to contribute, and (4) safe to challenge the status quo—all without fear of being embarrassed, marginalized, or punished in some way" (Clark, 2020, p. 3), and "a sense of being able to show and

employ self without fear of negative consequences to self-image, status, or career" (Kahn, 1990, p. 708).

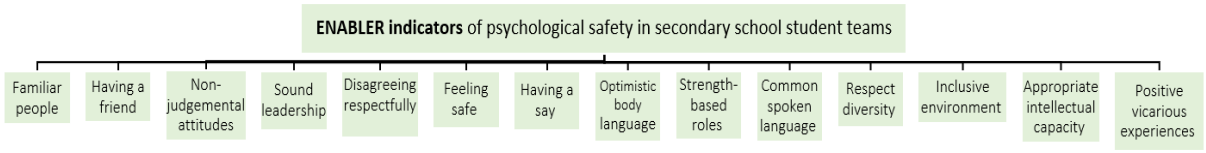
Based on the secondary school students' voiced understandings, the triangulated findings from the analyses of the online survey data and the focus groups data in this research defines *psychological safety* in secondary school student team contexts as "a safe, supportive, adult-supervised environment where one collaborates with friends and familiar people who exhibit optimistic, social cues that enable one to get along and comfortably share ideas and divergent perspectives without fear of covert and overt isolation, disrespect, discrimination, and judgement."

5.3.2 Observed Indicators that Facilitate Psychological Safety – Enabler Indicators

To gain further insight, the emerging student understandings of *psychological safety,* informed **RQ1b. "***How is psychological safety enabled in collaborating secondary school student teams*?" **Figure CCA5.1** shows the summary of the 14 emergent enablers of *psychological safety* in secondary school student teams.

Figure CCA5.1

Emergent Enabler Indicators of Psychological Safety



Note. Enabler indicators of psychological safety in secondary school student teams identified in the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts".

The critical discussion of each of the enabler indicators is elevated by the voices of the secondary students in the following section.

5.3.2.1 Familiar People. Linking trust and friendships to the feelings of comfort as an enabler indicator of *psychological safety* in secondary school student teams, participant one in focus group one (FG1P1) pointed out:

> The more comfortable you are, the better you will be in a group. To know there's no danger. You can trust everyone. Mmmm....just cos I know them at school...but...you know?....theeeee...ummm... it's just the environment...really...just cos you are at school... you know...that everyone's here...trustworthy...at least...

Having trusting relationships with relevant people such as friends in secondary school student teams was also seen as an enabler by participant five from focus group two (FG2P5) who said, "It helps if you...like...know the people...like we said...if you are friends wth them...or...like...you know the people and you trust the people...and it's probably easier to work with them...and you feel safe...but...". Participant nine from focus group two (FG2P9) also believed that the younger-aged teachers were more relatable and their ability to engage in contemporary discussions enabled their [students] *psychological safety.* FG2P9 explained, "They [teachers in general] are more mature? I think they [younger teachers] are younger cos it's like...they have more experiences close to yours...and so like...they are often more chilled...and willing to just talk about random things...".

Sharing similar perspectives on trustworthy people and processes as enabler indicators of *psychological safety* in secondary school student teams, two [unidentifiable] respondents of the online survey in **Chapter Four** wrote these two verbatim statements in response to the open-text prompt of Q5:

1. "support and collaboration"; and
2. "The team is incredibly supporting".

5.3.2.2 Having a Friend. Having friends (and forming new friendships) in a team was perceived as an enabler indicator of *psychological safety* in secondary school student team contexts. Participant seven from focus group six (FG6P7) elucidated:

> Ummmm…well some teachers have the technique of making it so you actually don't sit next to friends and have to make friends. So when you sit at a different table away from your friends...and when you are in a group you try to work and then when you're in a group you have that option of having those guys as [friends] well.

For this student, an enabling indicator was being able to work as friends when assigned intentionally by teachers to groups without existing friends. Friendship was also an important enabler for participant sixteen in focus group (FG6P16) who shared, "Ummm, having my friends around me. I don't know one or two [friends]". Participant fifteen (FG6P15) agreed, "Ummm. Mine's friends as well". Participant six in focus group four (FG4P6) similarly stated, "Just like friends also with you. To talk to friends. To talk to…".

5.3.2.3 Non-Judgemental Attitudes. Friendships in teams was also connected to feelings of acceptance in the team. The relevance of body language in arbitrating a judgemental attitude of a team member was communicated by participant nine in focus group six (FG6P9) who explained, "When placed in a group where you have no friends, you don't feel like you can say anything and you get judged…or even body language". Advising on how to overcome this feeling, participant fourteen of focus group six (FG6P14) suggested, "Put yourself out there? Mini conversations first". With a one-liner, participant four from focus group one (FG1P4) summed up the conversation on non-judgemental attitudes, by stating. "Judgement-free".

5.3.2.4 Sound Leadership. Initiating the concept of the appropriateness of both student and adult leadership as enabler indicators of *psychological safety*, participant five from focus group four (FG4P5) described:

> I was thinking about….like…if we are talking about…like…teams and groups. The leadership that it has? Depending on how the team's led is how the team interacts with each other, I guess. I think both…teachers and students are both important. Like…if it's like…student leadership, then that's great…and if it's adult leadership…same…like. Like…for example, in

> the Middle School, there are student leaders…and like…students…other students come to the student leaders if they don't feel comfortable…for example…with a staff member. So, I think they all play a part.

Participant four from focus group four (FG4P4) further explained:

> It can be a bit of both cos if it's the students leading, there's maybe a student whose kind of…kinda rally up the troops, then the…teacher…how they…I guess…lead the…each of the groups…to interact? Like you've got two fantastic situations…where you need to speak someone…maybe the teachers can't help or don't really understand…or that aspect of it… so I think they'll play a part in situations where you need to speak to someone about something that maybe the teachers can't help with or don't really understand that aspect of, so you can go to the students or if the students don't really see that point of view. If you go to the teacher, so you kinda get examples of things to focus on.

Drawing attention to the complementary partnership of student and adult leadership, participant two from focus group four (FG4P2) commented, "They all kinda help each other".

5.3.2.5 Respectful Disagreements. In **Chapter Two**, it was reported that disagreements are inevitable in collaborative environments as long as team members are not engaged in groupthink and are willing to disagree or offer divergent perspectives on a matter at hand (Janis, 2008; Sunstein & Hastie 2015). **Chapter Two** also prompted that *psychological safety* did not indicate an absence of conflict, but rather an opportunity for any disagreements that occurred, to be managed constructively with productive outcomes (Barsade, 2000; Edmondson, 2002). The focus group participants understood that disagreements will arise, but they sought for such divergent-pointed discussions to be managed in respectful manners. Commenting on how a disagreement could be voiced with positive language, in focus group one, participant three (FG1P3) suggested, "No...but like...they have to be... able to say that they don't agree in a more positive and respectful way... rather than being like no...like...cos that won't make you wanna talk again...". To convey disagreements or differences of opinions in a team in a respectful manner, participant one from

focus group five (FG5P1) proposed, "Discussing it [the disagreement]". Having further discussions where reasons are provided for a disagreement and are accompanied with suggestions for the offered divergent point was seen as one way to disagree respectfully by participant one in focus group five (FG5P1) who explained, "Discussing it... Yeah...discussing it with respect. You know...not saying...ooohhhh, you're wrong...that's bad sort of thing...but just saying...yeah, I understand that but I think ...you know...it's just the way that you word it...". Building on the suggestion of FG1P3, participant four from focus group three (FG3P4) shared a specific, positive language strategy of acknowledgement of alternative perspectives/contributions that could work in a situation where collaborating secondary school students disagree by describing, "I think that I should let…if they disagree, that it should be…not like disagreement: but like an acknowledgement…of like…another idea".

5.3.2.6 Feeling Safe. In **Chapter Two**, Edmondson (1999) defined *psychological safety* as "a shared belief held by team members that the team is safe for interpersonal risk taking and captures a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up" (p. 354). As far as the focus group participants in the secondary school student team context were concerned, feeling safe in a team was linked to having friends in the team. This opinion was voiced by several participants such as participant five in focus group two (FG2P5) who opined, "It [feeling safe] helps if you...like...know the people...like we said...if you are friends with them...". When the researcher asked for the number of friends that focus group participants expected in a team to promote their *psychological safety*, participant three in focus group four (FG4P3) simply stated, "Maybe, at least one? …One or two". Participant seven in focus group six (FG6P7) was confident that once placed in a team, he was going to be just fine, stating, "I'll assume you're safe [in the team]".

5.3.2.7 Having a Say. Kahn (1990) described *psychological safety* in **Chapter Two** as "feeling able to show and employ oneself without fear of negative consequences to self-image, status or career" (p. 708). In the focus groups, the participants bounced off opinions off each other and made comments and utterances to affirm, extend or strengthen what other participants had

shared or were sharing. In **Chapter Three**, symbolic interactionism (Blumer, 1969) was described as having the enablement to co-construct meanings from the social interactions of the focus group participants (including the researcher's) personal experiences, beliefs, and opinions (Charmaz, 2017; Sandelowski, 1995a). Being able to have a say in matters at hand was seen by participant four from focus group three (FG3P4) as an enabling indicator of *psychological safety* in secondary school student teams, "Ah…Everyone being able to…have their say?" Participant four from focus group three (FG3P4), however heeded a word of caution, "Yeah…like you don't talk too much and not let others have like their say as well".

An environment that moves learners from the position of spectators to active participants of learning opens safe passages for the development of soft skills such as resilience, self-confidence, independent learning skills and self-efficacy (Clark, 2020). Providing a strategy to enable *psychological safety* for secondary school student teams, participant two from focus group five (FG5P2) felt having a say was not enough but being able to express an opinion was more effective by suggesting:

> I think when you are in a group...you just got to...like...establish respect from the get go? Uumm...because...if you are putting your opinions out...you don't know...like...*** [Participant 4] said...if they're gonna...you know... form their own opinions...and then not agree with you...and you gonna feel isolated. Why should you say something if you gonna end up feeling isolated?...Like...it's not a positive feeling that you put yourself through. I think...it's just... everyone has to give...you know... their own side whether they like it or not...which is a bit...bbrruuuhh...but like...if everyone's saying something, you know...you're not alone. You're not saying something that might offend someone else...that might be wrong...so you giving everyone their own opinion.

Participant one from focus group five (FG5P1) established their preference for having divergent opinions acknowledged by saying:

> Thanks. Uummm...not feeling pressured to say anything ...even...yeah...and even... to just confine... to other peo... other people's opinions... Yeah...so...like ... ...you have your own opinion...you have to be in their opinion... To have your own opinion? Yeah... Yeah...so you don't have to agree with theirs... .

Sharing their perspectives on seeking opinions as an enabler indicator of *psychological safety* in secondary school student teams, a [unidentifiable] respondent of the online survey in **Chapter Four** wrote this verbatim statement in response to the open-text prompt of Q5:

> - "Open to all thoughts, not forced to have an opinion on something".

5.3.2.8 Optimistic Body Language. Across the focus groups non-verbal communication cues such as body language were perceived to be an enabler indicator of *psychological safety* in secondary school student teams. Participant nine from focus group two (FG2P9) commented on the comfort that non-verbal cues project in a team with familiar people:

> Be friendly? Smile? Because I'm comfortable with them...like...my team…So, I would give my opinion. I guess...it's...uumm...a lot easier...to...be...I don't know... psychologically safe...for lack of a better word...in a team where you know...people...have similar experiences...they are similar ages...like for example...all in a school setting...that's different to what a teacher will experience for example... .

On this matter, participant one from focus group two (FG2P1) said, "It helps if the others are accepting of anyone no matter what. I don't know...it's just like...you can tell something [from their body language]...like...[if you are accepted or not]…". Acknowledging the researcher's observed disposition in the focus groups as an example of how friendliness can enable *psychological safety* in secondary school student teams, participant four from focus group four (FG4P4) said, "A friendly face. Even if it's just like…cos right now, you're [researcher] being like…very energetic…and like smiling the whole time…and I feel like if you [researcher] were being very…like…".

The researcher's disposition was also commented on by participant three from focus group three (FG3P3) as an enabler of *psychological safety* in secondary school student teams who state,

"You're [researcher] very open. You [researcher] are very talkative…". Mimicking a very serious, unfriendly face, participant three from focus group four (FG4P3) chipped in, "…if you [researcher] are being very like…formal…it will make us all feel a bit more…". Participant four from focus group four (FG4P4) finished FG4P3's statement, acknowledging, "…uncomfortable".

5.3.2.9 Strength-Based Roles. Using the strengths of team members in secondary school student teams was seen as an enabler of *psychological safety* in secondary school student teams. Participant three in focus group three (FG3P3) advocated for the assignment of appropriate roles, "Having roles? Like a scribe…someone who always kinda like…". Participant three from focus group two (FG2P3) reminded other participants about the social diversity of team members:

> I think...uummm...it takes people long...like...for example, if it takes people a long time to come out of their shell...and you have to...like...do this project...like... in a set amount of time...trying to jump on people's strengths...for example, they don't want to do the oral part of the presentation, then they can do more of the writing?...or the planning?

Regarding strength-based roles, an [unidentifiable] respondent of the online survey in **Chapter Four** wrote this verbatim statement in response to the open-text prompt of Q5:

> - "Being able to use teachers and friends [either may know more on a matter] as a support net if I am unsure on anything".

5.3.2.10 Common Spoken Language. To enable *psychological safety* in secondary school student teams, some focus group participants emphasised verbal communication strategies such as a common spoken language. Although participant three from focus group five (FG5P3) recognised that not everyone will speak when provided with an opportunity to contribute to a group, positing:

> I guess like...let everyone have an equal opportunity to talk...like...because if it's like...you know...like...teachers...and like you raise your hand...like...not everyone would...speak out...but at least ...if you have...if everyone gets given a chance to talk, then everyone's...like... opinion can be heard somewhat. Like...[speaking in] English?

Different ways of communication were brought up by participant nine from focus group two (FG2P9) who stated, "Communication. I mean...I guess there's always other ways to communicate... but some people use maps and all that to...I don't know...communicate in calculations…and that's what they're doing...but...like...language...definitely is a really big part of them".

5.3.2.11 Respect Diversity. To respect someone is to value and appreciate them for "diversity produces nothing and blesses no one unless its value can be drawn out" (Clark, 2020, p. 18). Talking about a common spoken language enabling *psychological safety* in secondary school student teams, Participant three from focus group five (FG5P3) explicated their perspective on intercultural literacy as an indicator of a respect for diversity, saying:

> The thing is not just about language. It's about understanding culture as well...cos when I hang out with...like...my mates who are like...Asian...some Filipino...or of other like...ethnicities. I wouldn't say...I act differently...but I can know what to say...and what not to. Certainly at school, I'd say...I conform...to like...mmrrmmm...uumm...the vibe...so...like. It is...especially...like...when I came to Australia as I was young. I had to learn…how to like...be at school. Yeah...cos it was different...yeah...[I had to] integrate.

Sharing their beliefs and opinions about a seeming lack of respect for their racial diversity as a secondary school student [from a migrant, Asian community] in a team, participant three of focus group five (FG5P3) recounted a [unfair] judgemental experience:

> Mmm...when I was in primary school...growing up...I'd say so [I was judged]...but now...like...I've gotten used to it...say...like...like...changing to the environment...as I said. You know...I think it's a bit of both…I think Australian culture...is diverse...different...like...people from different countries...but at the same time, I've had to adapt. Like... being from the ***** [Asian country] home environment...and school.

Sharing a personal experience about being unfairly judged as a member of the African migrant community, FG4P3 stated firmly, "Well, I thought that…I don't get…well…I've been judged before. If I

thought…if someone judges me, for like…say…my race or something, I'll call them out…Yeah, I would".

On the subject of self-reassurance and self-empowerment, when faced with a [unfair] judgemental situation in a secondary school student team, participant one from focus group four (FG4P1) counselled:

> I guess you just tell…tell yourself that…they don't really know you. If it's not something that you already know…like if they're not your existing friend…they don't actually know you…in that their…it really doesn't mean anything…and their judgement really just doesn't mean anything. They are just probably saying it to put you down. It's probably got no actual facts behind it. You need to tell yourself.

When a discussion ensued in focus group four about an alternate dispute resolution strategy regarding illegitimate race discrimination issues as a barrier to *psychological safety* in secondary school student teams, participant three from focus group four (FG4P3) accentuated, "Yes, don't mess about with me! Race is not anything about…First of all, you give them …". Before FG4P3 could finish sharing their actioned response to their perceived racist experience, FG4P3 was interrupted by participant four (FG4P4) who warned:

> They [those who judge FG4P3 for their race] need to…like…pick and choose their battles as such… like you need to decide…how…how you [FG4P3] gonna take up the situation…like…you know… they say that…back…and it's like…but do you then…go all out on it?...like…call them out? But then…they've [those who judged FG4P3 for their race] done it to themselves. At the end of the day, if you [those who judged FG4P3 for their race] put yourself out there, you've gotta…expect to…Take the consequences of your actions.

Empirical evidence indicates that *psychological safety* has been studied majorly in English-speaking, Western cultures (Edmondson & Lei, 2014; Friedman et al., 2006; Hofstede, 2001; Liu et al., 2010; Newman et al., 2017). The findings of the systematic literature reviews of Edmondson & Lei (2014) and Newman et al. (2017), and Frazier et al.'s (2017) meta-analysis in **Chapter Two**

confirmed the need for the exploration of *psychological safety* on individual, team, and organisational outcomes across different cultural contexts. The elevated voices of these students reinforce this focus for further research.

5.3.2.12 Inclusive Environment. The focus group participants felt that inclusivity and a non-judgemental environment were enabler indicators of *psychological safety* in secondary school student teams. Clark (2020) describes inclusivity as not merely tolerance by fellow humans but an instinctive sense that permission has been granted by others in a socio-cultural situation for one to cross an invisible social boundary via gestures that reflect an invitation or a rejection. Aligning with this knowledge and student responses informing the observed indicator for respecting diversity, participant five from focus group one (FG1P5) described, "Yeah... being inclusive counts…Welcome?...Feeling welcome? Feeling ...like...comfortable within a group...". Commenting on the inclusivity of the environment, an [unidentifiable] respondent of the online survey in **Chapter Four** wrote this verbatim statement in response to the open-text prompt of Q5:

- "Open Environment*".*

5.3.2.13 Appropriate Intellectual Capacity. Considering the contribution that the competence of the team members may play in task completion as an enabler of *psychological safety* in secondary school student teams, participant three in focus group one (FG1P3) explained:

> Inclusivity…Uumm...I think another one...like...you obviously need to be inclusive and have like... kind of emotional connection...and stuff, but also like...intellectually and...that sort of thing. You need to ...you need to kind of know that the people you are with ...they're going to contribute...to what you're working towards. So, if it's like...a piece of work that you need to do...or a presentation...or like...leadership...like you need to do events... or that sort of thing ...you wanna have peace of mind that everyone is going to contribute...so you can get something done… Like...when you say something, they'll be like...yeah...like, I agree...rather than just be like...whatever... .

Participant one from focus group one (FG1P1), however, emphasised that all team members had the capacity to contribute something good to the team regardless of the level of their cognition, "They wanna talk to you…Respect…Yeah…everyone regardless of their capacity or ability can bring something to a group".

5.3.2.14 Positive Vicarious Experiences. Human instincts are able to sense the vibe and tone of the atmosphere around us and cause us to respond accordingly (Clark, 2020). Participant nine from focus group six (FG6P9) mentioned the impact of vicarious observations as an enabler of *psychological safety* in secondary school student teams, "Ummm, I can…like…when you see other people like being themselves I think that will like encourage you to be more yourself, you know? You don't feel like you can say anything and you get judged... Or even body language". Sharing the opinion of FG6P9, and adding their perspective of achieving team objectives when one feels accepted, participant one from focus group two (FG2P1) explained, "Sometimes… It helps if the others are accepting of anyone no matter what….Yeess? …I don't know...it's just like...you can tell something...like...Yeah…Mmm...inevitably, being able to get done what you were set out to get done?...".

Participant six from focus group three (FG3P6) added, "I think…confidence? Like if you have confidence…Like…talk and be open like you [researcher] are". The focus group participants, however, felt that too much talkativeness could be a barrier to *psychological safety* in secondary school student teams. Providing an example of how a talkative team member could be managed respectfully, participant four in focus group three (FG3P4) explained:

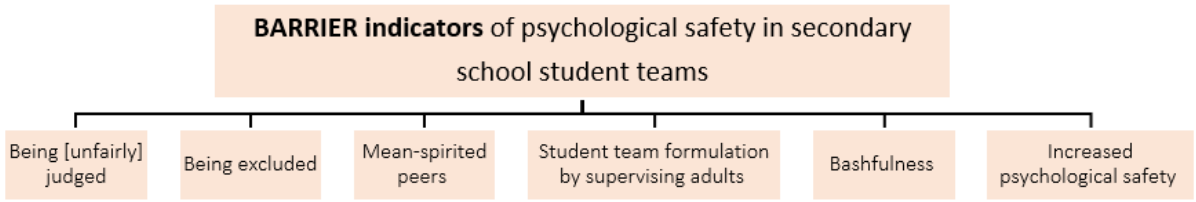
> I feel like you can kind of like…maybe hint to it? Like…at them being…that little bit too…Hey, can you tone it down a little bit. Like…we are all trying to do our work. I guess it's also trying not to like…so much…have a go at them. More like…hey, I know like…like…this is how…this is how you get your work done, but we need to be able to do our work…for that, we need a little bit more… .

5.3.3 Observed Indicators that Hinder Psychological Safety – Barrier Indicators

To inform **RQ1c. "***What are the barriers to psychological safety in secondary school student teams*?", the emergent, barrier, observed indicators of *psychological safety* in secondary school student teams that were grounded in the data were justified by the voiced opinions, perspectives and experiences of the respondents from Q5 of the online survey (**Table CCA4.1** in **Appendix E**) and from the focus group participants in their discussions with the researcher. **Figure CCA5.2** summarises the six emergent barriers to *psychological safety* in secondary school student teams.

Figure CCA5.2

Emergent Barrier Indicators of Psychological Safety



Note. Barrier indicators of psychological safety in secondary school student teams identified in the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts".

The impact of being included and not being [unfairly] judged in collaborating secondary school student teams have been identified as emergent, enabling, observed indicators of *psychological safety* in secondary school student teams (**5.3.2.3** above). It can be inferred the reverse of those discussions holds true as barriers to *psychological safety* in secondary school student teams. The six, emergent, barrier, observed indicators to *psychological safety* in secondary school student teams are explicated below with some examples of supporting verbatim statements from the focus group participants.

5.3.3.1 Being [Unfairly] Judged. In **5.3.2.1** above, having their say on trustworthy people and processes, "support and collaboration" was perceived as an enabler indicator of *psychological safety* in secondary school student teams by a [unidentifiable] respondent to the open-text prompt of Q5 of the online survey in **Chapter Four**. In **5.3.2.3** above, FG6P9, FG6P14 and FG1P4 linked friendships in secondary school student teams to feelings of acceptance in a "judgement-free" secondary school student team environment as enabler indicators of *psychological safety*. Feeling uncomfortable in secondary school student teams due to feelings of being [unfairly] judged was addressed by participant seven from focus group four (FG4P7), "Eeerrmmm…Well, I guess if you feel like judged...in kind of a group setting, that would kind of make you feel uncomfortable…to be around everyone, I guess". Not wanting to talk again in the team as expounded by FG1P3 was not an acceptable outcome for participant three from focus group four (FG4P3) [a member of the African migrant community] who strongly asserted a personal, deflective technique:

> If someone is judging you, it's a bit hard to tell yourself that…aahhmmm…it doesn't mean anything…because it's obviously…personally, if someone judging me…and also, it can have an emotional effect on you. It will make you think…it will make you rethink whatever they're judging you about…but then depending on like…if you compare yourself to them…and like…if they like… about what they're judging you about…I kinda think to myself…like come on…look at yourself…that's what you think…aaha… .

5.3.3.2 Being Excluded. Speaking of the discomfort of collaborating with others who are "exclusive", participant three from focus group one (FG1P3) discussed the positive and negative effects of exclusive teams:

> The people that you're with...like...kinda going off...like...the judgemental or exclusive sort of people...it's less likely that you gonna wanna...uuummm... say your ideas cos you gonna feel like they're not gonna join in with what you're saying... and you gonna either...like...end up doing it all on your own...or not do your best work...because you're holding back what you could bring to a group... .

Sharing their lived experience in a team as a secondary school student from a migrant, Asian background, participant three from focus group five (FG5P3) explained how they faced exclusion for their culturally literate ideas which were deemed to be non-conforming by other team members:

> Not being...very...not being... being able to communicate [common spoken language]. Ummm...like if you're not being heard. Yeah...if you don't share any ideas. Ummm…like what other people think...like...uumm…Umm...uh...yes...when you're like...feeling the sense of the room…and you'll feel the mood...if like...if your ideas don't conform with the majority...you might feel...like...unsafe. Umm…me personally?...probably not [will not speak out if my ideas don't conform with the majority]…cos...like me against everyone else.

Confirming the experience of FG5P3 about being excluded for positing ideas that did not conform with the status quo or established team norms, participant four from focus group five (FG5P4) also shared their concerns about being excluded for putting forth non-conformist opinions:

> I dunno...being put down. Uurrmmm...I dunno...people maybe thinking that...I dunno...aarrmmm...people might not think your opinion is worthy. And maybe...they don't agree with it. And maybe...they'll gang up...everyone will...just...agree with one another...and then you are isolated. I dunno...I don't know how to explain this...but eerrmmm...it just happens...sometimes.

Existing [external] issues between team members that filtered into the team was perceived as a barrier indicator with participant three from focus group (FG3P3) describing how that could create exclusion, "Breaking down teamwork…like…someone could have…like…two people could have like…something happen outside of the group and then bring it into the group. Then that definitely can destroy it…Just having a split".

5.3.3.3 Mean-Spirited Peers. In secondary school student teams, a collaborative learning space with students who were referred to as "mean" by some focus group participants was seen to be a barrier indicator to psychological safety. This was evidenced by a conversation in focus group

one where participants made comments to support their experiences on team personalities. Participant four (FG1P4) initiated the discussion by stating:

> ...it's what *****[P2] said...like...if I'm working with like popular people...like...the typically like...or... they're cool...like...I will be more...like...in my shell...because...like...I don't want them to be...like...she is a weird kid that does all the stuff...and...like...just (P4 laughs) Mean...yeah...just you ...Yeah...like citro...and they ... and they've got close friendship groups. So, even if you're just like...in...in a...in doing like...group work or something...with them... they are so exclusive... they don't... they're not opening up...and... you know…collaborating.

Participant three (FG1P3) joined the discussion and described their experience with "mean" peers:

> Mean...Yeah...exclusive…Yeah…I think it's a high level of self confidence…Yeah…Mmmm...yeah...no...not over...I don't know...Yeeaahh... I feel like it's not so much like... they are straight up to your face mean. It's just that they give off that vibe...like...if you're too much...like...out there...they'll be like...judgemental... Like...when you say something, they'll be like...yeah...like, I agree...rather than just be like...whatever... .

It was noted that it was the female secondary school students who were classified as "mean" by their peers, not the male students. Describing the challenging impact of the presence of "mean" female peers on socio-emotional team relationships, participant five (FG1P5) expressed, "Mean girls...kinda...like…I think it's a high level of self-confidence…I was gonna say... it's a very... close knit...type of group…and it's like hard to get...into...Mmm...mmm...so...it's...work?" Participant four (FG1P4) crystallised FG1P5's point by positing, "Mean...yeah.. they've got close friendship groups".

The voiced opinions of FG1P4, FG1P3 and FG1P5 in focus group one showed that negative relationship-related feelings were barriers to *psychological safety* in secondary school student teams. As discussed in **Chapter Two**, in their study on the social skills of high school students in the mid-western United States (US) about intragroup conflict and collaboration, Lee et al. (2015)

concluded that although task-related conflict was perceived to be beneficial for collaboration, process-related and relationship-related conflicts such as those emanating from meanness among team members as pointed out by the focus group participants, must be regulated.

Discussing mean and unkind peers and how to identify them in a groupwork situation, Participant twelve (FG6P12) emphasised, "They be mean. Tone of voice…facial expressions. What they say? How they say it". Relating to this identification measure, participant fifteen (FG6P15) repeated, "Facial expressions. Ummmm, I guess like if someone looks like they are interested in like the conversation or like, they are willing to do (inaudible words)". FG6P12 and FG6P15 thus confirmed the dual role of body language as an enabler of and a barrier to *psychological safety* in secondary school student teams.

5.3.3.4 Student Team Formulation by Supervising Adults. The focus group participants discussed the impact that adults in the school environment such as teaching and support staff have on the formulation of teams they organise for collaborative purposes in in curricular or co-curricular learning spaces. For participant nine from focus group two (FG2P9), the discomfort of being compelled to collaborate with others selected by their teachers was raised, "This is something that is really minor…But some teachers have...umm...they pick partners for you or pick groups for you...and I know it makes some people feel uncomfortable?...".

Based on their understanding of *psychological safety* and their reflection of the behaviours of the focus group discussion participants including the researcher, participant four in focus group five (FG5P4) did not feel that being made to speak in a team against your will was not an action that enabled *psychological safety*, so they exclaimed, "But is that psychologically safe if we force people to talk?" However, a lack of appropriate communication in teams that teachers compel secondary school students to collaborate in without negotiation group was perceived to be a barrier to *psychological safety*. Participant four from focus group two (FG2P4) verbally expressed their thoughts about the impact of this style of group formulation, "It's a lot harder to do your work and feel motivated...[if there is no communication]".

Several participants from focus group two such as participant three (FG2P3), participant five (FG2P5), participant three (FG2P3) and participant one (FG2P1) agreed with FG2P4 and stated that being compelled to join teams put together by teachers led to exclusion. When asked directly to comment on their shared experiences, participant five (FG2P5) said, "It does.*";* participant three (FG2P3) said, "It can do."; and participant one (FG2P1) said, "It can...yeah."

5.3.3.5 Bashfulness. Regarding a reluctance to delve into the task at hand as a barrier indicator to *psychological safety* in secondary school student teams, participant three from focus group three (FG3P3) mentioned, "When everyone is shy". To augment the *psychological safety* of shy members of the team so they can contribute better in a timely manner, participant five from focus group three (FG3P5) recommended, "Would you encourage them? I guess…like gestures…to make them feel more comfortable with you".

Discussing strategies to encourage shy team members, participant three from focus group three (FG3P3) suggested:

> Mmm…I guess maybe like having a one-on-one conversation with them before you open them to the group? Like make them more comfortable with one of us, and then like you move them on to the…like get them to talk to everyone. And makes them more comfortable?

Participant four from focus group three (FG3P4) also proposed, "Get them more involved? Asking them what their thoughts are…and eerhh…Aaarrrmm…mmm…acknowledge?...". However, participant ten from focus group six (FG6P10) was not too keen on the shared strategies as they believed it placed an unwanted focus on the shy team member, so they boldly offered a variant:

> Uhh, I don't know I feel like if you put a lot...I feel like if you put focus on that person that doesn't want to speak and the fact that they're not speaking. That will like get them to speak less because it's more pressure on them to speak. Not ignore them, but like just let them like come out like not come out but like let them speak when they're ready I guess? I don't know, maybe like, don't know, not sure. Yeah I have no clue, maybe like a day or two [for

> them to be ready to speak]. Yeah depending on how tough the person is. Ummm, I don't know, I'd just say that like hey we need your help and you're not really helping if you're not saying anything. Yeah, maybe you can try and find like a common interest I guess. Like twister or something.

Further contributing, participant four from focus group three (FG3P4) opined:

> It just depends on the type of person you are…Cos I think if you're confident, you are gonna be like…ok…like…whatever…you can think whatever you want, but if you are shy, then you gonna be like…oh, well, I don't really wanna talk…they gonna judge me.

Wondering if the reflective recounts of the migrant students (i.e., FG4P3 and FG5P3) held true for participant fifteen (FG6P15), a seemingly shy student from the African migrant community who had not yet contributed to the discussions, the researcher tried to engage them on the subject of shyness in teamwork. When FG6P15 finally spoke, FG6P15 calmly stated, "I'm just not shy. Uhhhh…I can start a conversation. Probably about the work. Uhhh…I don't really do teamwork. I do it if I have to but...I just don't need to use them [teamwork skills]". Participant twelve (FG6P12) confirmed, "No he's not shy at all". Participant thirteen (FG6P13) reiterated, "He's more of an independent worker".

5.3.3.6 Increased Psychological Safety. For some focus group participants, a team could have too much *psychological safety* which could be a barrier indicator to *psychological safety* in secondary school student teams. Discussing this point, participant four of focus group five (FG5P4) described the effect of too much *psychological safety* on team performance or outcomes, stating:

> Yeah...walking on egg shells...kind of vibe. Well...because...I mean...it [psychological safety] will be increase because you wouldn't wanna upset or hurt her or anything...people...but you might not get true results...like...you normally would if you weren't as cautious.

Asked by the researcher how team members will be able to gauge this unproductive level of *psychological safety*, participant six from focus group five (FG5P6) said:

> Maybe, the opinions of other people in the team…like...they don't really...I dunno...they...I dunno...they might not want to hear from me. Like...they might just say like...oooohhh...what's she's like ...said recently...isn't like...real or something.

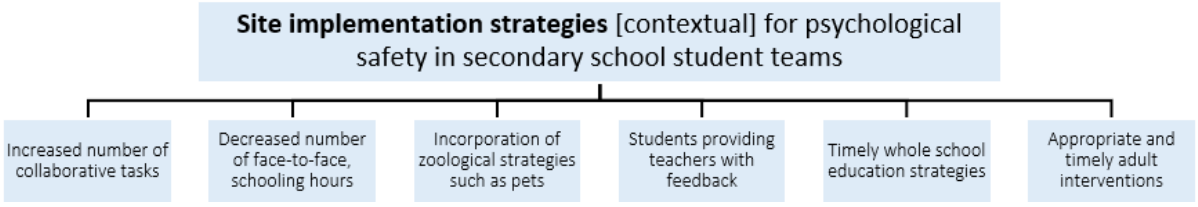
In **Chapter Two**, Frazier et al.'s (2017) meta-analysis findings found that high levels of *psychological safety* may be associated with negative outcomes (Bolino et al., 2004) such as cheating behaviours (Pearsall & Ellis, 2011). To deal with the ineffective impact of what was described as too much *psychological safety* in student teams by focus group participants, participant six from focus group five (FG5P6) suggested, "I think...I dunno...like what he [Participant 3] was saying...like...just communicate with one another".

5.3.4 Contextual Site Implementation Strategies for the Psychological Safety of Students in Secondary Schools

To inform **RQ1d.** "*How can psychological safety be implemented in secondary school student team contexts*?", the focus group participants' voiced six recommendations about the implementation pathways of the emergent, enabling indicators of *psychological safety* in their secondary school student team context, as shown in **Figure CCA5.3**.

Figure CCA5.3

Focus Groups Participants' Suggestions about Psychological Safety Implementation Strategies in their School Context



Note. Recommended whole school strategies [data collection site-specific] for the implementation of psychological safety in secondary school student teams identified in the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts".

The above recommendations by the focus group participants are explicated below with supporting voiced statements from the focus group participants.

5.3.4.1 Increased Number of Collaborative Task. Within focus groups one, three and six, discussions focused on increasing opportunities for collaboration in curricular and co-curricular learning areas as a strategy for implementing *psychological safety* in their secondary school student team context. For example, participant 10 from focus group six (FG6P10) suggested, "More cooperative tasks would be nice. More group assignments". Participant four from focus group three (FG3P4) shared further thoughts, "I guess it's kind of hard to like…implement…like see it implement as such. I feel like it's kinda like stuff that happens over time. Maybe starting group work earlier on so that people will feel comfortable…working…being in groups?" FG3P4 continued to explicate:

> Like…no…like…younger age…they feel comfortable in a group setting so that they understand…like…what kind of things they need to…do in their group settings. I would say [start in] probably like…year 4…year 5…because I feel like…that's when the major like…friendship issues…kinda…start happening as well…so, like…being able to have that group work…being able to like…work in groups…as well as being in friendship groups…like… .

Participant one from focus group one (FG1P1) agreed, "More ...like... group activities...Like...start them small...".

Discussing the barrier indicator of "Student Team Formulation by Supervising Adults" in **5.3.3.4**, it was noted that participant four in focus group five (FG5P4) felt that being made to speak in a team against your will was not an action that enabled *psychological safety.* FG5P4 stated, "But is that psychologically safe if we force people to talk?". On the contrary, participant six from focus group one (FG1P6) advocated that forcing people to talk in certain team situations was an actual enabler indicator of *psychological safety*; not the former, as indicated in **5.3.3.4** by FG5P4. FG1P6 therefore, shared their thoughts, "I think ...it's the main thing is...if you force people...like...to talk to each other more, there will be...less barriers...up to people...and they'll want to talk to each other more". FG3P5 similarly supported student team compositions with some unfamiliar people,

proposing, "Say…like…get more with people you don't really know? To get your own thoughts out…(voice tapers off so inaudible words)…".

When asked by the researcher to elucidate the group composition suggestion, FG3P5 explained, "Not blind…not a full group… (voice trails off so inaudible words)". Participant seven (FG3P7) piped in support, "A healthy mix" to which FG3P5 answered, "Yeah…It will be like…2 [people known to you]." The participants in focus group one, however, agreed that teamwork could be perceived to be more of a challenge for their secondary school peers who were from a migrant background particularly when they were placed with other students, they were not familiar with. Participant five (FG1P5) explained the difficulty faced by migrant students in secondary school student teams, "It's kind of awkward at the start. It takes a while...to actually...Yeah...you don't know if you should be making small talk...or just sit there and do your work...like...it gets awkward...but then…". To affirm the level of the faced difficulty of migrant students in secondary school student teams, participant two (FG1P2) whispered, "Scary...".

The focus group one participants also agreed that teamwork could also be perceived to be more challenging for their secondary school peers who had moved schools although the age at which the student moves played a significant role in their feelings of *psychological safety*. Participant three (FG1P3), however, felt that *psychological safety* in that instance depended on the group composition, and shared their personal experience:

> I feel like...it depends on the...gr...the particular group that you are in...like...and the personalities you've got in the group...cos I know that ...like...we've moved schools a few time…and ...uuummm...like...you can tell that ...it's harder in some areas to... uurrmm...become part of a group…and then...uurrmmm... in other places, it's really natural... so... .

Delineating the challenge levels faced by students in teamwork that is based on the stage of schooling at which the school move is based, participant six (FG1P6) detailed:

> …and even different age levels...like...primary school...mates with everyone. Well, for me...just friends with everyone. It was a whole lot easier. I also think ...it might ...that I wasn't aware of that kinda...different social kind of ...kids and that. The popularity and that...like...wasn't really a thing...so it was much easier I reckon... to be able to do group tasks and that...with other people... yeah... .

5.3.4.2 Decreased Number of Face-to-Face, Schooling Hours. Discussions regarding the decrease of schooling hours as a strategy for implementing *psychological safety* in their secondary school student team context occurred in focus group six where participant seventeen (FG6P17) proposed, "…(inaudible words)… go to school less…Because it's like, less stress, and more effort will be put into less days". Participant thirteen (FG6P13) concurred, "Yeah, on the Wednesdays we finish at one [1pm]". Participant seventeen (FG6P17) responded, "Nah, I'm talking about a whole day gone. Well year 12 and year 11 are the years".

5.3.4.3 Incorporation of Zoological Strategies Such as Pets. In terms of the focus group five's discussions about incorporating zoological strategies such as pets in curricular and co-curricular learning spaces as a strategy for implementing *psychological safety* in their secondary school student team context, participant one (FG5P1) suggested:

> Dogs for teachers. No teachers. Just dogs. I do...I do think the idea of support dogs is a good idea…cos at my old school, we used to have support dogs...and whenever you felt ...you would...another adult might not pick that up...but...you would go...you would go...like...you would just go see a dog...and there were turtles...a cat ...and you take turns ...and take photos…cos animals release endorphins? Cos you have… .

