A Brief Cognitive Behavioural Intervention to Reduce the Negative Effects of Social Networking Site Use.

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INCLUDED PUBLICATIONS

Herriman, Z., Taylor, A. M., & Roberts, R. M. (2023). Interventions to reduce the negative impact of online highly visual social networking site use on mental health

outcomes: A scoping review. *Psychology of Popular Media*, *13*(1), 111-139. https://doi.org/10.1037/ppm0000455

Herriman, Z., Roberts, R. M., Taylor, A. M., & Slater, A. (2024). A pilot evaluation of a cognitive therapy micro-intervention to reduce the negative impact of online social networking site use on well-being. *Journal of Behavioral and Cognitive Therapy, 34*(2), 100494. https://doi.org/10.1016/j.jbct.2024.100494

Herriman, Z., Roberts, R. M., Taylor, A. M., & Slater, A. (2024). A CBT-based micro-intervention to reduce the negative impact of Instagram use on well-being – A randomised controlled trial. *Psychology of Popular Media – In review.*

ABSTRACT

Online social networking site use has become a daily practice for many. A range of negative psychological outcomes have been linked to social networking site use, particularly with platforms of a highly visual nature, including reduced well-being and body image. Social comparison processes (e.g. appearance-based comparisons) play a considerable role in the association between highly visual social networking site (HVSNS) use and well-being outcomes; HVSNSs provide opportunity for unrealistic social comparisons due to the curated and positive nature of images presented. A need for psychology-informed interventions designed to reduce the negative impact of HVSNS use exists. Cognitive behavioural therapy (CBT) techniques have demonstrated success in therapeutic programs delivered both in person and via an online format, and in addressing social comparison processes generally, rendering CBT a promising treatment modality for addressing these processes.

The overall aim of this research project was to develop and assess the effectiveness of a brief CBT-based program, Social Media Aware (SMA), designed to minimise the negative impact of HVSNS use on a range of well-being outcomes. A systematic scoping review with meta-analysis was conducted to map the existing literature focussed on interventions for psychological impacts of HVSNS use, to inform program design. While highlighting the infancy of the field, findings demonstrated the potential utility of CBT-based and other psychology-informed interventions in minimising the negative impact of HVSNS use on a range of well-being outcomes.

A CBT-based micro-intervention, ‘Social Media Aware’ (SMA), was then developed. This short interactive video intervention focused on cognitive restructuring techniques and targeted a range of negative thoughts stemming from social comparisons across many areas of life and the self. This included perceived success,

happiness, relationships, and attractiveness. A pilot study (*n*=59) was conducted to assess the acceptability of the program and the feasibility of a subsequent randomised controlled trial. Pilot study results demonstrated acceptability of the program, in addition to immediate reductions in negative affect. Data were also collected regarding the types of negative thoughts experienced by participants when using HVSNSs, which confirmed the wide range of thoughts targeted by the SMA program.

A randomised controlled trial (*n*=167) was conducted, and modest but statistically significant improvements were shown across all areas assessed in the desired directions among those who received the intervention, compared to the control group. This included state body satisfaction, negative affect, positive affect, satisfaction with life, and negative automatic thoughts (frequency and believability). No effect of moderation of social comparison orientation nor mediation via negative automatic thoughts were shown.

Overall, this research provided evidence for the efficacy of CBT-based interventions, such as the SMA program, in reducing the negative impact of HVSNS use on well-being and body satisfaction. While demonstrating usefulness as an accessible stand-alone intervention with immediate benefits, findings from the SMA program may also help to inform the future design of more comprehensive social media literacy programs. Future studies should continue to explore the specific factors that may identify those more likely to respond to the program and the potential impact of other CBT-based strategies.

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DECLARATION

I, Zoe Herriman, certify that this work contains no material that has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide.

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CHAPTER 1. EXEGESIS

1.1. Preamble

The research in this thesis was driven by a need for a greater understanding of the negative impact of highly visual social networking site (HVSNS) use on psychological outcomes and intervention tools to help reduce these impacts, as identified during my practice as a clinical psychologist. Prior to the commencement of the current program of research, I spent 18 years practicing as a clinical psychologist, providing treatment to adolescent and adult clients who presented with a wide range of mental health concerns. During this practice I noticed that social media use was a common trigger for negative thoughts and feelings, in particular those relating to negative self-evaluation. This seemed to be even more prevalent among younger clients who reported a higher level of social media use. This led me to examine the literature to gain a greater understanding of the topic, and to search for interventions that may assist my clients. This search highlighted the dearth of research in the field and the then lack of easily accessible programs that can be incorporated into psychology practice.

I was particularly interested in the potential benefit of cognitive behavioural therapy (CBT) strategies to reduce the negative impact of social media use for two main reasons. Firstly, a requirement of psychologists providing services via the Australian government funded services (Medicare) included the expectation that treatment provided was evidence-based, such as CBT (Australian Government Department of Health and Aged Care, 2023), leading to my experience with this modality. Secondly, I experienced success as a practitioner with this approach in the clinical setting both in terms of therapeutic support for mental health concerns more broadly, and specifically when supporting clients to manage the negative impact of social media use. In the application of CBT, practitioners commonly help clients to

identify their negative automatic thoughts and assist them to develop skills to respond to those thoughts in adaptive ways. When supporting clients to identify and respond to negative automatic thoughts relating to HVSNS use, I observed commonalities in the themes of negative self-evaluations that stemmed from the social comparisons that occurred when using social media. I consequently found myself using similar methods to help restructure these cognitions across different clients, with beneficial effects. This led me to consider whether a CBT-based intervention or education program may be of benefit to the wider community. As such, the idea to design and evaluate the effectiveness of a brief and easily accessible program, targeted to reduce the negative impact of social media use, was born.

Before commencement of the current research, my preliminary search of the literature suggested that different types of social media platforms had different features and, in turn, contributed to different psychological outcomes (Kross et al., 2021; Royal Society for Public Health, 2017, May). For example, one survey found that using the video-sharing platform YouTube led to small reductions in symptoms of anxiety, depression and loneliness, while Instagram, Facebook, Snapchat and Twitter (now known as 'X') use led to increases in these symptoms (Royal Society for Public Health, 2017, May). I chose to focus on HVSNS platforms for the current project, such as Facebook and Instagram, due to their frequent use in the Australian population (The Global Statistics, 2023), increasing popularity across the world (Olafson & Tran, 2021; Ortiz-Ospina, 2019) and the comparatively large amount of research currently available on the mental health impacts of use of these platforms, particularly Facebook, in the areas of well-being and body image.

1.2. Structure of Project and Thesis

The current project was structured as follows. First, a review of the relevant literature on the impact of HVSNS use is presented in Chapter 2. This includes discussion of the mechanisms behind the negative impact of HVSNS use and an overview of existing interventions designed to reduce the negative impact. A systematic scoping review was conducted, to identify all possible studies that may inform the development of an intervention program, and this forms Chapter 3 of the thesis. This included an analysis of program design, outcome variables of interest, methods of assessing outcomes, theoretical underpinnings of intervention programs, and intervention effects. The scoping review confirmed small numbers of psychology-informed interventions that mainly focussed on body image-related outcomes. It also highlighted the dearth of interventions focusing on well-being outcomes more generally, such as cognitive well-being (life satisfaction) and emotional well-being. However, many of the included studies demonstrated modest improvements in their assessed outcomes (body image and other well-being outcomes), highlighting the potential of psychology-informed studies in the area. Two brief interventions of a CBT nature were identified, with one reporting a positive impact, supporting the use of CBT for the current project.

Following the systematic scoping review, a brief CBT-based e-learning program aimed at reducing the negative impact of HVSNS use on both well-being and body image, named Social Media Aware (SMA), was developed. The theoretical basis and empirical support behind the application of a CBT approach, the e-learning video format, micro-intervention format, and CBT strategies chosen are presented in Chapter 4. Chapter 5 includes elaboration of the reasons behind methodological decisions that could not be fully discussed in the individual journal articles due to the need for

conciseness. The acceptability and feasibility of the SMA program was then assessed via a pilot study, outlined in Chapter 6. The program was found feasible and acceptable to participants, in addition to preliminary findings to suggest that the program may be useful in reducing negative affect in the short term. A randomised controlled trial was subsequently conducted and is presented in Chapter 7. The thesis finishes with a discussion of the findings of the thesis as a whole and implications of thesis findings for practice and research. While each manuscript (Chapters 3, 6 and 7) contains a brief overview of individual study limitations, implications and directions for future research, a discussion of these relating to the project as a whole is also explored.

CHAPTER 2. INTRODUCTION AND LITERATURE REVIEW

2.1. Preamble

This chapter provides an overview of the literature relating to the impact of social media use on well-being. A description of the development of social media platforms and the association between HVSNS and well-being and mental health outcomes is first provided. This chapter then includes discussion of social comparison as an important driver in the relationship between HVSNS use and wellbeing, and highlights the importance of distinguishing between passive and active forms of social media use. A brief outline of the predominant intervention designs for the prevention and treatment of the ensuing negative sequalae is then provided. A rationale for an e-learning CBT-based micro-intervention is then presented, before aims and objectives of the thesis are finally discussed.

2.2. The Rise of Social Media and Social Networking Sites

Online social media use has become increasingly common worldwide across a range of age groups, with the number of social media users surpassing 5 billion in 2024 (Statista, 2024a). While smaller, less prolific predecessors had existed since the 1970's, social media use is considered by many to have begun in 2004, when the platform 'Myspace' achieved 1 million monthly users (Ortiz-Ospina, 2019). Since then, numerous platforms with varying features have evolved, from microblogging accounts, such as Twitter, to social networking sites, such as Facebook, and video sharing platforms, such as YouTube (Kuss & Griffiths, 2017).

While the success of individual platforms has varied, social media use as a whole has rapidly increased since 2004. For example, the percentage of adults in the USA who used social media rose from 5% in 2005 to 79% in 2009 (Ortiz-Ospina, 2019).

Such increases have been observed globally, with Facebook use increasing from 1.5% of the world's population in 2008 to approximately 30% in 2018 (Ortiz-Ospina, 2019). While in 2024 a worldwide average of 2 hours and 23 minutes per person per day was recorded, variation in social media use can be observed across countries, varying from 31 minutes per day in Japan to 3 hours and 49 minutes per day in Brazil (Statista, 2024b; The Global Statistics, 2024a). Australians over the age of 16 years have demonstrated trends in social media consumption similar to the global estimate social media use, with 2024 data revealing an average of 2 hours per day per person (The Global Statistics, 2024b). Facebook and Instagram were reported to be the most popular social media platforms in 2024, with 73.6% and 55.5% of the Australian population, respectively, actively using the platforms (The Global Statistics, 2023). This high level of consumption of social media platforms which have a high proportion of visual content, like Facebook, Instagram and Snapchat, has also become particularly commonplace across the world. Indeed, Instagram and Facebook represent 2 of the 3 most popular social media platforms, with over 2 billion users each, and with Snapchat having over 800 million users worldwide (Statista, 2024c).

Concurrent to the increase in social media consumption since 2004, there has been an increase in the rates of mental health difficulties among young people, such as eating disorders, depression and suicidality (Galmiche et al., 2019; Mojtabai et al., 2016). This has led to suggestions that social media may be the cause (Twenge, 2020), including a warning in 2011 from the American Academy of Paediatrics Council on Communications and Media about the risks of excessive social media use among young people (O'Keeffe et al., 2011). Since then, a large amount of research has focused on the potential psychological consequences and methods for reducing any negative impacts of social media use (Kross et al., 2021).

2.3. Variations in Social Media Platforms

2.3.1. Definitions of Social Media Platforms

While the terms social media and social networking sites have been used interchangeably within the literature, some agreement on their definitions has emerged. Social media encompasses a broad range of online interactive web platforms that allow people to develop and share online content (Kietzmann et al., 2011; Kuss & Griffiths, 2017). The term has been used to refer to a variety of online weblogs ("blogs"), virtual games, video-sharing platforms, virtual social worlds, and online collaborative projects (Kuss & Griffiths, 2017). Social networking sites are a distinct subset of social media (Lambert et al., 2022) that have the primary aim of connecting people by allowing them to build an online profile, which they can use to communicate with others and build networks (Boyd & Ellison, 2007; Kuss & Griffiths, 2017). This can include microblogging sites such as X (formerly known as Twitter) and Weibo, and even online gaming platforms that allow for chat-based or verbal interactions between players during gameplay (Kuss & Griffiths, 2017).

2.3.2. Highly Visual Social Networking Sites

Highly visual social networking sites (HVSNSs), also at times referred to as appearance-focused or highly visual social media, represent another subgroup that has been proposed within the literature (Marengo et al., 2018; McCrory et al., 2020). The popularity and use of HVSNSs has received particular attention due to concerns about negative psychological outcomes (Marengo et al., 2018; McCrory et al., 2020). While social platforms are regularly evolving, at the time of commencement of the present program of research these included social networking site platforms such as Snapchat,

Instagram, and Facebook (Marengo et al., 2018; McCrory et al., 2020). Such platforms are characterised by their high visual content by allowing the sharing of photographs and videos, which can be digitally modified. This allows consumers to carefully curate their online presentations, with people inevitably posting more self-promoting, positive images, and news than negative (Mehdizadeh, 2010; Verduyn et al., 2015; Vogel & Rose, 2016). In turn, concerns have arisen about pressures to live up to unrealistic appearance and other ideals, such as the pursuit of thinness or measures of success, and ensuing negative judgements about the self (Perloff, 2014; Rodgers, 2015; Sanzari et al., 2023; Verduyn et al., 2020). Due to the variations across platforms and well-being outcomes found between platforms (Beyens et al., 2020; Sanzari et al., 2023), the importance of distinguishing between different platforms in research, such as HVSNSs and other forms of social media, has been recognised (e.g. Kross et al., 2021).

2.4. Highly Visual Social Networking Site Use and Psychological Outcomes

Concerns regarding the psychological impact of social media use on mental health have been longstanding (O'Keeffe et al., 2011; Twenge et al., 2018). However, research examining the mental health outcomes of HVSNSs has been at times contradictory, with both positive and negative well-being outcomes found. Some have reported positive outcomes including increased social capital (Ellison et al., 2007), sense of connectedness with others (Mitev et al., 2021; Sheldon et al., 2011), life satisfaction (Valenzuela et al., 2009), and self-esteem after viewing one's own profile (Khoo et al., 2024). Research in older adults has found social media use to be associated with improved complex working memory (Myhre, Mehl & Glisky, 2017) and an increased sense of connection among those with communication barriers, such as hearing impairments (Paglieri et al., 2023). Some researchers have highlighted an

additional benefit of social media as a mechanism for providing access to information and emotional support for vulnerable groups at a higher risk of mental health difficulties who cannot receive support elsewhere (Selkie et al., 2020).

A wide range of negative psychological consequences to social media exposure have also been recognised. This includes behavioural issues, such as an increase in conduct problems and episodic heavy drinking among adolescents (Brunborg & Burdzovic Andreas, 2019). Social media 'addictions', characterised by the compulsive use of social media and at times often referred to as 'pathological', 'problematic' or 'maladaptive' social media use, have also been found to stem from excessive social media exposure (Brailovskaia et al., 2019; Khumsri et al., 2015; Parlak Sert & Başkale, 2022).

Various negative emotional consequences have also been highlighted in the literature to stem from social media exposure. This includes reduced well-being (Faelens et al., 2021; Kross et al., 2013; Lambert et al., 2022), decreased life satisfaction (Brailovskaia, Ströse, et al., 2020), increased negative mood (Brown & Tiggemann, 2016), depression, (Frost & Rickwood, 2017; Lambert et al., 2022; Reed et al., 2023), suicidal thoughts (Twenge et al., 2018), anxiety (Frost & Rickwood, 2017; Lambert et al., 2022; Moujaes & Verrier, 2021), and dissatisfaction with one's intimate relationships (Yacoub et al., 2018) and sexual life (Gryc et al., 2023). Unique outcomes have also been associated with exposure to visual content on social media that focusses on appearance and weight (Rodgers & Nowicki, 2023; Sanzari et al., 2023). These outcomes include increased body image concerns (Fardouly et al., 2020; Roberts et al., 2022; Rodgers & Nowicki, 2023), body dissatisfaction (Casale et al., 2019; Engeln et al., 2020; Gryc et al., 2023; Sherlock & Wagstaff, 2019) and disordered eating (Frost & Rickwood, 2017; Stein et al., 2021).

The association between social media use and psychological outcomes such as wellbeing is also influenced by a number of personal and behavioural factors. This includes baseline levels of depression (Appel et al., 2015), poor self-esteem (Vidal et al., 2020), poor body image (Linardon, 2023), user motivations for social media use (Nesi & Prinstein, 2015), propensity to experience 'FOMO' ('fear of missing out' [an apprehension about missing out on shared enjoyable experiences]; Einstein et al., 2023; Przybylski et al., 2013; Rozgonjuk et al., 2020), and personality factors (e.g. narcissism; Brailovskaia, Bierhoff, et al., 2020). Another potential moderator in the relationship between social media use and wellbeing outcomes is gender. While gender has not consistently been found to be a moderator in the relationship between social media use and mental health (Meier & Reinecke, 2020), social media exposure has been found more likely to lead to disordered eating and poor body image among women, compared to men (Dane & Bhatia, 2023). While the influence of user characteristics is still under exploration, there has also been recognition in the literature that different user behaviours when engaging with social media are associated with unique emotional outcomes and, as such, should be examined individually (Kross et al., 2021).

2.5. Passive vs Active Social Media Use

Closer analysis of the associations between social media use, including HVSNS use, and well-being led to the distinction between passive and active forms of use. Active use refers to any online activity that involves directly communicating with others, such as posting or commenting on another's post (Verduyn et al., 2015). Passive forms of use refer to any online activity that does not involve direct communication with others, such as browsing or consuming information (Verduyn et al., 2015). While

active use has shown associations with improved well-being (Escobar-Viera et al., 2018), passive social media use (including HVSNS use) has been consistently associated with the poorest psychological outcomes. This includes reduced well-being, higher levels of body dissatisfaction, and increased depressive symptoms (Chen et al., 2016; Escobar-Viera et al., 2018; Fioravanti et al., 2021; Frost & Rickwood, 2017; Ryding & Kuss, 2020; Tiggemann & Barbato, 2018; Verduyn et al., 2015). This association has been observed in both cross-sectional studies and in experimental research that was designed to investigate causal effect (Engeln et al., 2020; Hicks & Brown, 2016; Mohammed, 2020; Verduyn et al., 2015). For example, in a study by Verduyn et al. (2015), participants who passively used Facebook for 10 minutes experienced a reduction in subjective well-being, while people who used the platform actively did not. Similarly, Engeln et al. (2020) found that only 7 minutes of passive Instagram use led to increased negative affect. This association has been explained by the opportunity to compare oneself negatively to others during passive use, without the benefits that come with more active forms of use that involve communicating with others, such as an increased sense of connection (Kross et al., 2021; Nisar et al., 2019). Findings that people tend to use HVSNSs passively 50% more often than they do actively (Verduyn et al., 2015) may also help to explain the negative psychological impacts found from HVSNS use.

Despite widespread recognition of the value in distinguishing between passive and active forms of social media use (Kross et al., 2021; Verduyn et al., 2021), the delineation has also attracted some criticism, with meta-analyses failing to find consistent negative associations with passive use and well-being outcomes (Liu et al., 2019; Valkenburg et al., 2021; Yin et al., 2018). This has led to the suggestion that the classification of active vs passive use may be an oversimplification that does not

sufficiently capture the heterogeneity of social media user experiences (Meier & Krause, 2023). User experiences, and therefore consequences of those experiences, are likely to differ dependent on the social media platforms used. This includes exposure to differing content dependent on the unique constellation of 'profiles' or 'pages' each user follows (Meier & Krause, 2023). Further, experiences may be impacted by other individual factors such as personality traits (Meier & Krause, 2023). However, despite such concerns, the active/passive dichotomy is still considered by many as a more effective framework for classifying social media behaviours and measurement of potential harmful effects of social media exposure than measuring time spent on social media alone (Meier & Krause, 2023; Verduyn et al., 2021).

2.6. Social Comparison Theory and Social Media

Social comparison is the cognitive process whereby people use others as an external guide against which to assess aspects of themselves, such as their abilities, social standing, and attractiveness (Festinger, 1954). According to social comparison theory, people have an innate drive to evaluate themselves and their lives by comparing themselves to similar others (Festinger, 1954). Social comparison theory postulates that social comparison is integral for fulfilling human needs, such as the need for approval and affiliation with others (Festinger, 1954). Indeed, social comparison has been found present across cultures (Baldwin & Mussweiler, 2018) and the lifespan (Callan et al., 2015). Such comparison processes can be detrimental to well-being, particularly when comparing oneself to those who are perceived to be outperforming or superior to us in some way (upwards social comparison; Brickman & Bulman, 1977). In contrast, comparing oneself with those perceived as less fortunate (downward social

comparisons), can have beneficial psychological outcomes, including higher levels of gratitude and fewer negative emotions (Nicuță & Constantin, 2021).

Numerous studies have shown that social comparison processes are an important driver in the association between the consumption of various forms of social media, particularly with respect to passive use, and poor well-being outcomes (Kross et al., 2021; Verduyn et al., 2020; Verduyn et al., 2015). Social comparison theory has often been applied in relation to the psychological impacts of consuming forms of traditional media, such as magazines. A recurrent theme in the literature includes the attractiveness of models and actors often used in advertising campaigns, presenting opportunities for unrealistic upwards comparisons and the potential for the development of problematic body image and disordered eating (Crusius et al., 2022). The inclusion of social media into this media landscape has led to increasing concerns relating to social comparison and mental health outcomes from such exposure. Although people are known to also make comparisons with comparison targets who are less similar to oneself (Gilbert et al., 1995), social comparison theory postulates that people are even more likely to compare themselves to similar others (Festinger, 1954). As those using social networking sites are presented with images and news not only from famous celebrities but also from one's chosen peer group, social comparisons may occur even more frequently than when using other forms of traditional media.

In contrast to the offline world and other forms of traditional media, social networking sites also provide greater opportunity for upwards social comparisons due to the overly positive news and images presented. This may lead consumers to view others as happier, more successful or attractive than they actually are (Verduyn et al., 2020; Verduyn et al., 2017). While some adaptive or positive experiences, such as inspiration and admiration, have been found from such upwards social comparisons

(Tosun & Kaşdarma, 2020), negative experiences, such as such as envy and poorer self-evaluations (Chen et al., 2016; Weber et al., 2021) have been found to be commonly invoked following social media use.

In particular, HVSNSs are thought to encourage appearance-based comparison processes due to the focus on visual images and appearance-based pressures, such as images of unrealistic 'thin-ideal' body presentations (Perloff, 2014; Rodgers, 2015), placing consumers at a higher risk of body image concerns (Marengo et al., 2018). Furthermore, users can provide feedback via social networking sites through likes and comments, which may give signals to users about one's social desirability (de Valle et al., 2021). Social comparison, and especially upwards social comparison, on social media has been found to occur more frequently during passive use than active use and has also been associated with poorer well-being (Nisar et al., 2019; Yoon et al., 2019). Indeed, a meta-analysis of 33 studies by Yoon et al. (2019) found that more frequent general social comparisons on social networking sites were related to higher levels of depressive symptoms, with a small to medium effect (r= 0.24). A greater frequency of upward social comparisons was found associated with higher levels of depressive symptoms with a medium effect (r= 0.32). Further highlighting the impact of this cognitive process, both general and upwards social comparisons on social networking sites were found to be more strongly related to depression than the amount of time spent on platforms.

2.7. Interventions to Address the Negative Impact of Highly Visual Social Networking Sites

2.7.1. Exposure Reduction Strategies.

While most of the research in the HVSNS field has focused on the mechanisms driving negative psychological consequences of use, studies on interventions to reduce the negative effects of use are emerging. Much of this research has adopted the behavioural strategy of exposure reduction or abstinence from social media use. Improvements across a range of mental health outcomes have been found with such approaches, including improvements in measures of life satisfaction (Allcott et al., 2020; Coyne & Woodruff, 2023; Fioravanti et al., 2020), perceived well-being (Graham et al., 2021; Lambert et al., 2022), positive affect (Fioravanti et al., 2020), happiness (Allcott et al., 2020), and appearance satisfaction (Coulthard & Ogden, 2018). Decreases in depression (Davis & Goldfield, 2024; Hunt et al., 2023), eating disorder symptoms (Dondzilo et al., 2024), body image dissatisfaction (Balbo et al., 2017), anxiety (Abbasi & Drouin, 2019; Lambert et al., 2022), social media addiction symptoms (Brailovskaia, Ströse, et al., 2020; Coyne & Woodruff, 2023), and stress (Coyne & Woodruff, 2023; Vanman et al., 2018) have also been identified following exposure reduction interventions. However, a reduction in HVSNS exposure has also at times been found to negatively impact measures of social connectedness. This includes lower social connection and capital (Mitev et al., 2021), increased feelings of social pressure (Stieger & Lewetz, 2018) and increased loneliness (Vally & D'Souza, 2019) with HVSNS abstinence. This raises the question of whether another approach could be taken that allows one to experience potential benefits arising from HVSNS use, while avoiding potential negative impacts.

Questions regarding the acceptability of exposure reduction approaches also exist, with such techniques not always being well received. For example, qualitative findings from Brown and Kuss (2020) found that many participants who were requested to undertake a 7-day period of abstinence expected to have difficulties with doing so. Reported anticipated problems included difficulties coping with stress when unable to distract oneself with social media, concerns about feeling bored, and anticipated troubles with resisting the habit. Such anticipated difficulties with abstinence are unsurprising as social media has become an integral part of communicating with others, staying in touch with friends and family, purchasing products, and accessing news (Oberlo, 2023). Indeed, some studies adopting social media exposure reduction strategies reported attrition rates of over 40% (Hunt et al., 2021; Przybylski et al., 2021), adding to concerns about the feasibility of this approach over the longer term.