Participant five (FG5P5) agreed, "…aaahhhhh....I like that idea ["Dogs for teachers. No teachers. Just dogs."]. FG5P5 was however of the alternate notion that toy animals would be a better option thereby recommending, "Maybe you put a fake pet. A stuffed animal. I used to have one when I was in kindergarten". Participant six (FG5P6) opined, "…and it's like the...uummm... mascot".

When asked by the researcher about the determining factor for the animal choice, Participant four (FG5P4) quipped, "Allergies...will take that decision". A horse was not a popular zoological choice with participant five (FG5P5) sharing a reason for not supporting a horse as a pet choice, "I got bit by a horse on the boob. It was scary". Participant one (FG5P1) approved that a horse was not a good pet choice for a student team, and encouraging the focus group members to opt for a turtle as a pet of choice despite, interestingly, sharing a close, unsavoury, personal encounter with a turtle:

> No horses. That's the thing with it. It's kind of...like...some people are scared of dogs. Some people are scared of cats. We could get a turtle though. Cos not many people are afraid of turtles. Turtles are good. Trust me... they're good...they feel nice. Just the whole...they just...and their little paws...what are they called?...I got bit on the nose by a turtle.

5.3.4.4 Students Providing Teachers with Feedback. In terms of the discussions that participants in focus groups two and five had about providing and receiving feedback in curricular and co-curricular learning spaces as a strategy for implementing *psychological safety* in their secondary school student team context, participant four from focus group five (FG5P4) explained:

> I think like...we can have class discussions. I know in class discussions, some people don't actually wanna say...yeah...so maybe...like...anonymous? I know some teachers in Health and stuff...they wanna keep it anonymous...people can say their opinions and stuff in...on like...a piece of paper and they put it in a hat...rather that the student having ...to say it themselves...when they don't want to.

In terms of students being able to offer progressive feedback to their teachers, participant nine from focus group two (FG2P9) propounded:

> Also being able to like...fill out this form where you...give like...honest...feedback about teachers...like…we…I know...in past years, we've had...where teachers will give you a link and like...it's anonymous, so you just say what you honestly think about them. Sometimes, it's brutal...but...you can also like...say... .

5.3.4.5 Timely Whole School Education Strategies. In terms of the discussions that participants in focus group four had about timely whole school education strategies as a strategy for implementing *psychological safety* in their secondary school student team context, participant four (FG4P4) counselled on race issues:

> feel like…aahhmmm…just be careful that you're keeping them [those who act in racist manners] safe…like you said. So, I feel like…it's more…like…if you want to stop it [racism] from happening, you need to look at the education of it [racism] …so like…instead of them [school] doing it wrong and then there being like a punishment or like a judgement or something, it [school] needs to…you need to take a step back…and think about how you can educate [whole school]. So, like if it's in a workspace, for instance, you know, take a step back and think about how you can educate…everyone in the workplace…and not make that person [who acted in a racist manner] to feel left out…and…just like… reiterate like… this isn't how we want people to be but, making sure that you're delivering it to everyone; not just that person [who acted in a racist manner]. To make sure…there might be…like little things…you just feel like…you just need to be careful…especially with people's feelings…cos then…you are making that person [who acted in a racist manner] feel uncomfortable even though…they've done something [racism] wrong. So, then an education. And I will definitely say that it was school before. When things have gone poorly…it's not because that's drill it into these individual people. We need to educate everyone. And I would say…educate…everyone being educated.

Participant three (FG4P3) shared an ongoing whole school strategy to encourage the focus group participants, "Hhmmm… like creating…like rules…that everyone should follow? …Like for example… a uniform. The school has changed the dress code. So, girls can wear something that boys can wear". To offer clarification, participant two (FG4P2) added, "It isn't boy-girl anymore. It's just dress pants. It…" To explain the education involved in the potential change process, participant four (FG4P4) described the required debriefing process that will ensure successful whole school outcomes:

> So, the uniform?...it doesn't say boys or girls. All the students…and…like…the student leadership…all that got talked about…and… I feel like…the idea of like… a debrief…as well…I feel like debriefing is something…that people don't do a lot. So, if…you…so, we will sit here…and have this conversation…and collaborate together…but there's not like a check-in at the end… like now, how does everyone feel? Like… you might do it, but sometimes there's not that check-in…like…so, how does everyone feel about this? So we had… we might have a big school meeting about a topic…but, sometimes they don't express the fact that now…if any of this is relevant to or something like that…you can come communicate that with…with teachers? So, it's just like they spit the information at you…and then, like… see you later. I thought there needs to be more of like…a…now…if you want to have your opinion or if you uncomfortable. Yeah…just like a debrief…or…like…just a bit more depth…cos the option might be there…but you just don't know what to say?

Participant three (FG4P3) concluded, "…like an understanding".

5.3.4.6 Appropriate and Timely Adult Interventions. In terms of the discussions that participants in focus group one had about appropriate and timely adult interventions as a strategy for implementing *psychological safety* in their secondary school student team context, participant one (FG1P1) described the role of parents in modelling best learning practices, "No. It's just the way. It's the way you're raised...it definitely …you attract the right people. You learn off your parents because you are with your parents most of the time, so...it's just the social cues...".

The participants in focus group one agreed that the timely follow-up of student matters would support the implementation of *psychological safety* in their secondary school student team context. Participant six (FG1P6) demonstrated their frustration with the lack of actionable follow-up, "I know they do like...a lot of ...like...oohhh....no bullying stuff, but I think it ....yeah....never works...and like...nothing ever changes. They just need to do more...instead of just saying...oh... "Bullying No Way"...and then just not do anything about the bullying". However, making reference

to the positive impact of wellbeing interventions in their school context, participant two (FG1P2) said:

> I like how at our school… we have a lot of different groups and stuff that you can join ...like...that are run by teachers in the school. Like...we have a "Solidarity Group" that go and focus on like...current issue ...kind of things. Like...they had a fundraise for awareness of different communities in our school. So, I like that... that's the way they recognise them all...and recognise how they... interact between different communities.

5.4 The Constant Comparative Analysis (CCA) of the Focus Groups' Data

Informed by the voices of the secondary school students, CCA (Charmaz, 2000; Glaser, 1965, 1998; Glaser & Strauss, 1998) was employed to analyse the qualitative data collected with the focus groups towards the formulation of a theory that was well grounded in the data (Charmaz, 2014, 2015, 2017). CCA was used to synthesise the dynamic interactions of the researcher with the focus group data that enabled the uncovering of additional insights and connections between participant perspectives about *psychological safety* in secondary school student team contexts that might have been missed with the thematic and statistical analyses of the online survey data.

Table CCA5.1 outlines the steps followed in the CCA to achieve rigour and relevance in its findings that contribute to the identification of themes of *psychological safety* in their secondary school student team context to inform **RQ1**.

Table CCA5.1

The Four Stages of Constant Comparative Analysis (CCA)

CCA stage	What happened at this stage?
Comparing incidents applicable to each category	Beneficial comparisons were made while describing and conceptualising the range of similarities and differences between the participants' [and the researcher's] accounts of their beliefs, attitudes, and experiences of *psychological safety* in the secondary school student team context (Boeije, 2002; Charmaz, 2014). The researcher's knowledge of *psychological safety* in today's world and the participants' voiced insights were used to generate codes using a specially built framework for the CCA analyses. The participants' voiced accounts applicable to each code were categorised into emergent *psychological safety* observed indicators and were repeatedly compared to co-construct meaning and discover patterns and trends (Strauss & Corbin, 1998) about how they defined *psychological safety* in secondary school student team contexts. The participants' responses to the concluding qualitative question in the online survey was included in these comparisons in both their narrative and quantified forms.
Integrating categories and their properties	Moving between inductive and deductive reasoning as a hybrid-coding approach, the categories were pieced together to make connections that described the associations between the emergent observed indicators of *psychological safety* in secondary school student team contexts (Strauss & Corbin, 1998).
Delimiting the theory	Having developed the categories through coding (theoretical sampling), key categories that were evident were selected following further review and development. These key categories were compared again to the other categories with careful observation of the similarities in the associations between the emergent *psychological safety* observed indicators. The key categories were again refined and woven into core categories, which described *psychological safety* in collaborating secondary school student teams. That was when the [refined] theoretical framework of *psychological safety* in secondary school student team contexts that was grounded in the data were formulated (Strauss & Corbin, 1998). The evolving model was initially constructed following the analyses of the online survey data in **Chapter Four.**
Writing the story	The new knowledge discovered from the analysed data about the observed indicators of *psychological safety* in collaborating secondary school students and its associated observed indicators were then compared with the knowledge of *psychological safety* in the adult work team context based on the work of Edmondson (1999). This enabled the informed refinement of the emergent theoretical framework of *psychological safety* in secondary school student team contexts.

Note. Thematic analytical approach used to analyse qualitative data collected with focus groups in the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts". This approach was based on the steps described in "The constant comparative method of qualitative analysis" by Glaser, B. G. (1965). *Social problems*, *12*(4), 439.

As described with **Table CCA5.1** above, the data collected with the focus groups were coded, categorised and themed separately for each of the six focus groups using a coding framework (**Table CCA5.2** in **Appendix I**), and then combined afterwards for interpretation.

Given the limited empirical evidence of *psychological safety* measurements and research in secondary school environments with adolescents as evidenced in **Chapter Two**, the *a priori* codes, categories and themes utilised in building the hybrid coding framework for the CCA process were borrowed from Edmondson's (1999) work with adults in workplaces. As discussed in **Chapter Three**, to make the combined, complex information accessible, engaging, and actionable, the qualitatively analysed data with CCA were converted to [quantified] frequency counts.

The frequency of utterance strategy was adopted for the coding of the data because it allowed for a deeper understanding of *psychological safety* from the students' elevated voices. It provided the researcher with a systematic and objective way to identify and prioritize key themes that mattered most to the young adolescents. It also reflected the salience of certain ideas from the young adolescents and reduced the bias of the researcher. This coding strategy guided the analyses by enabling the researcher to capture patterns across the sample, supporting the development of theory and future research directions.

Table CCA5.9 shows a tabulated summary of the frequency counts of the combined data from the six focus groups that identified the hybrid-coded, categories and themes of observed indicators of *psychological safety* in secondary school student team contexts.

Table CCA5.9

The Summary of the Frequencies of the Observed Indicators of Psychological Safety from the Combined Coded Data of the Six Focus Groups

| Framework 'structured' analysis - deductive coding (Based on Edmondson, 1999, p. 354) | Grounded 'emergent' theory - inductive coding (Based on the participant statements from focus group six – grounded in the data (Charmaz, 2014) | | |

Code	safety	speaking up	mutual respect and trust	acceptance	approval	acknowledgement	professional relationship	body language	personal relationship	empathy	mental health challenge	friendship	humour	familiarity	personality	getting along	support	inclusivity	diversity	adult leadership	student leadership	information sharing	shared focus	conflict resolution	psychological safety enabler	psychological safety barrier	site implementation strategy
Count FG1	4	11	8	5	2	5	1	10	7	6	7	3	2	4	7	7	13	17	9	-	-	10	-	3	9	1	7
Count FG2	7	8	7	5	3	6	3	7	4	10	3	3	-	7	3	5	5	11	7	1	-	-	2	-	2	3	4
Count FG3	13	13	12	5	3	10	7	8	7	8	1	1	2	4	1	8	13	12	5	2	-	4	5	2	2	-	2
Count FG4	11	7	1	2	5	10	6	-	6	1	3	6	-	2	2	8	9	5	2	5	5	1	3	1	7	3	-
Count FG5	5	13	6	3	4	5	1	7	5	5	7	-	3	2	3	6	3	7	4	-	1	6	-	4	6	3	3
Count FG6	2	7	2	2	-	-	-	5	2	10	6	7	-	-	3	9	10	8	5	4	1	5	-	-	3	-	2
Total Count	**42**	**59**	**36**	**22**	**17**	**36**	**18**	**37**	**31**	**40**	**27**	**20**	**7**	**19**	**19**	**43**	**53**	**60**	**32**	**12**	**7**	**26**	**10**	**10**	**29**	**10**	**18**

Note. FG1 – Focus Group one; FG2 – Focus Group two; FG3 – Focus Group three; FG4 – Focus Group four; FG5 – Focus Group five; FG6 – Focus Group six

Note. Hybrid coding framework constructed by the researcher to analyse the qualitative data collected with focus groups in the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts".

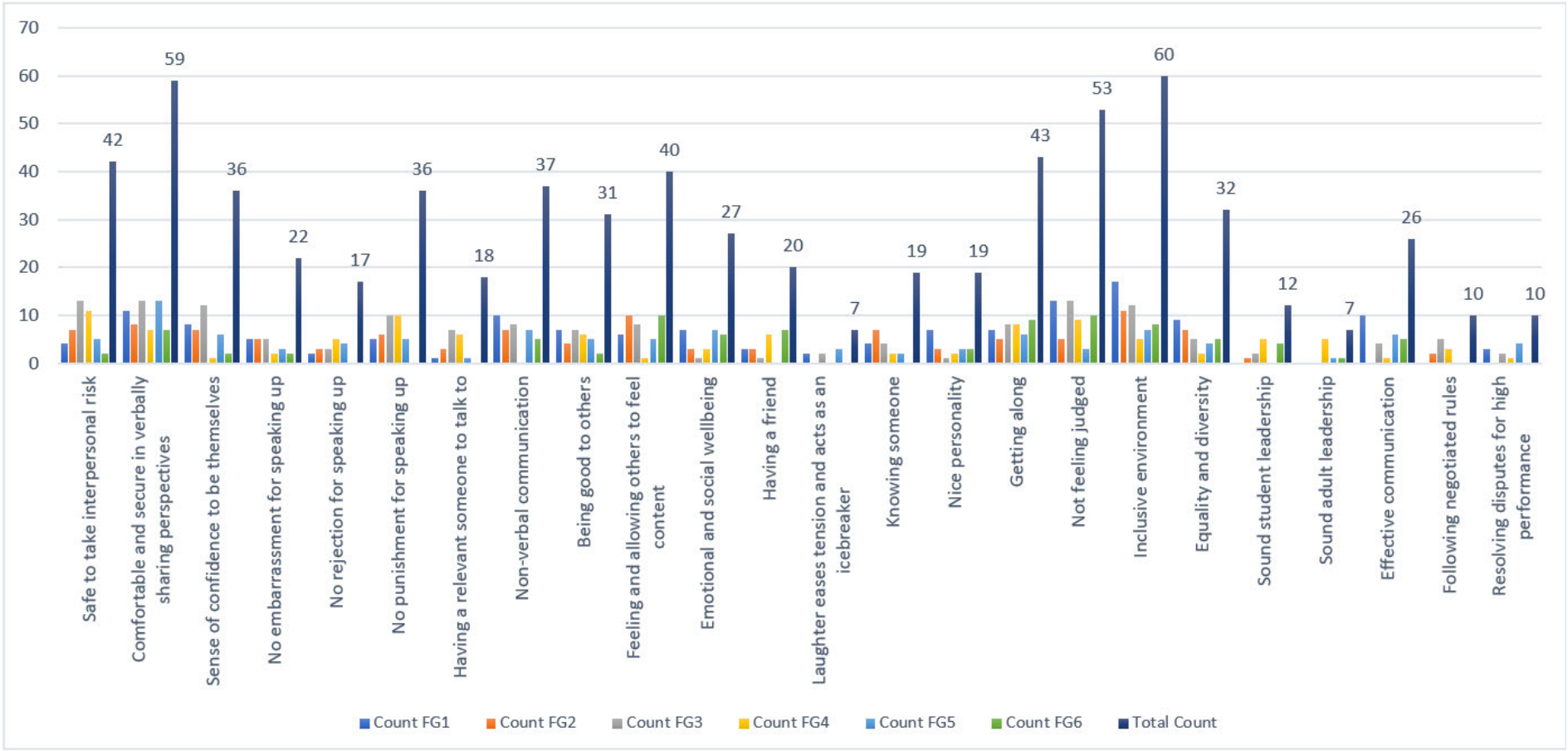
The students' discussions with the researcher facilitated the identification of 24 categories of observed indicators of *psychological safety* in reference to their secondary school student team context. Numbered in hierarchical order, the categories include:

1. inclusive environment	2. comfortable and secure in verbally sharing perspectives	3. not feeling judged
4. getting along	5. to take interpersonal risk	6. Feeling and allowing others to feel content
7. non-verbal communication	8. no punishment for speaking up	9. sense of confidence to be themselves
10. equality and diversity	11. being good to others	12. emotional and social wellbeing
13. effective communication	14. no embarrassment for speaking up	15. having a friend
16. nice personality	17. knowing someone	18. having a relevant someone to talk to
19. no rejection for speaking up	20. sound student leadership	21. resolving disputes for high performance
22. following negotiated rules	23. sound adult leadership	24. laughter eases tension and acts as an icebreaker

For concise representations and more comprehensive understandings of the extensive narrative findings, the numerical values as counts or frequencies [quantified] of the 24 categories of observed indicators were transferred to Microsoft Excel (Microsoft Corporation, 2018) to be transformed into graphs and figures (**Figures CCA5.4 – CCA5.8**). These were used as visual aids to facilitate the quick, overall understanding of the comparative analyses of the comprehensive dataset with a variety of charts to suit different audiences. The clustered column chart in **Figure CCA5.4** shows the comparative frequency of the categories of observed indicators of *psychological safety*, providing foundational insights into the secondary school students' perceptions about *psychological safety* in their collaborative contexts that informed **RQ1**.

Figure CCA5.4

Clustered Column Chart Showing the Emergent Categories of the Observed Indicators of Psychological Safety



To visualise the hierarchical nature of the relationships between the 24 categories of observed indicators in an interactive and engaging format, the sunshine burst chart in **Figure CCA5.5** shows the distributions of the categories of observed indicators of *psychological safety* in secondary school student team contexts. The bigger the pie size, the more relevant the *psychological safety* observed indicator was to the collaborating secondary school students, informing **RQ1**.

Figure CCA5.5

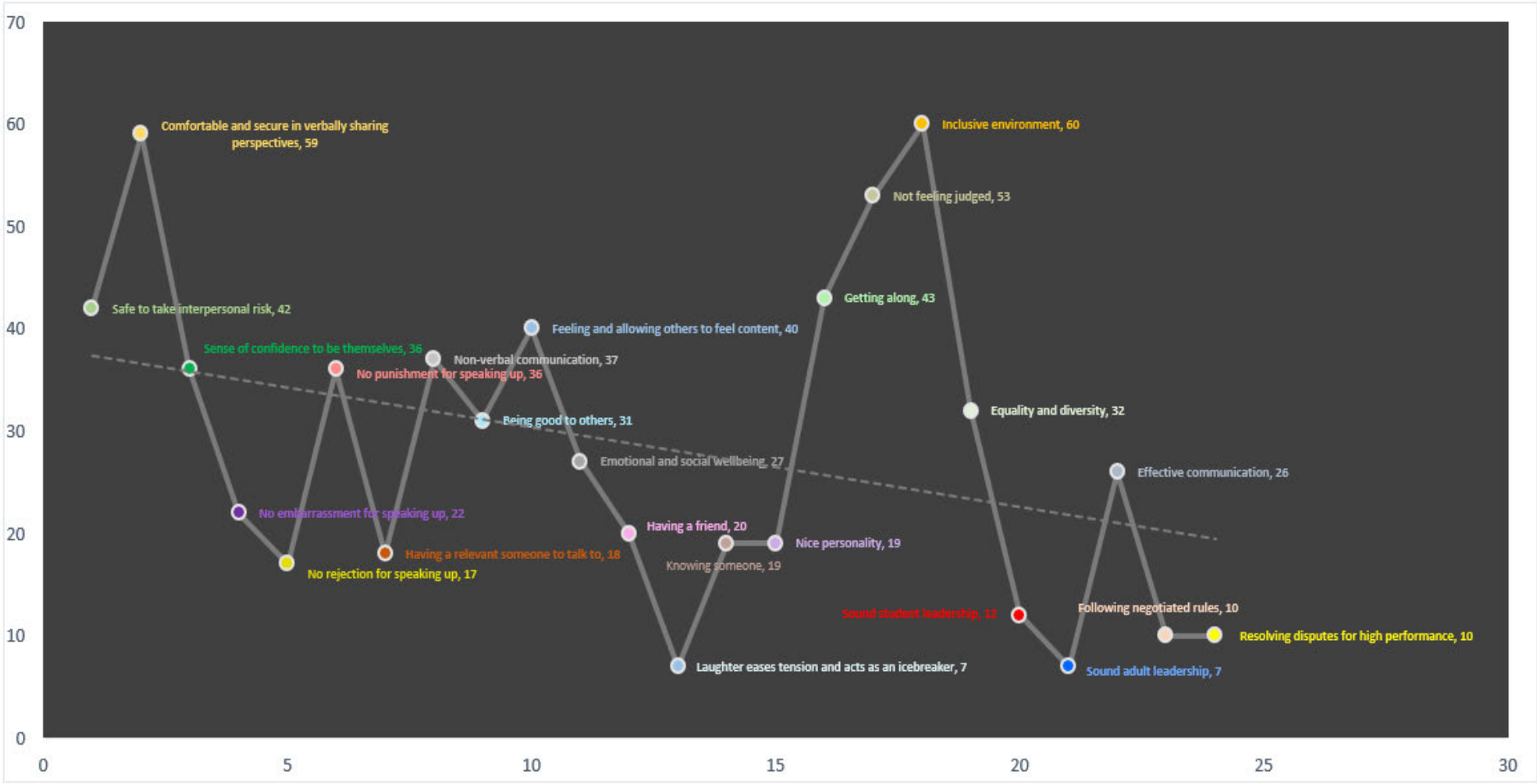
Sunshine Burst Chart Showing the Emergent Categories of the Observed Indicators of Psychological Safety



To identify patterns that led to more meaningful conclusions about the observed indicators of *psychological safety* in secondary school student team contexts that informed **RQ1**, the scatter chart in **Figure CCA5.6** augments the clarity, organisation, and interpretive depth of the findings, highlighting the 10 major categories, observed above the line of best fit.

Figure CCA5.6

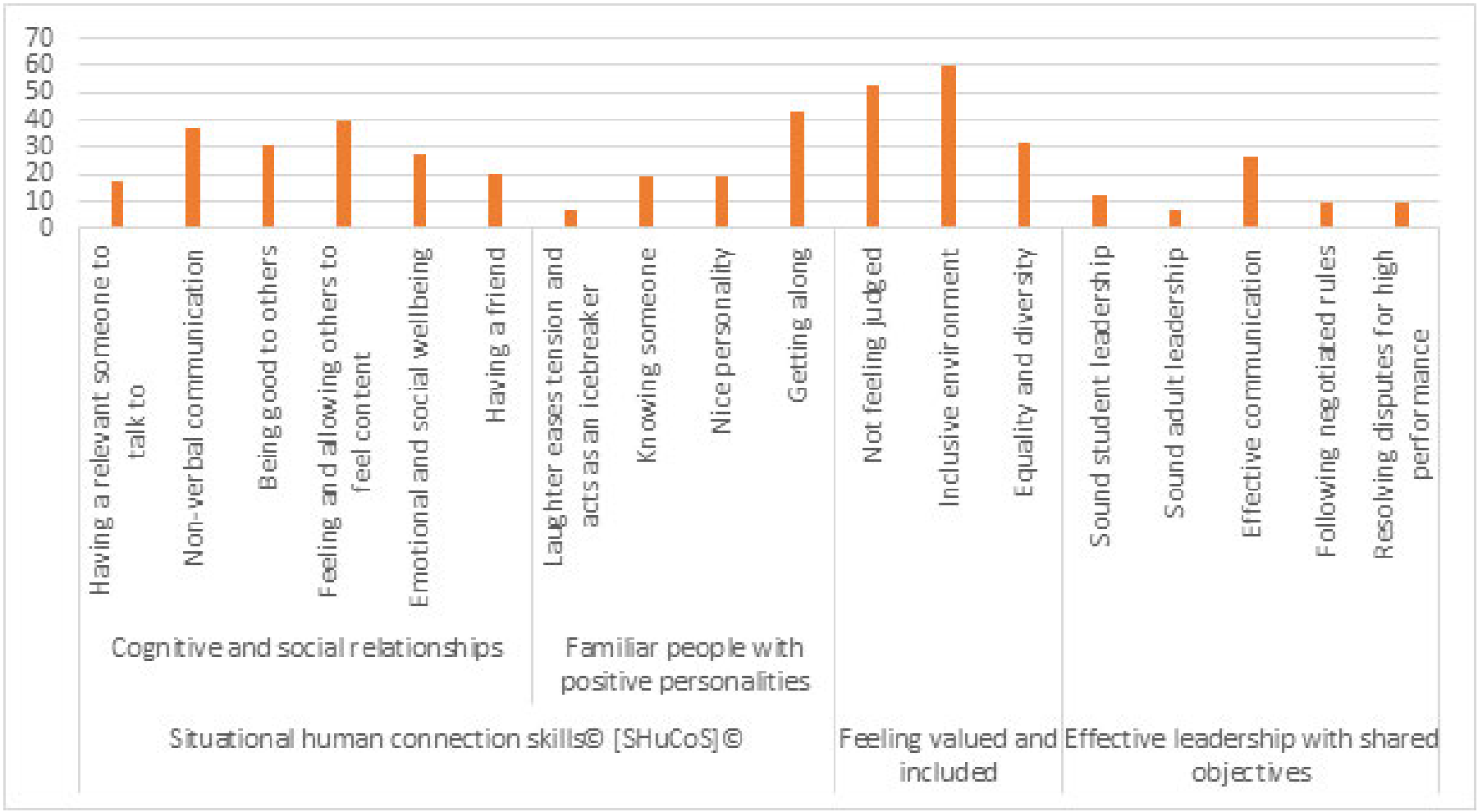
Scatter Chart Showing the Patterns of the Emergent Categories of Psychological Safety



To enhance the depth, coherence, and interpretive power of the findings, with CCA, the 24 key categories were compared for similarities and refined until 18 core categories emerged. The 18 core categories were also compared further and woven together until their transformation into four emergent themes of *psychological safety* in secondary school student team contexts that informed **RQ1**. **Figure CCA5.7** shows a bar chart that is used to describe and theorise the relationships between the emergent categories and the emergent themes of observed indicators of *psychological safety* in secondary school student team contexts.

Figure CCA5.7

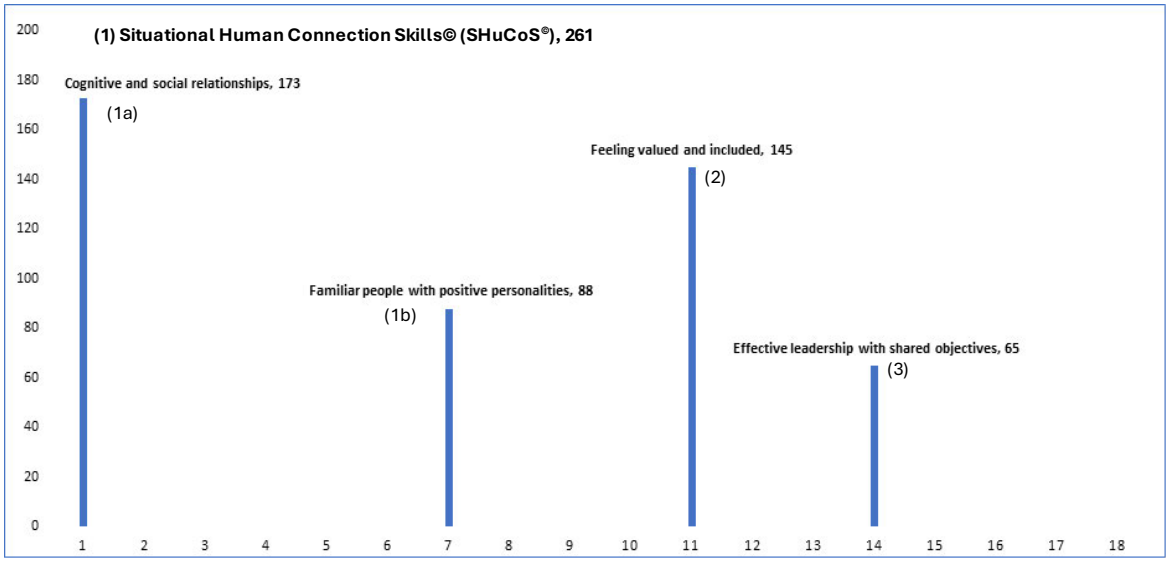
Bar Chart Showing the Transformation of the Emergent Categories into Emergent Themes of Psychological Safety



Subsequently, to grasp the overall CCA findings at a glance to inform the situational, social, and cultural understandings that promote innovative educational pathways, policy planning, future research and forecasting, the line chart in **Figure CCA5.8** represents the trends of the four emergent themes of *psychological safety* in secondary school student team contexts in a simple, but logical and compelling way that informed **RQ1**.

Figure CCA5.8

Line Chart Showing the Total Counts that Demonstrate the Trends of the Emergent Themes of Psychological Safety



The four main themes demonstrated in **Figure CCA5.7** and **Figure CCA5.8** above were further refined into three core themes by combining 1a. cognitive and social relationships and 1b. familiar people with positive personalities. These themes were merged because of the significant overlap in their underlying meanings. This post-analysis refinement is applied to minimise redundancy and improves the clarity, coherence and parsimony of the thematic analysis. The two combined themes were termed by the researcher as **(1) Situational Human Connection Skills©** (**SHuCoS©**). This resonates with the naming of "The SHuCoS© Scale", "The SHuCoS© Model", and "The SHuCoS© Framework" of *psychological safety* in **Chapter Four** based on the results of the multivariate analyses of the data collected with Q4 of the online survey and the findings of the

thematic analyses of the responses to Q5 of the online survey. The two other core themes were **(2) feeling valued and included** and **(3) effective leadership with shared objectives.**

5.5 Comparing and Contrasting the Emergent Categories and Themes of Psychological Safety in Collaborating Secondary School Students and Adults in Work Teams

The CCA findings enhanced the understanding of the meanings behind the quantitative relationships depicted by the survey data results. Additionally, the findings of the CCA highlighted the social, cultural, and environmental factors that helped to interpret the online survey data results within the broader secondary school student education context. With the identification of the three, emergent core themes of *psychological safety* in secondary school student team contexts, a more in-depth understanding of the significance of the integrated findings of the quantitatively and qualitatively analysed data are now available for further exploration and detailed discussion about *psychological safety* in collaborating secondary school students.

5.5.1 Theme One: Situational Human Connection Skills© (SHuCoS©)

This first core *psychological safety* theme, **Situational Human Connection Skills©** (**SHuCoS©**) combines the two main sub-themes: **cognitive and social relationships** and **people with positive personalities** (**Figure CCA5.7**). This is due to the overlap of the close relationships between the underlying meanings in the two main sub-themes. The CCA approach permits the merging of such sub-themes to improve clarity of the analysis. With the provision of enhanced coherence via theme refinement, thematic redundancy is avoided, the data is then accurately presented, and the validity of the analysis is enhanced.

For this core theme, all the 10 core categories of observed indicators of *psychological safety* in secondary school student teams (having a relevant someone to talk to, non-verbal communication, being good to others, feeling and allowing others to feel content, emotional and

social wellbeing, having a friend, laughter eases tension and acts as an icebreaker, knowing someone, nice personality and getting along) were distinct to those evidenced in the adult work teams. With reference to "nice personality", in adult work teams, in **Chapter Two**, Amy Edmondson explained to Morra Aarons-Mele of 'The Anxious Achiever' in an interview that such a personality was not an indicator of *psychological safety*, Amy Edmondson said, "So it's [psychological safety] not being nice. It's not safe space. It's not a trigger free environment. It's not a guarantee that everything you do will get a round of applause, right?" (Harvard Business Review, 2021).

Chapter Two reported that in workplaces, trust was not considered to be an indicator of *psychological safety* (Kramer, 1999; McAllister, 1995; Robinson, 1996). The perspectives of the focus group participants demonstrated that collaborating secondary school students valued **Situational Human Connection Skills©** (**SHuCoS©**) for establishing a climate of friendship, respect, and trust for the promotion of the early prevention of destructive conflict and the achievement of communal objectives (Edmondson & Mogelof, 2006).

5.5.2 Theme Two: Feeling Valued and Included

For the second core theme of **feeling valued and included** (**Figure CCA5.7**), the core category of equality and diversity was distinct to the secondary school student team context. For the two core categories of not feeling judged, and inclusive environment, the voiced insights of the focus group participants demonstrated their appreciation for opportunities to make meaningful contributions in a team where they are valued and included as individuals who can be themselves (Allen & Bowles, 2012; Knapp et al., 2015). These insights of the secondary school students about *psychological safety* were similar to *psychological safety* research findings in workplaces. In her interview with Morra Aarons-Mele, the host of 'The Anxious Achiever' in **Chapter Two**, Amy Edmondson stated, "But what it is, [*psychological safety*] is a sense of permission for candour. What it is, is the belief that you can be yourself." (Harvard Business Review, 2021). It was, nonetheless, pointed out in **Chapter Two** that in the adult work teams, *psychological safety* did not mean that one worked in an environment with no pressure, problems, conflict, disagreements nor a willingness to

present divergent viewpoints (Janis, 2008; Sunstein & Hastie 2015). In the focus groups, there were occasions when disagreements and divergent perspectives were shared respectfully by participants.

5.5.3 Theme Three: Effective Leadership with Shared Objectives

Regarding the third core theme of **effective leadership with shared objectives** (**Figure CCA5.8**), the core category of observed indicators of *psychological safety* in secondary school student teams (resolving disputes for high performance) was distinct to the secondary school student team context. Three core categories of observed indicators of *psychological safety* in secondary school student teams (sound leadership, effective communication, following negotiated rules) were similar to the findings of *psychological safety* research in workplaces. **Chapter Two** reported that *psychological safety* has been shown to influence leadership (Hirak et al., 2012; Liu et al., 2014) in adult work teams. In organisational spaces, Amy Edmondson described leadership as "the small things you do to make a difference, to influence others…" (Allen & Bowles, 2012; Knapp et al., 2015), however this keyword [leadership] was not reflected in Edmondson's (1999) definition of *psychological safety*.

5.6 Integrating the Focus Groups Findings with the Online Survey Data Results

The findings of this mixed methods research's CCA uncovered some significant, categories and themes of observed indicators of *psychological safety* that were distinct to the secondary school student context. The qualitative findings from the focus groups' data analyses complemented the quantitative and qualitative results of the online survey data analyses. **Table CCA5.10** demonstrates this complementarity of the integrated findings.

Table CCA5.10

Integrated Findings Identifying the Categories and Themes of Observed Indicators and the Variables that Measure Psychological Safety in Secondary School Student Team Contexts

Focus groups (*N* = 52)			**Online survey** (*N* = 372)				
Findings from the qualitative analyses of the data collected with the focus groups			**Findings from the qualitative analyses of the responses to Q5 of the online survey**		**Results from the quantitative analyses of the responses to Q5 of the online survey**		
"The SHuCoS© Framework"							
					"The SHuCoS© Model"		
					"The SHuCoS© Scale"		
Categories	**Themes**		**Categories**	**Themes**	**Variables**	**Themes**	**Categories**
Feeling and allowing others to feel content	Cognitive and social relationships	Situational Human Connection Skills© (SHuCoS©)	Individual safety Collective safety	Safety	Team Efficacy (TEF)	Competence	Necessary abilities and proficiencies
			Feeling valued Credited strength	Acknowledgement			
Having a friend			Having an existing friend	Friendship		Collaborative risk-taking	Conflict resolution
Having a relevant someone to talk to			Knowing someone	Familiarity			
Knowing someone							Safe to take interpersonal risks
Emotional and social wellbeing			Personal relationship Professional relationship Collegiality Team support Teamwork	Relationships			
Non-verbal communication							Lifelong learning
Laughter eases tension and acts as an icebreaker	Familiar people with positive personalities		Getting along Conflict avoidance	Congeniality			Effective information sharing
Being good to others							
Getting along			Self-esteem Open-mindedness	Personality			
Nice personality							

		Democracy				
Not feeling judged	Feeling valued and included	Not being judged Having support Being understood	Non-judgemental support	Team psychological safety (TPS)	Open communication	Constructive instruction Cooperative collaboration
Inclusive environment		Setting Atmosphere	Environment		Supportive environment	Experiential learning
Sense of confidence to be themselves		Being oneself Not being anxious	Diversity		Inclusive team culture	Respect for diversity
Equality and diversity						High team performance
Resolving disputes for high performance	Effective leadership with shared objectives	Trusting someone Risk-taking Honesty	Mutual trust and respect	Team learning behaviours (TLB)	Goal-aligned candour	Shared and aligned understanding of goals
Sound student leadership		Collective efficacy	Shared focus			Speaking up candidly about task at hand
Effective communication					Creativity for innovation	Inquiring minds Problem-solving capacity
Sound adult leadership		Adult care Peer care Friends	School context support			Shared focus
Following negotiated rules						Good technical skills

5.7 Refining and Naming "The SHuCoS© Framework"

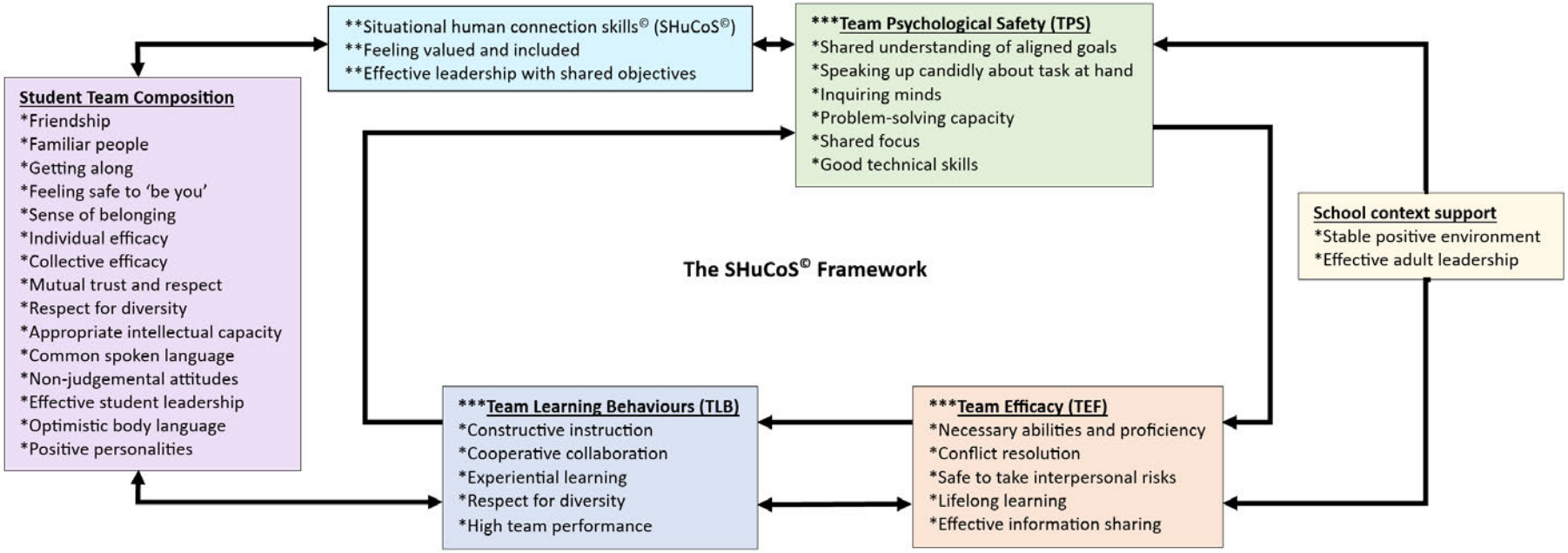
The integrated analyses of the data (**Table CCA5.10**) supported the refinement of the emergent theoretical framework (**Figure TFW4.1**) that emerged in **Chapter Four**. **Figure TFW5.1** presents a refined version of the emergent, theoretical framework subsequent to the analyses of the qualitative data collected with focus groups in this chapter, Five.

The emergent core categories and themes of *psychological safety* from the analyses were incorporated into the framework to further describe the associations between the themes, categories, variables and latent variables of *psychological safety* in secondary school student team contexts. This refinement ensured that all aspects of the research findings are aligned and logically connected to enhance coherence, facilitate interpretation and strengthen the validity of the refined framework in established knowledge, thereby enhancing its credibility.

In line with "The SHuCoS© Scale" for measuring *psychological safety* in secondary school student team contexts, and "The SHuCoS© Model" that describes the associations between the *psychological safety* latent variables, **Figure TFW5.1** shows the refined and extended theoretical framework, named by the researcher as "The SHuCoS© Framework" of *psychological safety*. This is a significant and original contribution of this research to *psychological safety* in secondary school student team contexts and to the overall *psychological safety* scholarship.

Figure TFW5.1

"The SHuCoS© Framework"



*Observed indicator of *psychological safety*

**Theme of *psychological safety*

***Latent variable that measures *psychological safety*

"The SHuCoS© Framework" in **Figure TFW5.1** defines team learning behaviours (TLB), team psychological safety (TPS), and team efficacy (TEF) as follows:

Team efficacy: Secondary school students collaborating in teams with the necessary abilities and proficiency, feeling safe to take interpersonal risks with a capacity to resolve conflicts, and seek information from external sources to support their increased learning inquisitiveness.

Team learning behaviours: Secondary school students collaborating in teams who receive adequate instruction for effective cooperation, show a liking for each other, feel safe to admit errors and learn from them, and acknowledge and respect diversity by offering non-judgemental support to each other for the achievement of high collective performance.

Team psychological safety: Secondary school students collaborating in teams who feel safe to speak up candidly about matters at hand, are equipped with the appropriate technical skills that enable the effective completion of tasks and can communicate divergent opinions to solve problems while sharing a convergent focus to achieve team goals.

5.8 Summary

Chapter Five presented the findings of the qualitative data analyses for the six focus groups. The chapter recounted the modelling of *psychological safety* by the researcher in the focus group discussions. A coding framework was constructed for the hybrid coding which comprised of *a priori* codes from Edmondson's (1999) study. The coding approach also considered the researcher's perspectives, and the participants' voiced accounts of their beliefs, attitudes, and experiences of *psychological safety* in their secondary school team contexts. With the hybrid coding approach coupled with Constant Comparative Analysis (CCA), codes were initially assigned to the theoretical definition of *psychological safety* from Edmondson (1999). The themes from Edmondson's (1999) pertaining to the organisational context such as taking safe, interpersonal risks, and the confidence of not being embarrassed, rejected or punished for speaking up were also evident in the researched secondary school student team contexts. From the transcriptions of the focus group discussions, the frequency of utterance of the participants' voiced accounts were coded, categorised, themed, and

quantified, thereafter. From the transcriptions of the discussions, the first research question (RQ1) and the four sub-questions (RQ1a., RQ1b., RQ1c., RQ1d.) were answered.

The quantification process involved graphing the frequencies of the themes in Microsoft Excel and presenting the data, diagrammatically, to simplify the comprehensive information for easier understanding. The findings identified 24 key categories of observed indicators of *psychological safety* in the secondary school student team context that were reduced to 18 core categories from which three core themes emerged: Situational Human Connection Skills© (SHuCoS©), feeling valued and included and effective leadership with shared objectives. For the secondary school students, personal relationships such as friendships and "nice" (a term used by the participants) people who were preferably already known to team members were valued as being significant enablers of psychological safety. This was because the participants viewed these indicators as being able to mellow the impact of barriers to their team *psychological safety* such as "mean" (a term used by the participants) peer attitudes. The adolescent participants consistently reinforced that a supportive, non-judgmental attitude was important to their *psychological safety* in team learning spaces. Optimistic body language, sound leadership, effective communication (including non-verbal communication such as body language) and respect for cognitive, behavioural, and cultural diversity were also revealed as being pertinent to their *psychological safety*. Some of the discussions also focused strongly on racial diversity but interestingly, no discussions produced any voiced accounts on gender diversity. Reference to increased *psychological safety* and "mean girls" were deemed by some secondary school students to be barriers to their *psychological safety* in their school's team context. The adolescents also recommended ways in which they believed their *psychological safety* could be augmented in their school context such as having increased opportunities to engage in teamwork from pre-secondary years of schooling. The qualitative findings of the focus groups complementarily enhanced the quality and depth of the critical, scientific insights provided by the quantitative results of the online survey data. This strengthened the validity of the outcomes of this multi-phased, mixed methods research to enable valid conclusions to be

drawn towards the refinement of "The SHuCoS© Framework". This thesis concludes with **Chapter Six**, which summarises the key findings of this research to inform valid conclusions with discussed implications for theory, practice, policy, and future research.

Chapter Six: Summary of Key Findings and Conclusion

6.1 Introduction

Chapter Six reports a summary of the key findings of the analyses of the data collected in this multi-phased, mixed methods research. The drawn conclusions offered by the qualitative depth and quantitative breadth inform the *psychological safety* scholarship within the secondary school education context with six, original and significant contributions. They are: (1) designing an online survey instrument for collecting data; (2) developing and naming the *psychological safety* measurement scale i.e., "The SHuCoS© Scale"; (3) "The SHuCoS© Model" that demonstrates the associations among the latent variables of *psychological safet*y; (4) observed indicators of *psychological safety*; (5) "The SHuCoS© Framework" that clarifies an organised perspective among the observed indicators, themes and latent variables of *psychological safety*; and (6) novel definition of *psychological safet*y for secondary school student team contexts. Following a reminder of these listed key findings, the limitations of this research's design and conduct are acknowledged. **Chapter Six** concludes with implications for theory, practice, policy, methodological considerations for future research, and the researcher's concluding reflections.

6.2 Aide-Memoire

Chapter One of this thesis provided a conceptual framework (**Figure MSM1.1**) informed by three theoretical lenses of symbolic interactionism (Blumer, 1969), social learning theory (Bandura, 1977) and 'constructivist' grounded theory (Charmaz, 2014) that established the purpose and significance of this research.

The complementary findings of a narrative review and a systematic literature review in **Chapter Two** revealed that numerous studies had been conducted with adults in the workplace, notable ones in tertiary education, with a deficiency of studies in the K-12 sector. The findings of the systematic literature review, phase one of this research, identified that no studies had empirically

investigated *psychological safety* in the secondary school student team context, yet. This confirmed a clear knowledge gap that justified the need for this research. in **Chapter Three**, key learnings from the findings of phase two of this research, the sequential, convergent, mixed methods, pilot study led to the refinement of the research tools and processes for the conduct of the main study. This included a developed scale that was adapted from Edmondson (1999). This scale was used in collecting demographic, qualitative and quantitative data in phase three of this research. The main study, which combined phases three and four in a parallel, convergent, mixed-methods (QUANTITATIVE-qualitative-QUALITATIVE) design prioritised secondary school students' perspectives and voices in framing, defining and measuring *psychological safety*.

Chapter Four discussed the analyses and results of the demographic, quantitative data and qualitative data collected with the online survey. **Chapter Five** discussed the analyses and findings of the qualitative data collected with the focus groups. **Chapter Five** further synthesised the integration of its findings with the results and findings of **Chapter Four.** The results and findings of **Chapters Four and Five** were used to inform the nine research questions: RQ1., RQ1a., RQ1b., RQ1c., RQ1d., RQ2., RQ2a., RQ2b., and RQ2c.and the three hypotheses: Ho_1, Ho_2, and Ho_3. The integrated findings from the analyses of phases three and four in **Chapters Four and Five** discovered three themes of *psychological safety*, an adapted 16-item measurement scale from Edmondson (1999), a structural model, a theoretical framework, and a new definition of *psychological safety*; all grounded in the data. The key findings from the four phases of this research are summarised below.

6.2.1 Key Findings of the Systematic Review – Phase One

The SLR in **Chapter Two** was an "empty" review. This finding revealed that *psychological safety* had not yet been explicitly investigated in secondary school student team contexts.

6.2.2 Key Findings of the Pilot Study – Phase Two

From the pilot study's findings, the researcher gained critical insights into the appropriateness and effectiveness of the main study's methodology. Subsequently, collaborative

opportunities were sought with the leaders in the participating school contexts to negotiate the most appropriate cohorts and time points for data collection in their school calendar, as well as conducive times for meeting and engaging with potential participants. The online survey instrument was redesigned with a different software, some of the language or terminology used for the adapted 23 scale items were amended to improve their appropriateness for developmental, cultural and linguistical inclusiveness of secondary student participants, and an open-ended, qualitative item was added to afford participants with the opportunity to expand on their quantitative responses to the scale items (Yin, 2014). The analyses for the validation of the adapted 23-item scale's responses were augmented with confirmatory factor analysis (CFA) and an Rasch Analysis to enable the further identification and removal of poorly functioning items to make the adapted scale more robust (Fox & Jones, 1998). The pilot study's findings also indicated the adolescents were eager to engage deeply in responding to guiding questions, so these were trimmed and reviewed to comprise broader, open questions that enabled participants to directly express themselves in an empowered manner regarding *psychological safety* areas and topics of important significance to them.

6.2.3 Key Findings of the Main Study – Phase Three (Online Survey) and Phase Four (Focus Groups)

The main study's key findings are provided by the critical insights informed by the responses to nine research questions and three hypotheses.

6.2.3.1 Critical Insights Provided by RQ1. – *"What are the observed indicators of psychological safety in secondary school student team contexts?".*

Informed by the students' voices, RQ1 and the four sub-questions (RQ1a., RQ1b., RQ1c., RQ1d.) identified the students' understandings of *psychological safety*, and how it can be enabled or hindered in their teams and implemented in their school contexts.

With the findings of the analyses of the data collected from the focus groups in **Chapter Five** offering clarification, context, complementarity, strength and depth to the online survey results in

Chapter Four, the integrated findings of phases three and four of this research identified 70 observed indicators. Forty-six (46) observed indicators were identified from the results of the integrated analyses of the quantitative data [16] and qualitative data [30] collected with the survey, and 24 observed indicators emerging from the findings of the qualitative analyses of the data collected with focus groups.

Diverging from empirical research focused on adults in workplaces, five observed indicators were considered to be distinct to the secondary school student team context: (1) respect for diversity; (2) congeniality; (3) familiarity; (4) non-judgemental environment; and (5) friendship. The results and findings of **RQ1**'s sub-questions contributed new knowledge of *psychological safety* as perceived by the secondary student participants.

6.2.3.1.1 RQ1a. - "What is the Secondary School Student's Understanding of Psychological safety in their Team Context?". The voiced insights of the focus group participants and the online survey respondents emphasised their understanding of *psychological safety* as (1) the importance of a positive and supportive, contextual learning environment with (2) sound student and adult leadership where (3) experiential learning for high team performance took place following (4) constructive instruction and (5) effective collaboration.

6.2.3.1.2 RQ1b. - "How is Psychological Safety Enabled in Secondary School Student Teams?". An explication of the three emergent themes of *psychological safety* (**Figure CCA5.1**) enabled the discovery of 14, observed indicators that enabled *psychological safety* from the participants' accounts. They were: (1) familiar people; (2) having a friend; (3) non-judgemental attitudes; (4) sound leadership; (5) disagreeing respectfully; (6) feeling safe; (7) having a say; (8) optimistic body language; (9) strength-based roles; (10) commonly spoken language; (11) respect diversity; (12) inclusive environment; (13) appropriate intellectual capacity; and (14) positive vicarious experiences.

These enabler indicators illuminated the impact of the learning environment and human personality on human behaviours, as explained by Albert Bandura's social learning theory (Bandura,

1977) in **Chapter Three**. The highlighted enabler indicators of *psychological safety* in secondary school student team contexts in **RQ1b**. above and the summarised oversight provided in **Table CCA5.10** in **Chapter Five** also affirmed some of the literature in **Chapter Two** which perceived *psychological safety* as a significant influencer of problem-solving skills (Carmeli et al., 2014), relationships (Carmeli et al., 2012), leadership (Hirak et al., 2012; Liu et al., 2014), and team cohesion (Baer & Frese, 2003; Zhang et al., 2010); the latter described by the adolescents in this research as more of getting along i.e., congeniality. Although the association of team performance and *psychological safety* was not indicative in this research, some of the secondary school students for example participant four in focus group five (FG5P4), believed that too much or increased *psychological safety* in a team could be a barrier to the *psychological safety* of team members in itself by causing them to "...walking on egg shells...kind of vibe…You might not get true results...like...you normally would if you weren't as cautious" thereby reducing productivity or performance. In the secondary school student team context, this supported Frazier et al.'s (2017) meta-analysis findings in **Chapter Two**, which found that high levels of *psychological safety* may be associated with negative outcomes (Bolino et al., 2004) such as cheating behaviours (Pearsall & Ellis, 2011) in the adult work environment.

6.2.3.1.3 RQ1c. - "What are the Barriers to Psychological Safety in Secondary School Student Teams?".

This research discovered six observed indicators that hindered *psychological safety* from the participants' accounts as: (1) being unfairly judged; (2) being excluded; (3) mean-spirited peers; (4) student team formulation by supervising adults; (6) bashfulness; and (7) increased *psychological safety* (**Figure CCA5.2**). These identified barriers were perceived to create an unsafe environment, thereby hindering collaboration when working in teams. **Chapter Two** supported this perception of the focus groups' participants by positing that a lack of supportive group member interactions due to status conflict posed a serious challenge in fostering team creativity because the social environment was deemed to be unsafe for group members to share their creative ideas (Sung & Choi, 2021).

6.2.3.1.4 RQ1d. - "How Can Psychological Safety be Implemented in Secondary School Student Team Contexts?".

The participants' accounts revealed that in their school context, i.e., study site one, *psychological safety* in student teams can be implemented in six ways: (1) increased number of collaborative tasks; (2) decreased number of face-to-face, schooling hours; (3) incorporation of zoological strategies such as pets; (4) students providing feedback to teachers regarding their instructional efficacy; (5) timely whole school education strategies; and (6) appropriate and timely adult interventions (Figure CCA.3). The recommendation for students to provide their teachers with feedback may further inform teachers with the *psychological safety* needs of their students as well as contribute to teachers' confidence in their collaborative and innovative instructional methods, thereby leading to improved educational outcomes. The six recommendations of the students directly inform educational practices to enhance *psychological safety* and positively impact on school culture by enhancing their learning environment and improving their wellbeing because they are more likely to engage actively in their learning without fear of ridicule, rejection, or other negative consequences. Increased *psychological safety* when working in teams, has the potential to promote a sense of value, belonging, inclusivity, and academic risk-taking and reduce anxiety, stress, and destructive conflict. The student recommendations offer initiatives across whole school education, teaching practices, and increased student opportunities to engage in team activities to further develop *psychological safety* skills, thereby aiming to increase collaborative support that fosters a sense of community and teamwork, intellectual and socio-emotional growth, and higher academic performance for the students, as well as implications for teacher professional development.

6.2.3.2 Critical Insights from the Answers to RQ2.

Emerging from the findings of this study, "The SHuCoS© Model" (**Figure CFA16.2**) described the associations between the latent variables that measure *psychological safety* in secondary school student team contexts and informed the answer to RQ2. In **Chapter Two**, previous research findings reported that in organisations, communication skills (Frazier & Fainsh-midt, 2012; Gong & Li, 2019), learning behaviours (van

Emmerik et al., 2011) and creativity and innovation (Carmeli et al., 2010; Gu et al., 2013) of team members were influenced positively by *psychological safety*. The answers to RQ2's three sub-questions (RQ2a., RQ2b., RQ2c.) and three null hypotheses (H_{o1}, H_{o2}, H_{o3}) that were tested, confirmed these also applied in the secondary school student team context.

6.2.3.2.1 RQ2a. - "Does a Student's Feeling of Efficacy in the Team [TEF] Influence their Feelings of Psychological Safety in the Team [TPS]?". Organisations have recognised the importance of psychological resources and collaborative power for creativity, innovation, and organisational growth (Donaldson et al., 2019). Although research evidence has generally shown a positive correlation between team psychological safety (TPS) and team efficacy (TEF) (Kessal et al., 2012; Newman et al., 2017), only a few studies have actually investigated and reported the impact of *psychological safety* on team efficacy (Abror, 2017). The findings of this research did not reject H_{o1}, the first null hypothesis [$p = .50$]. This indicated that in the secondary school student team contexts of this research, team psychological safety did not positively influence team efficacy [$r = .04$] (**Table RQA4.1**). "The SHuCoS© Model" (**Figure CFA16.2**) evidenced that for the sample of collaborating secondary school students in this research, an increase in their team psychological safety (TPS) had no significant, positive influence on their team efficacy (TEF).

6.2.3.2.2 RQ2b. - "To What Extent Does a Student's Feeling of Psychological Safety in a Team [TPS] Predict his/her Learning Behaviour [TLB] in that Team?". *Psychological safety* was shown to influence team learning (Edmondson, 1999, Kim et al., 2020; Wong et al., 2010) and team creativity, which is an outcome of the learning behaviours of the team (Ayub et al., 2022; Kim et al., 2021; Madjar & Ortiz-Walters, 2009). The findings of this research rejected H_{o2}, the second null hypothesis [$p < .001$], thereby showing that in the secondary school student team contexts of this research, team psychological safety predicted team learning behaviours [$\beta = .50$] (**Table RQA4.2** and **Table RQA4.3**). "The SHuCoS© Model" (**Figure CFA16.2**) evidenced that for the sample of collaborating secondary school students in this research, a change in their team psychological safety (TPS) strongly predicted a change in their team learning behaviours (TLB). This demonstrated that an

increase in their team learning behaviours (TLB) strongly predicted an increase in their team psychological safety (TPS).

6.2.3.2.3 RQ2c. - "How Can a Student's Attitude to Learning in a Team [TLB] Affect the Team's Efficacy [TEF]?". The impact of social influences, personalities, and environmental factors on team efficacy have been investigated (Hunter et al., 2007; Mathieu et al., 2008). Dyer & Nobeoka (2000) stated that when the members of a team learn to improve their problem-solving skills, they give their organisation at a competitive edge. Despite van Emmerik et al. (2011) stating that team efficacy is positively correlated with team learning behaviours such as experimentation, reflective communication, and codification (Vermuelen, 2003), Kim et al. (2020) advised that further studies were required to identify the direction of the causal relationship between team efficacy and team learning behaviours. The findings of this research rejected H_{o3}, the third null hypothesis [$p < .001$], thereby showing that in the secondary school student team contexts of this research, team learning behaviours influenced team efficacy [$r = .40$] (**Table RQA4.4**). "The SHuCoS© Model" (**Figure CFA16.2**) evidenced that for the sample of collaborating secondary school students in this research, an increase in their team learning behaviours (TLB) moderately increased their team efficacy (TEF).

6.3 Significant Contributions to Existing Knowledge

The findings of this multi-phased, mixed-methods research made several nuanced discoveries, six of which are considered to be original and significant contributions to existing knowledge on *psychological safety* in collaborating secondary school students and the overall *psychological safety* scholarship.

6.3.1 First Significant Contribution – Online Survey Instrument

The findings of the SLR in phase one of this research (**Chapter Two**) evidenced the absence of an appropriate tool for collecting data on the *psychological safety* of secondary school students. The online survey instrument (**Table MSM4.1**) was designed to elevate the students' perspectives. This instrument collected demographic, quantitative and qualitative data from participating

secondary school students about their opinions of their experiences on *psychological safety* in their team contexts.

6.3.2 Second Significant Contribution – Named Measurement Scale

In the absence of an adequate measurement instrument as indicated by the complementary findings of the narrative review and SLR in **Chapter Two**, the findings of this mixed-methods research provided adequate, statistical support for "The SHuCoS© Scale" (**Table RSM16.3**) This scale is innovative within the *psychological safety* scholarship in providing educational communities with a tool to monitor and appraise the students' *psychological safety* on a regular basis in the school year. The appropriate use of this scale will inform timely interventions that s will support continuous student improvement by ensuring safe and supportive learning environments.

6.3.3 Third Significant Contribution – Named Structural Model

The associations among the three latent variables: (1) team efficacy (TFE); (2) team psychological safety (TPS); and (3) team learning behaviours (TLB) that measure the *psychological safety* of collaborating secondary school students in "The SHuCoS© Scale" are described by "The SHuCoS© Model" (**Figure CFA16.2**). For the sampled secondary school students in this research, TLB, TEF and TPS indicate the relevance of the three main factors that influence their *psychological safety* during collaborative tasks. Knowledge of these factors will support the creation of wellbeing curricula that will encourage adolescents to actively engage with their learning, think critically and creatively without fear of unfair judgement, overt and covert exclusion, or even punishment. "The SHuCoS© Model" aligned with the 1950's study of Carl Rogers in **Chapter Two**. There, Rogers (1954) postulated that children with comparably better-developed creative potential were nurtured in psychologically safe and psychologically free environments where non-judgemental, unconditional acceptance and empathy were genuinely demonstrated.

6.3.4 Fourth Significant Contribution – Categories and Themes of the Identified Observed Indicators of Psychological Safety

As demonstrated by **Tables IND4.1** and **IND4.2**, and **Figures CCA5.10** and **QLA5.2**, the identified 70 observed indicators of *psychological safety* in secondary school student team contexts were classified into three core themes: (1) Situational Human Connection Skills© (SHuCoS©); (2) feeling valued and included; and (3) effective leadership with shared objectives that emerged from 28 core categories: (1) feeling and allowing others to feel content; (2) having a friend; (3) having a relevant someone to talk to; (4) knowing someone; (5) emotional and social wellbeing; (6) non-verbal communication; (7) laughter eases tension and acts as an icebreaker; (8) being good to others; (9) getting along; (10) nice personality; (11) not feeling judged; (12) inclusive environment; (13) equality and diversity; (14) resolving disputes for high performance; (15) sound student leadership; (16) effective communication; (17) sound adult leadership; (18) following negotiated rules; (19) high cognitive capacity; (20) conflict resolution; (21) effective information sharing; (22) cooperative collaboration; (23) experiential learning; (24) respect for diversity; (25) inquiring minds; (26) problem-solving capacity; (27) shared focus; and (28) good technical skills.

Knowledge of the classified 28 core categories and three core themes further informs the understanding, prioritisation, and implementation of *psychological safety* in the secondary school student team context with implications to align with a school's vision and goals to support an inclusive environment that enhances the school's overall educational mission. Prioritisation of *psychological safety* will guide the creation of engaging curriculum content in the students' secondary school contexts that emphasise their "SHuCoS©" to prepare secondary school students for enhanced socio-emotional skills and high academic attainment for their imminent learning and their future career-readiness.

6.3.5 Fifth Significant Contribution – Named, Emergent Theoretical Framework

"The SHuCoS© Framework" (**Figure TFW5.1**) demonstrates the associations among the latent variables that measure *psychological safety* in "The SHuCoS© Model" (**Figure CFA16.2**), and the 16 categories of observed indicators in "The SHuCoS© Scale" (**Table RSM16.3**) as well as the three core themes that describe *psychological safety* and its connections with other observed indicators in their composed student teams and their school context. The framework clarifies the *psychological safety* indicators that contribute to the involvement of adults (i.e., stable, positive environment and effective adult leadership) in supporting a positive school climate, thus reinforcing these psychologically safe norms in learning spaces, in the school community, and at home.

Underpinned by the students' voices, the theoretical framework stresses the identified indicators that support the development and implementation of inclusive practices (especially in student teamwork) that respect and celebrate diversity, ensuring that all students feel valued and included in a non-judgemental, stable, well-led, supportive school environment. Contributing to the extension of the frameworks of Clark (2020), Edmondson (1999) and Kahn (1990) in the adult workplaces, this framework contributes to the holistic fostering of *psychological safety* that embraces the socio-emotional and academic development and growth of the whole adolescent, crucial milestones for the lifelong success of future leaders; secondary school students.

6.3.6 Sixth Significant Contribution – Novel Definition of Psychological Safety

Although some of the findings of this research resonated with the findings and associated definitions of *psychological safety* in adult workplaces by researchers such as Clark (2020), Edmondson (1999, 2012, 2018), and Kahn (1990), the findings of this research evidence nuanced indicators of *psychological safety* that are distinct to the secondary school student team context. These nuances (such as friendship, familiarity, congeniality, non-judgemental environment, respect

for diversity) led to the creative revelation of a novel definition of *psychological safety*. The novel definition provides the key words that guide and support the involvement of the adults (teachers and parents/caregivers) in reinforcing the *psychological safety* of the students both at school and at home. This definition will assist with the implementation of relevant strategies that foster the relevant keywords (observed indicators) to build psychologically safe student teams which are harmonious for effective collaboration and a positive culture that enhances the wellbeing and success of the whole school community.

This new definition was the outcome of the researcher's synthesis of the different data points from the various students' voices in the six focus groups (**Figure DPS5.1**) and the students' perspectives from their online survey responses (**Table IND4.1**). Therefore, informed by the intersecting, self-reported perspectives and shared, spoken voices of the sampled students',, the researcher's creative synthesis led to an innovative, overall definition of *psychological safety* in the secondary school student team context as "a safe, supportive, adult-supervised environment where a student collaborates with friends and familiar people who exhibit optimistic, social cues that enable the student to get along and comfortably share ideas and divergent perspectives without fear of covert and overt isolation, disrespect, discrimination, and judgement"©.

6.4 Limitations of the Research

As a critically reflexive researcher, it is important to put the findings of this research into perspective. This action is emblematic of research transparency thereby showing the researcher's integrity and enhancing this research's credibility. By acknowledging and sharing the limitations of this research, the scientific rigour applied in the conduct of this research is demonstrated thus strengthening the reliability of its drawn conclusions. Knowledge of the limitations of this research also guides future researchers who wish to replicate this study by enabling them to interpret the findings of this research with a realistic understanding of its context and scope. The limitations are now noted, below:

By investigating the identified knowledge gap, the nature of this convergent, parallel, mixed-methods (QUANqualQUAL) research's findings were more exploratory than conclusive.

The data collected from the secondary school students of two South Australian schools represent a small part of the Australian school and student context. The purposeful focus on secondary school students as outlined in **Chapter One** did not include students from preschools, primary or middle schools, thereby the findings of this research may not be representative of the broader school system due to reduced statistical power, skewed interpretations, and limited generalisability.

The data collection process experienced operational constraints. The implications of the Covid-19 pandemic and its variants made it challenging to gain data collection site approvals and access in a timely manner, requiring flexibility, critical thinking, and problem-solving as a researcher in terms of responsiveness with the research design, recruitment protocols, and ethics applications. Finding an appropriate–time to collect the data were also a challenge because it was important to ensure that this period did not clash with school site times for report writing, examination preparation and conduct, and end of school-year ceremonies especially for this research's Years 10 – 12 students.

The data collection methods were perceived as time consuming or repetitive by some of the students. Two respondents prevented the emails about the data collection from reaching their inboxes. Although the research focus and conduct were endorsed by the school as being of educative value and of minimal distraction, the researcher was mindful that the participants had to stop working on their examination research projects (SACE RP) to respond to this mixed-methods research's online surveys at three different times over three Terms as well as participate in focus groups.

It must be noted that being a self-response survey, for reporting purposes, the analyses considered the possible situation where observed practice differed from the reported practice. This was because the collected data were based on student self-reports which were founded on the

students' own opinions, viewpoints, and beliefs on the *psychological safety* construct that were personally and culturally biased. There was also a risk of several biases such as acquiescence, recall, non-response, self-selection, social desirability, and sampling that emanated from the subjectivity of the employed, self-response survey (Bertrand & Mullainathan, 2001; Diener et al., 2010), which made it challenging to accurately interpret identified associations among the latent variables of *psychological safety* construct. The risk of bias in terms of measurement outcomes due to non-respondents was heightened due to the non-probability sampling strategy that was employed. This bias was problematic because the characteristics of the non-respondents varied from those of the respondents.

There were many variables that defined *psychological safety* in the secondary school student team context. However, due to the aims of this mixed-methods research, only the observed indicators and the latent variables highlighted through the integrated findings of the analyses of the online survey and focus groups and from the responses to the research questions were synthesised and reported.

It must be noted that although data were collected at three, separate time points from the same cohort of secondary school students, the longitudinal nature of this mixed-methods research was vulnerable (Keeves, 1987; White & Arzi, 2005). It was not possible to measure the dynamic changes of *psychological safety* in the secondary school student team context because the survey completed by the participants differed slightly at each of the three data collection points, so the analyses was conducted on the combined data for all three collection points.

6.5 Implications of Research Findings and Recommendations

Given *psychological safety* in secondary student school team contexts is an under researched field and being mindful that the findings of this study cannot be generalised, significant implications for theory, practice, policy and further research have emerged that can be applied in secondary and potentially, K-12 school contexts. These implications are discussed below.

6.5.1 Theoretical Implications

New insights have been created by the findings of this research to advance theoretical knowledge on the *psychological safety* scholarship, improve practical applications, augment theory integration with existing theoretical frameworks, and guide future research.

6.5.1.1 Supporting Existing Theories. "The SHuCoS© Scale" (**Table RSM16.3**) was adapted from Edmondson's (1999) *psychological safety* scale, which provided a foundation on which "The SHuCoS© Scale" was built by offering established principles and concepts as a starting point. Edmondson's (1999) scale provided empirical evidence and validation, thereby strengthening the consistency, robustness, and credibility of "The SHuCoS© Scale".

6.5.1.2 Contradicting Existing Theories. The SHuCoS© Model" (**Figure CFA16.2**) describes the associations between the manifesting latent variables (TLB, TPS, TEF) of "The SHuCoS© Scale" (**Table RSM16.3**) to further inform the *psychological safety* of collaborating secondary school students engaging in teams within their learning spaces. The latent variables in this model differ from that of Edmondson's (1999) for her model recognised 13 variables or constructs of *psychological safety* for adults in work teams.

6.5.1.3 Extending Existing Theories. The existing studies and theories of *psychological safety* have been in organisations. This research's findings revealed nuanced observed indicators in the secondary school student team contexts such as friendship, familiarity, and congeniality. "The SHuCoS© Framework" (**Figure TFW5.1**) demonstrates new dimensions of *psychological safety* in the school student context that were previously unexplored, thus expanding the existing *psychological safety* theoretical frameworks of researchers like Clark (2020), Edmondson (1999), and Kahn (1990) in the adult workplaces.

6.5.1.4 Refining and Clarifying the Definition of Psychological Safety. The novel definition of *psychological safety* in the secondary school student team context offered a more

comprehensive and cohesive understanding of the *psychological safety* phenomenon as it manifests in the secondary school student team context.

6.5.1.5 Proposing New Theoretical Framework.

"The SHuCoS© Framework" (**Figure TFW5.1**) that emerged supports the development of a more nuanced understanding of the constituents of *psychological safety* and its manifestation pathways in the secondary school student team context. This new framework provides a foundation for the study of *psychological safety* in the secondary school student team context as well as continuity and coherence in the *psychological safety* scholarship, contributing to the maintenance of a robust, intellectual tradition.

The associations between the existing theoretical frameworks of *psychological safety* in the adult workplaces by researchers such as Clark (2020), Edmondson (1999) and Kahn (1990), and the secondary school student team context, as uncovered in this research, fosters innovation and encourages a progressive dynamic approach to scientific inquiry and discovery.

6.5.2 Practical Educational Implications

The thoughtful integration of "The SHuCoS© Scale" (**Table RSM16.3**), "The SHuCoS© Model" (**Figure CFA16.2**), "The SHuCoS© Framework" (**Figure TFW5.1**) and the novel definition of *psychological safety* (**Figure DPS5.1**) into educational practice in secondary schools and potentially, K-12 schools, can contribute to the enhancement of students' learning experiences, that improve their educational outcomes and prepares them adequately for future career and life's challenges.

"The SHuCoS© Framework" of this research's findings underscore the significance of friendships, congeniality, familiarity, and respect for diversity in a non-judgemental environment to the collaborative learning for the sampled secondary school students. Bandura's (1977) social learning theory postulated that learning behaviours in a social environment are facilitated by observation, imitation, and modelling. These vicarious actions that positively influence *psychological safety* in collaborating secondary school students are advanced by trusting relationships in the team such as through friendships (Mayo, 2004).

Whereas **Chapter Two** clarified that in the organisational environment, it had been decided that *psychological safety* was *not trust* (Kramer, 1999; McAllister, 1995; Robinson, 1996), or *emotional safety* despite having an emotional carrying capacity (Carmeli et al., 2009), or *team cohesion* (Janis, 2008; Sunstein & Hastie 2015) or *intrinsic motivation* (Amabile, 2001), it was evident from the integrated findings of this research that for the student participants, *psychological safety* in their team contexts was indicated by such. In the workplace, friendships were evidenced by researchers to encourage gossip, unneeded dependence, and nepotism (Butt, 2020; Menard, 2017), interfere with performance by clouding boundaries and causing anxiety when breakdowns occurred (Choi & Ko, 2020; Morrison & Nolan, 2007), and was positively linked to sexual harassment (Berman et al., 2002; Pillemer & Rothbard, 2018). Other researchers have however found that friendships in organisations progressed team efficacy (Herman et al., 2008), employee engagement (Khaleel et al., 2016), role performance (Ozbeck, 2018), increased productive outcomes (Song & Olshfski, 2008), and overall career success (Markiewicz et al., 2000). Likewise, the results of a recent study by Durrah (2023) in the Omani private sector did not support "the relationship between friendship opportunities and psychological safety" (p. 28605), but rather highlighted the special place that workplace friendships had in encouraging innovative behaviours among employees. Despite friendships being seen as a double-edged sword in organisations (Morrison, 2009b; Morrison & Cooper-Thomas, 2016) with the potential to create inclusivity (Kark & Carmeli, 2009) and innovative behaviour (Zhao et al., 2022) yet cause organisational deviance (Gupta, 2022), the causal association of friendship to *psychological safety* in organisations are yet to be proven. What emerged from this research's findings is that in secondary school student team contexts, getting along with team members, and having a friend or a familiar face in the team was perceived to be significant observed indicators of *psychological safety* for the sampled students.

The participants in this research called attention to the composition of student teams facilitated mainly by the adults in the secondary school environment such as teachers. In **Chapter Two**, it was asserted that *psychological safety* was a conduit that assisted with trust-building

between students and their peers and their teachers to foster a strong sense of belonging (Baeva & Bordovskaia, 2015). To foster this sense of belonging and trust, the respondents requested for teachers to enable teams composed of optimistic team members with nice personalities, team members with inquiring minds and problem-solving capacity, healthy team member relationships through cooperative partnership and non-judgemental support. These observed indicators were subtly insinuated in the research findings of workplaces by researchers such as Kim et al. (2020) although team members with nice personalities was not accentuated as important in the workplace.

6.5.2.1 Leadership Style of School Leaders. Cutting-edge school leadership fosters progressive and innovative, educational pedagogy for educating and skilling the future workforce; secondary school students. In Chapter Two, Edmondson and Lei (2014) concluded that *psychological safety* is a moderator of an interpersonal safety climate. They argued that for a positive impact, *psychological safety* had to be "combined with other essential elements (e.g., strategy, vision, goals, supportive leadership, and so on) to best enable learning and performance" (p. 40).

Underpinning "The Underpinning "The SHuCoS© Framework" (**Figure TFW5.1**) was the sampled secondary school students' preference for "effective adult leadership" in a "stable positive environment" as part of their "school context support". The students' voiced preferences for teams where *psychological safety* was monitored by observed indicators such as "getting along", "positive personalities" and "cooperative collaboration", also included an underlying inference for preferring a relational leadership style in their school contexts. Relational school leadership has been reported to be valuable to optimistic teacher attitudes, student wellbeing and student performance (Uhl-Bien, 2006; Webb, 2021) and significantly contributes to school improvement (Adams & Forsyth, 2013; Dube & Jita 2018; Moolenaar & Sleegers, 2010; Tschannen-Moran, 2014). In light of the findings of this research, school leaders are encouraged by the students in this study, to adopt a relational leadership style that promotes *psychological safety* education and practice and also

flexible and dynamic dependent on their school context, its emergent urgencies, and the evolving priorities of a changing, global, educational landscape.

6.5.2.2 Monitoring and Appraising the Psychological Safety of Collaborating Students.

To further improve and sustain the socio-emotional progression, general wellbeing, collaborative success and academic attainment of secondary school students working in teams, the implementation of "The SHuCoS© Scale" (**Table RSM16.3**) may provide an evidence-informed and valid instrument to monitor the *psychological safety* of their students. Implementing "The SHuCoS© Scale" at regular intervals e.g., once a semester, can track individual student's observed indicators of *psychological safety* over time, thereby potentially informing the variances and early risk signs to signal preventative strategies and/or interventions for emergent socio-emotional and academic issues.

School leadership could also analyse the *psychological safety* of their students at cohort (e.g., year level, age, key stage) or demographic (e.g., identity, ethnicity) levels to inform policy and practice for targeted intervention. Implementing and analysing the effectiveness of "The SHuCoS© Scale" can also inform the further refinement of the scale for its reliability and validity in supporting the scientific understanding of the *psychological safety* phenomenon in the secondary school context. While "The SHuCoS© Scale" was grounded within the secondary school student team context, there is potential for its application and adaption in the broader K-12 school context.

6.5.2.2.1 Instructional Strategies. Due to the direct impact instructional improvement has on student achievement, schools that maintain a strong focus on effective instruction are described as high performing (Barber & Mourshed, 2007). Instructional staff (i.e., teachers) are expected to understand students and their learning processes in order to design and implement effective educational strategies that support the forging of respectful, positive school and home relationships (AITSL, 2018, 2022; Australian Government, 2022; DFE, 2020, 2021; NZER, 2022; OECD, 2020).

"The SHuCoS© Model" (**Figure CFA16.2**) and "The SHuCoS© Framework" (**Figure TFW5.1**) highlight the significance of student-voiced indicators such as "constructive instruction", "good

technical skills", "necessary abilities and proficiency" and "Situational Human Connection Skills© (SHuCoS©)" on the *psychological safety* of collaborating secondary school students. Adolescent learners in secondary schools are at the developmental stage of their lives where they face socio-emotional and mental health challenges with their self-esteem, identity, bullying, destructive discrimination, self and peer conflict and pressure, educator and parental pressure and conflict, academic and sexual stress, sleep deprivation, drugs and alcohol, anxiety, and social media.

Equipping teachers with professional development to adopt innovative teaching or instructional practices that are more aligned with "The SHuCoS© Framework" will further emphasise student-centred teaching and learning approaches associated with *psychological safety*, that can advance catering to diverse learning needs when working in teams. Knowledge of the TEF, TPS and TLB components and associations in the model and observed indicators can directly inform teaching pedagogy and instruction when planning for team learning experiences to create psychologically safe, learning spaces that will support the instruction of transferable soft skills and general capabilities, as well as the physical and mental wellbeing and academic achievement of young adolescents.

6.5.2.2.2 Facilitating Student Team Compositions for Pastoral, Curricular and Co-curricular Purposes. This research's findings indicate that separating existing friendships in homegroups, forms and learning spaces (for instance) with an aim of compelling adolescents to make new friends does not often have a positive impact on student wellbeing, socio-emotional progression, collaborative success, and academic performance. "The SHuCoS© Framework" (**Figure TFW5.1**) reflects student preference to be placed in a team with at least one friend or a familiar face depending on the class size and social-emotional or academic context to engender "stable, positive environments" that support the *psychological safety* of collaborating students.

Furthermore, to enhance student *psychological safety* in curricular and co-curricular spaces, teaching and support staff are encouraged to refer to "The SHuCoS© Framework" to consider recommended observed indicators of "student team composition" that will enable the formulation

of healthy and balanced student teams for instructional efficacy and the everyday, active practice of general capabilities or employability skills such as "cooperative collaboration" for the students' career readiness. "The SHuCoS© Framework" has potential extended implications such as informing decisions for class compositions for the start of a new school year or for the addition of new students within the school year. This teacher action of appropriate student team formulation will also strengthen their trusting relationships with their students in their learning spaces and that can only be a good situation.

6.5.2.3 Monitoring and Measuring Strategies. Teachers can employ "The SHuCoS© Framework" (**Figure TFW5.1**) to introduce alternative assessment methods (e.g., formative) that better capture the students' socio-learning progress in line with the precepts of this new theoretical framework to provide ongoing, continuous, assessment feedback and support that enhances wellbeing and academic outcomes.