2.7.2. Manipulation of Social Media Content

Some researchers have examined the impact of altering or curating HVSNS content on well-being outcomes. For example, Fardouly and Holland (2018) examined the potential impact of attaching written disclaimer-type labels to idealised social media images on women's body dissatisfaction and mood, such as “Not real life - I didn’t pay for this outfit, took countless photos trying to look hot for Instagram”. They found this approach intervention to have no impact on mood, and participants who viewed idealised social media images experienced a decline in state body dissatisfaction irrespective of the presence of disclaimers. On the other hand, Slater et al. (2019) found improvements with a small effect in body satisfaction (d= 0.21) among women who viewed parody images of thin-ideal celebrity Instagram posts, while finding no improvements in body satisfaction among women who were exposed to the thin-ideal

images alone. Fardouly et al. (2023) also examined the potential impact of body positive content (content promoting acceptance and love for all body types) on HVSNS users. Young adult women were requested to follow either a body positive Facebook group, an appearance neutral Facebook group, or use Facebook as normal for two weeks. They found decreases in body dissatisfaction post-task among those in the body positive (of small effect; η_p^2=0.05) and appearance neutral groups (of small effect; η_p^2=0.03), as well as decreases in appearance comparisons among the body positive group (of small effect; η_p^2=0.05). These improvements were also maintained at the 4-week follow-up. While providing valuable insight into the relationship between social media content and outcomes, limitations with such content manipulation strategies exist as users do not have control over what members of their network post. For example, in a survey of over 1,200 Australian adolescents 51% reported seeing unwanted content on social media (The University of Sydney, 2023).

2.7.3. Social Media Literacy Programs

Alternative approaches have been adopted to try to minimise the psychological harm caused by social media use without necessitating abstinence or reduction in exposure. Building on the success of traditional media literacy programs in reducing the negative impacts of traditional media exposure on well-being outcomes (Wade et al., 2017; Zuair & Sopory, 2022), social media literacy programs are emerging. The development of specialised programs for the social media landscape is important, given that social media provides users with the option to create and share content, and exposure therefore differs from traditional media sources (e.g. magazines; Perloff, 2014). As HVSNSs also have distinct features and pressures associated with uploading and viewing images (Gordon et al., 2021; Holland & Tiggemann, 2016; McLean et al.,

2019), relative to other forms of social media, they warrant further unique and targeted interventions.

While mental health outcomes of interest have varied, social media literacy programs share a focus on increasing awareness about their potential for negative impact on mental health, and often present strategies to manage the associated pressures. McLean et al. (2017) undertook a pilot evaluation of a social media literacy program (BOOST) designed to reduce eating disorder risk factors with adolescent girls. The 3 x 50-minute session program was designed to teach skills required to challenge advertising and images presented by social media and increase resilience to appearance comparisons. Improvements of small effect sizes were observed for weight satisfaction (d= 0.19) and disordered eating measures (d= 0.26) in those who undertook the program, relative to a control group. Gordon et al. (2021) undertook an evaluation of a social media literacy program (SoMe) across 4 x 50-minute sessions with a focus on improving body image, dieting and well-being outcomes. The program aimed to provide skills to critique social media content, develop strategies to respond to negative feedback, and encourage less of an appearance-focus in their social media interactions. At 6-months follow-up small positive intervention effects were found for dietary restraint (d=0.24) and depression scores (d=0.22) and among girls, and in self-esteem (d=0.29) among boys.

Brief, single-session social media literacy programs have also been developed, with (Bell et al., 2021) evaluating the efficacy of a 1-hour program (Digital Bodies). The program aimed to improve body image by targeting appearance-related pressures in the social media environment. Adolescent participants, irrespective of gender, demonstrated increases in body satisfaction with a small effect in the week following intervention and at 8-week follow-up (d= -0.38, d=-0.37, respectively). Girls were also

found to have less thin-ideal internalisation post-intervention of moderate effect size (*d*= 0.78); however, this was not maintained at follow-up. While demonstrating improvements in body image-related outcomes stemming from appearance-based social comparisons, there is an ongoing need for programs that also target social comparisons more generally, such as with ones abilities, relationships, or popularity, that may underpin reduction in other well-being outcomes (Kross et al., 2021). The need for more easily accessible options also remains, with many of the existing social media literacy programs difficult for the general community to access and labour intensive to deliver.

2.7.4. Psychology-Informed Programs

A variety of brief and more accessible psychology-informed programs are also emerging and have demonstrated some success, as explored in detail in Chapter 3. This includes the study by Aboody et al. (2020) who developed a CBT and mobile phone-based intervention that trained users how to identify and challenge maladaptive body image-related beliefs. Those who used the app for 4 minutes per day for 2 weeks were found to experience a reduced impact of HVSNS exposure on a range of symptoms when compared to a control group who did not use the app. Many of these improvements were of moderate to large effects and were also maintained at 1-month follow-up, including body image disturbance (*d*= 0.61), appearance satisfaction (*d*= -0.67), self-esteem (*d*= 0.55), and trait physical appearance anxiety (*d*= 0.89). Gobin et al. (2022) examined whether a 3-minute self-compassion writing task could prevent increases in body dissatisfaction among women following exposure to images of thin women on Instagram. Those who undertook the writing task experienced less appearance dissatisfaction after viewing the thin-ideal images relative to the control

group (small effect; *d*= 0.21). While weight dissatisfaction remained relatively unchanged among those who undertook the writing task from pre- to post- exposure, those in the control group experienced significant increases in weight dissatisfaction following exposure to the thin-ideal images (*d*= 0.07). These findings support the use of brief, targeted designs and contribute to the decision for a brief intervention design for the current project, as discussed in detail in Chapter 4.

2.8. Aims of Thesis

The overarching aim of this thesis was to design and evaluate the effectiveness of an easily accessible psychological intervention aimed at reducing the negative impact of passive HVSNS use on well-being outcomes. The program of research aimed to contribute to the literature by isolating and examining the effectiveness of cognitive restructuring techniques for managing negative impacts of social media use and to provide an easily accessible, cost-effective option for potential clinical use. The thesis involved three main objectives; firstly, to review and integrate the current literature focused on existing interventions designed to minimise the negative impact of HVSNS on well-being outcomes. This was done to identify gaps in the literature and inform intervention design. Secondly, the proposed research aimed to design a cognitive restructuring intervention (Social Media Aware; SMA) program. The intervention aimed to reduce the frequency of social comparisons to online images and related text, by changing the perception that they are a realistic source of comparison and reduce the negative emotions that follow. The final aim of the study was to examine the program's efficacy. A pilot study was initially conducted to determine acceptability and feasibility. A randomised controlled trial was subsequently conducted to determine the effectiveness of the intervention in reducing the negative impact of HVSNS use on

well-being and body satisfaction. It was hypothesized that the CBT program would reduce the negative impact of HVSNS use on well-being and body satisfaction.

CHAPTER 3. PAPER ONE

3.1. Preamble

The aim of this first study was to map the existing literature relating to interventions designed to minimise the negative impact of HVSNS use on mental health outcomes through a systematic scoping review. At the time the study was conducted, interventions had only been recently emerging in the literature and no such review had been conducted. The study aimed to identify approaches that had shown promise to help inform the intervention design for the present project, along with methods for assessing efficacy of the intervention. Effect sizes for relevant study outcomes were also calculated, presented, and pooled, where appropriate.

Herriman, Z., Taylor, A. M., & Roberts, R. M. (2023). Interventions to reduce the negative impact of online highly visual social networking site use on mental health outcomes: A scoping review. *Psychology of Popular Media*, *13*(1), 111-139. https://doi.org/10.1037/ppm0000455

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Principal Author

Name of Principal Author (Candidate)	Zoe Herriman		
Contribution to the Paper	Conceptualisation, Methodology, Data curation, Formal analysis, Writing – original draft.		
Overall percentage (%)	85%		
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.		
Signature		Date	28.02.24

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);
ii. permission is granted for the candidate in include the publication in the thesis; and
iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Dr. Amanda Taylor		
Contribution to the Paper	Methodology, Validation, Writing – review & editing, Supervision.		
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Please cut and paste additional co-author panels here as required.

3.3. Submitted Manuscript

Abstract

The popularity and usage of highly visual social networking site (HVSNS) platforms, such as Facebook, Instagram, and Snapchat, have increased exponentially over recent years. Research suggests several negative mental health outcomes, including body dissatisfaction, increased depression, and reduced well-being. While targeted interventions have emerged, they have had mixed outcomes and vary in objective and design. A scoping review was undertaken to map the existing literature relating to interventions designed to reduce the negative impact of highly visual social networking sites on psychological outcomes to inform future program development. A systematic search of the literature was conducted, and the features and effectiveness of interventions were examined. Effect sizes (using Hedge's g) were additionally calculated using a random effects model, with data pooled where possible. Results indicated a wide variety of approaches to interventions and with focus on varying mental health outcomes. Existing interventions demonstrate promise with a general trend towards small improvements in well-being outcomes. However, the review highlights the need for consistency in terminology relating to online platforms, development of interventions that are theory driven, along with improved methodological rigour. The continued development of psychological programs that are designed to minimise the negative impact of HVSNSs on mental health outcomes is encouraged across diverse populations.

Key words: Highly visual social networking, social media, mental health, well-being, intervention.

Public Policy Relevance Statement

Psychology-informed interventions designed to reduce the negative impact of online highly visual social networking site use on mental health outcomes have been varied in their design and outcomes of interest. Despite some variation in intervention success, a general trend towards modest positive improvements were found. Further development of easily accessible interventions that are theory driven and with improved methodological rigour is required.

Introduction

The psychological effects of online social networking site (SNS) use have attracted considerable attention and debate over the last decade, with efforts to curb the negative impacts emerging within the research literature. The term social media relates to a broad range of online interactive web platforms that allow people to share online content (Kietzmann et al., 2011; Kuss & Griffiths, 2017). Social networking sites represent a subset of social media where the primary aim is to connect people by allowing them to build an online profile and use that to communicate and build networks (Boyd & Ellison, 2007; Kuss & Griffiths, 2011, 2017) and are becoming some of the most popular forms of social media. In particular, the use of SNSs with a high-level visual content (i.e., highly visual social networking sites; HVSNS), such as Facebook, Instagram, and Snapchat, has gained momentum. Instagram and Facebook are listed as 2 of the 4 most commonly used social media platforms worldwide, with over 2.9 billion Facebook and over 1.4 billion Instagram monthly active users (Statista, 2022a). These HVSNSs, also previously referred to as highly visual social media (Marengo et al., 2018; McCrory et al., 2020), have a primary function of sharing photographs and videos, which users can digitally modify (Marengo et al., 2018; McCrory et al., 2020). This allows users to carefully curate their online lives and manage how they present themselves, with the inevitable outcome of users posting more self-promoting, positive images and news than negative (Mehdizadeh, 2010; Verduyn et al., 2015; Vogel & Rose, 2016). While some benefits have been found, such as increased self-esteem after viewing one's own profile (Gentile et al., 2012), concerns have developed about pressures to live up to unrealistic ideals and ensuing negative judgements about the self (Verduyn et al., 2020).

Accordingly, a host of negative psychological effects have been associated with HVSNS use. This includes dissatisfaction with one's intimate relationships (Yacoub et al., 2018), increased body image concerns (Fardouly et al., 2020), decreased life satisfaction (Brailovskaia, Ströse, et al., 2020), reduced well-being (Faelens et al., 2021) and a range of mental health symptoms. Frost and Rickwood (2017) conducted a systematic review of 65 studies that examined the mental health outcomes associated with Facebook use and found six main associated outcomes including depression, anxiety, disordered eating, alcohol use and Facebook addiction. Research focussed on the newer highly visual platform Instagram suggests similar negative impacts, including greater body dissatisfaction, anxiety, and depression (Brown & Tiggemann, 2016; Casale et al., 2019; Moujaes & Verrier, 2021; Tiggemann & Barbato, 2018). Passive use, defined as online activity that does not involve direct communication with others, such as browsing, scrolling or consuming information (Burke et al., 2011; Verduyn et al., 2015), has been associated with the poorest mental health outcomes, including higher levels of depression, body dissatisfaction and reduced well-being (Escobar-Viera et al., 2018; Fioravanti et al., 2021; Frost & Rickwood, 2017; Tiggemann & Barbato, 2018; Verduyn et al., 2015). The association between passive use and problematic mental health outcomes is suggested to be drive by an increased tendency to compare oneself negatively to others, without the benefits of an increased sense of connection that has been found to come with more active forms of use that involve communicating with others (Kross et al., 2021).