6.5.2.3.1 Self-Regulated Learning. Offering an alternative to psychoanalytic and behaviourist theories with his emphasis on human freedom, dignity, and self-actualisation, **Chapter Two** reported that Rogers extended his creative, therapeutical ideations into the world of education where he advocated for learner-centred approaches (Rogers, 1951). Being a self-report survey, "The SHuCoS© Scale" (**Table RSM16.3**) can be used to encourage personalised learning and reflective learning techniques where the secondary school students monitor their own *psychological safety* when working in teams to foster better collaboration, critical thinking, and problem-solving for themselves as individual team members and even as a collective evaluation technique, for the whole student team.

6.5.2.3.2 Student Engagement. **"**The SHuCoS© Framework" (**Figure TFW5.1**) can be used by the secondary school students to self-appraise their increased awareness, understanding and respect for the self-empowerment that is provided by sharing bold, out-of-the-square perspectives that may be divergent, controversial and conflict-inducing in collaborative situations but yet, provides affordances for unique creations and innovative dimensions for their school learning and

future careers. This practice can contribute to the further development of the framework from the students' applied and reflective viewpoints.

6.5.2.4 Home-School and Support Services Engagement. Sharing "The SHuCoS© Scale" (**Table RSM16.3**), "The SHuCoS© Framework" (**Figure TFW5.1**) and the new definition of *psychological safety* (**Figure DPS5.1**) with parents/caregivers and 'wraparound' services in the community may offer the students' close networks the notion of how to support their *psychological safety* while addressing their diverse needs in environments and situations external to the regulated school environment. Creating programs to engage parents/caregivers and external agencies on the use and application of the scale and the framework will strengthen partnerships by involving in the implementation processes. This will place all stakeholders on a 'level playing field' by maintaining open communication channels when it comes to the students' *psychological safety* in teamwork (and individual) situations out of school to augment their capacity for personal and pastoral achievement.

6.5.3 Policy Implications

There is no workforce without education; be it formal, informal, or non-formal. To bridge the global skills gap, collaboration of governments across nations is further needed to initiate and advance consistent policy standards across the globe that promote sustainable curricular pathways for the teaching and learning of team norms like *psychological safety* in collaborating secondary school students, and potentially, K-12 schools. This will lead to improved wellbeing of the students, their productivity at school, at home and in their communities and their overall future success.

6.5.3.1 Global Education Policies. Innovative capacity places nations in a privileged position to address the significant environmental, economic and social challenges our rapidly changing world faces. At the core of this innovation is human capital; human beings such as secondary school students who apply their knowledge and applicable skills to turn their collaborative creativity into innovative processes and products. How then can educational institutions like K-12 schools foster the continuous upgrade of team norms such as *psychological*

safety that value learning environments that value the sharing of creative knowledge and transferable skills that this Knowledge Age critically needs? Although no single policy will provide all the answers to this question, the design of educational policies which support adaptive learning institutions that facilitate a culture of creativity among students will be beneficial.

The findings of this study offer implications for educational policies to consider the inclusion of the observed indicators of *psychological safety* in "The SHuCoS© Framework" (**Figure TFW5.1**) that foster creative learning behaviours when secondary school students work in teams. According to the OECD Global Teaching InSights, teacher instruction in many secondary schools in the OECD participating schools in PISA 2018, involved predominantly instructing from the front of the class and efficiently switching to around the class, with student collaboration happening in less than 22% of video-observed lessons (OECD, 2020). Cooperation or collaboration was evidenced as a critical part of student teamwork (OECD, 2023), and the findings of this research evidence "cooperative collaboration" as a team learning behaviour that fosters *psychological safety* in "The SHuCoS© Framework" thereby highlighting the importance of social interactions as posited by social learning theory (Bandura, 1977) for student wellbeing and learning.

Exploring "The SHuCoS© Scale" (**Table RSM16.3**) and "The SHuCoS© Framework" within the global field to facilitate collaborative learning norms such as *psychological safety*, and its reliable monitoring in secondary schools may inform global policy and curriculum. This will contribute to global goals of encouraging students to regard setbacks and mistakes as learning opportunities (OECD, 2013, 2016, 2023). "The SHuCoS© Scale" and "The SHuCoS© Framework" approaches this through "experiential learning" as advocated through the students' voices in this research, measured reliably as team learning behaviours (TLB) in "The SHuCoS© Model" (**Figure CFA16.2**).

6.5.3.1.1 Legal Protection and Ethical Considerations. Integrated within policy development, there are important implications for policymakers to introduce legal protections and processes (that model *psychological safety*) for individuals who speak up about *psychological safety* issues that can potentially arise to ensure such individuals are protected from retaliation, thereby

fostering a more open and safer environment for the continued progression of this critical phenomenon on the global education landscape.

In terms of ethics, the development of appropriate ethical guidelines for the monitoring, appraisal, fair and just implementation of *psychological safety* in schools, and its long-term sustenance will uphold the nations, local authorities, and schools that aspire to create psychologically safe learning environments for improved wellbeing and the overall success of their students.

6.5.3.2 National Education Policies. This research was located in South Australia including secondary school student participants and while the findings may not be generalised, implications extend from the findings i.e., "The SHuCoS© Scale" (**Table RSM16.3**), "The SHuCoS© Framework" (**Table RSM16.3**) with its accompanying new definition of *psychological safety* (**Figure DPS5.1**) across Australia and the global context, as mentioned. Implications for educational jurisdictions and sites to consider incorporating the scale, framework and nuanced definition of *psychological safety* in secondary school student team contexts as they deem fit in their contemporary, secondary education curricula to achieve their contextual, national policy goals for curriculum revisions, standardised assessments, teacher training programs, and anti-bullying initiatives in their schools.

6.5.3.2.1 Funding and Public Awareness for Future Research. Governments and educational institutions could provide increased funding for research into the *psychological safety* phenomenon in schools so "The SHuCoS© Scale" (**Table RSM16.3**) and "The SHuCoS© Framework" (**Figure TFW5.1**) can be further developed to promote deeper understandings of *psychological safety* and its implementation strategies. National governments and organisations could also launch public awareness campaigns to educate communities about the importance of *psychological safety* and how to foster it in their various school contexts.

6.5.3.3 Local Education Authority (LEA) Policies. It will be beneficial for policymakers of local education authorities to consider the student voices that supported "The SHuCoS© Scale"

(**Table RSM16.3**), "The SHuCoS© Framework" (**Figure TFW5.1**) and the novel definition of *psychological safety* for secondary school student team contexts when building K-12 curriculum and wellbeing policies for whole school improvement.

6.5.3.3.1 Curriculum Development. Integrating "The SHuCoS© Scale" (**Table RSM16.3**) and "The SHuCoS© Framework" (**Figure TFW5.1**) into secondary school curricula will ensure the content reflects the current understandings of the secondary school students of *psychological safety* and its practices in their context. The development of interdisciplinary or cross-curricula programs that align with the principles of "The SHuCoS© Scale", "The SHuCoS© Framework" and the novel definition of *psychological safety* for secondary school student team contexts, are encouraged.

6.5.3.3.2 School Site Policies. The revision of site policies to reflect the practices and the principles advocated by "The SHuCoS© Scale" (**Table RSM16.3**), "The SHuCoS© Framework" (**Table RSM16.3**) and the new definition of *psychological safety* (**Figure DPS5.1**) in secondary school student team contexts may be beneficial. This action will foster the development of improved support systems for students and their teachers and support workers to adapt to the timely monitoring of the *psychological safety* of collaborating students, the student team composition process, student socio-emotional self-regulation, innovative instructional and behaviour management strategies among others.

6.5.3.3.3 Integration of New Technologies in the School Curriculum. In this Knowledge Age of machine learning and generative AI, especially following the Covid-19 pandemic period, blended learning models in educational institutions that combine traditional and digital approaches for enriched learning processes are in use and have come to stay. Creating and leveraging educational technology tools that align with "The SHuCoS© Scale" (**Table RSM16.3**) and "The SHuCoS© Framework" (**Table RSM16.3**) will facilitate engaging, interactive learning experiences for the secondary school students who work in teams, and potentially, K-12 students. This will require the professional development of teachers and support staff, which is discussed in **6.5.3.2.3** below.

6.5.3.3.4 Attitude to Learning [Behaviour] Management Policies. The employment of "The SHuCoS© Framework" (**Figure TFW5.1**) in the development or extension of existing behaviour management frameworks in schools will support the increasing invisibility of creative students who share divergent viewpoints in learning spaces and sometimes are deemed behaviourally inappropriate. Sometimes, creative students express themselves in such perceived manners because they feel unvalued and excluded because of their unique offerings, which materialise in ill behaviours that attract discipline. This, in turn worsens the students' frustrations thereby decreasing their collaborative capacity for their future learning hence their socio-emotional wellbeing and academic attainment. The encouragement of instructional strategies and behaviour management techniques which foster speaking up in teamwork to share convergent or divergent perspectives that support creative pursuits regarding the task at hand must be emboldened. This will require the professional development of teachers and support staff, which is discussed below.

6.5.3.3.5 Professional Development of Teachers and Support Staff. As per the students' voiced recommendations in Figure CCA.3, provision of professional development for staff that includes the implementation of "The SHuCoS© Scale" (**Table RSM16.3**) and "The SHuCoS© Framework" (**Figure TFW5.1**) will encourage collaborative learning communities inclusive of leadership, teaching and professional staff where best practices and implementation strategies can be designed, trialled, evaluated, shared and improved.

6.5.4 Future Research Implications

Psychological safety in the secondary school student team context is an emerging scholarship, as evidenced by the findings of the systematic literature review in **Chapter Two**. The findings of this research aim to stimulate further diversifying of contemporary research in the field of *psychological safety* in school educational context, including the secondary years and potentially the K-12 school environment. The targeted focus on the senior secondary years 10-12 in this research, provided groundbreaking foundational evidence to inspire and inform future research to increase the understanding of *psychological safety* in secondary school student teams to support adolescent

physical and emotional wellbeing, their collaborative achievements, academic attainment and the sealing of the graduate skills gap for their career readiness in the rapidly changing 'Knowledge Era'.

6.5.4.1 Methodological Implications for Future Research. In connection with this research's limitations as cited above in **6.4**, ten methodological suggestions are made for the conduct of future research:

1. "The SHuCoS© Scale" (**Table RSM16.3**) is administered to randomised samples of participants in a variety of secondary school contexts (such as public, independent, special schools, Catholic, Islamic, single sex, co-educational) and world-wide locations to enhance its capacity for global generalisability.
2. "The SHuCoS© Scale" is administered in a large, randomised, student sample from a significant number of diverse education sites and contexts (such as preschool, primary, middle school, VET, tertiary) to afford opportunities to examine whether the associations revealed by in this research will resonate with diverse education contexts.
3. "The SHuCoS© Scale" is reviewed to consider the inclusion of text-free options and culturally inclusive language and contemporary, affirming, bias-free terminology that is free of ambiguities for the scale items.
4. The participant information sheet (PIS) includes clarification of the reasons and intended use for collecting demographic data with "The SHuCoS© Scale" upfront to improve response rates and participant understanding.
5. Consideration is given to the exploration of the *psychological safety* of student identity, and of students from migrant communities and indigenous backgrounds. Care must be taken though as these types of comparative analyses often reinforce stereotypes, non-beneficial societal hierarchies and compromise diversity (Barnett et al., 2019; Noroña-Zhou & Bush, 2021).
6. Consideration is given to the investigation of different team compositions of students to explore the moderating variables of team psychological safety. This will uncover patterns of

the student team composition indicators revealed by this research will resonate with the preschool (Birth-K), primary (R-6) and middle school students (7-9).

7. If item redundancy and assessment gaps occur in a resulting measurement scale during a validation process, it is recommended the researcher either considers removing the redundant items, collecting more data, or writing additional items in the scale to resolve the potential weakness or degradation of the measurement function of the scale caused by the item redundancy.
8. The conduct of longitudinal research will aid an improved understanding of the fluidity of *psychological safety* in the K-12 student context i.e., how it evolves over time.
9. Collaboration between international research teams will offer a global perspective of *psychological safety* in secondary school student team contexts as well as the K-12 school context.
10. Engage in investigations about *psychological safety* in adult contexts in schools in order to enable educators and school systems share their perspectives and opinions on *psychological safety* in their context.

6.5.4.2 Theoretical Implications for Future Research. In connection with this research's theoretical implications as cited above in **6.5.1**, one theoretical suggestion is made for the conduct of future research:

1. Conducting ongoing research on *psychological safety* that assess the effectiveness of "The SHuCoS© Scale" (**Table RSM16.3**) and "The SHuCoS© Framework" (**Figure FTW5.2**) in secondary school student team practice will contribute the necessary data-driven adjustments that can inform their extension into the tertiary student context.
2. Further research in schools is also needed to explore potential relationships between *psychological safety* in student teams and academic achievement, team innovation and outcomes, and social emotional learning that extend "The SHuCoS© Scale" and "The SHuCoS© Framework" into added *psychological safety* dimensions.

6.6 Researcher Reflexivity

To provide richer insights into how the robustness and credibility of this research was achieved, I will offer some reflections on how my own biases and assumptions influenced this research's processes.

In terms of contextual sensitivity, I understood and was very much aware of my socio-cultural background as a female member of the ethnic minority community in South Australia. Due to my previous experiences with racial discrimination in South Australian schools directed at me majorly from teaching staff, I was somewhat anxious about how my interactions were likely to be perceived generally by this research's participants and members of their school communities. I was, however, pleasantly surprised by the positive welcoming behaviours of the school leaders, teachers, administrators, students and their parent/caregivers who provided additional consent. The focus group discussions with the adolescents of study site one was an enjoyable part of this research's experiences. I loved their open-mindedness and candour.

Regarding self-awareness and bias identification, I also recognised and acknowledged my personal biases based on my personal beliefs and opinions about secondary school education, instructional practices, and student-teacher relationships that may have influenced the decisions that I made on data collection and analyses in this mixed methods research. For instance, I initially designed this research as a major quantitative study (QUAN) with a minor qualitative study aspect (qual) to confirm the QUAN results (i.e., QUANqual) because I felt my research strengths were skewed towards quantitative analytical and interpretation processes. This research however ended up becoming a QUANQUAL with equal weight on both parts due to the extensive data I collected and analysed with the focus groups, evidencing my continuous reflection and adaptability as a reflexive researcher.

Continuously reflecting on the ethical issues of this research's processes, I regularly self-questioned the impact of my personal biases, debriefed every fortnight with my supervisory team, received feedback on my learning journey, kept detailed records of my meetings and actions, and

undertook reflexive thoughts about the decisions I made about data collection, analyses and interpretation to enhance the transparency, fairness, rigour, integrity, and credibility of this research.

6.7 Conclusion

The joy of today's learning, future career, and life success in this digital age of globalisation, machine learning and generative AI requires a wide range of soft skills also known as personal attributes or general capabilities to complement technical or formal qualifications also known as hard skills. To reach their full potential, secondary school students need to be equipped with competencies such as effective communication, adaptability, intercultural literacy and problem-solving to ignite their creative skills for progressive innovation in our rapidly changing world. To advance student creativity, students must feel psychologically safe in collaborative situations to realise elevated self and collective efficacy towards collaborative skills and team norms for high-performance outcomes as future entrepreneurs, employers, or employees in the Knowledge Era. *Psychological safety* is often construed (or may be misconstrued) to be an important variable in only mental health and wellbeing contexts. *Psychological safety* is, however, beneficial in team spaces in various industries such as marketing and sales, customer service, research and development, medicine and allied health, human resources, project management, aviation, and education. It is a team norm or soft skill with diverse maze runs. Informed directly by the self-report-surveyed and spoken voices of senior secondary school students (Years 10-12) in South Australia, the findings of this research have further illuminated *psychological safety* as a core aspect of team dynamics and as a particularly critical team norm for fostering collaborative learning, creativity, and innovation in secondary school student teams. As a foundational study in the field of secondary student education, opportunities have emerged to inform future exploration of *psychological safety* related to education and beyond. Furthermore, through six, original and significant contributions (**6.3**), this research has added further novel insights to the *psychological safety* scholarship in the secondary school student team context for collaborative learning. Besides, this research's findings have

informed theoretical, practical and policy implications for nations, education authorities, school leaders, teaching and support staff, students, parents/caregivers and support services. Nevertheless, it is important to acknowledge the constraints and limitations encountered in this research (**6.4**), considering the enumerated implications for future research (**6.5.4**).

6.8 Closing Remarks

I often spend time wondering about a regular occurrence that I witnessed severally, in many workplaces around the world – on four continents. I have many unanswered questions. Why did the most talented and creative people who were key players of innovative pursuits and outstanding relationships in organisations I had been a part of, face overt and covert rejection and were sometimes even punished with demotion or dismissal? Why did they seem to keep 'getting into trouble' for doing the right thing; in fact, what the organisation needed; what they were recruited for? Why did they not receive any sort of acknowledgement for their creativity and contribution to organisational advancement? Why was their intellectual property (IP) literally subjected to orchestrated theft? Why were they ascribed undeserving nicknames? Why did some act to erode their sense of belonging? Why were they made to feel so out of place that they had to walk out; often traumatised and quite ill? Why did leaders and managers not help them? Why did leaders and managers seem to be swayed by the workplace bullies instead of the talented ones who were suffering in smiley-silence but continuing to make a difference, regardless? Why was it always too late for organisational leaders to realise after the departure of the creative one, that it was their accomplishments all that while? Why were the IP thieves unable to keep up the creative appearances they had been faking regardless of how much they believed they had learned off the creative one? Why were the IP thieves not disciplined for a lack of sincerity and integrity and honestly, plagiarism and theft? My questions remained unanswered.

I wanted to do something about this unfortunate and unfair situation which was depleting our work environment of the most needed brains especially for this day and age and the future. I worried about the future of my talented progeny. I love people. I love talent. I love uniqueness. I

love candour. I love having a laugh over a failed situation. I love trying again if at first, I don't succeed. I love trying new things. I love discussing topical issues. I love sharing an opinion. I love courage. I don't understand fence-sitters but that's ok too. I love moving around mentally and physically. I love working out new ways to solve problems. I quite frankly, love a challenge hence my seemingly personal status-quo-challenging behaviours. I love bantering over critical thoughts and innovative pursuits. I love a chat. I love fun situations. I find it boring doing the same things repeatedly. I love change. I love taking a different path to see where it may lead. I love 'different'! 'Good different' is great! 'New different' is exciting – just awesome!

Why do some people have a problem with 'different' – with awesomeness, I often wonder?

One day, a few years ago, it dawned on me that it was because talented and gifted people with creative minds see and act out of the barriers many others are confined to or want to be confined to, for it was 'comfortable'. The out-of-the-box thinking, and bold, astute or assertive actions (well, some will say it's stubbornness or arrogance…) that creative-minded people undertake to support the actualisation of their innovative ideas threaten others who may feel uncomfortable with the status quo-challenging behaviours. They stand out. They are different – 'good different' – 'unique different' – 'awesome different'. The people I saw being mistreated at work were admirable, so inspiring, so hardworking, so trustworthy, so reliable, so dependable, such awesome problem-solvers, and so so smart. Yet, they faced rejection, isolation, IP theft, demotion, witch-hunting, and even traumatic dismissal. This saddened me. I felt workplace wellbeing support standards required a review and even better, a reset. I believed it had something to do with a lack of people skills by the seemingly smart ones who led, largely. I wanted to study people - people skills – soft skills – human relations.

Then I met Charlie the astronaut who briefed me about *psychological safety* in collaborative communication contexts. I thought differently about it and applied it in the school context to see if I could reach out to smart, creative adolescents who are likely to suffer a workplace fate similar to that of the 'creatives' I came across. Inspired by the voices of the young people who engaged in this

research to emphasise the centrality of *psychological safety* during team engagement, I am on a mission to share my perspectives and experiences and to collaborate on the dissemination of this significant team norm phenomenon to future leaders and here we are… It has not been ...exactly...a smooth path, but we are here… See? 'Creative different'! 'Good different'! 'New different'! 'Awesome different'! Not such a bad thing, right?

I sign off by asking, "Is being smart enough?"

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Appendix A - Participant Information Sheet (PIS) for Students

Title	Being smart is not enough: A mixed methods study exploring the role of psychological safety in collaborative communication contexts
Short Title	
Project Number	
Project Sponsor	
Principal Investigator	
Supervisor	
Associate Investigators	

Introduction - What does my participation involve?

You are invited to participate in research conducted by the University of South Australia in collaboration with your school. You have been invited to participate in the study due to your involvement in teamwork in your lessons.

This Participant Information Sheet (PIS) tells you about the research purpose and your level of involvement. Knowing what is involved can help you decide if you do or do not want to take part in the research. Please read this information carefully. Ask questions about anything that you do not understand or would want to know more about. Before deciding whether to take part, you might want to talk about this research with your parent/caregiver, teacher, and/or your school Psychologist.

What is the purpose of this research?

Future career and life success require a wide range of skills and attributes. Competencies such as teamwork, creativity, or problem-solving are all needed for you to reach your potential. Communicating effectively in a team is a vital skill that is beneficial to your self-efficacy, your team's collective efficacy as well as your individual and communal success. This will advance your successful outcomes as a creative entrepreneur, employer and/or employee. To advance your creativity, you

must feel safe in shared environments to communicate and collaborate well to realise high-performance outcomes. This feeling of safety in teams is termed psychological safety.

In this research, we aim to measure the observable dimensions of psychological safety as well as your reported level of psychological safety as you work individually and in teams during lessons or in a co-curricular activity. We, as researchers, hope that our findings will help us to inform school curricula, and teaching and learning strategies at the secondary school level to enable more effective collaborative communication activities and outcomes. The results of this research will also be used by the Principal Investigator to obtain a Doctor of Philosophy degree at the University of South Australia.

What does participation in this research involve?

If you decide to take part in this research, we will ask you to read to understand and support your parents to sign the Consent Form. Please return the Consent Form to your school.

The research will take place while you work in your regular lessons with your teacher. This will start in Term 1, 2022 (February 2022) and end in Term 4, 2022 (December 2022). Three times each term, you will be given a survey to complete - at the beginning, middle and end of each term. The survey is designed to give us information about your perceived level of psychological safety while you work in your teams i.e., how safe you believe you are to respectfully speak your mind about tasks without fear of rejection or reprisal from other members of your team. The survey will be completed online and takes 5-8 min to complete. We will ask you to offer the researchers some of your personal details i.e., gender, year of schooling, and ethnicity. This additional information will be collected, once, the first time you complete the survey at the start of Term 1, 2022. This information will help us to interpret our results in fair and appropriate ways.

Two times during this research, towards the end of Term 2, 2022 and Term 4, 2022, you will take part in a focus group discussion to share your beliefs, thoughts, and feelings about your teamwork processes. The focus group will be facilitated by the primary researcher. It will run for about one hour.

This will be conducted in an online space and will be audio recorded. The audio recordings will help us to transcribe the discussions accurately.

The researchers will take every care to remove any identifying material from the responses you provide in the survey and at the focus group discussions as early as possible. Neither will be identified in the reporting of the research. However, the researchers cannot guarantee the confidentiality or anonymity of material transferred by the internet.

For this study's analytical purposes, the data that is collected during this research will be discussed and used by the researchers at the University of South Australia and your school leaders. The information sought from you for this study may be used for other future research purposes following the appropriate ethics approvals.

What are the possible benefits of taking part in this research?

We cannot guarantee or promise that you will receive direct benefits from participating in this research. Your involvement will help to inform future curriculum and teamwork activities, and you will learn about the process of working in teams. You will not be paid for your contribution to this research. You will not incur any costs when you participate in this research.

Do I have to take part in this research project?

Participation in this study is voluntary and you are free to decline or withdraw from the research project any time without affecting your routine care or relationships with the researcher, your school, or the University of South Australia, now or in the future.

If you decide to leave this research, the researchers will not collect additional personal information from you afterwards. However, the data collected from you up to the time you withdraw will form part of the research analyses as it may be impossible to identify and isolate your individual data. If you do not want this data to be included, you must tell the researchers or your teacher when you withdraw from the research project. If you decide you want to take part in the research project, you will be

asked to sign the participant Consent Form. You will be given a copy of this Participant Information Sheet to keep.

What are the possible risks and disadvantages of taking part?

- Psychological distress

The risk of psychological distress in this project is very low. If at any time you feel that some of the questions that we ask are stressful or upsetting, you can skip those questions, or you may stop participating in the activity immediately. If you become upset or distressed as a result of your participation in this research, the research team will arrange appropriate support for you. The support will be provided by qualified professionals at your school who are not members of the research team.

- Group discussions

All group participants will be asked to maintain the confidentiality of group discussions and the identity of participants. Whilst all care will be taken to maintain privacy and confidentiality, the researchers cannot guarantee anonymity and confidentiality for group discussions. You may experience embarrassment if one of the group members were to repeat things that you said in a team meeting or a focus group meeting.

Child Protection Disclosures

It is important to note that the researchers are mandated notifiers. They have a legal duty of care to notify the appropriate Child Protection services if they suspect child abuse or if you report child abuse during the research. The notification that is made could expose you and other people who are involved to potential civil, criminal, or other legal proceedings.

What will happen to the information about me?

The researchers will take every care to remove any identifying material from the responses you provide as early as possible. Likewise, an individual's responses will be kept confidential by the researchers and the participants will not be identified in the reporting of the research. All records containing personal information will remain confidential and no information which could lead to the identification of any individual will be released, unless as required by law. However, the researchers

cannot guarantee the confidentiality or anonymity of material transferred by email or the internet (such as the online survey) nor can the researchers guarantee the confidentiality of focus group discussions and participation. However, all participants will be required to commit to confidentiality as a condition of participation.

By signing the Consent Form, you consent to the research team collecting and using information about/from you for this research. During this research period, any information obtained in connection with this research that can identify you will remain confidential and will be securely stored in non-identifiable forms.

After the research period, all relevant information collected as part of the study, including audio recordings will be retained securely on the University of South Australia's servers for five years. The audio recordings and codification system files will be password-protected and stored separately from de-identified datasets. This data may potentially be used for future research projects and may be released to a third party in non-identifiable forms, subject to receiving ethics approval.

What if something goes wrong?

If you become upset or distressed as a result of your engagement in this research, the research team will be able to arrange appropriate support for you. The support will be provided by qualified professionals at your school who are not members of the research team.

What happens when this research ends?

The principal investigator will provide you with a summary of the findings of this research when it is completed. If you leave your school before the study's findings are summarised and provided to you, please contact the principal investigator at (*insert email address of researcher*).

Who is organising and funding this research?

This research is being conducted by:

Insert names of researchers

No member of the research team will receive a personal financial benefit from your involvement in this research project, other than their ordinary wages. The researchers and their institution [University

of South Australia] may however benefit financially from this research if this research assists the researchers and the organisations in any commercial enterprise.

Additionally, if any knowledge acquired through this research leads to discoveries that are of commercial value to the researchers or their organisations, there will be no clear benefit to you or your family from these discoveries.

Who has reviewed this research project?

All research in Australia involving humans is reviewed by an independent group of people called a Human Research Ethics Committee (HREC). The ethical aspects of this research have been approved by the HREC of the University of South Australia, and the protocol number for this study is #……. This research project has met the policy requirements of the South Australia (SA) Department of Education. We have the SA Education Department's approval (#.....) therefore to approach your Principal for permission to invite you to participate in this research. This research project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007 – updated 2018). This statement has been developed to protect the interests of people who agree to participate in human research studies.

Further information and who to contact

The person you may need to contact will depend on the nature of your query. If you want any further information concerning this research or if you have any problems which may be related to your involvement in the research, you can contact your Principal or the Principal Investigator at (*insert email address of researcher*).

If you have any complaints about any aspect of the research project, the way it is being conducted or any questions about being a research participant in general, please contact:

Reviewing HREC approving this research and HREC Executive Officer details

Reviewing HREC name	
HREC Executive Officer	
Telephone	
Email	

Mental health services outside the school setting:

Name	Services	Digital contact	Phone
Australian Government: Head to Health	apps, online programs, online forums, and phone services, as well as a range of digital information resources	headtohealth.gov.au/	
Beyond Blue Support Service	information and referral to relevant services for depression and anxiety related matters	www.beyondblue.org.au/get-support/get-immediate-support	1300 224 636
Black Dog Institute	diagnosis, treatment and prevention of mood disorders such as depression and bipolar disorder	www.blackdoginstitute.org.au/resources-support/	
Blue Knot Foundation Helpline	information and short-term counselling nationally via telephone for adult survivors of childhood trauma	www.blueknot.org.au helpline@blueknot.org.au (7 days a week 9am to 5pm AEST)	1300 657 380
Butterfly Foundation	support for Australians who suffer from eating disorders and negative body image issues and their carers	thebutterflyfoundation.org.au/	1800 33 4673
Carer Gateway	information about the support services available to those who care for a loved one, friend or neighbour	www.carergateway.gov.au	
FriendLine	for anyone who needs to reconnect or just wants a casual and anonymous chat about anything and everything.	friendline.org.au	
Headspace	helps young people who are going through a tough time	www.headspace.org.au/	
Kids Help Line	confidential and anonymous, telephone and online counselling service specifically for young people aged between 5 and 25	www.kidshelp.com.au/	1800 55 1800
Lifeline	24-hour telephone counselling service	www.lifeline.org.au/	13 11 14 **Text:** 0477 13 11 14 (6pm - midnight AEST)

Mindframe-Media	media and resource information about suicide in Australia	mindframe.org.au/	
MI Networks	personalised response to the needs of individuals living with mental illness, their carers, friends and family members. Offers access to relevant, up-to-date information, peer support and connections to local community networks	www.minetworks.org.au/	1800 985 944
1800RESPECT	sexual assault, domestic family violence counselling services 24-hour online support for workers and professionals	www.1800respect.org.au/	1800 737 732
QLife	anonymous, LGBTI peer support and referral for people wanting to talk about a range of issues including sexuality, identity, gender, bodies, feelings or relationships	qlife.org.au/	1800 184 527
ReachOut.com	helps young people lead happier lives	au.reachout.com/	
Relationships Australia	relationship support services for individuals, families and communities	http://www.relationships.org.au/	1300 364 277
SANE Australia	innovative programs and campaigns to improve the lives of people living with mental illness, their family and friends	http://www.sane.org/index.php	1800 187 263
Stride Mental Health	supports you in all stages of your mental health journey	https://stride.com.au	

Note. Information about the mental health services that accompanied the PIS was compiled by the researcher for the participants.

*Note***.** PIS template that was adapted for this research was downloaded from "humanethics@unisa.edu.au" by The Human Ethics Research Committee (HREC). University of South Australia. CRICOS Provider No: 00121B.

[1]All personal information has been redacted for confidentiality.

1

Appendix B - Consent Form for Participants

Research and
Innovation Services

Human Research Ethics Committee
Consent Form

This project has been approved by the University of South Australia's Human Research Ethics Committee. If you have any ethical concerns about the project or questions about your rights as a participant, please contact the Executive Officer of this Committee, Tel: +618 8302 6330; Email: humanethics@unisa.edu.au.

SECTION 1: CONTACT AND PROJECT DETAILS	
Researcher's Full Name	
Contact Details	
Supervisors' Names	
Contact Details	
Project Number	
Project Title	Being smart is not enough: A mixed methods study exploring the role of psychological safety in collaborative communication contexts

SECTION 2: PARTICIPANT CERTIFICATION

In signing this form, I confirm that:

- I have read the Participant Information Sheet, and the nature and the purpose of the research project have been explained to me. I understand and agree to take part.
- I understand the nature of my involvement in the project.
- I understand that I may not directly benefit from taking part in the project.
- I understand that I can withdraw from the project at any stage and that this will not affect my status now or in the future.
- I confirm that I am 18 years of age and agree to give consent.
- I understand that my consent indicates my agreement to be involved in the project.
- I understand that while information gained during the project may be published, I will not be identified, and my results will remain confidential unless required by law.
- I understand that my online participation in focus groups via Teams will be audio-recorded.
- I understand that all the information that I provide, including the audio recordings, will be retained securely at the University of South Australia for a minimum period of five years, in accordance with the University's policy for the storage and retention of research data.
- I understand that the audiotape(s) will be accessible to the researchers from the University of South Australia where the data will be stored, and the data will be destroyed after five years.
- I agree to maintain the confidentiality of focus group discussions and preserve the anonymity of focus group members.
- I agree that my anonymous results may be used for future research, subject to ethics approval.

- I agree that subject to ethics approval, my anonymous raw data may be viewed or used by a third party.
- I understand that while the researcher(s) will take every care to maintain my anonymity, the confidentiality of data submitted on the internet cannot be guaranteed.
- I understand that while the researcher(s) will take every care to maintain my anonymity, the confidentiality of focus group participation and discussions cannot be guaranteed.
- I agree with the research team using my personal and demographic data that I provide to them for the study.

Participant's Signature	*Printed Name*	*Date*

SECTION 3: RESEARCHER CERTIFICATION

I have explained the study to the participant and consider that he/she understands what is involved.

Researcher's Signature	*Printed Name*	*Date*

*Note***.** Consent Form template that was adapted for this research was downloaded from "humanethics@unisa.edu.au" by The Human Ethics Research Committee (HREC). University of South Australia. CRICOS Provider No: 00121B.

[2]All personal information has been redacted for confidentiality.

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Appendix C - Participant Information Sheet (PIS) for Parents/Caregivers

Title	Being smart is not enough: A mixed methods study exploring the role of psychological safety in collaborative communication contexts
Short Title	
Project Number	
Project Sponsor	
Principal Investigator	
Supervisor	
Associate Investigators	

Introduction - What does my child's participation involve?

Your child is invited to participate in research conducted by the University of South Australia in collaboration with your child's school. Your child has been invited to participate in the study due to their involvement in teamwork in their lessons.

This Participant Information Sheet (PIS) tells you about the purpose of the research and your child's level of involvement. Knowing what is involved can help you decide if you do or do not want your child to take part in the research. Please read this information carefully. Ask questions about anything that you do not understand or would want to know more about. Before deciding whether to permit your child to take part, you might want to talk about this research with your child, their teacher, and/or their school Psychologist.

What is the purpose of this research?

Future career and life success require a wide range of skills and attributes. Competencies such as teamwork, creativity, or problem-solving are all needed for your child to reach their potential. Communicating effectively in a team is a vital skill that is beneficial to your child's self-efficacy, their team's collective efficacy as well as their individual and communal success. This will advance your

child's successful outcomes as a creative entrepreneur, employer and/or employee. To advance your child's creativity, they must feel safe in shared environments to communicate and collaborate well to realise high-performance outcomes. This feeling of safety in teams is termed psychological safety.

In this research, we aim to measure the observable dimensions of psychological safety as well as your reported level of psychological safety as you work individually and in teams during lessons or in a co-curricular activity.

We, as researchers, hope that our findings will help us to inform school curricula, and teaching and learning strategies at the secondary school level to enable more effective collaborative communication activities and outcomes. The results of this research will also be used by the Principal Investigator to obtain a Doctor of Philosophy degree at the University of South Australia.

What does my child's participation in this research involve?

If you decide to permit your child to take part in this research, we will ask you to read to understand and sign the Consent Form. Please return the Consent Form to your child's school.

The research will take place while your child works in their regular lessons with their teacher. This will start in Term 1, 2022 (February 2022) and end in Term 4, 2022 (December 2022). Three times each term, your child will be given a survey to complete - at the beginning, middle and end of each term. The survey is designed to give us information about your child's perceived level of psychological safety while they work in their teams i.e., how safe they believe they are to respectfully speak their mind about tasks without fear of embarrassment, rejection, or reprisal from other members of their team. The survey will be completed online and takes 5 min to complete. We will ask your child to offer the researchers some of their personal details i.e., gender, year of schooling, and ethnicity. This additional information will be collected, once, the first time they complete the survey at the start of Term 1, 2022. This information will help us to interpret our results in fair and appropriate ways.

Two times during this research, towards the end of Term 2, 2022 and Term 4, 2022, your child will take part in a focus group discussion to share their beliefs, thoughts, and feelings about their

teamwork processes. The focus group will be facilitated by the primary researcher. It will run for about 20 min per group. This will be conducted face-to-face or in an online space via Teams or Zoom and will be audio recorded. The audio recordings will help us to transcribe the discussions accurately.

The researchers will take every care to remove any identifying material from the responses your child provides in the survey and at the focus group discussions as early as possible. Neither will be identified in the reporting of the research. However, the researchers cannot guarantee the confidentiality or anonymity of material transferred by the internet.

For this study's analytical purposes, the data that is collected during this research will be discussed and used by the researchers at the University of South Australia and your child's school leaders. The information sought from your child for this study may be used for other future research purposes following the appropriate ethics approvals.

What are the possible benefits of my child taking part in this research?

We cannot guarantee or promise that your child will receive direct benefits from participating in this research. Their involvement will help to inform future curriculum and teamwork activities, and they will learn about the process of working in teams. They will not be paid for their contribution to this research. They will not incur any costs when they participate in this research.

Does my child have to take part in this research project?

Participation in this study is voluntary and your child is free to decline or withdraw from the research project any time without affecting their routine care or relationships with the researcher, their school, or the University of South Australia, now or in the future.

If your child decides to leave this research, the researchers will not collect additional personal information from your child afterwards. However, the data collected from your child up to the time they withdraw will form part of the research analyses as it may be impossible to identify and isolate their individual data. If you or your child does not want this data to be included, you must tell the researchers or their teacher when your child withdraws from the research project.

If you decide you want your child to take part in the research project, you will be asked to sign the Consent Form as their parent/caregiver. You will be given a copy of this Participant Information Sheet to keep.

What are the possible risks and disadvantages of my child taking part?

Psychological distress

The risk of psychological distress in this project is very low. If at any time your child feels that some of the questions that we ask are stressful or upsetting, they can skip those questions, or they may stop participating in the activity immediately. If they become upset or distressed as a result of their participation in this research, the research team will arrange appropriate support for your child. The support will be provided by qualified professionals at your child's school who are not members of the research team.

Group discussions

All group participants will be asked to maintain the confidentiality of group discussions and the identity of participants. Whilst all care will be taken to maintain privacy and confidentiality, the researchers cannot guarantee anonymity and confidentiality for group discussions. Your child may experience embarrassment if one of the group members were to repeat things that they said in a team meeting or a focus group meeting.

Child Protection Disclosures

It is important to note that the researchers are mandated notifiers. They have a legal duty of care to notify the appropriate Child Protection services if they suspect child abuse or if your child reports child abuse during the research. The notification that is made could expose your child and other people who are involved to potential civil, criminal, or other legal proceedings.

What will happen to the information about my child?

The researchers will take every care to remove any identifying material from the responses you provide as early as possible. Likewise, an individual's responses will be kept confidential by the researchers and the participants will not be identified in the reporting of the research. All records

containing personal information will remain confidential and no information which could lead to the identification of any individual will be released, unless as required by law. However, the researchers cannot guarantee the confidentiality or anonymity of material transferred by email or the internet (such as the online survey) nor can the researchers guarantee the confidentiality of focus group discussions and participation. However, all participants will be required to commit to confidentiality as a condition of participation.

By signing the Consent Form, you consent to the research team collecting and using information about/from your child for this research. During this research period, any information obtained in connection with this research that can identify your child will remain confidential and will be securely stored in non-identifiable forms.

After the research period, all relevant information collected as part of the study, including audio recordings will be retained securely on the University of South Australia's servers for five years. The audio recordings and codification system files will be password-protected and stored separately from de-identified datasets. This data may potentially be used for future research projects and may be released to a third party in non-identifiable forms, subject to receiving ethics approval.

What if something goes wrong?

If your child becomes upset or distressed as a result of their engagement in this research, the research team will be able to arrange appropriate support for your child. The support will be provided by qualified professionals at your child's school who are not members of the research team.

What happens when this research ends?

The principal investigator will provide your child with a summary of the findings of this research when it is completed. If your child leaves school before the study's findings are summarised and provided to your child, please contact the principal investigator at (*insert email address of researcher*).

Who is organising and funding this research?

This research is being conducted by:

Insert names of researchers

No member of the research team will receive a personal financial benefit from your involvement in this research project, other than their ordinary wages. The researchers and their institution [University of South Australia] may however benefit financially from this research if this research assists the researchers and the organisations in any commercial enterprise.

Additionally, if any knowledge acquired through this research leads to discoveries that are of commercial value to the researchers or their organisations, there will be no clear benefit to you, your child, or your family from these discoveries.

Who has reviewed this research project?

All research in Australia involving humans is reviewed by an independent group of people called a Human Research Ethics Committee (HREC). The ethical aspects of this research have been approved by the HREC of the University of South Australia, and the protocol number for this study is # …….. This research project has met the policy requirements of the South Australia (SA) Department of Education. We have the SA Education Department's approval (# ……) therefore to approach your child's Principal for permission to invite your child to participate in this research. This research project will be carried out according to the National Statement on Ethical Conduct in Human Research (2007 – updated 2018). This statement has been developed to protect the interests of people who agree to participate in human research studies.

Further information and who to contact

The person you may need to contact will depend on the nature of your query. If you want any further information concerning this research or if you have any problems which may be related to your child's involvement in the research, you can contact the school Principal, or the Principal Investigator at (*insert email address of researcher*).

If you have any complaints about any aspect of the research project, the way it is being conducted or any questions about being a research participant in general, please contact:

Reviewing HREC approving this research and HREC Executive Officer details

Reviewing HREC name	
HREC Executive Officer	
Telephone	
Email	

*Note***.** PIS template that was adapted for this research was downloaded from "humanethics@unisa.edu.au" by The Human Ethics Research Committee (HREC). University of South Australia. CRICOS Provider No: 00121B.

[3]All personal information has been redacted for confidentiality.

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Appendix D - Consent Form for Parents/Caregivers

Research and Innovation Services

Human Research Ethics Committee
Consent Form

This project has been approved by the University of South Australia's Human Research Ethics Committee. If you have any ethical concerns about the project or questions about your rights as a participant, please contact the Executive Officer of this Committee, Tel: +618 8302 6330; Email: humanethics@unisa.edu.au.

SECTION 1: CONTACT AND PROJECT DETAILS	
Researcher's Full Name	
Contact Details	
Supervisors' Names	
Contact Details	
Project Number	
Project Title	Being smart is not enough: A mixed methods study exploring the role of psychological safety in collaborative communication contexts

SECTION 2: PARTICIPANT CERTIFICATION

In signing this form, I confirm that:

- I have read the Participant Information Sheet, and the nature and the purpose of the research project have been explained to me. I understand and agree to permit my child to take part.
- I understand the nature of my child's involvement in the project.
- I understand that my child and my family may not directly benefit from taking part in the project.
- I understand that my child can withdraw from the project at any stage and that this will not affect my child's status now or in the future.
- I confirm that I am the parent/caregiver and agree to give my child consent to participate in the project.
- I understand that my consent indicates my agreement for my child to be involved in the project.
- I understand that while information gained during the project may be published, my child will not be identified, and my child's results will remain confidential unless required by law.
- I understand that my child's online participation in focus groups via Teams will be audio-recorded.
- I understand that all the information that my child provides, including the audio recordings, will be retained securely at the University of South Australia for a minimum period of five years, in accordance with the University's policy for the storage and retention of research data.
- I understand that the audiotape(s) will be accessible to the researchers from the University of South Australia where the data will be stored, and the data will be destroyed after five years.

- I agree for my child to maintain the confidentiality of focus group discussions and preserve the anonymity of focus group members.
- I agree that my child's anonymous results may be used for future research, subject to ethics approval.
- I agree that subject to ethics approval, my child's anonymous raw data may be viewed or used by a third party.
- I understand that while the researcher(s) will take every care to maintain my child's anonymity, the confidentiality of data submitted on the internet cannot be guaranteed.
- I understand that while the researcher(s) will take every care to maintain my child's anonymity, the confidentiality of focus group participation and discussions cannot be guaranteed.
- I agree with the research team using my child's personal and demographic data that my child provides to them for the study.

Parent's/Caregiver's Signature	*Printed Name*	*Date*

SECTION 3: RESEARCHER CERTIFICATION

I have explained the study to the parent/caregiver and consider that he/she understands what is involved.

Researcher's Signature	*Printed Name*	*Date*

Note. Consent Form template that was adapted for this research was downloaded from "humanethics@unisa.edu.au" by The Human Ethics Research Committee (HREC). University of South Australia. CRICOS Provider No: 00121B.

[4]All personal information has been redacted for confidentiality.

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Appendix E - Focus Group Protocol



Note. Template adapted for this research was sourced from "Developing Distress Protocols for research on Sensitive Topics," by Draucker, C. B., Martsolf, D. S. and Poole, C., 2009, *Archives of Psychiatric Nursing 23*(5), pp. 343-35.

Appendix F – Systematic Literature Review

Table LTR2.1

Key Features of Common Literature Review Types

Review type	Description	Search and Appraisal	Time frame	Number of reviewers	Synthesis	Analyses	Perceived strengths of review type	Perceived limitations of review type
Traditional (narrative) review e.g., Hall, A. & Walton, G. (2004). Information overload within the health care system: a literature review. Health Information and Libraries Journal, 21(2), 102–8	Identifies and reviews published literature on a topic [wide range of related subjects] at various levels of completeness and comprehensiveness	- Can be comprehensive or not - Can include quality assessment or not	1 - 4 weeks	1	- Narrative	- Can be chronological, conceptual, or thematic	- Consolidates previous research that has been accomplished to avoid duplication - Enables gap identification	- Does not explicitly maximise the scope of collected data nor its analyses - Can potentially omit significant textual information - Does not evaluate the validity of research findings - Bias in drawn conclusions for they may support the researcher's paradigm and preferred hypothesis
Rapid review e.g., Bryant, S. L. & Gray, A. (2006). Demonstrating the	Uses a systematic review-type search and appraisal of	- Completeness of searching determined by	2 - 6 months	2	- Narrative - Tabular	- Quantifies the overall quality of literature	- Quick, but rigorous and explicit - Utilises 'short-cut' systematic	- Increased bias in conclusions drawn due to deliberate side-tracked and

positive impact of information support on patient care in primary care: a rapid literature review. Health Information and Libraries Journal, 23(2), 118–25	existing research on a topic to determine best practice	time constraints					literature review methodology processes to reduce timeframe such as broad	fast-tracked steps in the review process - Publication of poorly synthesized evidence due to rapid search timeframe that may overlook analytical discrepancies
Scoping review e.g., Weeks, L. C. & Strudsholm, T. (2008). A scoping review of research on complementary and alternative medicine (CAM) and the mass media: looking back, moving forward. BMC Complementary and Alternative Medicine, 19(8), 43	Scopes the extant literature (and includes research in progress) on a topic to identify research gaps	- Completeness of search decided by the timeframe or scoping constraints	1 - 4 weeks	1 – 2	- Diagrammatic - Tabular - Narrative commentary	- Quantifies the overall quality of relevant research (such as study design and other key features)	- Characterised by systematic, transparent, and replicable methodological processes of a systematic literature review - Determines the need for a full systematic literature review for the benefit of policymaking	- Limitations in rigour such as quality assessment leads to bias in drawn conclusions - Findings cannot be used to make policy or practice recommendations, therefore
Systematic literature review e.g., Weightman, A. L. & Williamson, J. (2005). The value and impact of	Adheres to PRISMA guidelines (Page et al., 2021) to provide a robust overview of systematically	- Exhaustive - Inclusion and exclusion criteria - Comprehensive	8 months - 2 years	2 or more	- Diagrammatic - Tabular summary	- Narrates the current state of knowledge on a specific research topic (such	- Collates and sums up all known knowledge on a specific research topic with either quantitative, qualitative and/or	- Inclusion criteria can be limiting due to its restriction of studies for inclusion to certain specificities

information provided through library services for patient care: a systematic review. Health Information and Libraries Journal, 22(1), 4 – 25	searched, appraised, and synthesised extant literature on a target research question(s) in a specific area of research to determine best practice and policy decision-making	- Quality assessment			- Narrative synthesis	as what is known, what remains unknown, uncertainty and limitations of findings, and recommendations for future research, policy, and practice)	mixed-method studies - Provides a meta-analysis of the extant literature - Outcomes of a sufficient number of well-designed experimental or quasi-experimental studies with data on the same topic can lead to the conduct of a meta-analysis	- Provides perceptions of the research effectiveness e.g., of an intervention, but is limited on answering complex research questions
Meta-analyses e.g., Saxton, M. L. (1997). Reference service evaluation and meta-analysis: findings and methodological issues. Library Quarterly,67(3), 267–89	Adheres to PRISMA guidelines (Page et al., 2021) in a systematic review-type, statistical synthesis of the results of quantitative studies on a specific research topic to provide precise measurable effects of the results	- Exhaustive - Inclusion and exclusion criteria - Comprehensive - Secondary statistical analyses - Quality assessment	10 months – 2.5 years	2 or more	- Diagrammatic - Graphical-Tabular - Narrative commentary	- Numerical analysis of measures of effect assuming the absence of heterogeneity - Sensitivity analyses	- Objectivity in evaluating research findings to extract "effect sizes" to contribute to a bigger picture - Provides rich resources to bridge the research-practice gap, and exposes new lines of inquiry for pursuit	- Combined studies may not be sufficiently similar (with sufficiently similar characteristics such as the population, interventions, measured outcomes) for seamless amalgamation - Its combined results cannot be more proficient or superior to the results of its inclusive, single studies

Note. Tabulation of common literature review types and their associated key attributes mapped against a Search, Appraisal, Synthesis and Analysis (SALSA) framework. Adapted from: "A typology of reviews: an analysis of 14 review types and associated methodologies" by Grant, M. J., & Booth, A., 2009. *Health Information and Libraries Journal*, *26*(2), 91-108 for the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts".

Table SLR2.1

Excluded Studies During the Extraction Process of the Systematic Review

Publication/Study	Participants	Methods / Interventions	Instrument(s)
#1010 - Dissertation Akiba, D. (2000). *Mistrust toward teachers: Implications for ethnic differences in affect, behaviour and cognition in classrooms*. Brown University.	104 **high school students** attending Central High School in Providence, Rhode Island participated in this study in groups of 6 to 15. …and 50 **college students** (average age = 19.7; 28 females and 22 males; 23 African-Americans and 27 European-Americans) attending one of the campuses of Middlesex Community College in Malden, Massachusetts who participated in this study in groups of 7 to 15. Both schools are urban public schools, and there are large numbers of minority students while teachers are mostly European-Americans.	**Mixed methods study design.** Three separate studies, each addressing its own set of issues, using the "liberal arts aptitude test": - Study 1 focused on two aspects of African-American students' mistrustful attribution in school: age progression and valence specificity. Students' actual grades were used to document the relationship among attribution, achievement motivation and school grades. Achievement motivation was examined in terms of task-specific future motivation. Various domains of participants' self-esteem were analysed to assess the relationship between attribution patterns and self-esteem. Participants took a test, which was ostensibly graded by a European-American teacher who knew each student's race. Each participant then received either positive or negative feedback on his/her performance and was asked to react to it. - Study 2 looks at non-African-American minorities to examine whether mistrust documented in the past among African-Americans may be prevalent among other minorities. - Study 3 aimed to determine whether African-Americans are mistrustful of European-American teachers, or any teachers at school, which is a	**Students' actual grades** were used to document the relationship among attribution, achievement motivation and school grades. **Achievement motivation** was examined in terms of task-specific future motivation. Various domains of **participants' self-esteem** were analysed to assess the relationship between attribution patterns and self-esteem. Participants took **a test**, which was ostensibly graded by a European-American teacher who knew each student's race. Each participant then received either positive or negative feedback on his/her performance and was asked to react to it. In this study, academic motivation was measured in terms of motivation to complete further tasks in the same domain.

		European-American institution. The primary focus here was on racial differences in attribution.	
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#651 - Dissertation Brake, A. (2014). *Right from the start: Teacher-student relationships and the transition to high school*. The University of Chicago.	16 **ninth grade students** (11 females, 5 males; 1 Arab, 2 Asian-American, 1 Black African, 1 African-American, 9 Latinos, 2 Whites) from two Science, two English, two Mathematics and two social studies classes … and 8 **ninth grade teachers** … in one public high school in Chicago serving a largely low-income and ethnically diverse student body	**Qualitative longitudinal study design.** Data were collected in four ways: 60 classroom observations, semi-structured interviews of students and teachers, as well as course grades. 24 teacher and 73 student interviews were conducted at lunchtime and after school and were audio-recorded. Each student was interviewed five times. The interviews took place five times in the academic year: one month before the beginning of the school year, week five, week ten, one week after the end of semester one, and one month before the end of semester two. Each teacher was interviewed three times. The interviews took place three times in the academic year: one month before the beginning of the school year, one week after the end of semester one, and one week after the end he semester two.	**A measure of student performance** to provide insights that will **improve the academic outcomes** of multi-ethnic, low-income, ninth-grade students in urban public schools and their **teachers' practices**.
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#589 Chapman, E. S., & McGregor, S. E. (2002). Effects of interpersonal attraction on cooperative learning outcomes for secondary level students. *Current Research in Social Psychology*, *7*(18), 311-325.	46 **students from two seventh grade** students in a Studies of Society and the Environment (SOSE) class in a middle class Australian secondary school	**Quantitative study design.** Pretesting for both classes was conducted in two separate sessions one week prior to the start of the intervention. Students were required to keep the list of names on this scale folded over whilst completing the form and to detach the list of names from the form immediately after completing the scale. For the attitudes scale, students were simply asked to rate the 12 items according to the five-point scale. The achievement test was given in the second session, with a 30 min time limit.	**An 18-item curriculum-based pre-test** and two **post-test 18-item quizzes**, one at the end of each two-week block. Students completed the **peer rating scale** and **attitudes scale** in the first session. For the peer rating scale, six different forms of the test were distributed randomly during the testing sessions so that students could not determine their own ratings by observing the response patterns of other class members. A **sociometric rating scale** was also used to provide a basis for assigning students to groups within the high and low cohesive

			condition, an **experimenter-developed attitude scale** at pre- and post-test.
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#588 Chavous, T. M., Rivas-Drake, D., Smalls, C., Griffin, T., & Cogburn, C. (2008). Gender matters, too: the influences of school racial discrimination and racial identity on academic engagement outcomes among African American adolescents. *Developmental Psychology*, *44*(3), 637.	410 **middle and high school African American adolescents** in grades 8-11. … and **their caregivers** in Maryland, USA	**Mixed methods study design.** For the 8th-graders, an interview-and-survey were used to collect data from the respondents in their homes. The parents of the adolescents were present in the home during the home visits for the interviews and surveys. For both the 8th-graders and 11th-graders, data was collected from the adolescents and their parents with individual interviews that lasted for approximately 1 hr each. Each of the participants filled out a 45min, self-reported questionnaire. Whenever possible, the interviewer's race was matched to the parent or primary caregiver's race. In many cases, a secondary caregiver was invited to complete a questionnaire. Informed consent was obtained from both the adolescent youth and their parents for the interviews and the survey.	The **survey** was used to measure the adolescents' (a) **psychological adjustment and mental health**; (b) **perceptions of discrimination** (c) **educational and occupational goals and expectations**; (d) **self-perceptions, sense of efficacy, and identity**; (e) **social and academic competencies and performance** and other **barriers to achieving one's goals**.
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#580 - Dissertation Clapper, C. A. (2008). *A phenomenological study of high performing middle school students and their experiences of the development of their relationships with their teachers*. The Pennsylvania State University.	5 **high performing ["rising"] seventh grade students** in a small suburban school district in Pennsylvania.	**Phenomenology study design.** The students engaged in three to four semi-structured, video- and audio-recorded interviews to examine teacher-student relationships from the students' experiential perspectives. The students were required to keep a diary (with prompts) of their ongoing, experiential relationships with their teachers between the interviews.	3 sets of **interviews** and **diary reflections** by students. Interview 1 – assessed their immediate past experiences of the students 'relationships with their former teachers as well as their expectations of the year to come and their hopes for their future relationships in the next school year. Interview 2 – similar to interview 1 but administered one week after the students had begun the next school year.

			Interview 3 – was based on the previously collected data in interviews 1 and 2. Students used their diary reflections to document specific positive or negative experiences they had with their teachers.
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#578 Clark, K. A., Konrad, M. and Test, D. W. (2019). UPGRADE your performance: Improving soft skills of students with disabilities. *Journal of Vocational Rehabilitation*, *49*(3), 351-365.	4 **eleventh grade students with a disability** in a suburban public high school in the south-eastern United States (US). The settings were: - In-school job site (i.e., cafeteria). - Small room located within the school building containing two student desks, a table, and two chairs. - Community job sites:	**Case study design.** Conceptual replication of Clark et al. (2018)'s UPGRADE intervention. Selected soft skills to be developed by students: - Lindsay: quality of work Lindsay – 16yr White female with a mild intellectual disability; allocated to a grocery store - Brendan: teamwork and communication Brendan – 17yr White male with autism and a mild intellectual disability; allocated to a mechanic garage. - Ayana: productivity and on-task Ayana – 18yr multi-racial (Latina and Black) with ADHD, heart disease, and hemiplegic migraines; allocated to a bowling alley; and - Antwoine: reliability Antwoine – 19yr Black male with emotional and behavioural disorder, and a mild intellectual disability; allocated to a pet supply store	UPGRADE I, and U-GRADE I intervention measured involved **self-monitoring, goal setting, self-graphing,** and **technology-aided instruction** and the **acquisition of employment.**
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#938 - Dissertation Edgar, S. N. (2012). *Approaches of high school facilitative instrumental music educators in response to the social and emotional challenges of students* (Doctoral	4 **high school instrumental music teachers [White; 2 males; 2 females; perceived to be caring]** with 10 years+ of professional band directing experience in rural, suburban, and urban settings; and	**Multiple instrumental case study.** The study explored how instrumental music teachers could respond to their students' social and emotional well-being challenges by assuming the role of a facilitative teacher. the parents of all the students of the bands were asked to participate in the study for a holistic perspective of the individual participants in their settings.	The interviews and observations were purposefully scheduled in the same time period in all four settings. With the three interviews, the first one with each instrumental music teacher took place before the observations or after the first observation. The second and third interviews took place after the observations to enable reference to

dissertation, University of Michigan.	… **grade 9-12 students who play instruments**, … and **parents of the students in the bands** (concert band, jazz band, and percussion ensembles)	One focus group and 3 interviews with each of the instrumental music teachers, one focus group for students in each setting with the instrumental music teachers selecting one male and one female student from each grade [9–12] , one parent interviews for each setting, including a phone interview with one high school (HS), , email correspondence with another HS, in-person interview with a third HS. , and three full days of observations at each setting. All the interview and focus group transcripts were sent to participants to ensure that an accurate interpretation of their perceptions had been obtained in text form.	specific, observed examples of their classroom interactions with their band students. The student focus groups and parent interviews took place after all the observations were completed.
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#544 Fan, F. A. (2012). Teacher: students' interpersonal relationships and students' academic achievements in social studies. *Teachers and Teaching*, *18*(4), 483-490.	1,954 randomly selected **13-15 years old Junior Secondary School (JSS) III students … and their teachers** in Social Studies in 50 Government Secondary Schools in Calabar Educational Zone of Cross River State in Nigeria.	**Quantitative study design.** The student questionnaire was first administered to the students, followed by the Social Studies Achievement Test to test the relationship between the teacher–student's interpersonal relationships and students' academic achievements in social studies.	The **Teacher–Students Relationships** Questionnaire; and 50-item multiple choice questions in Social Studies.
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#391 - Dissertation Hulse, E. K. (2017). *Experiences of Adolescents and Drama:" This is bullsh* t. I can't do it".* University of New Mexico.	A class of 25 **middle school** [7th and 8th graders] **students** enrolled in a drama class as their 'elective' for the year. The "insider" was 1 **middle school** (grades 6-8) **classroom drama teacher**, from a medium-sized city in the southwestern United States (US).	**Practitioner ["outside/insider"] action research study design.** The design of this study was to implement specific drama strategies as lessons with the students, with the primary focus on an issue the students chose to explore [student voice]. During the study, participants kept a dialogue journal (including the classroom teacher), which was collected after each session so that the written conversation was maintained between the researcher and the participants. Lessons and sessions were video/audio	Interviews Diary journals Video- and audio-recorded lessons The primary researcher had a dual role as an education drama specialist who assisted in expanding the instructional practice of a middle school drama teacher as well as being the researcher who collected and analysed data for this study. The primary researcher introduced instructional drama strategies new to the classroom teacher while she provided

		recorded, due to the nature of drama and "creating in the moment". The recorded language and conversations of the participants as well as the non-verbal communication captured with video allowed for analysis. The classroom teacher also kept a dialogue journal, and along with the researcher's journal, information was gathered through the perspectives of the adults involved. All sets of data were analysed for language used related to student experiences of creating a performance. The classroom teacher who was not given access to collected student work was encouraged to keep a researcher journal, her involvement with the lessons was video/audio-recorded and was also interviewed. The principal of the school invited the primary researcher to conduct a professional development session with other staff members who were exploring the use of drama in their curriculums.	input into the planning of the teacher's lessons. Students were in control of the details of what they explored through the use of drama. In the end, student voice and experiences informed all the participants on the implementation of drama instruction in order to answer the research question.

Publication/Study	Participants	Methods / Interventions	Instrument(s)
#907 – Book review Kerssen-Griep, J., Gayle, B. M., & Preiss, R. W. (2006). Classroom interaction and educational outcomes: Classroom communication and instructional processes: *Advances Through Meta-Analysis*, 129-147.	Not identified for individual studies. This is one of the 25 papers in this collection of reviews and analyses of research findings.	Topics include a comparison of college student performance across computer-assisted and traditional instruction formats, sex equity in the classroom, the effect of humorous lectures on learning, the relationship of teaching evaluations to research productivity, and family care versus day care".	Not identified for individual studies. Reviews and analyses of the findings of research studies on teacher effectiveness in the classroom, practices employed to enhance learning, and the impact of student-teacher interpersonal interactions.

Publication/Study	Participants	Methods / Interventions	Instrument(s)
#862 Lau, S., Liem, A. D., & Nie, Y. (2008). Task- and self-related pathways to deep learning:	1,476 **Grade-9 students** - 673 (45.6%) boys and 803 (54.4%) girls in Singapore. The participants' mean age was	**Quantitative conceptual model investigation.** Data were collected with two forms in an online survey. Half of the students in each class were randomly assigned to complete survey form 1, which	A self-reported online survey. The **task value** scale of four items asked the students to describe **how important, interesting, and useful** learning mathematics was for them.

The mediating role of achievement goals, classroom attentiveness, and group participation. *British Journal of Educational Psychology*, *78*(4), 639-662.	15.52 years (*SD* = 0.56). The sample consisted of 1,068 (72.4%) Chinese, 286 (19.4%) Malay, 85 (5.8%) Indian, and 37 (2.5%) who categorised themselves as 'others'.	was about their motivational beliefs and achievement-related behaviour in learning mathematics. The other half of the students in the class completed survey form 2, which was about the instructional practices of their mathematics teachers. The data used for analyses were drawn from survey form 1.	The **self-efficacy** scale of five items measured the students' confidence in the mastery of their mathematics skills following instruction in class. The **classroom attentiveness** scale of four items measured the students' level of attention and focus during mathematics instruction by their teacher.
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#857 Lee, D., Huh, Y., & Reigeluth, C. M. (2015). Collaboration, intragroup conflict, and social skills in project-based learning. *Instructional Science*, *43*(5), 561-590.	111 **students from 9th and 10th grades** (14-16 years old) in the two American studies classrooms in a small city area of the United States (US). There were a few Asian-American and African-American students and 65% of the students were male.	**Mixed methods study design.** Data was collected over three projects. Online survey was used to measure intragroup conflict, social skills, and collaboration. 1:1 interviews with 16 students who volunteered their participation to discuss their experience of conflict in group work.	Online questionnaire to measure levels of **collaboration, use of social skills of group members** and **intragroup conflicts.**
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#855 – Literature/dataset review or analysis Lee, M., & Lam, B. O. Y. (2016). The academic achievement of socioeconomically disadvantaged immigrant adolescents: A social capital perspective. *International Review of Sociology*, *26*(1), 144-173.	3,615 **eighth and ninth grade students** enrolled in 44 public schools in Southern Florida and Southern California.	The Children of Immigrants Longitudinal Study (CILS) Data consists of three waves of data collection. Wave 2 includes a number of variables pertaining to students' social relationships. Data for the study was sourced from Wave 2 of the CILS and analysed to investigate the relevance of social capital and the function of school staff and peers to the academic achievement of socio-economically disadvantaged groups.	CILS includes three variables closely related to student achievement, namely the national percentiles on mathematics and reading of the Stanford Achievement Test (SAT) and GPA. GPA, which was on a 5-point scale, was used as a dependent variable for analysing school performance.
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#799 Marsh, K. (2012). "The beat will make you be courage":	8 **refugees and newly arrived immigrant children and young people** (aged 0–18 years)	**Ethnographic multi-case study.** Students were provided with opportunities for peer tutoring, using music and language that was	**Music** and **Dance** as a means of **developing forms of communication**, a **sense of belonging** and **empowerment,** and as a

The role of a secondary school music program in supporting young refugees and newly arrived immigrants in Australia. *Research Studies in Music Education*, *34*(2), 93-111.	… and **adults** (5 **school staff**) within a number of schools, homes, and community contexts from the "Freemont" Intensive English Centre Greater Sydney area, NSW, Australia	meaningful to them and enabling them to feel a sense of mastery in a context where a lack of knowledge of a new environment may have left them feeling disempowered.	**contribution to cultural maintenance**, **identity construction, emotional release,** and **integration within the host culture**

Publication/Study	Participants	Methods / Interventions	Instrument(s)
#220 Salend, S. J., & Sonnenschein, P. (1989). Validating the effectiveness of a cooperative learning strategy through direct observation. *Journal of School Psychology*, *27*(1), 47-58.	Three classes of 23 **"emotionally disturbed" adolescents** took part in the study. - Class A had eight 14–16-year-old males. Five were 14year olds, two were 15year olds, and one was a 16year old. - Class B had ten 15–17-year-olds; eight males and two females. There were two 15year olds, five 16-year-olds and three 17year olds. - Class C had five 15-18-year-olds; three females and two males. There was one 15year old, two 17year olds, and two 18year olds.	**Qualitative reversal study design.** This study was conducted during Class A's general science class, Class B's biology class, and Class C's consumer math class. In Class A and Class B, the students were lectured and then participated in a teacher-led discussion. The students were asked to complete an individual written task related to the material taught by their teachers. In Class C, the students were instructed on a new concept and then given problems related to the concept to solve. Data on cooperative behaviours were collected by observation with a whole-interval recording system that sampled each student's on-task behaviour for 15-set intervals throughout the observation period. The academic performance of the students was assessed by the l the number of problems attempted and completed correctly. All students were offered weekly psychological counselling.	**Cooperative verbal behaviours** were defined as "(a) verbalized requests for assistance or instruction; (b) verbalizations of friendship, concern or congratulations; and (c) cheering". **Cooperative nonverbal behaviours** were defined as "gestures of friendship, concern or congratulations (e.g., handshaking, back-patting, hugging) and gestures of assistance". Predictor variables included **on-task behaviour**, **cooperative behaviours,** and **academic performance.**

Publication/Study	Participants	Methods / Interventions	Instrument(s)
#193 - Dissertation Scott, A. L. (2009). *"Ignored burden": Perceptions of racism in school contexts and academic engagement*	174 **high school students** [13-19 years] at four high schools in the San Francisco Bay area. The quantitative data analysis was limited to the **131**	**Concurrent triangulation mixed methods study design.** Risk and resiliency related to perceived racism were examined by analysing the impact of (a) racial identity, (b) racial socialization, (c) academic self-concept, (d)	A self-administered survey of 20-items that measured the students' **perceived racism across the school context**, **perceptions/experiences with individual and institutional racism in schools, student**

among African-American adolescents. University of California, Berkeley.	**students** who **self-identified as African-American** [African-American/Black, 71% (n=93) identified themselves as being African-American only, 20.6% (n=27) self-identified as multiracial, and 8.4% (n=11)] from a range of family and economic backgrounds.	utility of school, (e) culturally responsive teaching, and (f) disciplinary history on engagement. Quantitative data were collected with a comprehensive survey instrument. Qualitative data were collected with a range of methods such as focus groups, reflective writings and semi-structured interviews also employed to allow students to articulate their experiences with racism in schools in both verbal and written ways and to promote student voice without limitations associated with reliance on a singular form of expression.	**engagement in the schooling process,** and **moderator variables related to racial attitudes and school experiences.** Academic engagement and institutional racism were also measured.

Publication/Study	Participants	Methods / Interventions	Instrument(s)
#495 Strom, P. S., Strom, R. D., & Moore, E. G. (2009). Peer and self-evaluation of teamwork skills. *Journal of Adolescence*, *22*(4), 539-553.	300 **high school students** … and **their teachers**	**Quantitative field-testing study design.** Two sources of student observation, peers, and self. The Peer and Self-Evaluation System (PSES) is for students to identify and record observations of specific attitudes and skills demonstrated by teammates and themselves.	25-item PSES measuring **teamwork** (skills 1-5), **seeking and sharing information** (skills 6-10), **communicating with team-mates** (skills 11-15), thinking **critically and creatively** (skills 16-20), and **getting along with others in the group** (skills 21-25).

Publication/Study	Participants	Methods / Interventions	Instrument(s)
#23 Yoo, H. C., Miller, M. J., & Yip, P. (2015). Validation of the internalization of the Model Minority Myth Measure (IM-4) and its link to academic performance and psychological adjustment among Asian American adolescents. *Cultural Diversity and Ethnic Minority Psychology*, *21*(2), 237.	155 **self-identified Asian American adolescents** in a local public high school in the Southwest region of the United States (US). There were 36 students in the **ninth grade**, 56 in the tenth grade, 31 in the **eleventh grade**, and 32 in the **twelfth grade**, 83 females and 72 males; 99 U.S-born natives and 54 foreign-born. Those born outside the US self-identified as 42 Chinese, 33 Asian Indian, 23 Korean, 22	**Quantitative study design.** The study examined the relationships between academic performance, and psychological adjustment and the internalisation of the model minority myth among Asian-American high school adolescents living in the Southwest. Data were collection at lunchtime in a large quiet private room in the career centre at the school site. The students were rewarded with school supplies such as pencils, t-shirts, and water bottles as well as a pizza lunch for their participation.	The IM-4 is a 15-item survey with two sub-scales was used to measure the extent to which individuals believe Asian Americans are more successful than other racial minority groups based on **values emphasizing achievement and hard work and belief in unrestricted mobility toward progress.** The AESI is a 9-item survey with two sub-scales was used to measure the students' **perceived expectations and pressure from self, parents, and teachers as a source of academic stress**. The HSCL-21 is a widely used 21-item survey with three subscales was used to measure **distress symptoms** i.e., Affective

	Vietnamese, 16 multiracial, 11 Filipino/Filipina, 2 Taiwanese, 1 Japanese, 1 Hawaiian/Pacific Islander, 1 Malaysian, 1 Thai, and 1 Laos as well as one participant who did not respond.		Distress (seven items e.g., "feeling inferior to others"), Somatic Distress (seven items e.g., "soreness of your muscle"), and Performance Difficulty (seven items e.g., "trouble remembering things").
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#18 Yu, J., McLellan, R., & Winter, L. (2021). Which boys and which girls are falling behind? Linking adolescents' gender role profiles to motivation, engagement, and achievement. *Journal of Youth and Adolescence*, *50*(2), 336-352.	597 **Year 10 and Year 11 students** who were working toward their General Certificate of Secondary Education (GCSE) exams taken at the end of **Year 11 from four state secondary schools** in England. The majority of participants self-identified as White (83%), with the remaining students identifying as Black (6%), Asian (5%), or mixed race or other (6%). There were 291 girls aged 14-16 years and 13% of students were from low-income families indicated by their eligibility for free school meals at some point within the last 6 years.	**Quantitative study design.** A questionnaire was used to measure gender role conformity, motivation, and engagement of the students. The 20 min survey was administered during regular school hours the teachers were given the participant information sheet and the students were reminded of their confidential and voluntary participation. The students' achieved GCSE grades in English and mathematics were used to assess their academic performance. The time lag between self-report measures and achievement outcomes was introduced to understand the association between students' patterns of gender role conformity and their subsequent academic performance.	The questionnaire contained three sections with randomised items: **conformity to traditional gender roles** (48 items), **motivation and engagement in English** (13 items), and **motivation and engagement in mathematics** (13 items). Students' **conformity to traditional masculinity** was assessed by five subscales from the Conformity to Masculine Norms Inventory-46 (Parent & Moradi, 2009). Students' **mindset** was assessed by a brief 3-item scale (De Castella & Byrne, 2015). Student's **behavioural engagement** was assessed via perseverance and self-handicapping. **Perseverance** was assessed with a 4-item scale (Elliot et al., 1999). Students reported the frequency of self-handicapping behaviour on a 6-item scale adapted from the Patterns of Adaptive Learning Scale (Midgley et al., 2000). **Academic achievement** was operationalized as English and mathematics performance in the national GCSE exams at the end of secondary school.
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**

#513 Gaustad, M. G. (1999). Including the kids across the hall: collaborative instruction of hearing, deaf, and hard-of-hearing students. *Journal of Deaf Studies and Deaf Education*, *4*(3), 176-190.	6 **full-time graduate teachers** in training. 6 **educators** from self-contained classes of D/HH students, and 6 general educators from the US Department of Education, Ohio	Methods/Interventions and instruments(s) not explicated because participants are not secondary school students	
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#754 Mofidi, M., Strauss, R., Pitner, L. L., & Sandler, E. S. (2003). Dental students' reflections on their community-based experiences: the use of critical incidents. *Journal of Dental Education*, *67*(5), 515-523.	160 **senior Dentistry students** at the University of North Carolina (UNC) School of Dentistry	Methods/Interventions and instruments(s) not explicated because participants are not secondary school students	
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**
#212 – Literature/dataset review or analysis Sarra, C., Spillman, D., Jackson, C., Davis, J., & Bray, J. (2020). High-Expectations Relationships: A foundation for enacting high expectations in all Australian schools. *The Australian Journal of Indigenous Education*, *49*(1), 32-45.	**Educators** (teachers, school leaders, teacher-aides, Aboriginal Education Workers, and Community Elders) 6 **students from the Department of Social Science** at the University of Queensland as a final year research project	Methods/Interventions and instruments(s) not explicated because participants are not secondary school students	
Publication/Study	**Participants**	**Methods / Interventions**	**Instrument(s)**

#83 Wang, C., Harrison, L. J., McLeod, S., Walker, S., & Spilt, J. L. (2018). Can teacher–child relationships support human rights to freedom of opinion and expression, education and participation? *International Journal of Speech-Language Pathology*, *20*(1), 133-141.	4332, **4-5 years old Kindergarten children** (mean age = 4.17 years, SD = 0.38; 51% boys) from the Australian Children Kindergarten cohort (LSAC-K), Canberra. Among these children, 3.4% were identified by their parents as Indigenous Australians and 11.1% were identified as speaking a language other than English. … and **their families**	Methods/Interventions and instruments(s) not explicated because participants are not secondary school students

Note. A tabulated compendium of the characteristics of the extracted studies in the systematic literature review for the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student team contexts".