Scholars have begun to turn their attention to potential intervention strategies to ameliorate the negative psychological impacts of HVSNS use, with a variety of approaches and psychological outcomes of interest. This has ranged from exposure reduction approaches to improve well-being outcomes, such as life satisfaction and

positive affect (Fioravanti et al., 2020; Vanman et al., 2018), to social media literacy programs aimed at improving body satisfaction and reducing the impact of HVSNS exposure (Bell et al., 2021; Gordon et al., 2021). However, the field is still in its infancy and has produced mixed results. This has led to calls for further methodologically rigorous research focusing on interventions to minimise the negative and enhance the positive impact of SNSs on mental health (Kross et al., 2021). The current study aims to provide a guide for researchers by outlining the intervention approaches aimed at ameliorating the negative mental health impact of HVSNS that have been used to date, identify those that are showing promise and highlight areas for further exploration. The review will be the first to bring together the existing literature through a systematic scoping review approach. Where a systematic review has the primary aim of summarising findings across studies, a scoping review approach aims to map research and identify gaps within the literature (Arksey & O'Malley, 2005) and is considered particularly useful for informing emerging fields of research (Peters et al., 2015).

More specifically, the current review aims to address the following questions: (1) What were the populations and characteristics of studies? (2) Which HVSNS platforms were the focus of intervention? (3) What were the mental health outcomes measured and measurement tools utilised? (4) What theoretical frameworks were adopted to inform program design or interpret data? (5) What were the intervention program features and outcomes?

Method

The method of this systematic scoping review was informed by the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines

(Liberati et al., 2009) and the PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation (Tricco et al., 2018). The protocol was prospectively registered with the Open Science Framework on the 26.10.2021 (Herriman et al., 2021; https://osf.io/wpfx6) registration number - 10.17605/OSF.IO/WPFX6. While no substantial changes were made, minor clarifications were made to the eligibility criteria following the initial protocol registration and these were added to the registered protocol. Firstly, an amendment was made to note that studies referring to both non-HVSNS and HVSNS were to be considered if there was clear reference to the inclusion of HVSNS. Examples of interventions that were not designed specifically for HVSNS and thus considered too broad were also added.

Study Identification

The search strategies and database selection were developed by the primary author, in consultation with an expert research librarian. Six databases (Embase, Pubmed, PsychINFO, ERIC, CINAHL, SCOPUS) were searched, and the reference lists of included studies and reviews in the field were manually searched by the first author. The Scopus database search was limited to medicine, psychology, nursing, and social sciences subject areas. Each database was searched individually by title, abstract, keyword and subject heading for the relevant search terms. No limits were set on the date of publication, but the review was limited to peer-reviewed articles published in English. Search terms consisted of keywords and phrases relating to three broad concepts: (1) social media (e.g. social networking site, Facebook, Instagram), (2) intervention (e.g. treatment*) and (3) mental health outcome (e.g. well-being, depression, stress). The final search strategy for PsychINFO is provided in the online supplementary information (Table S1). An initial search took place between the dates

27/10/2021 and 28/10/2021. Email alerts were additionally set up to consider relevant articles published until 31/03/2022.

Study Selection

Covidence (Veritas Health Innovation, 2022), a web-based platform designed for the data management of scoping reviews was used to filter results and remove duplicates. The primary author (ZH) completed screening of 8914 titles and abstracts, with a randomly selected sample of 50 articles screened independently by a second reviewer not connected to the research team. Excellent agreement was shown, with 100% agreement between reviewers. Full texts of 234 papers were then obtained and screened by the primary author, with a random sample of 10% screened by the same second independent reviewer, and 100% agreement between reviewers.

Studies with participants of any age, in any country and in any environment (e.g. schools) were included. Studies had to examine the effectiveness of an intervention designed to reduce the negative impact of HVSNSs on mental health outcomes. This included studies that examined the mental health outcomes of interventions designed specifically for HVSNS exposure and those that directly tested the effectiveness of a more general intervention, such as a traditional media literacy program, on the impact of HVSNS exposure. For the current review, the definition of HVSNSs drew on that of McCrory et al. (2020) and included the platforms Snapchat, Instagram and Facebook. While there has been some contention as to whether Facebook meets the definition of a highly visual platform, it was included in the review for two main reasons. Firstly, a preliminary search identified that removing Facebook from the search criteria would restrict the breadth of the search and therefore reduce the ability to answer the research question, and secondly, Facebook has increasingly

introduced visual features to its site, including the introduction of "stories" and unique filters in 2017 (Cyca, 2018). Other social media platforms that did not meet the criteria of HVSNS by McCrory et al. (2020) were not included in the present review, consistent with calls in the literature to examine different types of platforms separately through the recognition that they have unique features and impacts on mental health (Kross et al., 2021; Royal Society for Public Health, 2017, May). Thus video-sharing platforms, such as TikTok and Youtube, and micro-blogging platforms, such as Twitter, were excluded.

Other studies using terms such as "social media" or "social networking sites" were included if there was reference to visual content as a focus, to reflect the various terminology used in the field. However, studies that focused on more general online activities or traditional media literacy programs were considered too broad and excluded, even if there was some reference to social networking site images in the program. Relevant study outcomes included any measure of mental health, consistent with the World Health Organisation's (WHO) definition of mental health as more than just the absence of pathology, but a "state of well-being, in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and is able to make a contribution to his or her community" (World Health Organisation, 2019b, p. 1). The current definition will encompass both negative aspects, defined as psychopathology (as outlined by the Diagnostic and Statistics Manual for Mental Disorders, version 5; DSM-5; American Psychiatric Association, 2022), and positive mental health outcomes, including well-being, happiness or life satisfaction. Known predictors of psychopathology were also included, such as body image (Bluett et al., 2016; Stice & Shaw, 2002). Social networking site addictions were included due to the consideration of problematic internet use in the DSM-5 (American Psychiatric Association, 2022) and its inclusion in the International Statistical

Classification of Diseases and Related Health Problems -11th Edition (ICS-11; World Health Organisation, 2019a). While any empirical design was considered, studies were only included if peer reviewed. The full inclusion and exclusion criteria can be viewed in the protocol (Herriman et al., 2021; https://osf.io/wpfx6).

Data Extraction

Guided by the primary objectives of the current review, information was extracted on the following components: country, participant characteristics (gender, age, and sample type), study design and methods, intervention details, mental health outcomes measured, psychometric measures used, HVSNS of focus, theoretical framework applied, and relevant intervention outcomes. Data was extracted by the primary author (ZH) with consultation with the research team, as required.

Critical Appraisal of Individual Sources of Evidence

While the scoping review method does not necessitate critical appraisal of individual sources, an appraisal of study quality is relevant to the weight given to study results and was undertaken to provide a suitably comprehensive overview of the existing evidence. The Mixed Methods Appraisal Tool (MMAT), Version 2018 (Hong et al., 2018) was chosen as it assesses the methodological quality of a range of study designs, including qualitative, quantitative, and mixed methods, which was expected to be found in the current scoping review. The MMAT includes two initial screening questions to determine whether the study is of sufficient empirical quality for the appraisal tool to be applied. These questions relate to the articulation of clear research question(s) and the suitability of the data collected for answering the research question. For each study design, five criteria are then assigned a “Yes”, “No”, or “Can't tell”

rating. Criteria included comparability of Randomised Controlled Trial (RCT) groups at baseline, adherence to intervention, completeness of outcome data, appropriateness of measurement tools or randomisation techniques, to name a few. The MMAT discourages the calculation of an overall 'score'.

The primary author completed quality appraisals using the MMAT tool, with a random 10% subsample of included articles screened independently by a second member of the research team (AT) to ensure the tool was accurately applied. There was 93% initial agreement between reviewers (26/28 items), with the two discrepancies discussed and full agreement reached. The primary author then completed the quality appraisal, with additional consultation with the research team as required.

Data Synthesis

Effect size data were entered into Comprehensive Meta-analysis Version 3.0 (Borenstein et al., 2013). Hedges' g was used as the effect size estimate as it corrects for biases due to smaller sample sizes. Only short–term effects (i.e., difference from baseline to post-intervention) were calculated as few studies included follow-up assessment. To calculate g, a pre-post correlation is required. As studies did not provide this information, an estimate of r=.70 was used, which is considered a conservative value for studies that have a repeated measures design (Estrada et al., 2018). Where possible, effect sizes were generated according to both within and between group comparisons. However, where studies did not include a control group or only included post-intervention assessments, g scores were calculated via the information available and presented separately to other data. The direction of g was standardized so that a positive value reflected greater improvement in mental health outcomes with intervention alone (increase in positive mental health outcomes or reduction in negative

mental health outcomes), or improved outcomes from the intervention, relative to controls. Larger numeric values indicated greater treatment effects (Cohen, 1988). To determine the precision of g, 95% confidence intervals were calculated, with statistical significance examined via *p* values set at $p < .05$. Due to the considerable heterogeneity among examined mental health outcomes, study design and intervention type (e.g. social media literacy program vs abstinence), the pooling of all effect sizes was not considered appropriate in all cases. All effect sizes are noted in Table 5 (supplementary data), with studies pooled when the same construct was measured via the same intervention type with comparable treatment length. The effect size for each study was weighted via the inverse variance (gw) and using a random effects model. Effect sizes are presented according to intervention type and mental health outcome of focus. Forest plots were generated in Microsoft Excel to graphically present results. Where multiple effect estimates were generated per construct (for example, different subscales measuring body image), these were averaged beforehand to ensure that data were independent. This was also done if more than one intervention group was included in the study (e.g. samples from different countries presented separately). Heterogeneity indices included the I^2 statistic, which represents the level of inconsistency across studies (Borenstein et al., 2017) and tau (τ) or the SD of a mean effect (Borenstein et al., 2013).

In total, 17 authors were contacted for data due to insufficient information provided in the reports to calculate effect sizes. Of those, eight provided the requested data (Gobin et al., 2022; Hall et al., 2021; Hinsch & Sheldon, 2013; Hunt et al., 2021; Hunt et al., 2018; Mosquera et al., 2020; Turel et al., 2018; van Wezel et al., 2021), leaving ten studies where effect sizes could not be calculated. Those studies with

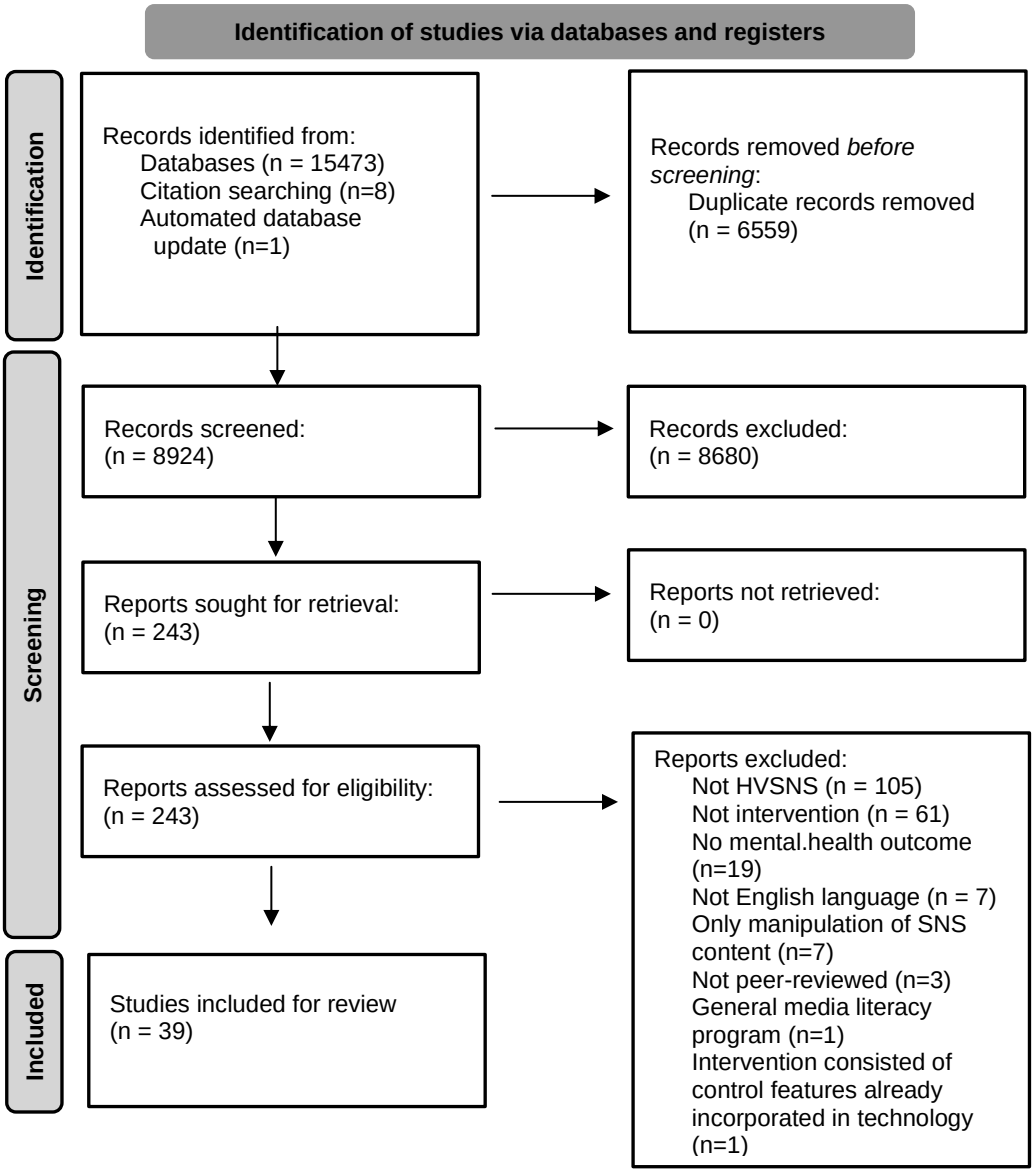
insufficient data to enable calculation of effect sizes were included in the narrative synthesis of findings.