Figure LTR2.2

Research Participants Who are Not Secondary School Students and their Study Settings

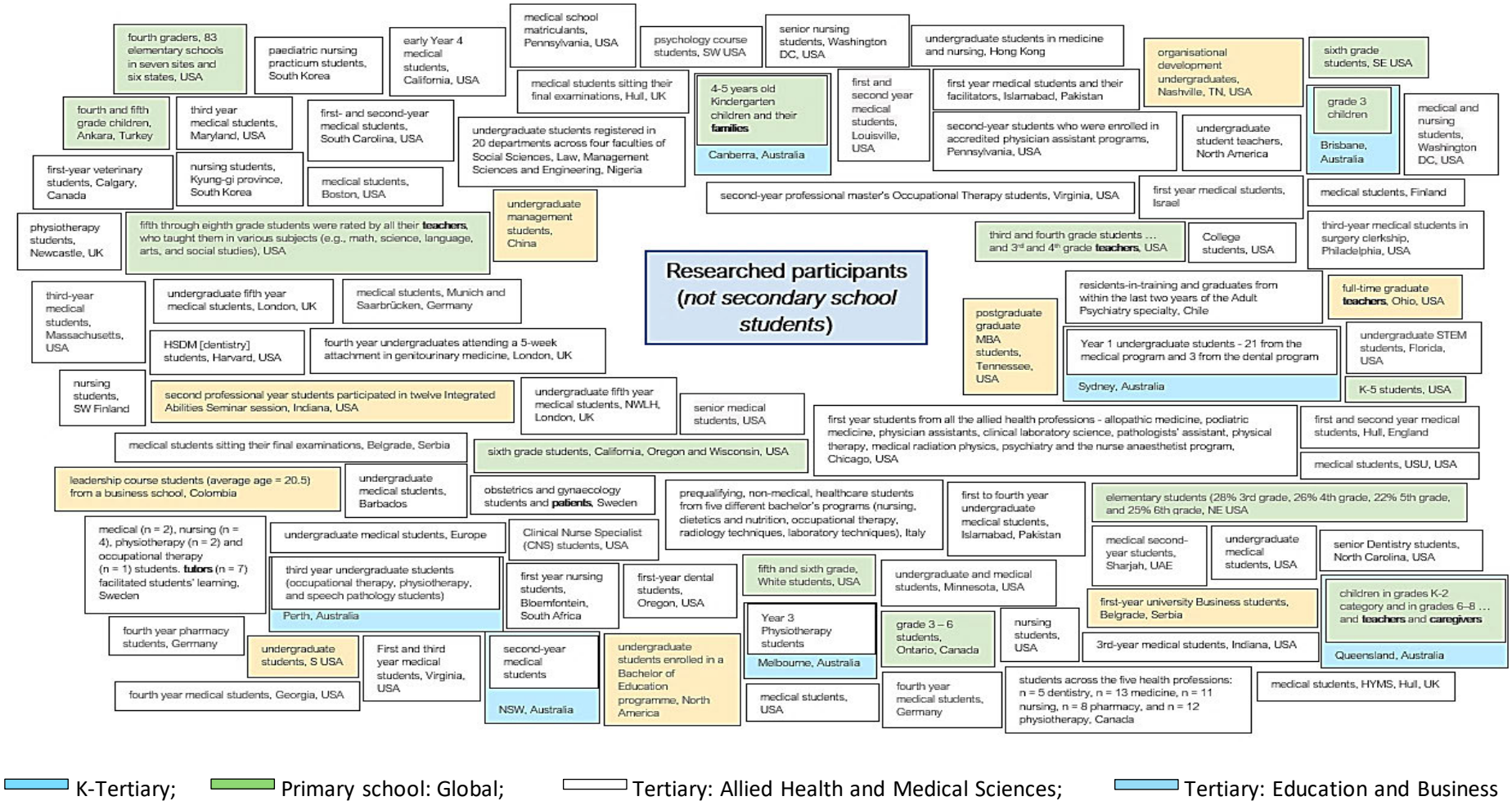
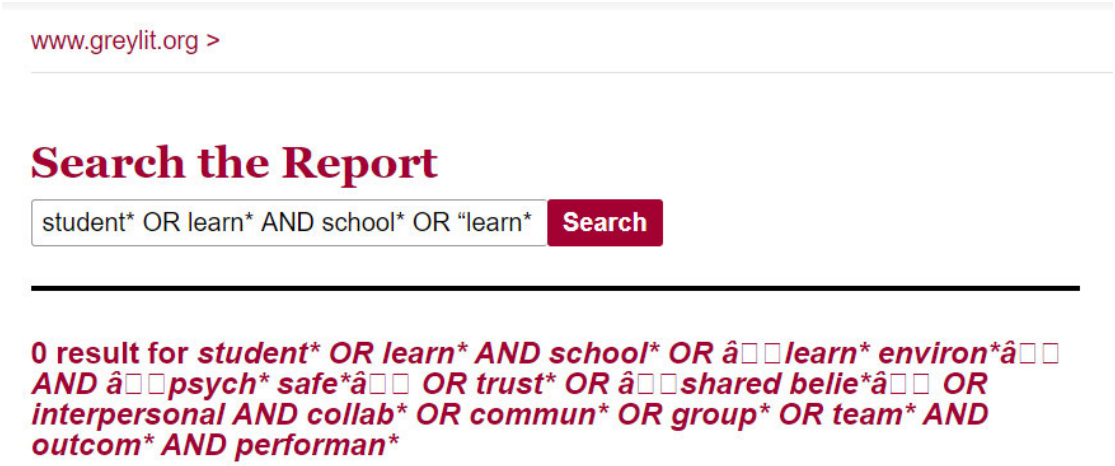


Figure SLR2.1

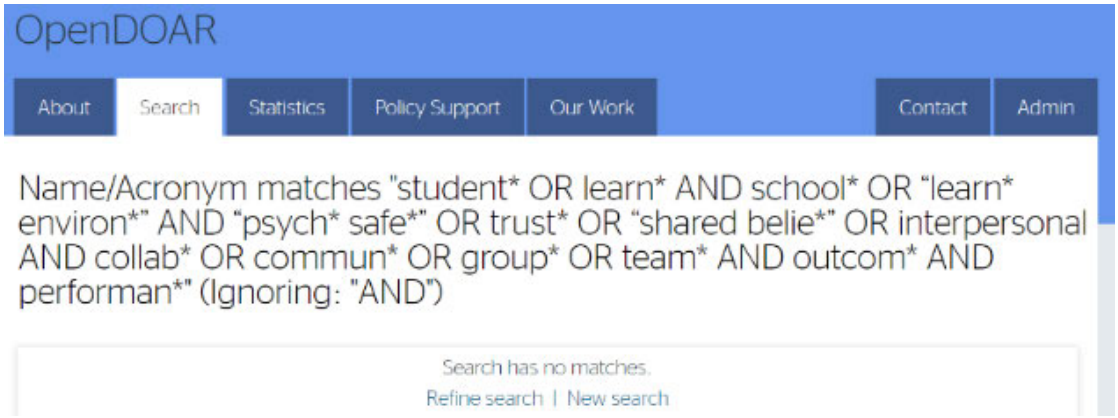
Search Output for The Grey Literature Report Database



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Figure SLR2.2

Search Output for the OpenDOAR Database



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Figure SLR2.3

Search Output for the PsychInfo Database

# ▲	Searches	Results	Type	Actions	Annotations
1	student*.mp. or exp Student Characteristics/ or exp Student Attitudes/ or exp Student Engagement/	671323	Advanced	Display Results | More	
2	High School Students/ or Middle School Education/ or School Learning/ or Vocational School Students/ or school*.mp. or Junior High School Students/ or Middle School Students/ or Private School Education/ or Nursery School Students/ or Intermediate School Students/ or High School Education/ or Elementary School Students/ or Public School Education/ or Primary School Students/	476966	Advanced	Display Results | More	
3	Classroom Environment/ or "learn* environ*".mp.	26801	Advanced	Display Results | More	
4	2 or 3	491640	Advanced	Display Results | More	
5	1 and 4	273398	Advanced	Display Results | More	
6	"psych* safe*".mp.	841	Advanced	Display Results | More	
7	Cooperation/ or "Trust (Social Behavior)"/ or trust*.mp.	63485	Advanced	Display Results | More	
8	Interpersonal Relationships/ or Attitudes/ or "shared belie*".mp.	48032	Advanced	Display Results | More	
9	"Listening (Interpersonal)"/ or Interpersonal Communication/ or Interpersonal Influences/ or Interpersonal Control/ or interpersonal.mp. or "Social and Interpersonal Measures"/ or Interpersonal Interaction/	156853	Advanced	Display Results | More	
10	6 or 7 or 8 or 9	240559	Advanced	Display Results | More	
11	5 and 10	12865	Advanced	Display Results | More	
12	Cooperation/ or exp Collaboration/ or collab*.mp.	101242	Advanced	Display Results | More	
13	commun*.mp.	635624	Advanced	Display Results | More	
14	Group Decision Making/ or Social Group Work/ or Group Characteristics/ or Group Discussion/ or Group Identity/ or exp Group Problem Solving/ or Group Participation/ or Group Structure/ or group*.mp. or Group Cohesion/ or Group Instruction/ or Group Dynamics/ or exp Group Performance/ or Group Size/	976286	Advanced	Display Results | More	
15	Teams/ or Group Performance/ or team*.mp. or Collective Behavior/	90657	Advanced	Display Results | More	
16	Cognitive Ability/ or Social Cognition/ or performan*.mp.	473020	Advanced	Display Results | More	
17	outcom*.mp.	443459	Advanced	Display Results | More	
18	16 and 17	49733	Advanced	Display Results | More	
19	12 or 13 or 14 or 15	1549662	Advanced	Display Results | More	
20	18 and 19	21036	Advanced	Display Results | More	
21	11 and 20	141	Advanced	Display Results | More	
22	limit 21 to peer reviewed journal	70	Advanced	Display Results | More	

*truncation

Figure SLR2.4

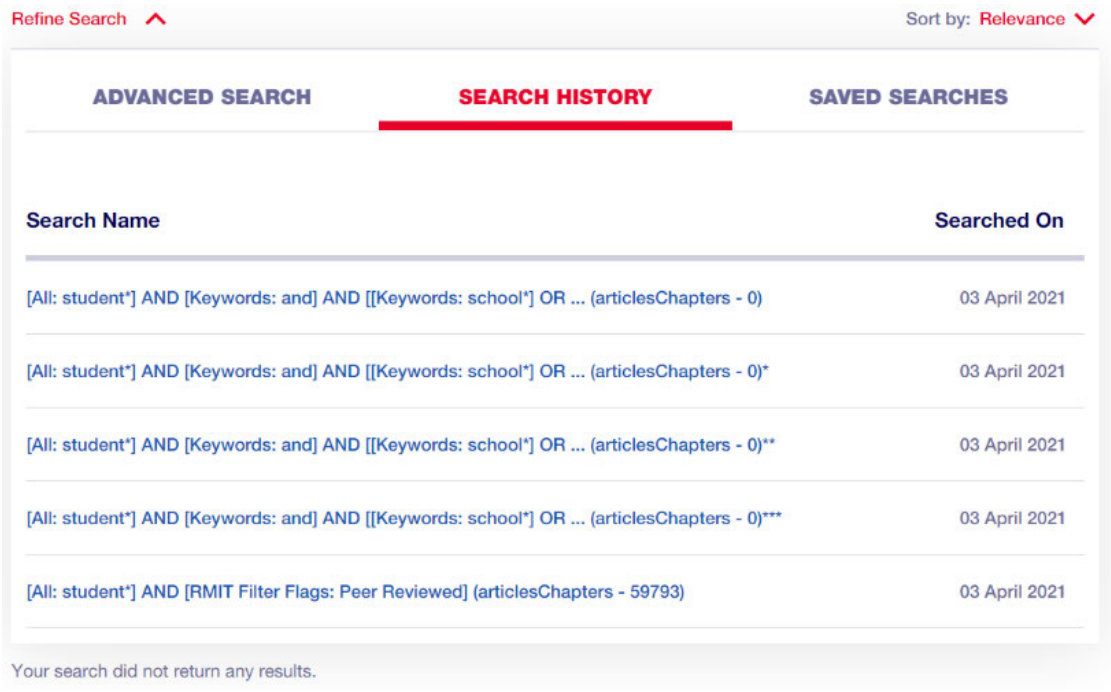
Search Output for the Scopus [Elsevier] Database

7	(KEY (student*) AND KEY (school* OR "learn* environ*") AND KEY ("psych* safe*" OR trust* OR "shared belie*" OR interpersonal) AND KEY (collab* OR commun* OR group* OR team*) AND KEY (outcom*) AND KEY (performan*))	12 document results	
6	(KEY (student*) AND KEY (school* OR "learn* environ*") AND KEY ("psych* safe*" OR trust* OR "shared belie*" OR interpersonal) AND KEY (collab* OR commun* OR group* OR team*) AND KEY (outcom*))	135 document results	
5	(KEY (student*) AND KEY (school* OR "learn* environ*") AND KEY ("psych* safe*" OR trust* OR "shared belie*" OR interpersonal) AND KEY (collab* OR commun* OR group* OR team*))	2,109 document results	
4	(KEY (student*) AND KEY (school* OR "learn* environ*") AND KEY ("psych* safe*" OR trust* OR "shared belie*" OR interpersonal))	3,044 document results	
3	(KEY (student*) AND KEY (school* OR "learn* environ*"))	85,018 document results	
2	KEY (student*)	477,470 document results	

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Figure SLR2.5

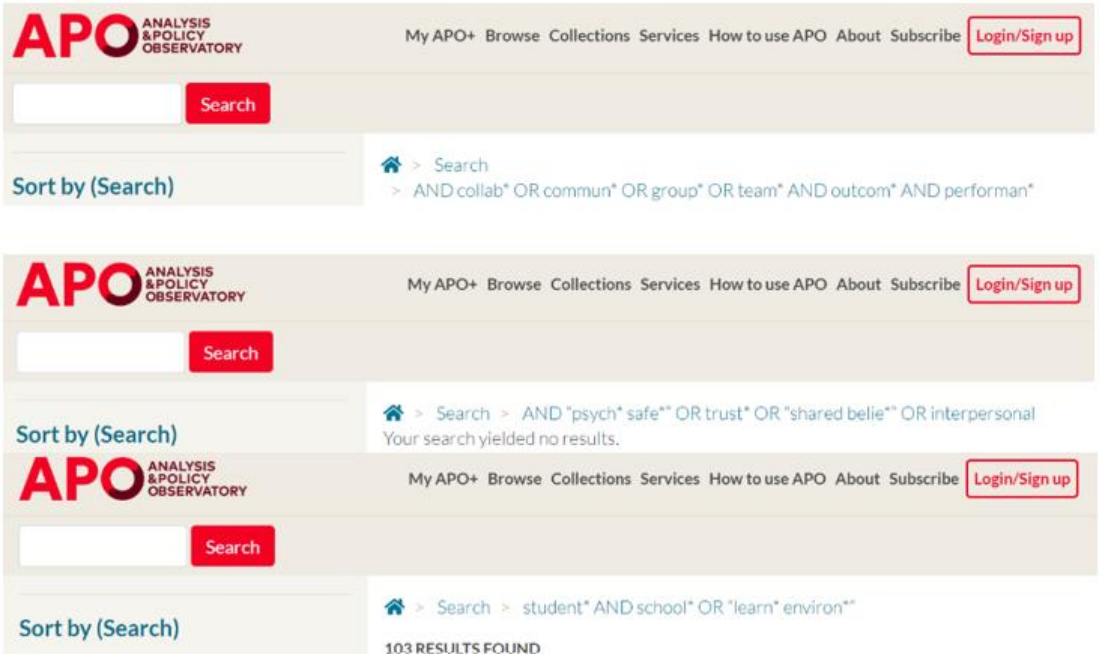
Search Output for the Indigenous Database [Informit]



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Figure SLR2.3

Search Output for the Analysis and Policy Observatory (APO)Database



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Appendix G – Edmondson's (1999) Psychological Safety Scale

Team survey item*
Supportiveness of organization context
1. This team gets all the information it needs to do our work and plan our schedule.
2. It is easy for this team to obtain expert assistance when something comes up that we don't know how to handle.
3. This team is kept in the dark about current developments and future plans that may affect its work.
4. This team lacks access to useful training on the job.
5. Excellent work pays off in this company.
Task design
1. The work that this team does makes a difference for the people who receive or use it.
2. The work we do on this team *itself* provides us with plenty of feedback about how well the team is performing.
3. Those who receive or use this team's output rarely give us feedback about how well our work meets their needs.
Clear direction
1. It is clear what this team is supposed to accomplish.
2. This team spent time making sure every team member understands the team objectives.
3. The team has invested plenty of time to clarify our goals.
Team composition
1. Most people in this team have the ability to solve the problems that come up in our work.
2. All members of this team have more than enough training and experience for the kind of work they have to do.
3. Certain individuals in this team lack the special skills needed for good team work.
Team efficacy
1. Achieving this team's goals is well within our reach.
2. This team can achieve its task without requiring us to put in unreasonable time or effort.
3. With focus and effort, this team can do anything we set out to accomplish.
Team psychological safety*
1. If you make a mistake on this team, it is often held against you.
2. Members of this team are able to bring up problems and tough issues.
3. People on this team sometimes reject others for being different.
4. It is safe to take a risk on this team.
5. It is difficult to ask other members of this team for help.
6. No one on this team would deliberately act in a way that undermines my efforts.
7. Working with members of this team, my unique skills and talents are valued and utilized.
Team leader coaching†
The team leader . . .
1. . . . initiates meetings to discuss the team's progress.
2. . . . is available for consultation on problems.
3. . . . is an ongoing "presence" in this team—someone who is readily available.

Team learning behavior*
1. We regularly take time to figure out ways to improve our team's work processes.
2. This team tends to handle differences of opinion privately or off-line, rather than addressing them directly as a group.
3. Team members go out and get all the information they possibly can from others—such as customers, or other parts of the organization.
4. This team frequently seeks new information that leads us to make important changes. . . .
5. In this team, someone always makes sure that we stop to reflect on the team's work process.
6. People in this team often speak up to test assumptions about issues under discussion.
7. We invite people from outside the team to present information or have discussions with us.
Team performance*
1. Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments.
2. Those who receive or use the work this team does often have complaints about our work.
3. The quality of work provided by this team is improving over time.
4. Critical quality errors occur frequently in this team.
5. Others in the company who interact with this team often complain about how it functions.
Internal motivation*
1. My opinion of myself goes up when I do my job well.
2. I feel bad and unhappy when I discover that I have performed less well than I should have in my job.
3. I feel a great sense of personal satisfaction when I do my job well.
Job Involvement*
1. I live, eat, and breathe my job.
Observer Survey Items
Team learning behaviors†
Team learning behaviors†
This team . . .
1. . . . asks its internal customers (those who receive or use its work) for feedback on its performance.
2. . . . relies on outdated information or ideas. (Reverse scored)
3. . . . actively reviews its own progress and performance.
4. . . . does its work without stopping to consider all the information team members have. (Reverse scored)
5. . . . regularly takes time to figure out ways to improve its work performance.
6. . . . ignores feedback from others in the company. (Reverse scored)
7. . . . asks for help from others in the company when something comes up that team members don't know how to handle.
Team performance*
1. This team meets or exceeds its customers' expectations.
2. This team does superb work.
3. Critical quality errors occur frequently in this team's work. (Reverse scored)
4. This team keeps getting better and better.
* 7-point scale from "very inaccurate" to "very accurate."
† 5-point scale from "never" to "always."

Note. The 54-item psychological safety scale of Professor Amy Edmondson extracted from Pp. 382 – 383 of "Psychological safety and learning behaviour in work teams", by Edmondson, A. C., 1999, *Administrative Science Quarterly*, *44,* 350-383. https://dx.doi.org/10.2307/2666999

Appendix H – Pilot Study

Table MSM3.4

The Online Survey Instrument with the Adapted 35-Item Scale from Edmondson (1999) Used in the Pilot Study

PSYCHOLOGICAL SAFETY IN SECONDARY SCHOOL STUDENT TEAMS													
Part 1: Demographic characteristics													
Q1. How do you identify?	Female			Male			Different identity (please specify)			Prefer not to answer			
Q2. Which year are you currently in?	Year 7		Year 8		Year 9		Year 10		Year 11		Year 12		
Q3. Please specify your ethnicity.	First Nations person	African	Asian	Australian	British	Canadian	Caribbean	European	North American	South American	Mixed ethnicity (please specify)	Different ethnicity (please specify)	Prefer not to answer
Part 2: Team survey items													
Q4. Your answers to the following 35 questions tell us what you think, feel, or perceive psychological safety in your team, is. Answer each question as accurately as you can.													
Supportiveness of school context													
1. This team gets all the information it needs to do our work and plan our schedule.	1 = Very inaccurate 2 = Somewhat inaccurate 3 = Inaccurate 4 = Neutral 5 = Accurate 6 = Somewhat accurate 7 = Very accurate												
2. It is easy for this team to obtain expert assistance when something comes up that we do not know how to handle.													
3. This team is kept in the dark about current developments and future plans that may affect its work.													
4. This team lacks access to useful training to complete a task.													
Task design													
1. The work that this team does makes a difference for the people who receive or use it.	1 = Very inaccurate 2 = Somewhat inaccurate 3 = Inaccurate 4 = Neutral 5 = Accurate 6 = Somewhat accurate 7 = Very accurate												
2. The work we do on this team itself provides us with plenty of feedback about how well the team is performing.													
3. Those who receive or use this team's output rarely give us feedback about how well our work meets their needs.													
Clear direction													
1. It is clear what this team is supposed to accomplish.	1 = Very inaccurate												

2. This team spent time making sure every team member understands the team's objectives.	2 = Somewhat inaccurate 3 = Inaccurate 4 = Neutral 5 = Accurate 6 = Somewhat accurate 7 = Very accurate
3. The team has invested plenty of time to clarify our goals.	
Team composition	
1. Most people in this team have the ability to solve the problems that come up in our task.	1 = Very inaccurate 2 = Somewhat inaccurate 3 = Inaccurate 4 = Neutral 5 = Accurate 6 = Somewhat accurate 7 = Very accurate
2. All members of this team have more than enough training and experience for the kind of task they have to do.	
3. Certain individuals in this team lack the special skills needed for good team collaboration.	
Team efficacy	
1. Achieving this team's goals is well within our reach.	1 = Very inaccurate 2 = Somewhat inaccurate 3 = Inaccurate 4 = Neutral 5 = Accurate 6 = Somewhat accurate 7 = Very accurate
2. This team can achieve its task without requiring us to put in unreasonable time or effort.	
3. With focus and effort, this team can do anything we set out to accomplish.	
Team psychological safety	
1. If you make a mistake on this team, it is often held against you.	1 = Very inaccurate 2 = Somewhat inaccurate 3 = Inaccurate 4 = Neutral 5 = Accurate 6 = Somewhat accurate 7 = Very accurate
2. Members of this team are able to bring up problems and tough issues.	
3. People on this team sometimes reject others for being different.	
4. It is safe to take a risk on this team.	
5. It is difficult to ask other members of this team for help.	
6. No one on this team would deliberately act in a way that undermines my efforts.	
7. Working with members of this team, my unique skills and talents are valued and utilised.	
Team learning behaviours	
1. We regularly take time to figure out ways to improve our team's collaborative processes.	1 = Very inaccurate 2 = Somewhat inaccurate 3 = Inaccurate 4 = Neutral 5 = Accurate 6 = Somewhat accurate 7 = Very accurate
2. This team tends to handle differences of opinion privately or off-line, rather than addressing them directly as a group.	
3. Team members go out and get all the information they possibly can from others - such as peers, parents, and school staff e.g., teachers.	
4. This team frequently seeks new information that leads us to make important changes.	
5. In this team, someone always makes sure that we stop to reflect on the team's collaborative process.	
6. In this team, we often speak up to test assumptions about issues under discussion	
7. We invite people from outside the team to present information or have discussions with us.	
Team performance	
1. Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments.	1 = Very inaccurate 2 = Somewhat inaccurate

2.	Those who receive or use the outputs this team produces often have complaints about our task.	3 = Inaccurate 4 = Neutral 5 = Accurate 6 = Somewhat accurate 7 = Very accurate
3.	The quality of outputs provided by this team is improving over time.	
4.	Critical quality errors occur frequently in this team.	
5.	Others in the school community who interact with this team often complain about how it functions.	

Note. The online survey instrument used to collect quantitative data in the pilot study of the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts". The 35-item scale in Q4. was adapted from pp. 382 – 383 of "Edmondson, A. C. (1999). Psychological safety and learning behaviour in work teams. *Administrative Science Quarterly*, *44,* 354.

https://dx.doi.org/10.2307/2666999

Table PSD3.1

Summarised Demographic Characteristics of the Pilot Study's Survey Respondents

Descriptive Statistics

	N	Range	Mean	Std. Deviation	Variance
Which year are you currently in? - Year 9	38	.00	3.0000	.00000	.000
Female	14	.00	1.0000	.00000	.000
Male	20	.00	1.0000	.00000	.000
Prefer not to answer	1	.00	1.0000	.	.
Different identity (please specify)	3	.00	1.0000	.00000	.000
Aboriginal and Torres Strait Islander	1	.00	1.0000	.	.
African	0				
Asian	2	.00	1.0000	.00000	.000
Australian	28	.00	1.0000	.00000	.000
British	2	.00	1.0000	.00000	.000
Canadian	0				
European	6	.00	1.0000	.00000	.000
North American	0				
South American	0				
Mixed ethnicity (please specify)	2	.00	1.0000	.00000	.000
Prefer not to answer	0				
Different ethnicity (please specify)	3	.00	1.0000	.00000	.000
Valid N (listwise)	0				

Table PSD3.2

Other Identities of the Pilot Study's Survey Respondents

Other (please specify)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		35	92.1	92.1	92.1
	A straight white man	1	2.6	2.6	94.7
	basketball	1	2.6	2.6	97.4
	Omnidimentional Vampire	1	2.6	2.6	100.0
	Total	38	100.0	100.0	

Table PSD3.3

Ethnicities of the Pilot Study's Survey Respondents

Statistics

		Aboriginal and Torres Strait Islander	African	Asian	Australian	British	Canadian	European	North American	South American	Mixed ethnicity (please specify)	Prefer not to answer	Different ethnicity (please specify)
N	Valid	1	0	2	28	2	0	6	0	0	2	0	3
	Missing	37	38	36	10	36	38	32	38	38	36	38	35
Mean		1.0000		1.0000	1.0000	1.0000		1.0000			1.0000		1.0000
Median		1.0000		1.0000	1.0000	1.0000		1.0000			1.0000		1.0000
Mode		1.00		1.00	1.00	1.00		1.00			1.00		1.00
Range		.00		.00	.00	.00		.00			.00		.00
Minimum		1.00		1.00	1.00	1.00		1.00			1.00		1.00
Maximum		1.00		1.00	1.00	1.00		1.00			1.00		1.00
Std. Deviation				.00000	.00000	.00000		.00000			.00000		.00000
Std. Error of Skewness					.441			.845					1.225
Std. Error of Kurtosis					.858			1.741					

Table PSD3.4

Other Ethnicities of the Pilot Study's Survey Respondents

Other (please specify)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		35	92.1	92.1	92.1
	INDIAN	1	2.6	2.6	94.7
	Italian	1	2.6	2.6	97.4
	Latvian	1	2.6	2.6	100.0
	Total	38	100.0	100.0	

Table PSD3.5

Case Processing Summary for Pilot Study's Statistical Analyses

Case Processing Summary

		N	%
Cases	Valid	36	94.7
	Excluded[a]	2	5.3
	Total	38	100.0

a. Listwise deletion based on all variables in the procedure.

Table PSD3.6

Test of the Internal Consistency of the Pilot Study's Adapted 35-item Scale from Edmondson (1999)

Reliability Statistics

Cronbach's Alpha	N of Items
.841	35

Table PSD3.7

Test of Sampling Adequacy of the Pilot Study's Adapted 35-item Scale from Edmondson (1999)

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.353
Bartlett's Test of Sphericity	Approx. Chi-Square	781.654
	df	465
	Sig.	<.001

Table PSD3.8

Total Variance Explained by the Factors of the Adapted 35-item Scale from Edmondson (1999)

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.753	22.151	22.151	7.753	22.151	22.151
2	4.272	12.204	34.355	4.272	12.204	34.355
3	2.819	8.054	42.409	2.819	8.054	42.409
4	2.527	7.219	49.628	2.527	7.219	49.628
5	2.162	6.178	55.806	2.162	6.178	55.806
6	2.022	5.776	61.583	2.022	5.776	61.583
7	1.715	4.899	66.482	1.715	4.899	66.482
8	1.550	4.429	70.910	1.550	4.429	70.910
9	1.248	3.564	74.475	1.248	3.564	74.475
10	1.152	3.291	77.765	1.152	3.291	77.765
11	1.098	3.138	80.903	1.098	3.138	80.903
12	.974	2.784	83.687			
13	.954	2.726	86.413			
14	.752	2.148	88.561			
15	.617	1.763	90.323			
16	.515	1.472	91.795			
17	.471	1.345	93.140			
18	.442	1.264	94.404			
19	.379	1.083	95.487			
20	.307	.877	96.364			
21	.275	.785	97.149			
22	.237	.678	97.827			
23	.179	.511	98.339			
24	.154	.440	98.779			
25	.119	.341	99.120			
26	.103	.293	99.413			
27	.072	.207	99.620			
28	.049	.140	99.760			
29	.032	.091	99.851			
30	.028	.079	99.930			
31	.015	.044	99.973			
32	.006	.018	99.991			
33	.003	.009	100.000			
34	4.208E-16	1.202E-15	100.000			
35	-2.057E-16	-5.876E-16	100.000			

Extraction Method: Principal Component Analysis.

Figure PSD3.2

Number of significant components that explained the total variance in the 35-item Scale Adapted from Edmondson (1999)

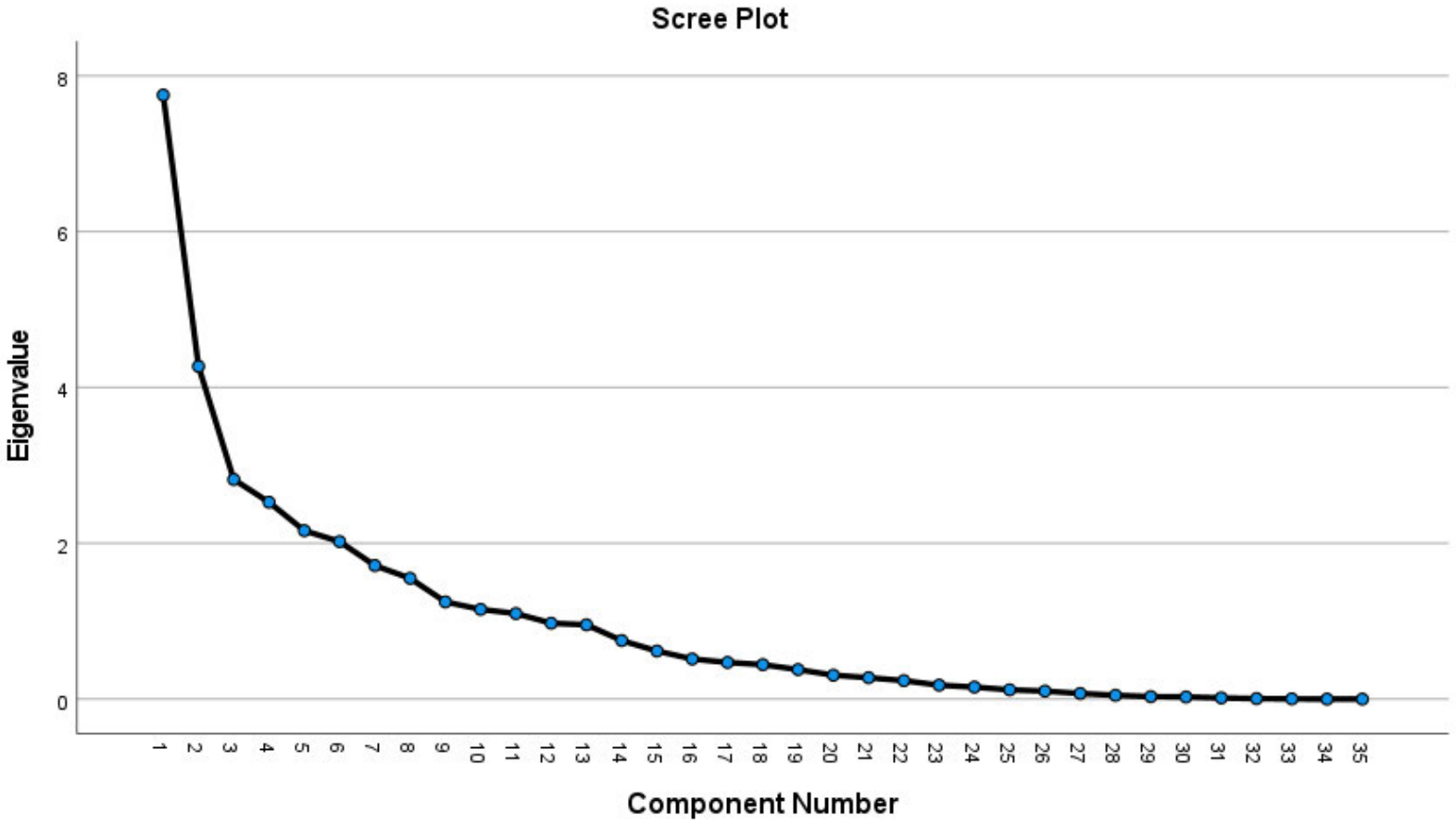


Table PSD3.9

Factor Loadings for 11 Extracted Components of the Adapted 35-item Scale from Edmondson (1999)

Component Matrix[a]

	Component										
	1	2	3	4	5	6	7	8	9	10	11
It is safe to take a risk on this team.	.806										
Most people in this team have the ability to solve the problems that come up in our task.	.761										
Achieving this team's goals is well within our reach.	.721										
All the team members are clear about what this team is supposed to accomplish.	.719										
This team frequently seeks new information that leads us to make important changes.	.709										
All the members of this team have more than enough training and experience for the kind of task they have to do.	.687				.508						
This team has spent time making sure every team member understands the team's objectives.	.686										
It is easy for this team to obtain expert assistance when something comes up that we are not sure of how to handle.	.656										
Team members go out and get all the information they possibly can from others to accomplish a task such as peers, parents and school staff e.g. teachers.	.650										
The work that we do on this team in itself provides us with plenty of feedback about how well the team is performing.	.598										
The work that this team does makes a difference for the people who receive or use it.	.532										
The quality of outputs provided by this team is improving over time.	.520										
In this team, someone always makes sure that we stop to reflect on the team's collaborative process.											
Members of this team are able to bring up problems and tough issues.											
In this team, we often speak up to test assumptions about the issues we have under discussion.											
Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments.		.674									
People on this team sometimes reject others for being different.		.658									
If you make a mistake on this team, it is often held against you.		.635									
We regularly take time to figure out ways to improve our team's collaborative processes.		.595									
Others in the school community who interact with this team often complain about how it functions.		.568									
Those who receive or use the outputs that this team produces often have complaints about our task.		.546									
Critical quality errors occur frequently in this team.		.525									
This team is kept in the dark about current developments and future plans that may affect its work.		.511									
This team lacks access to useful training to complete a task.			.624								
Certain individuals in this team lack the special skills needed for good team collaboration.			.617								
This team can achieve its task without requiring us to put in unreasonable time or effort.	.515		.561								
The team has invested plenty of time to clarify our goals.											
With focus and effort, this team can do anything we set out to accomplish.				.527							
Working with members of this team, my unique skills are valuably utilised.				.503							
This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group.											
No one on this team would deliberately act in a way that undermines my efforts.						.518					
We invite people from outside the team to present information or have discussions with us.											
It is difficult to ask other members of this team for help.											
This team gets all the information it needs to plan our work schedule.									-.609		
Those who receive or use this team's output rarely give us feedback about how well our work meets their needs.										.528	

Extraction Method: Principal Component Analysis.

a. 11 components extracted.

Table PSD3.10

Varimax-Rotated Factor Loadings for Four Extracted Components of the Adapted 35-item Scale from Edmondson (1999)

Rotated Component Matrix[a]

	Component			
	1	2	3	4
It is safe to take a risk on this team.	.840			
Most people in this team have the ability to solve the problems that come up in our task.	.753			
This team can achieve its task without requiring us to put in unreasonable time or effort.	.741			
Achieving this team's goals is well within our reach.	.722			
All the team members are clear about what this team is supposed to accomplish.	.649			
Members of this team are able to bring up problems and tough issues.	.631			
The work that we do on this team in itself provides us with plenty of feedback about how well the team is performing.	.624			
It is easy for this team to obtain expert assistance when something comes up that we are not sure of how to handle.	.583			
All the members of this team have more than enough training and experience for the kind of task they have to do.	.570			
We invite people from outside the team to present information or have discussions with us.	.517			
The quality of outputs provided by this team is improving over time.				
Those who receive or use this team's output rarely give us feedback about how well our work meets their needs.				
This team gets all the information it needs to plan our work schedule.				
In this team, someone always makes sure that we stop to reflect on the team's collaborative process.		.728		
This team has spent time making sure every team member understands the team's objectives.		.727		
This team frequently seeks new information that leads us to make important changes.		.678		
Team members go out and get all the information they possibly can from others to accomplish a task such as peers, parents and school staff e.g. teachers.		.669		
We regularly take time to figure out ways to improve our team's collaborative processes.		.622		
The work that this team does makes a difference for the people who receive or use it.				
It is difficult to ask other members of this team for help.				
This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group.				
If you make a mistake on this team, it is often held against you.			.740	
People on this team sometimes reject others for being different.			.736	
Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments.			.723	
Others in the school community who interact with this team often complain about how it functions.			.663	
This team lacks access to useful training to complete a task.			.554	
Certain individuals in this team lack the special skills needed for good team collaboration.			.535	
This team is kept in the dark about current developments and future plans that may affect its work.				
No one on this team would deliberately act in a way that undermines my efforts.				
Working with members of this team, my unique skills are valuably utilised.				.648
With focus and effort, this team can do anything we set out to accomplish.				.637
Critical quality errors occur frequently in this team.				.627
The team has invested plenty of time to clarify our goals.		.536		.561
Those who receive or use the outputs that this team produces often have complaints about our task.				.561
In this team, we often speak up to test assumptions about the issues we have under discussion.				.509

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 8 iterations.

Table PSD3.11

Total Variance of the Factors of the Adapted 23-item Scale Following the Validation of the Pilot Study's 35-Item Scale

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.174	26.843	26.843	6.174	26.843	26.843	4.725	20.542	20.542
2	3.316	14.415	41.258	3.316	14.415	41.258	3.679	15.996	36.538
3	2.422	10.531	51.789	2.422	10.531	51.789	3.314	14.408	50.946
4	2.047	8.898	60.688	2.047	8.898	60.688	2.241	9.742	60.688
5	1.444	6.277	66.965						
6	1.291	5.613	72.578						
7	.991	4.307	76.884						
8	.806	3.503	80.387						
9	.718	3.121	83.509						
10	.689	2.997	86.506						
11	.574	2.496	89.002						
12	.507	2.204	91.205						
13	.393	1.710	92.915						
14	.346	1.504	94.419						
15	.323	1.402	95.821						
16	.215	.937	96.758						
17	.190	.827	97.585						
18	.148	.644	98.229						
19	.133	.576	98.805						
20	.091	.397	99.202						
21	.077	.335	99.537						
22	.063	.275	99.812						
23	.043	.188	100.000						

Extraction Method: Principal Component Analysis.

Table PSD3.12

Varimax-Rotated Factor Loadings for Four Extracted Components of the Adapted 23-item Scale Following the Validation of the 35-Item Scale

Rotated Component Matrix[a]

	Component			
	1	2	3	4
It is safe to take a risk on this team.	.803			
This team can achieve its task without requiring us to put in unreasonable time or effort.	.742			
Most people in this team have the ability to solve the problems that come up in our task.	.702			
Achieving this team's goals is well within our reach.	.689			
Members of this team are able to bring up problems and tough issues.	.682			
All the team members are clear about what this team is supposed to accomplish.	.613			
The work that we do on this team in itself provides us with plenty of feedback about how well the team is performing.	.589			
We invite people from outside the team to present information or have discussions with us.	.538			
It is easy for this team to obtain expert assistance when something comes up that we are not sure of how to handle.	.537			
In this team, someone always makes sure that we stop to reflect on the team's collaborative process.		.800		
This team frequently seeks new information that leads us to make important changes.		.768		
This team has spent time making sure every team member understands the team's objectives.		.761		
Team members go out and get all the information they possibly can from others to accomplish a task such as peers, parents and school staff e.g. teachers.		.674		
We regularly take time to figure out ways to improve our team's collaborative processes.		.599		
Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments.			.805	
If you make a mistake on this team, it is often held against you.			.667	
People on this team sometimes reject others for being different.			.659	
Others in the school community who interact with this team often complain about how it functions.			.643	
This team lacks access to useful training to complete a task.			.628	
Certain individuals in this team lack the special skills needed for good team collaboration.			.609	
Working with members of this team, my unique skills are valuably utilised.				.800
Critical quality errors occur frequently in this team.				.645
In this team, we often speak up to test assumptions about the issues we have under discussion.				.535

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 9 iterations.

Table PSD3.13

Test of Sampling Adequacy of the Adapted 23-item Scale Following the Validation of the Pilot Study's 35-Item Scale

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.616
Bartlett's Test of Sphericity	Approx. Chi-Square	477.843
	df	253
	Sig.	<.001

Table PSD3.14

Test of Internal Consistency for the Adapted 23-item Scale Following the Validation of the Adapted 35-Item Scale

Reliability Statistics

Cronbach's Alpha	N of Items
.789	23

Table MSM3.3

Guiding Questions Used for Focus Group Discussions in the Pilot Study

	Focus group guiding questions - pilot study
Q1.	**What are the attitudes of you and other students towards the project?** (*What did people think/say/do?*)
Q2.	**What drove the positive/negative reaction? If negative, how could it be rectified?**
Q3.	**When thinking back to how the challenges were introduced to you, are there ways that could have been introduced to make it easier/better for you?**
Q4.	**What do you think are the aims of working in teams?** (*explore student [psychological] safety, collaborative outcomes, individual outcomes, teamwork, and communication*)
Q5.	**Do you think there is a specific way of communicating that could lead to or improve high team performance? If not, why not?** (*similar questions for outcomes, psychological safety, efficiency, teamwork, and communication*)
Q6.	**What are the barriers to effective teamwork?**
Q7.	**What are the enablers of effective teamwork?**
Q8.	**What would make it easier for you to work in teams?** (*How would you like to see these factors implemented to engender your confidence?*)

Note. Guiding questions for collecting qualitative data with focus groups in the pilot study of the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts".