Results

Selection of Sources of Evidence

After duplicates were removed the final search yielded 8914 studies. Title and abstract screening resulted in 234 full text articles retrieved. Of these, 204 were excluded (see Figure 1 for details of exclusion reasons), leaving 30 included papers. The reference lists of these papers and other reviews within the field were reviewed which led to the identification of another 8 articles. New articles sent via automated database updates led to the identification of one additional article, producing a final set of 39 studies included in the review (see Figure 1 for PRISMA flow diagram detailing progression through the screening process).

Figure 1
PRISMA flow diagram outlining the systematic search process



Quality Reporting

The methodological quality of studies assessed using the MMAT can be found in Table 1. Three case studies retrieved from the search did not meet the minimum requirements to be assessed using the MMAT, failing to demonstrate clear research objectives or the ability to assess the appropriateness of data collected (Bettmann et al., 2021; Dattilo et al., 2013; Soron, 2015). However, as a primary objective of a scoping

review is to provide an overview of the existing evidence irrespective of methodological quality (Peters et al., 2015) and in line with MMAT reporting recommendations, the studies will still be presented in the current paper.

Of the remaining 36 articles assessed for risk of bias, a wide range of methodological rigour was shown, with many studies demonstrating a high risk of bias. An almost universal shortcoming within the cohort was the inability to blind participants, although this is a recognised difficulty in the social sciences, where outcome assessments rely on self-report and individuals are often aware of the nature of interventions (Higgins et al., 2019). Only one exception included a cover story to their experiment, assessed whether participants were aware of the hypotheses during debriefing and excluded "unblinded" participants from analyses (Verduyn et al., 2015). Additional common shortcomings included a lack of information on randomisation techniques and lack of analyses of differences in baseline characteristics between control and experimental groups within the 27 quantitative randomised controlled trials. Another common methodological concern was the high attrition rate, which was particularly observed among studies that requested participants to alter the frequency of their SNS use. Within this group only 42.3% of studies reported a completion rate of over 80% (an acceptable cut-off limit recommended by Higgins et al., 2019) with two studies reporting an attrition of over 40% (Hunt et al., 2021; Przybylski et al., 2021). By comparison, 70% of all other experimental studies (focusing on social medial literacy or other psychology-informed programs) achieved a completion rate of over 80%.

Table 1

Mixed Methods Appraisal Tool (MMAT) Risk of Bias Assessment Results

MMAT category of study design	Study by first name and year	Responses					MMAT methodological quality criteria (Hong et al., 2018)
Quantitative RCT's		2.1	2.2	2.3	2.4	2.5	
	Aboody (2020)	🟢	🟢	🟢	🔴	🟢	**2.1. Is randomisation appropriately performed?** **2.2. Are the groups comparable at baseline?** **2.3. Are there complete outcome data?** **2.4 Are outcome assessors blinded to the intervention provided?** **2.5. Did the participants adhere to the assigned intervention?**
	Allcott (2020) [a]	🟢	🟢	🟢	🔴	🟢	
	Bell (2021) [b]	🟡	🟢	🟢	🔴	🟢	
	Brailovskaia (2020)	🟡	🟢	🟢	🔴	🟢	
	Coulthard (2018)	🟡	🟢	🔴	🔴	🟢	
	Danthinne (2022)	🟡	🟢	🔴	🔴	🟢	
	Deters (2013)	🟡	🟡	🟢	🔴	🟢	
	Engeln (2020) [c]	🟢	🟢	🟢	🔴	🟢	
	Esmaeili Rad (2018)	🔴	🔴	🟡	🔴	🟡	
	Fioravanti (2020)	🟡	🟢	🟡	🔴	🟢	
	Gobin (2022)	🟡	🟢	🟢	🔴	🟢	
	Gordon (2021) [d]	🟡	🟢	🟢	🔴	🟢	
	Graham (2021)	🟡	🔴	🔴	🔴	🟢	
	Hall (2021)	🔴	🟡	🔴	🔴	🟢	
	Hanley (2019)	🟢	🟢	🔴	🔴	🟢	
	Hunt (2018)	🟡	🟡	🟡	🔴	🟡	
	Hunt (2021)	🟢	🔴	🔴	🔴	🟢	
	Manwong (2018)	🟡	🟢	🟢	🔴	🟢	
	Mosquera (2020)	🔴	🟢	🟢	🔴	🟢	
	Przybylski (2021)	🟡	🟡	🔴	🔴	🟢	
	Sagioglou (2014)	🟡	🟢	🟡	🔴	🟡	
	Tromholt (2016)	🟡	🟡	🟢	🔴	🔴	
	Turel (2018) [a]	🟡	🟢	🟡	🔴	🟢	
	Vally (2019)	🟢	🟢	🟢	🔴	🟢	
	van Wezel (2021)	🟡	🔴	🔴	🔴	🟢	
	Verduyn (2015)	🟡	🟡	🟢	🟢	🟢	
	Weber (2021)	🟡	🟡	🟢	🟡	🟢	
Quantitative non-randomised		3.1	3.2	3.3	3.4	3.5	
	Hinsch (2013)	🟢	🟢	🟢	🔴	🟡	**3.1 Are the participants representative of the target population?** **3.2 Are measurements appropriate regarding both the outcome and intervention (or exposure)?** **3.3 Are there complete outcome data?** **3.4 Are the confounders accounted for in the design and analysis?** **3.5 During the study period, is the intervention administered (or exposure occurred) as intended?**
	McLean (2017)	🟢	🟢	🟡	🔴	🟢	
	Mitev (2021) [a]	🟢	🟢	🔴	🟢	🟢	
	Sheldon (2011)	🟢	🟢	🔴	🟢	🔴	
	Shoemaker (2022)	🟢	🟢	🟢	🔴	🟢	
	Shafi (2021)	🟢	🟢	🟢	🟢	🟢	
	Stieger (2018)	🟢	🟢	🔴	🔴	🔴	
Mixed methods		5.1	5.2	5.3	5.4	5.5	
	Brown (2020)	🟢	🟢	🟢	🟢	🟢	**5.1 Is there adequate rationale for using a mixed methods design to address the research question?** **5.2 Are the different components of the study effectively integrated to answer the research question?** **5.3 Are the outputs of the integration of qualitative and quantitative components adequately interpreted?** **5.4 Are divergences and inconsistencies between quantitative and qualitative results adequately addressed?** **5.5 Do the different components of the study adhere to the quality criteria of each tradition of the methods involved?**
	Vanman (2018)	🟢	🟢	🟢	🟢	🟢	
N/A		S.1	S.2				
	*Bettmann (2021)	🔴	🔴				**S1. Are there clear research questions?** **S2. Do the collected data allow to address the research questions?**
	*Dattilo (2013)	🔴	🔴				
	*Soron (2015)	🔴	🔴				

Note. 🟢 = Y, 🔴 = N, ⚫ = CT; MMAT= Mixed Methods Appraisal Tool; RCT= Randomised controlled trial. Acceptable cut-off limits for complete outcome data or adherence to intervention were set at 80% for RCT (as recommended by Higgins et al., 2019) and 70% for 1 year follow-up (as recommended by Viswanathan & Berkman, 2012). While many reported on either baseline demographics or baseline scores on outcome variables, few reported on both. Nonetheless, in the current review studies reporting on some baseline characteristics analyses were considered to have partially met the criteria and given a 'yes' score.

[a] Additional information obtained from available supplementary information.

[b] Additional information obtained from OSF- https://osf.io/detr9/?view_only=8495dc9574304b69856d2704558f809a

[c] Additional information obtained from OSF- https://osf.io/4ntsg/?view_only=70d031eab1fb4923bc7fbe8deefbc849

[d] Additional information obtained from Gordon et al. (2020).

* Further appraisal of these studies was not conducted as they failed the initial screening questions. All other studies passed initial screening questions.

Characteristics of Sources of Evidence

A summary of key characteristics can be found in the Table 2. Studies were grouped according to the mode of intervention applied, with a summary of intervention program features (intervention design and treatment modality), mental health outcomes of interest, HVSNS platforms of focus, population features (age, gender, country, and sample), and study findings. Information regarding psychometric measures and theoretical frameworks utilised in designing the interventions can be found in Table 3 and Table 4, respectively, and are described in more detail below.

Table 2

Summary of Study Key Characteristics

Authors / Year	Study design	Relevant sample	HVSNS of focus	Procedure	Mental health outcomes measured	Key findings
			Exposure-altering interventions			
Allcott, Braghieri, Eichmeyer, & Gentzkow (2020)	USA	RCT- EG and CG. Online. No follow-up.	EG n=580 (44% male). CG n= 1081 (42% male). EG - Mage=33.04 (SD=12.54). CG- Mage =32.34 (SD =11.71). Community sample	FB	EG= Abstinence from FB for 4 weeks. CG= Use as normal.	Well-being (happiness, life satisfaction, loneliness, depression, anxiety)	• Significant improvements were found in the EG from pre- to post-intervention compared to the CG in happiness, life satisfaction, depression, and anxiety • Loneliness outcomes not reported. • No changes were observed for daily measures of state happiness.
Bettmann, Anstadt, Casselman, & Ganesh (2021)	USA	Case study. In person. Qual. Follow-up not specified.	24-year-old woman. Outpatient.	"SM" with reference to photos.	Counselling (length not specified) and a 1-week period of SM restriction.	Depression, anxiety, problematic SM use.	• The client self-reported improvement in life satisfaction, depression and anxiety following 1 week of restricted use. • The client self-reported a return of symptoms after SM use resumed.
Brailovskaia, Strose, Schillack, & Margraf (2020)	Germany	RCT- EG and CG. Online. 3-month follow-up.	EG n=140 (80.7% women). CG n= 146 (74.7% women). EG - Mage= 24.15 (SD=5.06), range 18-51. CG - Mage= 25.39 (SD=6.69), range 18-59. Community sample.	FB	EG= Reduce FB use for 20 min over 14 days. CG= Use as normal.	Facebook addiction disorder, life satisfaction, depressive symptoms.	• Participants in the EG demonstrated significant decreases in level of Facebook addiction disorder and depressive symptoms, and increased life satisfaction from pre- to post-intervention when compared to the CG. • Effects remained stable to 3-month follow-up.
Brown & Kuss (2020)	England	Single-arm trial. Online. Mixed methods. No follow-up.	N=61 (67.21% female, 32.79% male). Age range 20-49 years. Mage = 24.4 (SD = 4.95). Community sample.	"SM", including FB, Ig and Sn.	EG= Abstinence from SM for 7 days.	Mental well-being, social connectedness	• Quantitative data indicated that EG participants experienced a significant increase in mental well-being and social connectedness from baseline to post-abstinence. • Qualitative analysis showed mixed findings on perceived social connectedness, with some feeling less connected to online peers and others more connected to offline peers.

Coulthard & Ogden (2018)	England	Multi-arm, RCT – 2x EG and 1x CG. Online. 1-week follow-up.	N=59 (male=23.7%). Mage= 20.37 (SD= 2.66), range 16-25. Mixed university student and community sample.	Ig	EG1= To post selfies on Ig and receive positive feedback ("likes") for 1 week. EG2= To post selfies on Ig and not receive feedback on 1 week. CG= No selfie-posting on Ig for 1 week.	Mood (positive and negative), appearance satisfaction, face satisfaction, self-esteem, perceived attractiveness.	• Those who abstained from posting selfies had a greater improvement in appearance satisfaction from baseline to both post-intervention and at 1-week follow-up, compared to the groups that posted selfies, with or without positive feedback • Posting selfies only led to an immediate improvement in face satisfaction post-intervention in the group that also received positive feedback ("likes"), compared to the posting group that received no feedback and the no-posting CG. However, these improvements were not maintained at 1-week follow-up. • No impact was observed for mood or self-esteem.
Deters, & Mehl (2013)	USA	RCT – EG or CG. Online. No follow-up.	N=86 (61% female) EG n=37, CG n=49 90% between 18-22 years old. University student sample.	FB	EG= Increase in posting behaviour for 1 week on FB. CG= Use as normal.	Loneliness, depression, happiness, life satisfaction, social connectedness	• EG participants reported significantly reduced loneliness from baseline to post-intervention (increased use), compared to the CG. The association between FB use and loneliness was mediated by participants feeling more connected to friends. • No impact was found on levels of depression or happiness.
Engeln, Loach, Imundo, & Zola (2020)	USA	Multi-arm RCT. 2x EG and 1x CG. Lab-based. No follow-up.	N=308 (100% women). Mage=19.40 (SD=1.23), range 18-26. University student sample.	FB, Ig	EG1= 7 minutes of Ig use. EG2= 7 minutes of FB use. CG= 7 minutes of a matching game on iPad.	Positive and negative affect, state body image.	• Participants in the Ig use condition experienced a decrease in positive affect, increase in negative affect, and decrease in body satisfaction from pre- to post-intervention (exposure), when compared to other conditions. • FB users showed no significant changes in outcome measures from pre-to-post intervention.
Fioravanti, Prostamo, & Casale, (2020)	Italy	RCT- EG and CG. Online. No follow-up.	EG n=40 (50% women), CG n=40 (50% women). EG female - Mage=24.9 (SD=3.08). EG male- M=25.45 (SD=4.99). CG female-Mage=25.2 (SD=3.59). CG male Mage=24.65 (SD=24.65). College student sample.	Ig	EG= Abstinence from Ig for 1 week. CG= Use as normal.	Satisfaction with life, positive and negative affect.	• Women in the EG demonstrated greater improvements in life satisfaction and positive affect from pre- to post- intervention than those in the CG. • The association between positive affect and abstinence was dependent on social appearance comparison. • No differences observed for men on any outcome.