Table PSD3.15

Identified Indicators of Psychological Safety in Secondary School Student Teams from the Pilot Study

Participant [in-vivo] statement	Code	Category	Theme
"…Knew each other really well, so it kind of helped that if someone messed up or made a mistake, it was easy to kind of understand and help them with it."	know, help, understand	Knowing someone in the team	Familiarity
"… in the same class and we're friends. I think we know what can irritate each other. So we kind of we know what not to do."	friend, know	Having a friend in the team	Friendship
"Well, that's one way to communicate better. They talk more effectively. I know the English language really helps."	communicate, speak, English	Being able to communicate	Communication
"So you need to rely on your team members…"	team, reliance	Having reliable team members	Reliability
"… You need to be able to trust them, work with them…"	trust, work	Having trustworthy team members	Trust
"… So that kind of that's my social skills, like what you were saying, as well as with determination, social skills."	social skills, determined	Collaborating with others who have desirable social skills	Social skills
"Creativity is probably, yeah, creativity no. one. So that's the number one skill for success. I agree. Creativity more so than words. It's just like problem-solving behind the books with that kind of problems."	creativity, problem-solving, success	Problem-solving capacity of the team will improve with creative people in the team	Creative problem-solving
"… And then when you understand them, you can sort of relate to them more and, you know, achieve a solution together."	understand, relationships, solution-focus	Having understanding team members	Empathy

Table PSD3.16

Insights Derived from the Quantitative Results and the Qualitative Findings of the Pilot Study

RQ1.	**RQ2.**
"What are the observed indicators that determine psychological safety in secondary school student team contexts?"	"How can psychological safety be measured in secondary school student teams?"
- Knowing someone in the team; - Having a friend in the team; - Having a friend in the team; - Having reliable team members; - Having trustworthy team members; - Collaborating with others who have desirable social skills; - Problem-solving capacity of the team will improve with creative people in the team; and - Having understanding team members.	*Psychological safety* can be measured in secondary school student team contexts with an adapted 23-item scale from Edmondson (1999). The adapted 23-item scale of eight latent variables for this purpose demonstrated acceptable reliability and mediocre validity. To improve the adapted scale's psychometric properties for enhanced performance, it needs further refinement through exploration, confirmation, and response.
Themes of Psychological Safety Indicators	**Latent Variables of Psychological Safety**
Familiarity	Supportiveness of organisational context
Communication	Task design
Friendship	Clear direction
Reliability	Team composition
Trust	Team efficacy
Social skills	Team psychological safety
Creative problem-solving	Team learning behaviours
Empathy	Team performance

An emergent definition of *psychological safety* grounded in the data from the focus groups and online survey was: “the belief that one feels safe in a team where they know someone or have a friend and can collaborate with creative, trustworthy people who have desirable social skills and share a common language of communication.” ©

Figure PSD3.1

Sequential, Convergent, Mixed-Methods Design for the Pilot Study

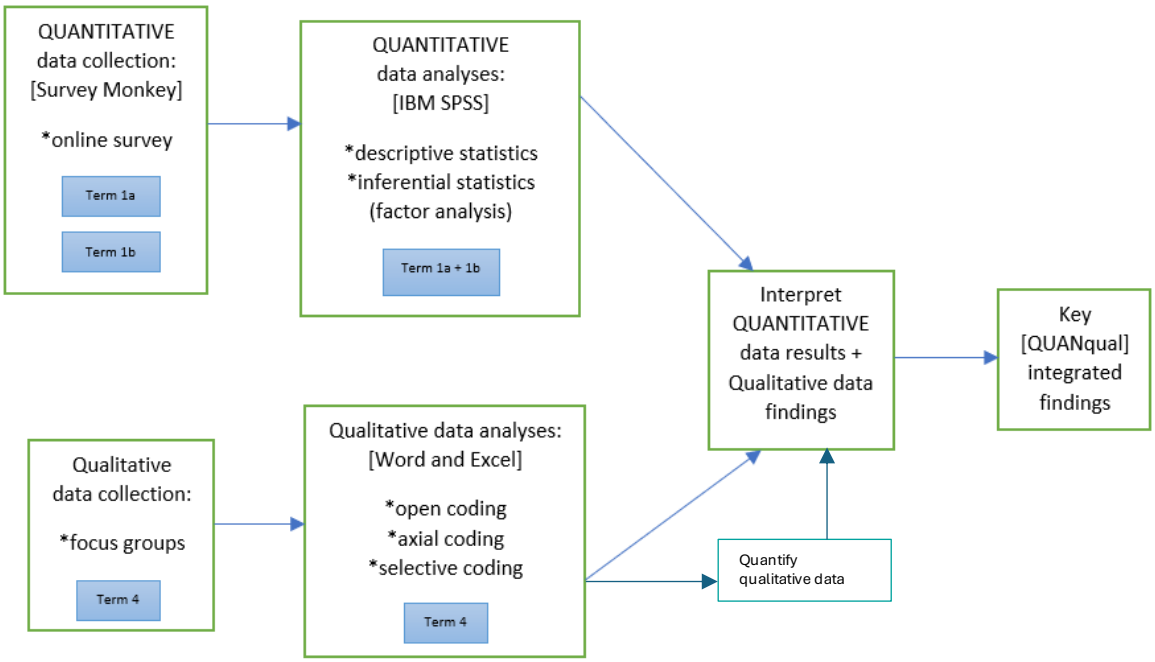
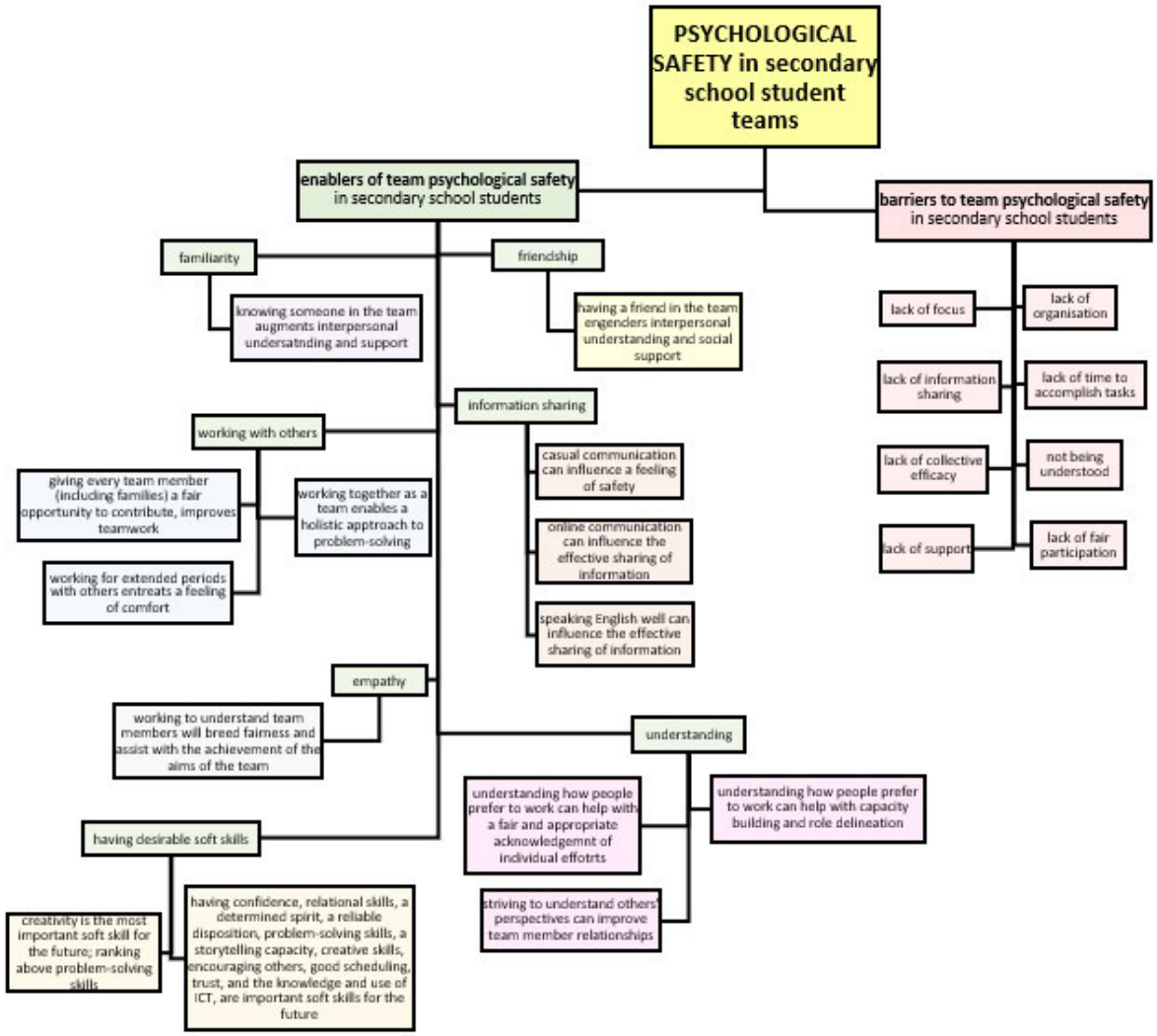


Figure PSD3.3

Emergent Barriers and Enablers of Psychological Safety in Secondary School Student Team Contexts from the Pilot Study



Note. The emergent barriers and enablers of psychological safety in secondary school student teams from the findings of the qualitative analysis of the data collected with focus groups for the pilot study of the research titled, "Being smart is not enough: A mixed methods approach to defining, framing and building a scale to measure psychological safety in secondary school student contexts".

Appendix I – Main Study: Qualitative Analyses

Table QLA3.1

Focus Group Participant Counts and Discussion Times

Focus group	Number of participants	Discussion time (min)
Focus group 1	6	26:19
Focus group 2	9	20:57
Focus group 3	6	23:56
Focus group 4	7	22:32
Focus group 5	7	25:32
Focus group 6	17 (two groups of nine and eight in one location)	21:10
Total number of participants	**52**	
Total discussion time		**139:06**

Table CCA5.2

The Coding Framework Used for the Constant Comparative Analysis (CCA) of the Data Collected with the Focus Groups

	Framework 'structured' analysis - deductive coding (based on the definition of Edmondson, 1999, p. 354)	**Grounded 'emergent' theory - inductive coding** (based on the participant statements from focus groups – grounded in the data (Charmaz, 2014; Glaser, 1965)
	Priori theme	**Emergent theme**
	"*Psychological safety* is "a shared belief held by team members that the team is safe for interpersonal risk taking and captures a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up"	
		Emergent category
	Priori code	**Emergent code**
Code	safety; speaking up; mutual respect and trust; acceptance; approval; acknowledgement	professional relationship; body language; personal relationship; empathy; mental health challenge; friendship; humour; familiarity; personality; getting along; support; inclusivity; diversity; leadership (adult; student); information sharing; shared focus; conflict resolution; psychological safety (enabler; barrier); Implementation strategy

#	Code Description
	The absence of interpersonal threat where individuals are likely to engage in trial and error and be creative in their actions (Edmondson, 1999).
	When concerns about being judged as incompetent when seeking and asking for help from people in positions of superiority. (Edmondson, 1999).
	A team climate characterised by interpersonal trust [but goes beyond] and mutual respect in which people are comfortable being themselves (Edmondson, 1999).
	The alleviation of excessive concern about others' reactions to actions that have the potential for embarrassment or threat, which learning behaviours often have (Edmondson, 1999).
	Making a mistake does not lead to rejection when they [individuals] have had team experiences in which appreciation and interest are expressed in response to discussion of their own and others' mistakes (Edmondson, 1999).
	Appreciation and interest are expressed in response to the discussion of their own and others' mistakes (Edmondson, 1999).
	Feeling valued and connected in ways that allow them [individuals] to overcome the uncertainty that accompanies working through problems and experimenting with solutions (Carmeli et al., 2009; Francis et al., 2016)
	Non-verbal communication related to general emotional cues such as eye contact, hand gestures, facial expressions, and body posture (Phutela, 2015).
	Individuals experience vitality, positive regard, and mutuality that enable them to find pleasurable and motivating connections, which keep them in a state that is likely to make them more willing to process information and work through problems (Stafford & Kuiper, (2021).
	A vicarious emotional response to the perceived emotional experiences of others (Jami et al., 2024).
	Not being equipped with the necessary life skills, support structures and resources to develop and maintain productive social relationships and learn effectively to overcome adversity and fulfil individual potential and good physical health. (Kieling et al., 2011).
	Multidimensional social phenomenon that includes expectations of being liked, mutual or inward-coming interaction, reciprocity, transivity and homophily which may transcend social relationships (Kitts & Leal, 2021).
	Spoken, non-verbal, written items that make a person laugh or smile (Ross, 2005) to create a positive emotional state that influences interpersonal skills and social relationships (Nash, 2014).
	A close knowledge of something or a close, informal, personal association between people known as an informal, relaxed friendliness (Gulati & Sytch, (2008).
	An individual's capacity to respond to situational or contextual cues to control their behaviour (Webster & Ward, 2011).
	Competent interactions that support satisfying, social relationships (Guy-Evans, 2020; Kemple & Hartle, 1997).
	Emotional and/or instrumental functions that communicate, care, nurture, and esteem (Semmer et al., 2008).
	The use of diverse pedagogies and strategies for diverse learning needs to embrace everyone in successful learning to generate a positive impact (Boyle et al., 2011; Loreman et al., 2011) and reduce inequalities (Wilkinson & Pickett, 2010).
	The practice or quality of including or involving [but not limited to] people from a range of different ages, social and ethnic backgrounds, political affiliation, genders, physical attributes, sexual orientations, religious values, cognitive capacities (Ely & Thomas, (2020; https://www.google.com/search?q=define+diversity&rlz).
	A supportive way to reduces obstacles to progress and allow team members to feel confident about their chances of success by making complex things simple and better (Summerfield, 2014).
	The voluntary act of making data or accounts that are possessed by an individual available to another individual (Boulos et al., 2006).
	Team members are subject to the same set of structural influences as well as perceptions that have developed out of salient shared experiences (De Vries, 1999; Poekert et al., 2022).
	The prevention, elimination, or resolution of competitive personal and cooperate interests, which can be constructive or destructive, and can lead to personal, professional and social change (Deutsch et al, 2011).
	An indicator or variable that assures an individual experience of feelings of acceptance, approval, and acknowledgement for being themselves in a mutually respectful environment without risk to their identity, individual competency, or performance (Edmondson, 1999)
	An indicator or variable that prevents an individual from experiencing feelings of acceptance, approval, and acknowledgement for being themselves in a mutually respectful environment without risk to their identity, individual competency, or performance (Edmondson, 1999)
	The successful execution of an approach that enhances the conception, adoption, operation and sustenance of an intervention or policy in a secondary school community.

Table CCA5.3

The Constant Comparative Analysis of the Data for Focus Group One Showing the Frequencies of the Observed Indicators of Psychological Safety

	Framework 'structured' analysis - deductive coding (Based on the definition of Edmondson, 1999, p354)	Grounded 'emergent' theory - inductive coding (Based on the participant statements from focus group one – grounded in the data (Charmaz, 2014)																		
	Priori theme	Emergent category																		
	"*Psychological safety* is "a shared belief held by team members that the team is safe for interpersonal risk taking and captures a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up"	Having a relevant someone to talk to	Non-verbal communication	Being good to others	Feeling and allowing others to feel content	Emotional and social wellbeing	Having a friend	Laughter eases tension and acts as an icebreaker	Knowing someone	Nice personality	Getting along	Not feeling judged	Inclusive environment	Equality and diversity		Effective communication		Resolving disputes for high performance	Enhancing psychological safety	Participant feedback
	Priori code	Emergent code																		
Code	safety	speaking up	mutual respect and trust	acceptance	approval	acknowledgement	professional relationship	body language	personal relationship	empathy	mental health challenge	friendship	humour	familiarity	personality	getting along	support	inclusivity	diversity	adult leadership	student leadership	information sharing	shared focus	conflict resolution	PS enabler	PS barrier	site implementation strategy

Focus Group One	FG1P1 FG1P3 FG1P4 FG1P2	FG1P3 FG1P4 FG1P3 FG1P1 FG1P1 FG1P3 FG1P6 FG1P5 FG1P1 FG1P4 FG1P6	FG1P1 FG1P3 FG1P3 FG1P1 FG1P3 FG1P2 FG1P1 FG1P2	FG1P5 FG1P1 FG1P5 FG1P4 FG1P3	FG1P3 FG1P3	FG1P1 FG1P4 FG1P5 FG1P3 FG1P2	FG1P6	FG1P2 FG1P4 FG1P3 FG1P5 FG1P1 FG1P1 FG1P3 FG1P5 FG1P5 FG1P4	FG1P2 FG1P1 FG1P3 FG1P4 FG1P3 FG1P3 FG1P6	FG1P2 FG1P3 FG1P4 FG1P4 FG1P3 FG1P6	FG1P2 FG1P3 FG1P4 FG1P3 FG1P5 FG1P3 FG1P6	FG1P4 FG1P5 FG1P6	FG1P2 FG1P1	FG1P1 FG1P4 FG1P3 FG1P3	FG1P4 FG1P4 FG1P3 FG1P5 FG1P1 FG1P3 FG1P1	FG1P2 FG1P3 FG1P4 FG1P3 FG1P5 FG1P1 FG1P6	FG1P3 FG1P3 FG1P1 FG1P1 FG1P3 FG1P4 FG1P3 FG1P1 FG1P6 FG1P2 FG1P3 FG1P6 FG1P2	FG1P2 FG1P1 FG1P4 FG1P3 FG1P5 FG1P2 FG1P1 FG1P1 FG1P3 FG1P3 FG1P3 FG1P1 FG1P2 FG1P3 FG1P6 FG1P6 FG1P2	FG1P3 FG1P2 FG1P1 FG1P3 FG1P1 FG1P3 FG1P1 FG1P6 FG1P2			FG1P4 FG1P3 FG1P1 FG1P3 FG1P1 FG1P3 FG1P1 FG1P3 FG1P6 FG1P2		FG1P3 FG1P3 FG1P2	FG1P2 FG1P3 FG1P5 FG1P5 FG1P4 FG1P3 FG1P3 FG1P1 FG1P1	FG1P6	FG1P3 FG1P1 FG1P6 FG1P1 FG1P6 FG1P2 FG1P6
Count	4	11	8	5	2	5	1	10	7	6	7	3	2	4	7	7	13	17	9	-	-	10	-	3	9	1	7

Note. FG1 – Focus Group one; P1 – participant one; P2 – participant two; P3 – participant three; P4 – participant four; P5 – participant five; P6 – participant six; PS – Psychological Safety

Table CCA5.4

The Constant Comparative Analysis of the Data for Focus Group Two Showing the Frequencies of the Observed Indicators of Psychological Safety

	Framework 'structured' analysis - deductive coding (Based on the definition of Edmondson, 1999, p354)	Grounded 'emergent' theory - inductive coding (Based on the participant statements from focus group two – grounded in the data (Charmaz, 2014)																								
	Priori theme	Emergent category																								
	"Psychological safety is "a shared belief held by team members that the team is safe for interpersonal risk taking and captures a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up"	Having a relevant someone to talk to	Non-verbal communication	Being good to others	Feeling and allowing others to feel	Emotional and social wellbeing	Having a friend		Knowing someone	Nice personality	Getting along	Not feeling judged	Inclusive environment	Equality and diversity	Sound leadership		Following negotiated rules		Enhancing psychological safety	Participant feedback					
	Priori code	Emergent code																								
Code	safety	speaking up	mutual respect and trust	acceptance	approval	acknowledgement	professional relationship	body language	personal relationship	empathy	mental health challenge	friendship	humour	familiarity	personality	getting along	support	inclusivity	diversity	adult leadership	student leadership	information sharing	shared focus	conflict resolution	PS enabler	PS barrier	site implementation strategy
Focus Group Two	FG2P1 FG2P3 FG2P5 FG2P5 FG2P9 FG2P9 FG2P3	FG2P1 FG2P3 FG2P3 FG2P9 FG2P9 FG2P9 FG2P3 FG2P9	FG2P4 FG2P2 FG2P3 FG2P8 FG2P1 FG2P5 FG2P9	FG2P1 FG2P3 FG2P1 FG2P5 FG2P9	FG2P1 FG2P5 FG2P9	FG2P4 FG2P1 FG2P5 FG2P9 FG2P9 FG2P3	FG2P9 FG2P9 FG2P9	FG2P3 FG2P4 FG2P2 FG2P3 FG2P8 FG2P9 FG2P1	FG2P3 FG2P8 FG2P1 FG2P9	FG2P3 FG2P4 FG2P2 FG2P4 FG2P3 FG2P9 FG2P1 FG2P5 FG2P9 FG2P1	FG2P1 FG2P4 FG2P3	FG2P9 FG2P5 FG2P3		FG2P3 FG2P4 FG2P3 FG2P8 FG2P5 FG2P9 FG2P3	FG2P4 FG2P2 FG2P3	FG2P8 FG2P9 FG2P1 FG2P5 FG2P9	FG2P1 FG2P3 FG2P4 FG2P9 FG2P9	FG2P1 FG2P1 FG2P3 FG2P3 FG2P8 FG2P4 FG2P1 FG2P5 FG2P9 FG2P9 FG2P1	FG2P8 FG2P9 FG2P1 FG2P5 FG2P9 FG2P9 FG2P1	FG2P9			FG2P1 FG2P9		FG2P1 FG2P9	FG2P9 FG2P9 FG2P1	FG2P9 FG2P9 FG2P1 FG2P9

Count	7	8	7	5	3	6	3	7	4	10	3	3	-	7	3	5	5	11	7	1	-	-	2	-	2	3	4

Note. FG2 – Focus Group two; P1 – participant one; P2 – participant two; P3 – participant three; P4 – participant four; P5 – participant five; P6 – participant six; P7 – participant seven; P8 – participant eight; P9 – participant nine; PS – Psychological Safety

Table CCA5.5

The Constant Comparative Analysis of the Data for Focus Group Three Showing the Frequencies of the Observed Indicators of Psychological Safety

	Framework 'structured' analysis - deductive coding (Based on the definition of Edmondson, 1999, p354)	Grounded 'emergent' theory - inductive coding (Based on the participant statements from focus group three – grounded in the data (Charmaz, 2014)																		
	Priori theme	Emergent category																		
	"*Psychological safety* is "a shared belief held by team members that the team is safe for interpersonal risk taking and captures a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up"	Having a relevant someone to talk to	Non-verbal communication	Being good to others	Feeling and allowing others to feel content	Emotional and social wellbeing	Having a friend	Laughter eases tension and acts as an	Knowing someone	Nice personality	Getting along	Not feeling judged	Inclusive environment	Equality and diversity	Sound leadership	Effective communication	Following negotiated rules	Resolving disputes for high performance	Enhancing psychological safety	Participant feedback
	Priori code	Emergent code																		
Code	safety	speaking up	mutual respect and trust	acceptance	approval	acknowledgement	professional relationship	body language	personal relationship	empathy	mental health challenge	friendship	humour	familiarity	personality	getting along	support	inclusivity	diversity	adult leadership	student leadership	information sharing	shared focus	conflict resolution	PS enabler	PS barrier	site implementation

Focus Group Three	FG3P3 FG3P1 FG3P4 FG3P2 FG3P3 FG3P6 FG3P5 FG3P3 FG3P4 FG3P3 FG3P1 FG3P3 FG3P4	FG3P3 FG3P4 FG3P4 FG3P3 FG3P6 FG3P4 FG3P5 FG3P3 FG3P3 FG3P4 FG3P1 FG3P4 FG3P3	FG3P3 FG3P4 FG3P4 FG3P3 FG3P4 FG3P3 FG3P6 FG3P4 FG3P3 FG3P5 FG3P3 FG3P6	FG3P4 FG3P6 FG3P5 FG3P3 FG3P4	FG3P3 FG3P6 FG3P3	FG3P4 FG3P6 FG3P4 FG3P5 FG3P3 FG3P4 FG3P3 FG3P4 FG3P3 FG3P4	FG3P4 FG3P3 FG3P6 FG3P3 FG3P5 FG3P3 FG3P6	FG3P3 FG3P3 FG3P6 FG3P4 FG3P3 FG3P5 FG3P4 FG3P5	FG3P1 FG3P4 FG3P4 FG3P6 FG3P3 FG3P4 FG3P5	FG3P4 FG3P1 FG3P3 FG3P6 FG3P3 FG3P4 FG3P4 FG3P4	FG3P3	FG3P4	FG3P4 FG3P3	FG3P1 FG3P2 FG3P4 FG3P5	FG3P4	FG3P4 FG3P4 FG3P3 FG3P6 FG3P4 FG3P3 FG3P5 FG3P4	FG3P3 FG3P1 FG3P4 FG3P2 FG3P3 FG3P4 FG3P5 FG3P3 FG3P5 FG3P4 FG3P4 FG3P3 FG3P6	FG3P3 FG3P4 FG3P4 FG3P3 FG3P6 FG3P5 FG3P3 FG3P3 FG3P4 FG3P4 FG3P5 FG3P4	FG3P3 FG3P4 FG3P5 FG3P3 FG3P4	FG3P3 FG3P6		FG3P3 FG3P6 FG3P5 FG3P4	FG3P4 FG3P3 FG3P3 FG3P5 FG3P4	FG3P3 FG3P3	FG3P3 FG3P6		FG3P4 FG3P5
Count	13	13	12	5	3	10	7	8	7	8	1	1	2	4	1	8	13	12	5	2	-	4	5	2	2	-	2

Note. FG3 – Focus Group three; P1 – participant one; P2 – participant two; P3 – participant three; P4 – participant four; P5 – participant five; P6 – participant six; PS – Psychological Safety

Table CCA5.6

The Constant Comparative Analysis of the Data for Focus Group Four Showing the Frequencies of the Observed Indicators of Psychological Safety

	Framework 'structured' analysis - deductive coding (Based on the definition of Edmondson, 1999, p354)	Grounded 'emergent' theory - inductive coding (Based on the participant statements from focus group four – grounded in the data (Charmaz, 2014)
	Priori theme	Emergent category
	"Psychological safety is "a shared belief held by team members that the team is safe for interpersonal risk taking and captures a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up"	Having a relevant someone to talk to; Being good to others; Feeling and allowing others to feel; Emotional and social wellbeing; Having a friend; Knowing someone; Nice personality; Getting along; Not feeling judged; Inclusive environment; Equality and diversity; Sound leadership; Effective communication; Following negotiated rules; Enhancing psychological safety
	Priori code	Emergent code
Code	safety; speaking up; mutual respect and trust; acceptance; approval; acknowledgement	professional relationship; body language; personal relationship; empathy; mental health challenge; friendship; humour; familiarity; personality; getting along; support; inclusivity; diversity; adult leadership; student leadership; information sharing; shared focus; conflict resolution; PS enabler; PS barrier; site implementation strategy

Focus Group Four	FG4P2 FG4P1 FG4P1 FG4P3 FG4P1 FG4P4 FG4P4 FG4P4 FG4P4 FG4P3 FG4P7	FG4P1 FG4P1 FG4P1 FG4P3 FG4P4 FG4P4 FG4P6	FG4P2	FG4P2 FG4P3	FG4P3 FG4P4 FG4P4 FG4P4 FG4P7	FG4P1 FG4P1 FG4P2 FG4P1 FG4P3 FG4P4 FG4P4 FG4P4 FG4P3 FG4P7	FG4P2 FG4P5 FG4P4 FG4P2 FG4P4 FG4P3		FG4P3 FG4P5 FG4P4 FG4P2 FG4P4 FG4P3	FG4P1	FG4P1 FG4P1 FG4P2	FG4P3 FG4P3 FG4P2 FG4P4 FG4P4 FG4P6		FG4P3 FG4P4	FG4P1 FG4P2	FG4P3 FG4P3 FG4P2 FG4P4 FG4P4 FG4P4 FG4P5 FG4P6	FG4P1 FG4P1 FG4P2 FG4P3 FG4P5 FG4P2 FG4P4 FG4P3 FG4P7	FG4P2 FG4P4 FG4P4 FG4P4 FG4P5	FG4P3 FG4P4	FG4P5 FG4P4 FG4P2 FG4P4 FG4P3	FG4P5 FG4P4 FG4P2 FG4P4 FG4P3	FG4P5	FG4P2 FG4P4 FG4P2	FG4P3	FG4P4 FG4P4 FG4P5 FG4P5 FG4P2 FG4P3 FG4P6	FG4P4 FG4P4 FG4P7	
Count	11	7	1	2	5	10	6	-	6	1	3	6	-	2	2	8	9	5	2	5	5	1	3	1	7	3	-

Note. FG4 – Focus Group four; P1 – participant one; P2 – participant two; P3 – participant three; P4 – participant four; P5 – participant five; P6 – participant six; P7 – participant seven; PS - Psychological Safety

Table CCA5.7

The Constant Comparative Analysis of the Data for Focus Group Five Showing the Frequencies of the Observed Indicators of Psychological Safety

	Framework 'structured' analysis - deductive coding (Based on the definition of Edmondson, 1999, p354)	Grounded 'emergent' theory - inductive coding (Based on the participant statements from focus group five – grounded in the data (Charmaz, 2014)
	Priori theme	Emergent category
	"*Psychological safety* is "a shared belief held by team members that the team is safe for interpersonal risk taking and captures a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up"	Having a relevant someone to talk to; Non-verbal communication; Being good to others; Feeling and allowing others to feel; Emotional and social wellbeing; Laughter eases tension and acts as; Knowing someone; Nice personality; Getting along; Not feeling judged; Inclusive environment; Equality and diversity; Sound leadership; Following negotiated; Resolving disputes for high; Enhancing psychological safety; Participant feedback
	Priori code	Emergent code
Code	safety; speaking up; mutual respect and trust; acceptance; approval; acknowledgement	professional relationship; body language; personal relationship; empathy; mental health challenge; friendship; humour; familiarity; personality; getting along; support; inclusivity; diversity; adult leadership; student leadership; information sharing; shared focus; conflict resolution; PS enabler; PS barrier; site implementation strategy

Focus Group Five	FG5P3 FG5P4 FG5P2 FG5P3 FG5P4	FG5P3 FG5P3 FG5P4 FG5P2 FG5P1 FG5P6 FG5P4 FG5P2 FG5P3 FG5P5 FG5P1 FG5P4 FG5P3	FG5P4 FG5P2 FG5P1 FG5P2 FG5P3 FG5P1	FG5P3 FG5P4 FG5P3	FG5P3 FG5P3 FG5P4 FG5P3	FG5P3 FG5P4 FG5P3 FG5P5 FG5P3	FG5P3	FG5P3 FG5P1 FG5P3 FG5P4 FG5P4 FG5P2 FG5P5	FG5P1 FG5P3 FG5P4 FG5P3 FG5P3	FG5P3 FG5P2 FG5P1 FG5P4 FG5P3	FG5P1 FG5P2 FG5P3 FG5P1 FG5P5 FG5P6 FG5P4		FG5P1 FG5P5 FG5P4	FG5P3 FG5P3	FG5P3 FG2P3 FG5P5	FG5P1 FG5P2 FG5P4 FG5P2 FG5P3 FG5P3	FG5P4 FG5P3 FG5P5	FG5P1 FG5P3 FG5P3 FG5P4 FG5P2 FG5P7 FG5P3	FG5P3 FG5P1 FG5P3 FG5P3		FG5P6	FG5P3 FG5P1 FG5P4 FG5P2 FG5P5 FG5P4		FG5P1 FG5P3 FG5P4 FG5P2	FG5P1 FG5P7 FG5P4 FG5P2 FG5P3 FG5P5	FG5P1 FG5P4 FG5P6	FG5P1 FG5P5 FG5P4
Count	5	13	6	3	4	5	1	7	5	5	7	-	3	2	3	6	3	7	4	-	1	6	-	4	6	3	3

Note. FG5 – Focus Group five; P1 – participant one; P2 – participant two; P3 – participant three; P4 – participant four; P5 – participant five; P6 – participant six; P7 – participant seven; PS – Psychological Safety

Table CCA5.8

The Constant Comparative Analysis of the Data for Focus Group Six Showing the Frequencies of the Observed Indicators of Psychological Safety

	Framework 'structured' analysis - deductive coding (Based on the definition of Edmondson, 1999, p354)	Grounded 'emergent' theory - inductive coding (Based on the participant statements from focus group six – grounded in the data (Charmaz, 2014)																							
	Priori theme	Emergent category																							
	"Psychological safety is "a shared belief held by team members that the team is safe for interpersonal risk taking and captures a sense of confidence that the team will not embarrass, reject, or punish someone for speaking up"		Non-verbal communication	Being good to others	Feeling and allowing others to	Emotional and social wellbeing	Having a friend			Nice personality	Getting along	Not feeling judged	Inclusive environment	Equality and diversity	Sound leadership		Effective communication			Enhancing psychological safety		Participant feedback
	Priori code	Emergent code																							
Code	safety	speaking up	mutual respect and trust	acceptance	approval	acknowledgement	professional relationship	body language	personal relationship	empathy	mental health challenge	friendship	humour	familiarity	personality	getting along	support	inclusivity	diversity	adult leadership	student leadership	information sharing	shared focus	conflict resolution	PS enabler	PS barrier	site implementation strategy
Focus Group Six	FG6P8 FG6P17	FG6P6 FG6P9 FG6P10 FG6P14 FG6P12 FG6P15 FG6P12	FG6P8 FG6P13	FG6P9 FG6P13				FG6P9 FG6P12 FG6P15 FG6P12 FG6P15	FG6P6 FG6P7	FG6P1 FG6P2 FG6P3 FG6P4 FG6P17 FG6P10 FG6P13 FG6P14 FG6P16 FG6P15	FG6P9 FG6P10 FG6P12 FG6P15 FG6P15 FG6P17	FG6P1 FG6P2 FG6P4 FG6P7 FG6P13 FG6P16 FG6P15			FG6P10 FG6P15 FG6P15	FG6P2 FG6P2 FG6P6 FG6P8 FG6P10 FG6P15 FG6P15 FG6P12 FG6P16	FG6P3 FG6P2 FG6P3 FG6P6 FG6P9 FG6P13 FG6P16 FG6P15 FG6P17 FG6P13	FG6P1 FG6P9 FG6P8 FG6P13 FG6P15 FG6P15 FG6P17 FG6P13	FG6P15 FG6P13 FG6P15 FG6P15 FG6P17	FG6P1 FG6P2 FG6P3 FG6P7	FG6P10	FG6P7 FG6P9 FG6P15 FG6P13 FG6P15			FG6P4 FG6P17 FG6P13		FG6P17 FG6P13

Count	2	7	2	2	-	-	-	5	2	10	6	7	-	-	3	9	10	8	5	4	1	5	-	-	3	-	2

Note. FG6 – Focus Group six; P1 – participant one; P2 – participant two; P3 – participant three; P4 – participant four; P5 – participant five; P6 – participant six; P7 – participant seven; P8 – participant eight; P9 – participant nine; P10 – participant ten; P11 – participant eleven; P12 – participant twelve; P13 – participant thirteen; P14 – participant fourteen; P15 – participant fifteen; P16 – participant sixteen; P17 – participant seventeen; PS – Psychological Safety

Appendix J – Main Study: Quantitative Analyses

Table DST4.4

Different Identities of the Online Survey Respondents

How do you identify? - Different identity (please specify)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		629	98.4	98.4	98.4
	Agender	3	.5	.5	98.9
	Cabbage	1	.2	.2	99.1
	Male	1	.2	.2	99.2
	non-binary	1	.2	.2	99.4
	Non-binary	1	.2	.2	99.5
	Non-Binary	2	.3	.3	99.8
	Nonbinary	1	.2	.2	100.0
	Total	639	100.0	100.0	

Table DST4.6

Mixed Ethnicities of the Online Survey Respondents

Please specify your ethnicity. - Mixed ethnicity (please specify)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		597	93.4	93.4	93.4
	(White Australian mother, British father)	1	.2	.2	93.6
	Aboriginal, British and Australian	1	.2	.2	93.7
	Aboriginal, british, Australian	1	.2	.2	93.9
	African and German	1	.2	.2	94.1
	Asian Australian	1	.2	.2	94.2
	aus Canadian	1	.2	.2	94.4
	Aussie Italian	1	.2	.2	94.5
	Aussie Italian	1	.2	.2	94.7
	australia and asian	1	.2	.2	94.8
	Australian / European	1	.2	.2	95.0
	Australian and Caribbean	1	.2	.2	95.1
	Australian and European	1	.2	.2	95.3
	Australian Italian	1	.2	.2	95.5
	Australian Japanese	1	.2	.2	95.6
	Australian/Asian	1	.2	.2	95.8
	Australian/British	3	.5	.5	96.2
	british / south african	1	.2	.2	96.4
	British and Australian	1	.2	.2	96.6
	Croatian and Australian	1	.2	.2	96.7
	European, Latin America, and Australian	1	.2	.2	96.9
	Filipino	1	.2	.2	97.0
	first nations european australian	1	.2	.2	97.2
	German, French, English, Jewish	1	.2	.2	97.3
	Half nigerian half australia	1	.2	.2	97.5
	Hungarian, Jewish, Australian	1	.2	.2	97.7
	Indian	1	.2	.2	97.8
	Italian	1	.2	.2	98.0
	Italian Irish Australian	2	.3	.3	98.3
	Italian, German.	1	.2	.2	98.4
	Italian, Hungarian	1	.2	.2	98.6
	Maltese/Egyptian	1	.2	.2	98.7
	middle eastern, white and Djab	1	.2	.2	98.9
	New Zealand/Australian	1	.2	.2	99.1
	part australian, part german and welsh	1	.2	.2	99.2
	portuguese/australian	1	.2	.2	99.4
	Russian, Greek, British, Egyptian	1	.2	.2	99.5
	South African / British	1	.2	.2	99.7
	South african/Australian	1	.2	.2	99.8
	South American and European	1	.2	.2	100.0
	Total	639	100.0	100.0	

Table DST4.7

Different Ethnicities of the Online Survey Respondents

Please specify your ethnicity. - Different ethnicity (please specify)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		632	98.9	98.9	98.9
	German, Dutch, Indonesian, Aboriginal, Irish, Gypsy	1	.2	.2	99.1
	Indian	3	.5	.5	99.5
	Italian	1	.2	.2	99.7
	middle eastern, lebanese	1	.2	.2	99.8
	Portuguese	1	.2	.2	100.0
	Total	639	100.0	100.0	

Figure CFA23.1

Model Structure Showing Path Diagram of the Adapted 23-Item Scale

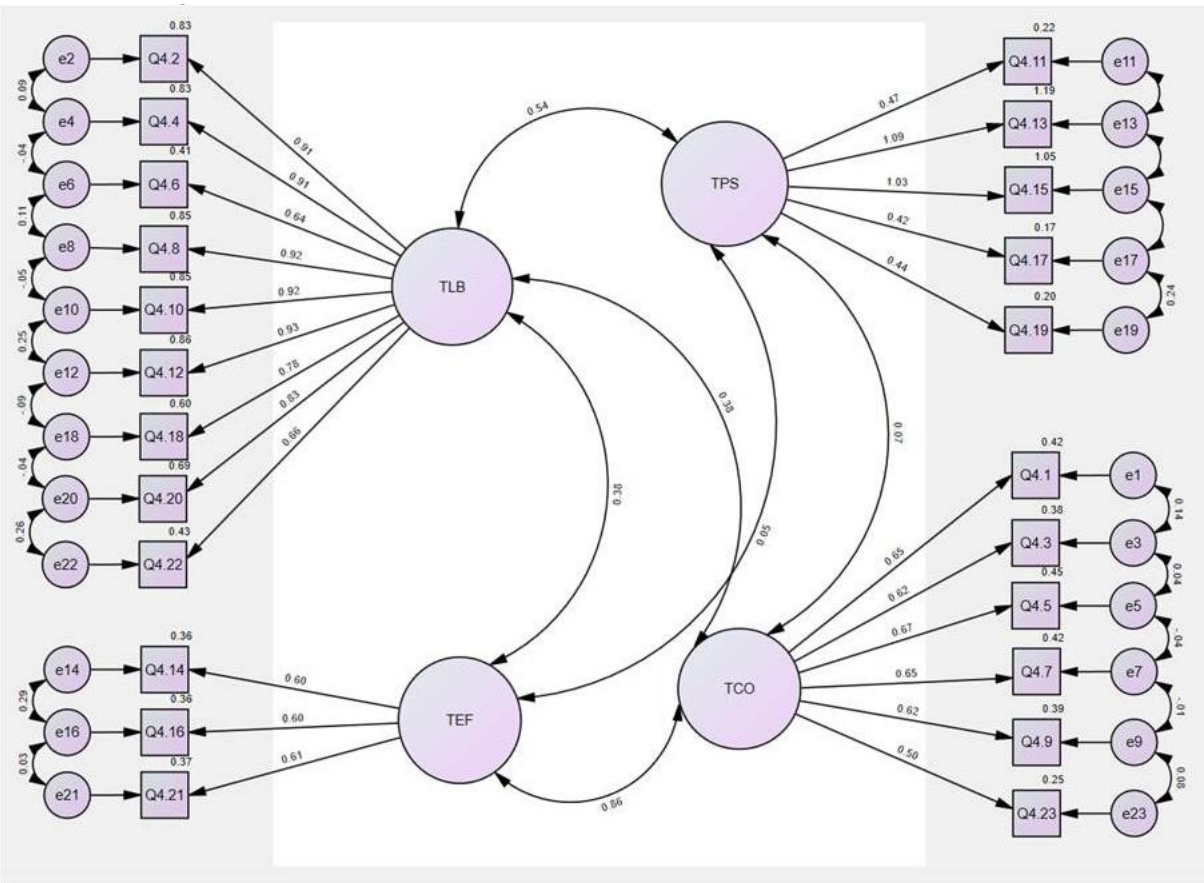


Table CFA23.1

Model Fit Summary of the Adapted 23-Item Scale

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	94	983.026	205	.000	4.795
Saturated model	299	.000	0		
Independence model	23	6236.383	276	.000	22.596