Graham, Mason, Riordan, Winter, & Scarf (2021).	New Zealand	RCT- EG and CG. Online. No follow-up.	EG n=58 (45 female), CG N=66 (49 female). EG- Mage=22.46 (SD=6.83), range 18-61 years. CG - Mage=22.46 (SD=6.83), range 18-61. University student sample	FB, Ig and Sn	EG- Reduced Ig, FB and Sn use - 10 mins per platform, per day for 1 week. CG- Use as normal.	Mental well-being.	• Compared to the CG, participants who reduced their use demonstrated improvements in well-being from pre-to post intervention (1-week SNS reduction). • The association between SNS use and well-being was mediated by sleep quality.
Hall, Xing, Ross, & Johnson (2019)	USA	Multi-arm RCT- 4x EGs and 1x CG. Online. No follow-up.	N= 130 (78.5% female) Mage =26.8 (SD=11.4), range 18-68. Mixed community and university student sample.	FB, Ig, Sn and Twitter.	EG1= Abstinence from SM for 1 week. EG2= Abstinence from SM for 2 weeks. EG3= Abstinence from SM for 3 weeks. EG4= Abstinence from SM for 4 weeks. CG= Use as normal.	Loneliness, affective well-being, quality of day.	• No differences in daily measurements of well-being outcomes were found between or within groups from abstinence, irrespective of abstinence duration.
Hanley, Watt, & Coventry (2019)	Australia, UK and USA	RCT- EG and CG. Online. No follow-up.	N=78. EG n=40, CG n=38. 35 males, Mage=29.49 (SD=5.61), 43 females, Mage=31.95 (SD=8.05). Community sample.	Ig and FB	EG= Abstinence from FB and Ig for 1 week. CG= Use as normal.	Satisfaction with life, positive and negative affect.	• Active users in the EG who abstained from Ig and FB demonstrated lower positive affect after intervention than active users in the CG. No effect was found for passive users. • No impact was found on life satisfaction.

Hinsch & Sheldon (2013) STUDY 1 & STUDY 2	USA	Online. STUDY 1 – Two-arm non-randomised trial. Participants self-selected group (EG or CG). 2x EG's and 1x CG, only 1x EG relevant to review. No follow-up. STUDY 2 – Single-arm trial. Follow-up 2-days post intervention.	STUDY 1 EG n=94 (59 women, 35 men). CG n=105, (36 men, 69 women). STUDY 2 EG group n=61 (31 women, 30 men). Ages not reported. University student samples.	FB	STUDY 1 – EG= Reduced FB use (self-directed) for 9 days. CG= Use as normal. STUDY 2 – EG=Abstinence from FB for 48 hours.	Life satisfaction.	STUDY 1 – • The more EG participants reduced their FB use from baseline (T1) to 2-days within intervention (T2) the greater their life satisfaction when compared to other participants. These changes were not observed in the CG. Benefits were not maintained at the end of the 9-day intervention (T3). • The association between FB use and life satisfaction was mediated by procrastination. STUDY 2 – • Abstinence from FB led to an increase in life satisfaction from baseline to post-intervention and at 2-day follow-up.
Hunt, Marx, Lipson & Young (2018)	USA	RCT- EG and CG. Online. No follow-up.	N=143 (108 women, 35 men). Age not reported. University student sample.	FB, Ig and Sn.	EG= Reduced Ig, FB, and Sn use - 10 mins per platform, per day for 3 weeks. CG = Use as normal.	Well-being (loneliness, anxiety, depression, self-esteem, social support, autonomy and self-acceptance).	• Participants in the EG experienced greater reductions in loneliness from pre- to post-intervention compared to those in the CG. • All participants in the EG experienced decreases in depression from three weeks of reduced use compared to those in the CG, but reductions in depression were greater for those higher in baseline depression. • No significant differences were found for other outcomes.

Hunt, All, Burns, & Li (2021)	USA	Multi-arm RCT- 2x EGs and 1xCG. Online. No follow-up.	N=88 (65 women, 23 men). Age not reported. University student sample.	FB, Ig, Sn and Twitter	EG1- Restrict SM use for 30-minutes total per day for 3 weeks. EG2- Restrict SM use for 30-minutes total per day and increase active use for 3 weeks. CG- Use as normal.	Loneliness, anxiety, depression, self-esteem.	• Highly depressed participants who restricted their time on social media (EG1) experienced reductions in depressive symptoms from baseline to week 4. These findings did not appear among non-depressed participants in the group. While participants who both reduced their use and increased their active use (EG2) reported fewer depressive symptoms at week 4 than the CG, they did not experience a significant decrease in depression over time. • Participants who were highly depressed at baseline and highly active in the EG2 (restriction + active group) reported greater depression at week 4 than those who were less active in the group. However, participants who were naturally more active in the CG reported lower levels of depression at week 4. • Highly active participants in the EG2 (restriction + active group) experienced lower self-esteem, greater loneliness and greater anxiety at 4-weeks compared to the less active in the EG2 (restriction + active group). • The most passive participants in the CG showed the lowest level of depression overall.
Mitev, Weinstein, Karabeliova, Nguyen, Law, & Przybylski (2021)	UK & Bulgaria (BG)	Cross-over three-arm RCT- 2x EG, 1x CG. Online. No follow-up.	U.K- n=116 (105 women, 10 male, 1 not disclose). BG- n=120 (78.3% women, 21.7% male) U.K.- Mage 19.41, range 18-30; BG- Mage=29.9, range 18-71. University student sample.	FB, Ig, Sn, Twitter, Tumblr, Pinterest, Tinder and Grindr	EG= Abstain from SM for 1-day. EG2= SM overuse for 1-day. CG= Use as normal.	Social capital (bonding or bridging), social connection, well-being (day satisfaction, self-esteem, positive and negative affect).	• In the U.K sample social connection was decreased on the lower use day compared with the normal use day. However, no differences were found on this measure between the overuse day and normal use day. No differences in these outcomes were observed for Bulgarian participants. • In the U.K. sample bonding social capital was significantly decreased on the lower use day compared with the normal or overuse days. However, no difference was observed between the normal use day and overuse day on this measure. • In U.K. participants, social connection served as an independent mediator linking lower use days to lower well-being, in contrast to normal use days. • No differences were found across the three conditions in the Bulgarian or U.K samples in well-being or bridging social capital.
Mosquera, Odunowo, McNamara, Guo & Petrie (2019) [a]	USA	RCT- EG and CG. Mixed online and lab based. No follow-up.	N=167. EG n=77 (57% women). CG n=90 (71% women). EG- Mage=20.69 (2.41), CG-Mage=20.51 (1.56). University student sample.	FB	EG= Abstinence from FB for 1 week. CG= Use as normal.	Subjective well-being (life satisfaction, how worthwhile life is, happiness, level of worry, and depression)	• A reduction in feelings of depression was found among EG men from pre- to post- abstinence. There were no significant effects for women. • No differences were found for overall life satisfaction, how worthwhile life is, worry or happiness.

Przybylski, Nguyen, Law, & Weinstein (2021) [b]	USA, England & Hong Kong	Cross-over two-arm RCT- EG and CG. Online. No follow-up.	N=600. UK- n=205 (82% women), U.S.S- n=198 (69.5% women), HK - n=197 (82.7% women). UK- Mage=20.06 (SD=4.62), range 18-56 years. US-Mage=20.36 (SD =1.71), range 17-32 years. UK-Mage=21.13 (SD=2.26), range 18-35 years University student sample.	"All SM", with reference to FB, Ig and Sn as SM sites to cease in the instructions given to participants	EG= Abstinence from SM for 1 day. CG= Use as normal.	Well-being (relatedness need satisfaction), positive and negative affect, self-esteem, day satisfaction.	• There were no differences observed in well-being, positive affect, negative affect, or self-esteem on days participants used SM to days when they abstained. • Some negative effects were found when analyses were unadjusted for controls, with decreases in day satisfaction in UK and HK samples (not US,) and lower levels of social relatedness all samples, but results were not significant when adjusting for gender and age.
Sagioglou & Greitemeyer (2014) STUDY 2	USA	Multi-arm RCT- 1x EG and 2 x CG. Online. No follow-up.	N=263 (163 females) Mage= 33.83 (SD=12.59). Community sample.	FB	EG= 20 mins of FB use. CG1 = 20 mins of Internet browsing. CG2= no activity.	Mood.	• Analysis of post-intervention data showed that participants in the EG reported significantly lower mood after FB use when compared to the CGs. • The association between FB use and mood was mediated by how meaningful they felt their time on FB was.
Shafi, Nakonezny, Miller, Desai, Almorsy, Ligezka, Morath, Romanowicz, & Croarkin (2021)	USA	Two-arm, non-randomised controlled trial. In person. No follow-up.	EG n=30, (19 female), CG n=30, (19 female). EG- Mage=15.26 (SD=1.22) CG- Mage= 14.83 (SD=1.11) Mixed inpatient and community sample.	"Social media" with Ig, FB and Sn the three most common sites used for exposure task.	EG= (Depressed inpatient adolescents) 20 minutes of SM use following 24-hours of SM and internet abstinence. CG= (Non-depressed adolescents) 20 minutes of SM use following 24-hours of SM and internet abstinence.	Self-esteem, depression, physiological stress (salivary α-amylase and cortisol).	• Significant increases in salivary cortisol and α-amylase levels were observed in the EG from pre-to post 20-minute SM exposure. No significant changes were found in these measures in the CG participants pre-to post exposure. • Significant increases in depression were observed in both EG and CG participants from pre-to post exposure. • No changes were found in self-esteem measures.
Sheldon, Abad & Hinsch (2011) STUDY 3	USA	Single-arm trial. Online. No follow-up.	N=98 (36 men, 33 women). Age not reported. University student sample.	FB	EG= Abstinence from FB for 48 hours.	Connection and disconnection (loneliness).	• Significant decreases in connection were found post-abstinence from baseline. • No changes were found in feelings of disconnection post-abstinence from baseline.

Stieger & Lewetz (2018)	Germany	Single-arm trial. Online. No follow-up.	N=152 (70% women). Age 18-80 years. Mage=27.4 (SD=11.9). Community sample.	"All SM"-FB was one of two recruitment methods.	EG= Abstinence from SM for 1 week.	Positive and negative affect, withdrawal symptoms (boredom and craving).	• Increased withdrawal symptoms (craving and boredom) were found during the 7-day intervention (data were collected on numerous occasions during intervention). Craving continued at 4-day follow-up while boredom reduced to baseline level when resumed use. • No changes were observed in positive or negative affect. An increase in perceived? social pressure to be on social media was also observed during abstinence.
Tromholt (2016)	Denmark	RCT – EG and CG. Online. No follow-up.	N=1095 (86% women). Mage=34 (SD=8.74) Community sample.	FB	EG= Abstinence from FB for 1 week. CG= Use as normal.	Affective well-being, life satisfaction.	• Analysis of post-intervention (abstinence) data found greater life satisfaction and positive emotions in the EG relative to CG. The association between these well-being outcomes and FB abstinence was greater for those who experienced medium/ high envy or whose prior use was medium /heavy intensity, and for passive FB users.
Turel, Cavagnaro, & Meshi (2018)	USA	RCT – EG and CG. Online. No follow-up.	EG n= 413 (146 women, 218 male), CG n= 142 (59 female, 69 male). EG Mage=24.3 (SD=5.12), range 20-54 years. CG Mage=23.43 (SD=3.31), range 20-38 years. University student sample	FB	EG= Abstinence from FB for 1 week. CG= Use as normal.	Perceived stress	• People in the EG experienced a greater reduction in absolute stress than did the CG after abstinence. However, the difference in relative (to baseline) stress reduction results between groups was not significant. • Interaction effects were found between treatment (EG/ CG) and level of FB use. While both typical FB and excessive FB users experienced a reduction in stress after abstinence, excessive users in the abstinence group experienced a greater reduction in absolute stress and relative stress than typical users.
Vally & D'Souza (2019)	United Arab Emirates	RCT- EG and CG. In person. No follow-up.	N=78. EG n=39, CG n=39 (47.4% men, 52.6% women). EG- Mage= 22.15 (SD=1.98), CG- Mage=22.01 (SD=2.07). University student sample.	"SM", reference to posting photos, videos, and "stories" as part of usual active use.	EG= Abstinence from SM for 1 week. CG= Use as normal.	Satisfaction with life, affective well-being (positive and negative affect), loneliness, perceived stress.	• Participants in the EG experienced an increase in negative affect and loneliness, and decline in life satisfaction, following intervention compared to the CG. • No changes were observed for stress or positive affect.
van Wezel, Abrahamse, & Vanden Abeele (2021)	Netherlands	RCT- EG and CG. In person. No follow-up.	N=76. EG, N=40 (Female 26, 14 men). CG, N=36 (Female 23, men 13). EG- Mage= 21.42 (SD=3.75). CG-Mage= 20.47 SD=2.92). University student sample.	FB, Ig, Sn and YouTube	EG1- Reduction in SM use by 50% for 1-week. EG2- Reduction in SM use by 10% for 1-week.	Emotional well-being (positive and negative affect).	• No differences were found in well-being outcomes after 1-week of restricted use.

Vanman, Baker, & Tobin (2018)	Australia	RCT – EG and CG. Lab-based. Mixed methods. No follow-up.	N=138 (58 men, 87 women). Mage=22.43, range 18-40 years. Community sample	FB	EG= Abstinence from FB for 5 days. CG= Use as normal.	Well-being (life satisfaction, positive and negative affect, loneliness), perceived stress and physiological stress (measured via salivary cortisol levels).	Quantitative analysis: • People in the EG experienced lower levels of salivary cortisol levels (physiological stress) after 5 days of abstinence compared to the CG. • The FB abstinence group reported lower levels of life satisfaction after abstinence, with the EG group experiencing less of a positive change in life satisfaction following abstinence than did the CG. • No significant differences in perceived stress, loneliness, positive or negative affect were found between groups. Qualitative analysis: • EG participants had a more negative perception of their assigned task than those assigned to CG, with EG participants using a greater number of negative words to describe their feelings towards the task after group assignment.
Verduyn, Lee, Park, Shablack, Orvell, Bayer, Ybarra, Jonides, & Kross (2015) STUDY 1	USA	Randomised, two-arm trial - 2 x EG. Lab-based. No follow-up.	N=84 (52 females). Active use group n=42, passive use group n=42. Mage=19.93 (SD=4.20) University student sample.	FB	EG1= 10 minutes of active FB use EG2= 10 minutes of passive FB use.	Affect, life satisfaction, loneliness, social connectedness.	• No immediate effect was observed but a delayed effect was noted in the evening following intervention in the passive use group, with participants experiencing a decrease in affective well-being relative to baseline and post-intervention scores. • No changes were reported for the passive group for life satisfaction, loneliness, or social connectedness. • No change pre-post intervention was found for the active use group.
Social media literacy programs							
Bell, Taylor, Paddock, & Bates (2021) [c]	England	Cluster RCT – EG or CG. In person. 8-week follow-up.	N=290 (151 female) Mage=12.81 (SD= 0.40), range 12-13. High school student sample.	"SM", with reference to images and Instagram in program content.	EG- 1-hour interactive social media education session. (Digital Bodies). CG- Waiting list control.	Body satisfaction	• Improvements in body satisfaction were found at 1-week post-intervention and 8-week follow-up for males and females who received the intervention, relative to the CG.

Gordon, Jarman, Rodgers, McLean, Slater, Fuller-Tyszkiewicz, & Paxton (2021) [d]	Australia	Cluster RCT – EG or CG. In person. 12-month follow-up.	N= 892 (49.5% male, 49% female, 1.5% 'other/ prefer not to respond'). Mage=12.77 (SD-0.74), range 11-15. High school student sample.	"SM" with reference to images, FB, Ig and Sn in program content.	EG- 4 x 50-minute social media literacy program (SoMe program). CG- Lessons as usual.	Body dissatisfaction, state body dissatisfaction, dietary restraint, depressive symptoms, self-esteem, drive for increased muscularity.	• Among girls in the EG improvements in depression and dietary restraint were found from baseline to 6-month follow-up when compared to girls in the CG but were not maintained at 12-month follow-up. • Among boys, improvements in self-esteem were found for those in the EG relative to the CG from baseline to 6-month follow-up but were not maintained at 12-month follow-up. • Among boys, while a reduction in dietary restraint behaviours occurred over the 12-months in both groups, this effect was significantly weaker for those in the EG. • Boys in the EG experienced a significantly increased drive for muscularity from baseline to 12-months, relative to those in the CG. • No differences were found on other outcome measures.
McLean, Wertheim, Masters, & Paxton, (2017)	Australia	Single-arm trial. In person. No follow-up.	N=101. EG n=64, CG n=37 (100% female) Mage=13.13 (SD=0.33). High school student sample.	SM, with reference to images in program content.	EG- 3 x 50-minute social media literacy program (BOOST).	Body image, fear of fat, fear of negative appearance evaluation, dietary restraint.	• Significant improvements were found from baseline to post-program for body image and dietary restraint. • No differences were observed for body image, fear of fat, or fear of negative appearance evaluation following intervention.
Shoemaker Brino, Derouin, & Silva, (2021)	USA	Single-arm trial. Telehealth. No follow-up.	N=28 (71.4% female). Mage = 14.2 (SD=1.9), range 12-17). Outpatient community sample.	"SM" with reference to Ig in program content	EG- 5 x 1-hour social media literacy program.	Depression and anxiety (single measure of both), problematic internet use.	• Significant reductions were found from pre- to post- intervention in problematic internet use severity, and depression and anxiety scores.
Other psychology-informed programs							
Aboody, Siev, & Doron (2020)	Israel	RCT- EG and CG. Online intervention, in person follow-up assessment. 1-month follow-up.	N=91 (100% female). Mage= 23.51 (SD= 1.45), range 19-28 years College student sample.	Ig	EG- Use of a CBT-based mobile app (GGBI) for 2 weeks (4 mins daily), before exposed to Ig. CG- Did not use application, before exposed to Ig.	Appearance-related anxiety, appearance satisfaction, negative mood.	• Comparison of post-Ig exposure data indicated that those in the EG demonstrated greater appearance satisfaction and less body-related anxiety after viewing Ig images, when compared to the CG. • The EG and CG did not differ in negative mood following the Ig exposure task. • These results were found again at 1-month follow-up when the exposure task was repeated.

Danthinne, Giorgianni, Ando, & Rodgers (2021)	Japan	RCT-EG and CG. Online. No follow-up.	N=568 (100% female). (Number who undertook Ig exposure task not specified). Mage=25.38 (SD= 3.52), range 18-30 years. Community sample.	"SM" celebrity images.	EG- Viewed 2-minute video (Dove Real Beauty ID) then exposed to SM. CG- View control video (weather report) then exposed to SM.	State body satisfaction, facial satisfaction, and negative mood.	• Among those with low media similarity sceptism, those in the EG reported higher body satisfaction following exposure to celebrity social media images, compared with those in the CG. No significant differences were found for those with high media similarity sceptism, or on any other outcome measure when measuring the capacity of the intervention to modify the effects of exposure to celebrity social media images.
Dattilo, Juraschek, & Everett (2013)	USA	Case study. In person. Qual or quant data not specified. Weekly follow-up for 3 months.	22-year-old male. Inpatient. Follow-up for 3-months	FB	CBT techniques used during counselling, antipsychotics and mood stabilisers, with 7-days reduced FB use.	Psychotic symptoms, anxiety.	• The treatment team assessed that the patient responded well to medication, was "calmer" with FB abstinence, and demonstrated increased insight following CBT. • Patient was discharged after 7 days and did not require re-hospitalisation during weekly follow-up visits for 3 months.
Esmaeili Rad & Ahmadi (2018)	Iran	RCT- EG and CG. Online. No follow-up.	EG- n=100 (65% female). CG- n=100 (62% female). EG age range 19-26. CG age range 18-28. University student sample.	"SNSs", Ig listed as second favourite application by participants	EG- Use of a reality therapy-based mobile application for two weeks. CG- No mobile application provided.	Social networking addiction, depression, anxiety, life satisfaction.	• Pre- to post- comparisons indicated significant reductions in social networking addiction, depression, and anxiety among the EG following intervention. Pre-to post-comparisons also revealed significant increases in life satisfaction in the EG following intervention. However, no significant changes were found in pre-to post measures in the CG.
Gobin, McComb, & Mills (2022)	Canada	RCT- EG and CG. Online. No follow-up.	N=230 (100% women). Mage=25.88 (SD=0.70), range 18-55 years. Mixed university student and community sample.	Ig images	EG- 3-minute writing-based self-compassion intervention before exposed to Ig. CG- Simple sorting task before exposed to Ig.	State body dissatisfaction (weight dissatisfaction and appearance dissatisfaction).	• The self-compassion intervention protected against body dissatisfaction triggered by Ig images. Participants in the EG demonstrated decreased weight and appearance dissatisfaction from pre-to post-intervention. These improvements were maintained after Instagram use, with no differences in measures pre-to post exposure. In contrast, participants in the CG demonstrated a significant decrease in weight dissatisfaction from pre- to post- control (sorting) activity and no changes in appearance dissatisfaction, but experienced increased weight and appearance dissatisfaction from pre-to post-Ig exposure.

Manwong, Lohsoonthorn, Booranasuksakul, & Chaikoolvatana (2018)	Thailand	Cluster RCT- EG or CG. In person. 4-week follow-up.	N=245, EG n=125 (54.4% female), CG n=120 (50.8% female). Age range 12 -15 years. High school student sample.	SM, with FB and Ig reported as 2 of the 3 most popular SM sites used by participants.	EG- 8 x (45-50 minute) group activity-based motivational enhancement therapy program (GA-MET program). CG- School activities as usual.	SM addiction, self-esteem, depression, child behaviours (emotional symptoms, hyperactivity/ attention, conduct problems, peer relationship, and prosocial behaviour)	• Those who received the program demonstrated a significantly greater reduction in emotional behaviours from pre- to post-intervention, relative to the CG. These findings were not maintained at 4-week follow-up. • Those who received the program and were classified as 'not addicted' at baseline demonstrated a significantly greater reduction in depression scores post-intervention and at 4-weeks follow-up, relative to the CG. However, these differences were not found among those classified as 'almost addicted' or 'addicted'. • No significant differences were found for self-esteem, SM addictive behaviour scores or other child behaviour subscales.
Soron (2015)	Bangladesh	Case study. In person. Qual or quant data not specified. Follow-up not specified.	27-year-old male. Outpatient.	FB	6 x CBT sessions (40 minutes), social skills program, one internet-free family day implemented each week.	Facebook addiction disorder.	• Client deleted two of three Facebook accounts and reduced duration of Facebook use to less than 1 hour (period of reduced use not specified).
Weber, Messingschlager, & Stein (2021) STUDY 2	Germany	Multi-arm RCT- 2x EG and 1xCG. Online. No follow-up.	N-184 (50% female). EG1 n=66, EG2 n=64, CG n=55. Mage=27.49 (SD= 5.6), age range 18-39. Community sample.	Ig	EG1- Educated about fundamental attribution error before viewing an Ig profile. EG2- Educated about growth mindset concept before viewing an Ig profile. CG- Read information (e.g. statistics) about Ig before viewing an Ig profile.	State self-esteem.	• No significant differences were found for self-esteem after viewing Ig profiles between EG or CG following intervention.

Note. N= number of participants; Mage = mean age; SD= standard deviation; FB= Facebook; Ig= Instagram; Sn= Snapchat; SM = social media; SNS= social networking site; RCT= randomised controlled trial; EG= experimental group; CG = control group; Qual= qualitative; Quant= quantitative. Outcome measurement tools in Table 4. Only sub-studies, relevant experimental conditions (where studies involved larger samples or multiple conditions) and mental health outcomes relevant to the review will be reported. Outcomes summarised are as reported in the paper and from quantitative analyses, unless specified otherwise. All measures of mental health outcomes were measured by self-report unless specified otherwise.

[a] Additional information obtained from supplementary information obtained in Mosquera et al. (2020).

[b] Additional information obtained Przybylski et al. (2020).

[c] Additional information obtained from OSF https://osf.io/detr9/?view_only=8495dc9574304b69856d2704558f809a

[d] Additional information obtained from Gordon et al. (2020).

Populations and Characteristics of Included Studies

Across the 39 studies, none were published prior to 2011. Nine (23.1%) were published between 2011 and 2017, 11(28.2%) were published between 2018 and 2019, and 18 (46.2%) from 2020 to 2021 (with the remaining paper in early 2022). Over one-third of the research was conducted in the USA (*n*=16, 41.0%), with another third (*n*=14, 35.9%) in other western countries, including Europe and Australia. Asia, the Middle East, and mixed populations were each represented in 3 studies (7.7%). University student samples were the most common sample of focus (*n*=17 studies, 43.6%), with community samples also the focus of numerous studies (*n*=10; 25.6%). High school student samples were included in 4 (10.3%) studies, with the majority of these (75%) used in studies that examined the efficacy of social media literacy programs. A range of ages were observed between studies, with articles reporting ages as young as 12 up to a mean of 34 years. However, only 6 (15.4%) focused on adolescents and no studies reported a mean age beyond 34 years. Of the studies retrieved, 79.5% (*n*=31) included on all genders, with 2 case studies (5.1%) focusing on men and 6 studies (15.4%) focusing solely on female cohorts. The majority (*n*=5) of these female-oriented studies focused on body image-related outcomes.