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.842	.788	.871	.824	.869
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.077	.072	.082	.000
Independence model	.184	.180	.188	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	1171.026	1178.374		
Saturated model	598.000	621.375		
Independence model	6282.383	6284.181		

Table PCA21.1

Test of Sampling Adequacy for the Adapted 21-Item Scale

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.920
Bartlett's Test of Sphericity	Approx. Chi-Square	5727.914
	df	210
	Sig.	<.001

Table PCA21.2

Sum of Squared Factor Loadings of the Variables in the Adapted 21-Item Scale

Communalities

	Initial	Extraction
All the team members are clear about what this team is supposed to accomplish.	1.000	.468
This team has spent time making sure every team member understands the team's objectives.	1.000	.845
In this team, we often speak up to test assumptions about the issues we have under discussion.	1.000	.850
This team lacks access to useful instruction or training to complete a task.	1.000	.640
It is easy for this team to obtain expert assistance when something comes up that we are not sure of how to handle.	1.000	.497
Team members go out and get all the information they possibly can from others to accomplish a task such as peers, parents and teachers.	1.000	.866
All the members of this team have more than enough training and experience for the kind of task they have to do.	1.000	.435
Most people on this team have the ability to solve the problems that come up in our tasks.	1.000	.867
Certain individuals in this team lack the special skills needed for good team collaboration.	1.000	.589
With focus and effort, this team can do anything we set out to accomplish.	1.000	.882
If you make a mistake on this team, it is often held against you.	1.000	.797
Members of this team are able to bring up problems and tough issues.	1.000	.480
People on this team sometimes reject others for being different.	1.000	.760
It is safe to take a risk on this team.	1.000	.474
It is difficult to ask other members of this team for help.	1.000	.563
We regularly take time to figure out ways to improve our team's collaborative processes.	1.000	.666
Recently, this team seems to be "slipping" a bit in its level of performance and accomplishments.	1.000	.544
This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group.	1.000	.763
This team frequently seeks new information that leads us to make important changes.	1.000	.443
Others in the school community who interact with this team often complain about how it functions.	1.000	.705
We invite people from outside the team to present information or have discussions with us.	1.000	.385

Extraction Method: Principal Component Analysis

Table PCA21.1

Test of Sampling Adequacy for the Adapted 21-Item Scale

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.920
Bartlett's Test of Sphericity	Approx. Chi-Square	5727.914
	df	210
	Sig.	<.001

Table CFA21.1

Model Fit Summary of the Adapted 21-Item Scale

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	84	911.978	168	.000	5.428
Saturated model	252	.000	0		
Independence model	21	5858.052	231	.000	25.360

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.844	.786	.869	.818	.868
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.083	.078	.089	.000
Independence model	.195	.191	.200	.000

Table PCA16.1

Test of Sampling Adequacy for the Adapted 16-Item Scale

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.912
Bartlett's Test of Sphericity	Approx. Chi-Square	4710.539
	df	120
	Sig.	<.001

Table PCA16.2

Total Variance Explained by the Factors of the Adapted 16-Item Scale

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.274	45.463	45.463	7.274	45.463	45.463	5.719	35.743	35.743
2	2.406	15.036	60.499	2.406	15.036	60.499	3.000	18.750	54.493
3	1.554	9.713	70.212	1.554	9.713	70.212	2.515	15.719	70.212
4	.886	5.537	75.749						
5	.765	4.782	80.531						
6	.570	3.565	84.096						
7	.525	3.279	87.375						
8	.412	2.577	89.953						
9	.355	2.221	92.174						
10	.316	1.972	94.146						
11	.254	1.586	95.732						
12	.194	1.210	96.943						
13	.162	1.010	97.952						
14	.133	.833	98.785						
15	.114	.715	99.500						
16	.080	.500	100.000						

Extraction Method: Principal Component Analysis

Table PCA16.3

Varimax-Rotated Factor Loadings of Three, Extracted Components in the Adapted 16-Item Scale

Rotated Component Matrix[a]

	Component		
	1	2	3
This team has spent time making sure every team member understands the team's objectives.	.897		
In this team, we often speak up to test assumptions about the issues we have under discussion.	.873		
This team lacks access to useful instruction or training to complete a task.	.556	.571	
Team members go out and get all the information they possibly can from others to accomplish a task such as peers, parents and teachers.	.885		
All the members of this team have more than enough training and experience for the kind of task they have to do.			.580
Most people on this team have the ability to solve the problems that come up in our tasks.	.920		
Certain individuals in this team lack the special skills needed for good team collaboration.		.786	
With focus and effort, this team can do anything we set out to accomplish.	.932		
If you make a mistake on this team, it is often held against you.	.391	.822	
Members of this team are able to bring up problems and tough issues.			.765
People on this team sometimes reject others for being different.	.389	.812	
It is safe to take a risk on this team.			.716
This team tends to handle differences of opinion privately or offline, rather than addressing them directly as a group.	.776	.385	
This team frequently seeks new information that leads us to make important changes.			.693
Others in the school community who interact with this team often complain about how it functions.	.558	.639	
We invite people from outside the team to present information or have discussions with us.			.638

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalization

a. Rotation converged in 6 iterations

Table PCA16.5

Test of Internal Consistency for the Adapted 16-Item Scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.908	.900	16

Figure CFA16.1

Model Structure Showing Path Diagram of the Adapted 16-Item Scale

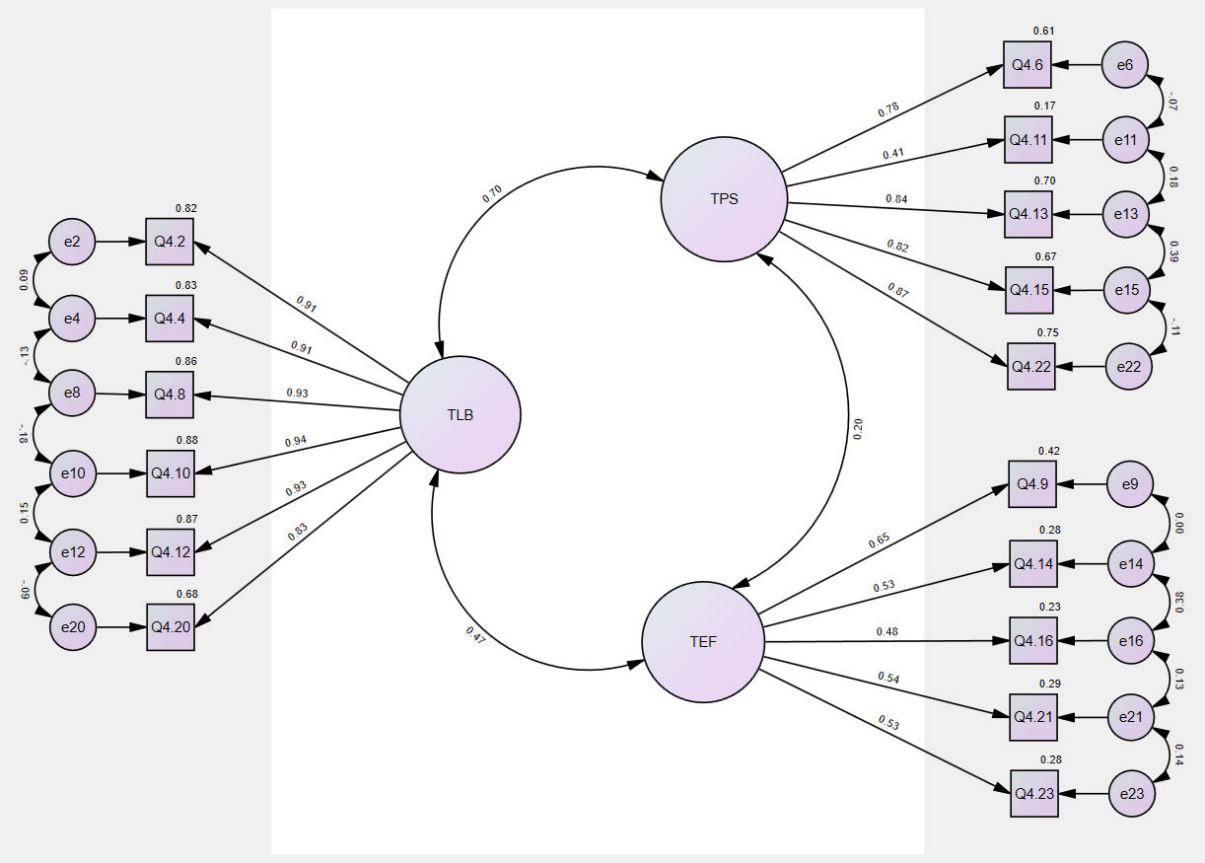


Table CFA16.1

Path Model Fit Statistics of the Adapted 16-Item Scale

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	64	417.560	88	.000	4.745
Saturated model	152	.000	0		
Independence model	16	4795.555	136	.000	35.261

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.913	.865	.930	.891	.929
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.077	.069	.084	.000
Independence model	.232	.226	.237	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	545.560	549.064		
Saturated model	304.000	312.322		
Independence model	4827.555	4828.431		

Table RSM16.6

Generalised Item Analysis for All Items of the Adapted 16-Item Scale

```
------------------------------------------------------------------------------
Item 1
------
item:1 (TLB1)
N 372 (Weighted 372)   Item-Rest Cor.  0.80   Item-Total Cor.  0.84
Obs mean:  3.07  Exp Mean:  3.07  Adj Mean:  3.07  (Exp & Adj use: PV)
Item Threshold(s):    -3.40 -0.28  0.45  3.68   Weighted MNSQ   0.75
Item Delta(s):        -3.37  0.32 -0.16  3.66
------------------------------------------------------------------------------
 Label    Score     Count   % of tot  Pt Bis      t  (p)   PVAvg:1  PV SD:1
------------------------------------------------------------------------------
   1       1.00         3       0.81   -0.20     -3.9(.000) -2.461   1.952
   2       2.00       161      43.28   -0.75    -21.8(.000) -0.641   0.498
   3       3.00        36       9.68    0.03      0.5(.605)  0.266   0.559
   4       4.00       150      40.32    0.68     17.9(.000)  1.098   0.736
   5       5.00        22       5.91    0.20      3.9(.000)  1.251   0.8
==============================================================================
Item 2
------
item:2 (TLB2)
N 372 (Weighted 372)   Item-Rest Cor.  0.83   Item-Total Cor.  0.86
Obs mean:  2.98  Exp Mean:  2.98  Adj Mean:  2.98  (Exp & Adj use: PV)
Item Threshold(s):    -3.23 -0.11  0.61  3.85   Weighted MNSQ   0.62
Item Delta(s):        -3.20  0.49  0.01  3.83
------------------------------------------------------------------------------
 Label    Score     Count   % of tot  Pt Bis      t  (p)   PVAvg:1  PV SD:1
------------------------------------------------------------------------------
   1       1.00         2       0.54   -0.21     -4.1(.000) -3.389   1.569
   2       2.00       169      45.43   -0.77    -23.2(.000) -0.613   0.516
   3       3.00        52      13.98    0.07      1.3(.194)  0.312   0.601
   4       4.00       133      35.75    0.69     18.1(.000)  1.198   0.654
   5       5.00        16       4.30    0.23      4.5(.000)  1.624   0.718
==============================================================================
Item 3
------
item:3 (TLB3)
N 372 (Weighted 372)   Item-Rest Cor.  0.68   Item-Total Cor.  0.73
Obs mean:  2.60  Exp Mean:  2.61  Adj Mean:  2.61  (Exp & Adj use: PV)
Item Threshold(s):    -2.54  0.58  1.30  4.53   Weighted MNSQ   0.76
Item Delta(s):        -2.52  1.18  0.70  4.51
------------------------------------------------------------------------------
 Label    Score     Count   % of tot  Pt Bis      t  (p)   PVAvg:1  PV SD:1
------------------------------------------------------------------------------
   1       1.00        16       4.30   -0.09     -1.8(.072) -0.254   0.754
   2       2.00       199      53.49   -0.66    -16.9(.000) -0.401   0.791
   3       3.00        77      20.70    0.30      6.1(.000)  0.745   0.651
   4       4.00        76      20.43    0.52     11.8(.000)  1.435   0.713
   5       5.00         4       1.08    0.13      2.6(.009)  2.151   0.565
------------------------------------------------------------------------------
```

```
------------------------------------------------------------------------------
Item 4
------
item:4 (TLB4)
N 372 (Weighted 372)   Item-Rest Cor.  0.84   Item-Total Cor.  0.87
Obs mean:  2.99  Exp Mean:  2.99  Adj Mean:  2.99  (Exp & Adj use: PV)
Item Threshold(s):    -3.25 -0.13  0.59  3.83   Weighted MNSQ   0.57
Item Delta(s):        -3.22  0.47 -0.01  3.81
------------------------------------------------------------------------------
 Label    Score     Count   % of tot  Pt Bis      t  (p)   PVAvg:1  PV SD:1
------------------------------------------------------------------------------
   1       1.00        1       0.27   -0.18    -3.5(.000) -4.498   0
   2       2.00      167      44.89   -0.79   -25.1(.000) -0.656   0.475
   3       3.00       48      12.90    0.06     1.0(.278)  0.31    0.557
   4       4.00      146      39.25    0.74    21.2(.000)  1.206   0.679
   5       5.00       10       2.69    0.15     2.8(.004)  1.422   0.83
==============================================================================
Item 5
------
item:5 (TLB5)
N 372 (Weighted 372)   Item-Rest Cor.  0.37   Item-Total Cor.  0.43
Obs mean:  3.81  Exp Mean:  3.81  Adj Mean:  3.81  (Exp & Adj use: PV)
Item Threshold(s):    -4.78 -1.66 -0.94  2.30   Weighted MNSQ   0.86
Item Delta(s):        -4.75 -1.06 -1.54  2.28
------------------------------------------------------------------------------
 Label    Score     Count   % of tot  Pt Bis      t  (p)   PVAvg:1  PV SD:1
------------------------------------------------------------------------------
   1       1.00        1       0.27   -0.17    -3.2(.001) -4.498   0
   2       2.00       15       4.03   -0.18    -3.6(.000) -0.766   0.697
   3       3.00       75      20.16   -0.28    -5.6(.000) -0.408   0.628
   4       4.00      245      65.86    0.26     5.1(.000)  0.454   1.03
   5       5.00       36       9.68    0.12     2.3(.019)  0.742   1.169
==============================================================================
Item 6
------
item:6 (TLB6)
N 372 (Weighted 372)   Item-Rest Cor.  0.81   Item-Total Cor.  0.84
Obs mean:  3.11  Exp Mean:  3.10  Adj Mean:  3.10  (Exp & Adj use: PV)
Item Threshold(s):    -3.45 -0.33  0.39  3.62   Weighted MNSQ   0.74
Item Delta(s):        -3.43  0.27 -0.21  3.60
------------------------------------------------------------------------------
 Label    Score     Count   % of tot  Pt Bis      t  (p)   PVAvg:1  PV SD:1
------------------------------------------------------------------------------
   1       1.00        2       0.54   -0.14    -2.7(.006) -2.533   2.779
   2       2.00      158      42.47   -0.80   -25.3(.000) -0.706   0.42
   3       3.00       37       9.95    0.00     0.0(.980)  0.161   0.533
   4       4.00      148      39.78    0.75    21.7(.000)  1.206   0.684
   5       5.00       27       7.26    0.14     2.7(.006)  0.871   0.672
==============================================================================
Item 7
------
item:7 (TPS1)
N 372 (Weighted 372)   Item-Rest Cor.  0.21   Item-Total Cor.  0.30
Obs mean:  3.24  Exp Mean:  3.23  Adj Mean:  3.23  (Exp & Adj use: PV)
Item Threshold(s):    -3.68 -0.56  0.16  3.39   Weighted MNSQ   1.71
Item Delta(s):        -3.66  0.04 -0.45  3.37
------------------------------------------------------------------------------
 Label    Score     Count   % of tot  Pt Bis      t  (p)   PVAvg:1  PV SD:1
------------------------------------------------------------------------------
   1       1.00       15       4.03   -0.05    -1.0(.320) -0.327   1.35
   2       2.00       73      19.62   -0.20    -4.0(.000) -0.294   0.745
   3       3.00      106      28.49   -0.04    -0.7(.453)  0.15    0.918
   4       4.00      164      44.09    0.25     4.9(.000)  0.625   1.132
   5       5.00       14       3.76   -0.08    -1.4(.144) -0.046   1.164
------------------------------------------------------------------------------
```

Item 8

item:8 (TPS2)
N 372 (Weighted 372) Item-Rest Cor. 0.80 Item-Total Cor. 0.84
Obs mean: 3.18 Exp Mean: 3.18 Adj Mean: 3.18 (Exp & Adj use: PV)
Item Threshold(s): -3.58 -0.47 0.26 3.49 Weighted MNSQ 0.87
Item Delta(s): -3.56 0.13 -0.35 3.47

Label	Score	Count	% of tot	Pt Bis	t (p)	PVAvg:1	PV SD:1
1	1.00	2	0.54	-0.21	-4.1(.000)	-3.389	1.569
2	2.00	155	41.67	-0.78	-24.0(.000)	-0.696	0.428
3	3.00	30	8.06	-0.02	-0.3(.744)	0.11	0.502
4	4.00	143	38.44	0.69	18.4(.000)	1.138	0.727
5	5.00	42	11.29	0.22	4.2(.000)	0.95	0.697

Item 9

item:9 (TPS3)
N 372 (Weighted 372) Item-Rest Cor. 0.65 Item-Total Cor. 0.71
Obs mean: 2.51 Exp Mean: 2.51 Adj Mean: 2.51 (Exp & Adj use: PV)
Item Threshold(s): -2.36 0.76 1.49 4.72 Weighted MNSQ 0.91
Item Delta(s): -2.33 1.36 0.88 4.70

Label	Score	Count	% of tot	Pt Bis	t (p)	PVAvg:1	PV SD:1
1	1.00	40	10.75	-0.13	-2.4(.015)	-0.24	0.976
2	2.00	181	48.66	-0.60	-14.4(.000)	-0.387	0.755
3	3.00	74	19.89	0.26	5.1(.000)	0.752	0.77
4	4.00	75	20.16	0.57	13.2(.000)	1.487	0.604
5	5.00	2	0.54	0.10	1.8(.063)	1.913	0.453

Item 10

item:10 (TPS4)
N 372 (Weighted 372) Item-Rest Cor. 0.26 Item-Total Cor. 0.33
Obs mean: 3.64 Exp Mean: 3.64 Adj Mean: 3.64 (Exp & Adj use: PV)
Item Threshold(s): -4.43 -1.31 -0.58 2.65 Weighted MNSQ 1.15
Item Delta(s): -4.40 -0.71 -1.19 2.63

Label	Score	Count	% of tot	Pt Bis	t (p)	PVAvg:1	PV SD:1
1	1.00	4	1.08	-0.09	-1.7(.089)	-1.071	2.288
2	2.00	26	6.99	-0.23	-4.5(.000)	-0.681	0.828
3	3.00	94	25.27	-0.10	-1.9(.053)	-0.022	0.807
4	4.00	224	60.22	0.20	4.0(.000)	0.452	1.088
5	5.00	24	6.45	0.04	0.8(.415)	0.592	1.073

Item 11

item:11 (TPS5)
N 372 (Weighted 372) Item-Rest Cor. 0.62 Item-Total Cor. 0.68
Obs mean: 2.52 Exp Mean: 2.52 Adj Mean: 2.52 (Exp & Adj use: PV)
Item Threshold(s): -2.37 0.75 1.47 4.71 Weighted MNSQ 1.17
Item Delta(s): -2.34 1.35 0.87 4.69

Label	Score	Count	% of tot	Pt Bis	t (p)	PVAvg:1	PV SD:1
1	1.00	51	13.71	-0.19	-3.6(.000)	-0.338	0.876
2	2.00	173	46.51	-0.50	-10.9(.000)	-0.312	0.834
3	3.00	61	16.40	0.17	3.3(.001)	0.613	0.728
4	4.00	79	21.24	0.56	12.8(.000)	1.428	0.658
5	5.00	8	2.15	0.14	2.7(.007)	1.529	0.901

Item 12

item:12 (TEF1)

N 372 (Weighted 372) Item-Rest Cor. 0.25 Item-Total Cor. 0.32

Obs mean: 3.72 Exp Mean: 3.72 Adj Mean: 3.72 (Exp & Adj use: PV)

Item Threshold(s): -4.60 -1.48 -0.76 2.48 Weighted MNSQ 1.29

Item Delta(s): -4.57 -0.88 -1.36 2.46

Label	Score	Count	% of tot	Pt Bis	t (p)	PVAvg:1	PV SD:1
1	1.00	8	2.15	-0.16	-3.0(.002)	-1.352	1.567
2	2.00	19	5.11	-0.13	-2.6(.009)	-0.338	0.92
3	3.00	81	21.77	-0.17	-3.3(.001)	-0.166	0.908
4	4.00	224	60.22	0.25	4.9(.000)	0.476	1.048
5	5.00	40	10.75	0.00	0.0(.975)	0.382	0.952

Item 13

item:13 (TEF2)

N 372 (Weighted 372) Item-Rest Cor. 0.81 Item-Total Cor. 0.85

Obs mean: 2.88 Exp Mean: 2.88 Adj Mean: 2.88 (Exp & Adj use: PV)

Item Threshold(s): -3.05 0.07 0.80 4.03 Weighted MNSQ 0.64

Item Delta(s): -3.02 0.67 0.19 4.01

Label	Score	Count	% of tot	Pt Bis	t (p)	PVAvg:1	PV SD:1
1	1.00	12	3.23	-0.14	-2.7(.007)	-0.601	1.42
2	2.00	160	43.01	-0.76	-22.5(.000)	-0.637	0.531
3	3.00	72	19.35	0.13	2.4(.014)	0.443	0.655
4	4.00	117	31.45	0.70	18.7(.000)	1.312	0.635
5	5.00	11	2.96	0.16	3.1(.002)	1.364	0.698

Item 14

item:14 (TEF3)

N 372 (Weighted 372) Item-Rest Cor. 0.28 Item-Total Cor. 0.35

Obs mean: 3.70 Exp Mean: 3.70 Adj Mean: 3.70 (Exp & Adj use: PV)

Item Threshold(s): -4.56 -1.44 -0.71 2.52 Weighted MNSQ 1.07

Item Delta(s): -4.53 -0.84 -1.32 2.50

Label	Score	Count	% of tot	Pt Bis	t (p)	PVAvg:1	PV SD:1
1	1.00	2	0.54	-0.12	-2.4(.017)	-2.181	3.276
2	2.00	26	6.99	-0.19	-3.8(.000)	-0.714	0.847
3	3.00	80	21.51	-0.17	-3.3(.001)	-0.205	0.748
4	4.00	237	63.71	0.26	5.1(.000)	0.488	1.043
5	5.00	27	7.26	0.02	0.4(.631)	0.549	1.144

Item 15

item:15 (TEF4)

N 372 (Weighted 372) Item-Rest Cor. 0.71 Item-Total Cor. 0.75

Obs mean: 2.65 Exp Mean: 2.65 Adj Mean: 2.65 (Exp & Adj use: PV)

Item Threshold(s): -2.63 0.49 1.21 4.45 Weighted MNSQ 0.85

Item Delta(s): -2.60 1.09 0.61 4.43

Label	Score	Count	% of tot	Pt Bis	t (p)	PVAvg:1	PV SD:1
1	1.00	26	6.99	-0.17	-3.3(.001)	-0.464	1.026
2	2.00	180	48.39	-0.61	-14.6(.000)	-0.42	0.728
3	3.00	70	18.82	0.18	3.5(.000)	0.565	0.658
4	4.00	90	24.19	0.60	14.5(.000)	1.435	0.658
5	5.00	6	1.61	0.15	2.9(.004)	1.714	0.678

Item 16

item:16 (TEF5)
N 372 (Weighted 372) Item-Rest Cor. 0.30 Item-Total Cor. 0.38
Obs mean: 3.55 Exp Mean: 3.55 Adj Mean: 3.55 (Exp & Adj use: PV)
Item Threshold(s): -4.25 -1.13 -0.41 2.83 Weighted MNSQ 1.29
Item Delta(s): -4.23 -0.53 -1.01 2.80

Label	Score	Count	% of tot	Pt Bis	t (p)	PVAvg:1	PV SD:1
1	1.00	10	2.69	-0.20	-3.9(.000)	-1.262	1.304
2	2.00	35	9.41	-0.19	-3.6(.000)	-0.441	0.738
3	3.00	93	25.00	-0.11	-2.1(.035)	-0.037	0.786
4	4.00	209	56.18	0.26	5.2(.000)	0.519	1.081
5	5.00	25	6.72	0.02	0.3(.744)	0.574	1.184

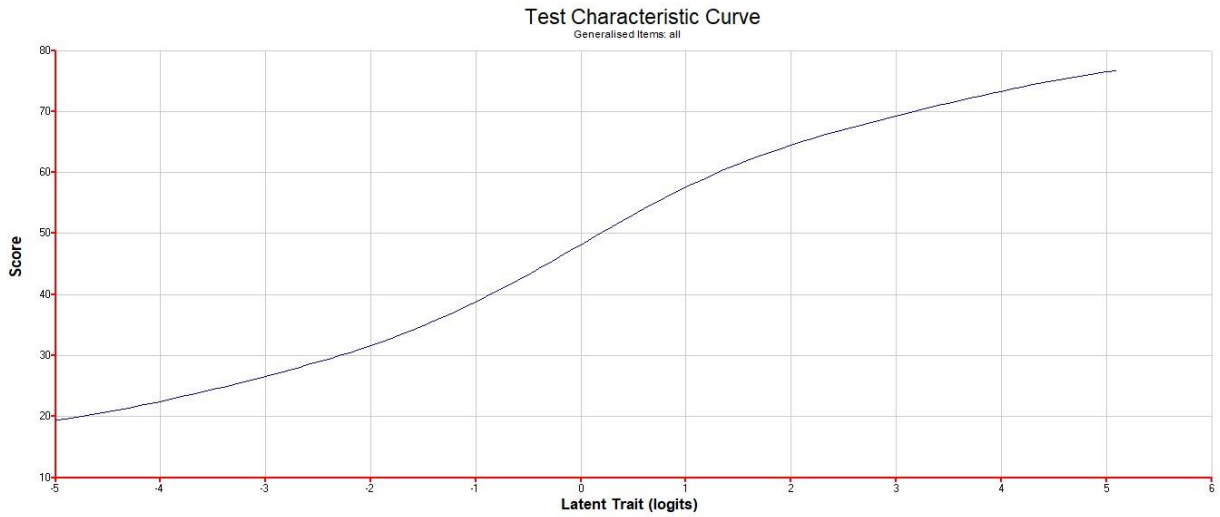
The following traditional statistics are only meaningful for complete designs and when the amount of missing data is minimal.
In this analysis 0.00% of the data are missing.

The following results are scaled to assume that a single response was provided for each item.

N	372
Mean	50.15
Standard Deviation	9.70
Variance	94.07
Skewness	0.05
Kurtosis	-1.07
Standard error of mean	0.50
Standard error of measurement	2.94
Coefficient Alpha	0.91

Figure RSM16.5

Case Characteristic Curve for All Items of the Adapted 16-Item Scale



Note. Figure RSM16.5 graphically represents the test characteristic curve (TCC) also known as a test information curve for the adapted 16-item scale. The higher values in the TCC indicated the measures of *psychological safety* in secondary school student teams with greater precision and the peak of the curve in the TCC is the point at which the items provided the most information about the respondents. The width of the TCC showed the range of the *psychological safety* trait over which the 16-item scale provided useful information about the *psychological safety* of the respondents in their student teams.

Figure CFA16.2

Structural Model Fit Statistics of the Adapted 16-Item Scale

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	8	.042	1	.838	.042
Saturated model	9	.000	0		
Independence model	6	165.281	3	.000	55.094

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	1.000	.999	1.006	1.018	1.000
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.333	.333	.333
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.000	.000	.080	.897
Independence model	.382	.334	.432	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	16.042	16.216		
Saturated model	18.000	18.196		
Independence model	177.281	177.412		

Figure CFA12.1

Model Structure Showing Path Diagram of the Adapted 12-Item Scale

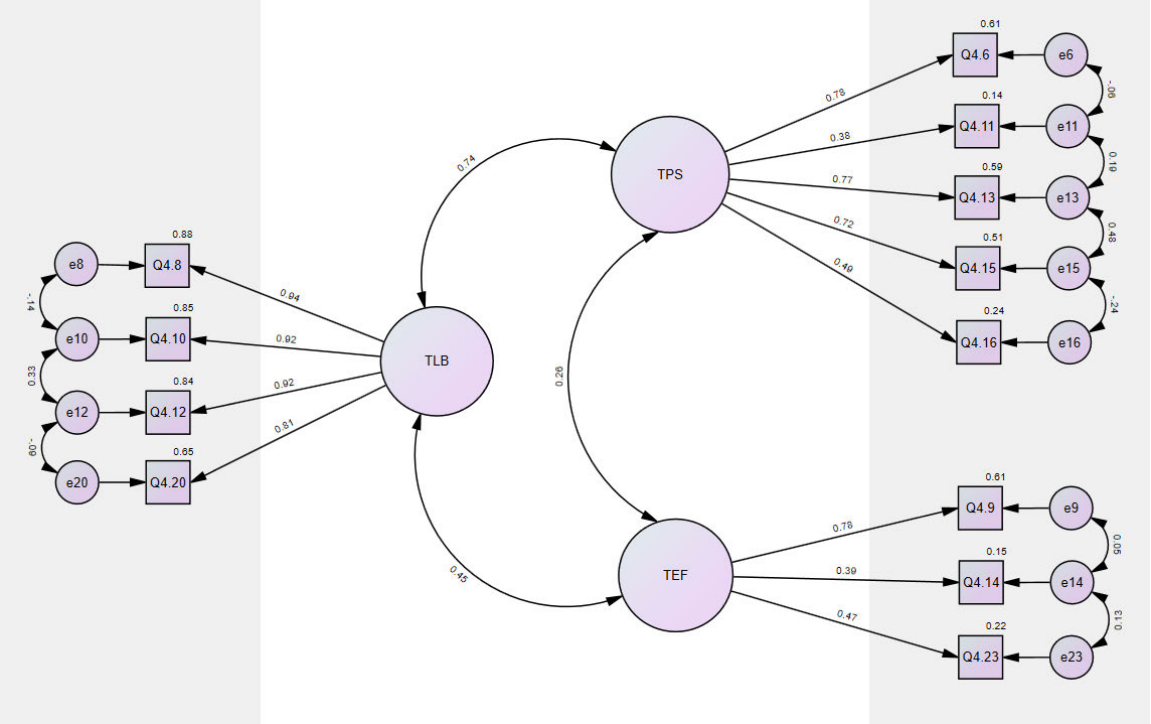


Table CFA12.1

Path Model Fit Statistics of the Adapted 12-Item Scale for Measuring Psychological Safety in Secondary School Student Team Contexts

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	46	488.912	44	.000	11.112
Saturated model	90	.000	0		
Independence model	24	2990.758	66	.000	45.315

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.837	.755	.849	.772	.848
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.165	.152	.178	.000
Independence model	.346	.335	.356	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	580.912	584.252		
Saturated model	180.000	186.536		
Independence model	3038.758	3040.501		

Table RSM12.6

Generalised Item Analysis for All Items of the Adapted 12-Item Scale

TERM 1: item

	VARIABLES			UNWEIGHTED FIT			WEIGHTED FIT		
	item	ESTIMATE	ERROR^	MNSQ	CI	T	MNSQ	CI	T
1	TLB1	0.925	0.069	0.68	(0.86, 1.14)	-4.9	0.72	(0.86, 1.14)	-4.3
2	TLB2	0.271	0.064	0.57	(0.86, 1.14)	-7.0	0.62	(0.87, 1.13)	-6.4
3	TLB3	-1.189	0.077	0.81	(0.86, 1.14)	-2.8	0.82	(0.84, 1.16)	-2.4
4	TLB4	0.082	0.064	0.74	(0.86, 1.14)	-3.8	0.82	(0.87, 1.13)	-2.8
5	TPS1	-0.137	0.065	1.43	(0.86, 1.14)	5.2	1.45	(0.87, 1.13)	6.0
6	TPS2	-0.043	0.064	0.91	(0.86, 1.14)	-1.2	0.97	(0.87, 1.13)	-0.5
7	TPS3	1.095	0.071	0.80	(0.86, 1.14)	-3.0	0.84	(0.86, 1.14)	-2.3
8	TPS4	-0.849	0.071	1.03	(0.86, 1.14)	0.5	1.04	(0.86, 1.14)	0.6
9	TPS5	1.083	0.071	1.05	(0.86, 1.14)	0.7	1.09	(0.86, 1.14)	1.3
10	TEF1	-1.017	0.074	1.23	(0.86, 1.14)	3.0	1.21	(0.85, 1.15)	2.6
11	TEF2	0.456	0.065	0.59	(0.86, 1.14)	-6.6	0.63	(0.86, 1.14)	-6.1
12	TEF3	-0.679*	0.069	1.18	(0.86, 1.14)	2.3	1.20	(0.86, 1.14)	2.7

An asterisk next to a parameter estimate indicates that it is constrained
^ Empirical standard errors have been used
Term is a fixed effect
Separation Reliability=0.993
Chi-square test of parameter equality=1300.93, df=11, Sig. Level=0.000

The following traditional statistics are only meaningful for complete designs and when the amount of missing data is minimal.
In this analysis 0.00% of the data are missing.

The following results are scaled to assume that a single response was provided for each item.

N	372
Mean	37.75
Standard Deviation	7.03
Variance	49.48
Skewness	0.05
Kurtosis	-0.95
Standard error of mean	0.36
Standard error of measurement	2.61
Coefficient Alpha	0.86

Figure CFA10.1

Model Structure Showing Path Diagram of the Adapted 10-Item Scale

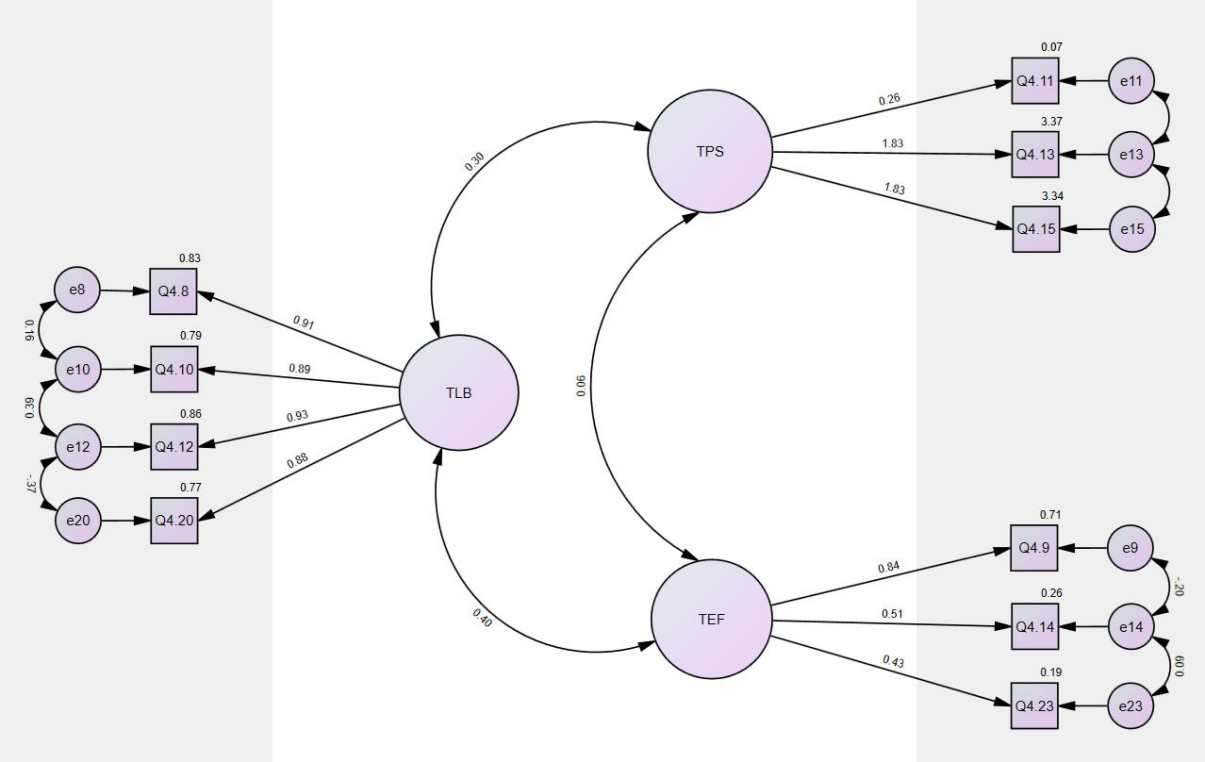


Table CFA10.1

Path Model Fit Statistics of the Adapted 10-Item Scale

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	40	118.063	25	.000	4.723
Saturated model	65	.000	0		
Independence model	20	2504.049	45	.000	55.646

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	.953	.915	.962	.932	.962
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	.100	.082	.119	.000
Independence model	.384	.371	.397	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	198.063	200.508		
Saturated model	130.000	133.972		
Independence model	2544.049	2545.271		

Table RSM10.6

Generalised Item Analysis for All Items of the Adapted 10-Item Scale

TERM 1: item

	VARIABLES			UNWEIGHTED FIT			WEIGHTED FIT		
	item	ESTIMATE	ERROR^	MNSQ	CI	T	MNSQ	CI	T
1	TLB1	0.266	0.064	0.57	(0.86, 1.14)	-6.9	0.62	(0.87, 1.13)	-6.4
2	TLB2	-1.204	0.077	0.82	(0.86, 1.14)	-2.6	0.83	(0.85, 1.15)	-2.2
3	TLB3	0.074	0.064	0.73	(0.86, 1.14)	-4.0	0.81	(0.87, 1.13)	-3.0
4	TLB4	-0.148	0.064	1.43	(0.86, 1.14)	5.2	1.46	(0.87, 1.13)	6.0
5	TPS1	-0.055	0.064	0.90	(0.86, 1.14)	-1.4	0.95	(0.87, 1.13)	-0.7
6	TPS2	1.091	0.071	0.80	(0.86, 1.14)	-3.0	0.84	(0.86, 1.14)	-2.3
7	TPS3	-0.867	0.071	1.14	(0.86, 1.14)	1.9	1.14	(0.86, 1.14)	1.9
8	TEF1	1.080	0.071	1.01	(0.86, 1.14)	0.2	1.05	(0.86, 1.14)	0.7
9	TEF2	0.452	0.065	0.59	(0.86, 1.14)	-6.6	0.63	(0.86, 1.14)	-6.1
10	TEF3	-0.690*	0.069	1.19	(0.86, 1.14)	2.4	1.22	(0.86, 1.14)	3.0

An asterisk next to a parameter estimate indicates that it is constrained
^ Empirical standard errors have been used
Term is a fixed effect
Separation Reliability=0.992
Chi-square test of parameter equality=930.91, df=9, Sig. Level=0.000

The following traditional statistics are only meaningful for complete designs and when the amount of missing data is minimal.
In this analysis 0.00% of the data are missing.

The following results are scaled to assume that a single response was provided for each item.

N	372
Mean	31.42
Standard Deviation	6.16
Variance	38.00
Skewness	0.05
Kurtosis	-1.00
Standard error of mean	0.32
Standard error of measurement	2.39
Coefficient Alpha	0.85

Figure CFA10.2

Structural Model Fit Statistics of the Adapted 10-Item Scale

Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	9	.000	0		
Saturated model	9	.000	0		
Independence model	6	88.831	3	.000	29.610

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	1.000		1.000		1.000
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.000	.000	.000
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Independence model	.278	.230	.329	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	18.000	18.196		
Saturated model	18.000	18.196		
Independence model	100.831	100.962		