HVSNS of Focus

Thirteen (33.3%) of the 39 studies focused exclusively on Facebook, including all 8 studies published prior to 2017. Five more recent studies (12.8%) focused on Instagram alone, with no studies focusing on Snapchat exclusively. Four studies (10.3%) examined a combination of Facebook, Instagram, and Snapchat, and 6 (15.4%) focused on numerous platforms including HVSNS. Eleven studies (28.2%) examined

social media generally with references to visual content or images, including all 4 studies that examined social media literacy programs.

Mental Health Outcomes and Measurement Tools

A wide range of mental health outcomes were assessed, mostly via self-report measures. Positive mental health outcomes, including affect, life satisfaction, social connection, and self-esteem, were included in most studies (*n*=30, 76.9%). Negative mental health outcomes, such as depressive or addiction symptoms, were measured in 38.5% (*n*=15) of studies, while 28.2% of studies (*n*=11) included known mental health predictors, such as body dissatisfaction and dietary restraint. Only two (5.1%) included objective measurement of stress via physiological measures (i.e., α-amylase, cortisol levels).

Consistent with the wide range of mental health outcome variables assessed, considerable heterogeneity in psychometric tools was observed (see Table 3). The most commonly applied tools were the Positive and Negative Affect Schedule (PANAS; n=11; Watson et al., 1988) to measure state affect, the Satisfaction with Life Scale (n=8; Diener et al., 1985) and Rosenberg Self-Esteem scale (n=9; Rosenberg, 1965). Variability was also observed in how specific mental health outcomes were measured, with a variety of self-report tools used to measure similar constructs. For example, measurement tools of choice for depressive symptoms included the Center for Epidemiologic Studies Depression Scale (Radloff, 1977), Beck Depression Inventory-II (Beck et al., 1996), Quick Inventory of Depressive Symptomatology – adolescent (Bernstein et al., 2010), and the Depression Anxiety Stress Scales- 21 (Lovibond & Lovibond, 1995). Thirty-five studies (89.7%) used at least one standardised test and twelve studies (30.8%) used both standardised tests and single assessment items (Likert

or visual analogue scales). Two studies relied only on single assessment items (5.1%), three used other multi-item non-standardised scales (7.7%), and two did not report their assessment tools (5.1%). Only two studies analysed qualitative data (5.1%).

Table 3.

Psychometric Measurements Used by Study

Authors and year	Relevant outcome measurement tools
Aboody et al. (2020)	The Physical Appearance State and Trait Anxiety Scale – State version (Reed et al., 1991) Single item scales (Visual Analogue Scales [VASs]; State appearance satisfaction, Negative mood) [a]
Allcott et al. (2020)	Satisfaction with Life Scale (Diener et al., 1985)* Three-Item Loneliness Scale (Hughes et al., 2004) European Social Survey well-being module (Huppert et al., 2009)* Single item scale (Likert; State subjective well-being) [b]
Bell et al. (2021)	Body Satisfaction Scale (Bird et al., 2013)
Bettmann et al. (2021)	No measurement tools mentioned
Brailovskaia, Ströse, et al. (2020)	Satisfaction with Life Scale- German version (Diener et al., 1985; Glaesmer et al., 2011) Depression Anxiety Stress Scales- 21- German version (Lovibond & Lovibond, 1995; Nilges & Essau, 2015) Bergen Facebook Addiction Scale- Brief – German version (Brailovskaia, 2017)
Brown and Kuss (2020)	Warwick-Edinburgh Mental Well-Being Scale (Stewart-Brown & Janmohamed, 2008) Social Connectedness Scale - Revised version (Lee et al., 2001)
Coulthard and Ogden (2018)	Body Cathexis Scale (Furnham & Greaves, 1994)* Rosenberg Self Esteem Scale (Rosenberg, 1979) Positive and Negative Affect Schedule (Watson et al., 1988) Single item scale (Likert; Perceived attractiveness) [c]
Danthinne et al. (2022)	Single item scales (VAS; Negative mood, state body satisfaction, state facial satisfaction) [d]
Dattilo et al. (2013)	Bergen Facebook Addiction Scale (Andreassen et al., 2012)**
Deters and Mehl (2013)	UCLA Loneliness scale (Russell et al., 1978) Subjective Happiness Scale (Lyubomirsky & Lepper, 1999) Center for Epidemiologic Studies Depression Scale - Short version (Andresen et al., 1994) Single item scales (Likert; Daily mood, social connectedness)
Engeln et al. (2020)	Positive and Negative Affect Schedule- Short form (Watson et al., 1988)* Body Image States Scale (Cash et al., 2002)
Esmaeili Rad and Ahmadi (2018)	The seven-dimension online social networking addiction scale (Esmaeili Rad & Ahmadi, 2017)*** The Beck Depression Inventory (Beck et al., 1961) The Beck Anxiety Inventory (Beck, 1988) The Satisfaction with Life Scale (Diener et al., 1985)
Fioravanti et al. (2020)	Satisfaction with Life Scale- Italian version (Di Fabio & Gori, 2016; Diener et al., 1985) Positive and Negative Affect Schedule- Italian version (Terracciano et al., 2003; Watson et al., 1988)
Gobin et al. (2022)	Single item scales (VASs; State body image) [e]
Gordon et al. (2021)	Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994)* Single item scale (VASs; State body dissatisfaction) [f] Dutch Eating Behaviour Questionnaire (Van Strien et al., 1986)* Center for Epidemiologic Studies Depression Scale- Revised (Haroz et al., 2014)* Single-Item Self-Esteem Scale (Robins et al., 2001) Rosenberg Self-Esteem Scale (Rosenberg, 1965)* Body Change Inventory (Ricciardelli & McCabe, 2002)*

Graham et al. (2021)	Warwick-Edinburgh mental well-being scale (Tennant et al., 2007)
Hall et al. (2021)	Three-Item Loneliness Scale (Hughes et al., 2004) Single item scale (Likert; Loneliness) Short Form Health Survey -SF-36 (Ware & Sherbourne, 1992)* Satisfaction with Life Scale (Diener et al., 1985)*
Hanley et al. (2019)	Quality of Life Enjoyment and Satisfaction Questionnaire-18 (Ritsner et al., 2005) Positive and Negative Affect Schedule (Watson et al., 1988)
Hinsch and Sheldon (2013)	Satisfaction with Life Scale (Diener et al., 1985) ****
Hunt et al. (2018)	The UCLA Loneliness Scale - Revised (Russell et al., 1980) The Spielberger State-Trait Anxiety Inventory (Spielberger et al., 1983)* The Beck Depression Inventory (Beck et al., 1996) Rosenberg Self Esteem Scale (Rosenberg, 1979) Ryff Psychological Well-Being Scale (Ryff, 1989)* The International Support and Evaluation List (Cohen et al., 1983)*
Hunt et al. (2021)	The UCLA Loneliness Scale - Revised (Russell et al., 1980) The Spielberger State Anxiety Inventory (Spielberger et al., 1983) The Beck Depression Inventory - II (Beck et al., 1996) Rosenberg Self Esteem Scale (Rosenberg, 1979)
Manwong et al. (2018) ***	Social Media Addiction Test - unpublished (Pernsungnern et al., 2014) Center for Epidemiologic Studies Depression Scale- Thai version (Trangkasombat et al., 1997) Rosenberg Self-Esteem Scale- Thai version (Wongpakaran & Wongpakaran, 2012) Strengths and Difficulties Questionnaire- Thai version (Wongpiromsarn et al., 2011)
McLean et al. (2017)	Body Esteem Scale (Mendelson & White, 2001)* Eating Disorder Examination-Questionnaire (Van Strien et al., 1986)* A measure of fear of fat (Goldfarb et al., 1985)***** A measure of fear of negative appearance evaluation (Lundgren et al., 2004)***** Dutch Eating Behaviour Questionnaire (Van Strien et al., 1986)
Mitev et al. (2021)	Single item scales (Likert; Day satisfaction, social connection) [g] Rosenberg Self Esteem Scale (Rosenberg, 1979)* Positive and Negative Affect Schedule- Short Form (Watson et al., 1988) 23-item scale measuring bonding and bridging social capital – unpublished (developed by authors)*****
Mosquera et al. (2020)	Single item scale (Likert; Subjective well-being) [h]
Przybylski et al. (2021)******	The Positive and Negative Affect Schedule (Watson & Clark, 1999) Rosenberg Self Esteem Scale (Rosenberg, 1979) Single item scale (Likert; Day satisfaction) [i] Basic Psychological Needs Scale (Chen et al., 2015)*
Sagioglou and Greitemeyer (2014)	Positive and Negative Affect Schedule (Watson et al., 1988)
Sheldon et al. (2011)	Single item scale (Likert; Relatedness needs satisfaction) [j]
Shoemaker Brino et al. (2022)	Generalised Problematic Internet Use Scale-2 (Caplan, 2002) Patient Health Questionnaire Anxiety and Depression Scale (Kroenke et al., 2016)
Soron (2015)	Facebook Addiction Scale (Bangla) – unpublished (developed by author)**
Shafi et al. (2021)	Rosenberg self-esteem scale (Gray-Little et al., 1997) Quick Inventory of Depressive Symptomatology - adolescent (Bernstein et al., 2010)
Stieger and Lewetz (2018)	International Positive and Negative Affect Schedule-Short Form (Thompson, 2007)* Single item scales (VAS; Withdrawal symptoms of internet addiction)
Tromholt (2016)	Positive and Negative Affect Schedule (Watson et al., 1988)* Single item scale (Likert; Life satisfaction) [k] Center for Epidemiologic Studies Depression Scale (Radloff, 1977)*
Turel et al. (2018)	Perceived Stress Scale - Short version (Cohen et al., 1983) Bergen Facebook Addiction Scale (Andreassen et al., 2012)
Vally and D'Souza (2019)	Satisfaction with Life Scale (Diener et al., 1985) Positive and Negative Affect Schedule-Short Form (Watson et al., 1988) Social and Emotional Loneliness Scale for Adults - Short Form (DiTommaso et al., 2004)* The Perceived Stress Scale (Cohen et al., 1983)
van Wezel et al. (2021)	Positive and Negative Affect Schedule (Watson et al., 1988)*
Vanman et al. (2018)	Satisfaction with Life Scale (Diener et al., 1985) Positive and Negative Affect Schedule (Watson et al., 1988)

	Perceived Stress Scale (Cohen et al., 1983) Social and Emotional Loneliness Scale for Adults – short form (DiTommaso et al., 2004)
Verduyn et al. (2015)	Single item scales (Likert; Loneliness, affect, connection) Satisfaction with Life Scale (Diener et al., 1985)
Weber et al. (2021)	Rosenberg Self-Esteem Scale- German version (Collani & Herzberg, 2003; Rosenberg, 1965) State Self-esteem scale- German version (Heatherton & Polivy, 1991; Robins et al., 2001)

Note. References are only listed if provided by authors.
*Includes where only some items from the scales used or if items somewhat adapted (e.g. last 4 weeks).
**Scale was mentioned during discussion of diagnosis, but no information provided on whether this was used as an outcome measurement tool.
***As cited in the corresponding study.
****Noted in discussion that the Positive and Negative Affect Schedule (Watson et al., 1988) was used, but results not reported.
*****Authors did provide any further information.
******Authors noted that the surveys and materials were translated to Chinese.
[a] Made reference to methodologies of Heinberg and Thompson (1995) and Tiggemann and Zaccardo (2015).
[b] Built on the Experience Sampling Method of Csikszentmihalyi and Reed (2014) and Stone and Shiffman (1994).
[c] Made reference to methodologies of Ogden et al. (2011).
[d] Made reference to methodologies of Heinberg and Thompson (1995).
[e] Made reference to methodologies of Tiggemann and McGill (2004).
[f] Made reference to methodologies of Durkin and Paxton (2002).
[g] Included reference to methodologies of Sheldon et al. (2011).
[h] Following OECD Better Life Initiative Guidelines (OECD, 2013).
[i] Made reference to methodologies of Cheung and Lucas (2014).
[j] Made reference to methodologies of Sheldon and Gunz (2009).
[k] Made reference to borrowing wording from Eurofound (2015; as cited in Tromholt, 2016).

Theoretical Frameworks Applied

Nine of the 39 studies (23.1%) discussed theoretical frameworks, models, or perspectives (see Table 5). Within this group, a range of theories were applied, reflective of the varying study aims and measured outcomes. Only 7 (17.9%) of these referred to them in their intervention design and 7 (17.9%) applied them when discussing results. Only two theories or models were referenced more than once. This included self-determination theory (Deci & Ryan, 1985), referenced both times in studies examining abstinence approaches (Brown & Kuss, 2020; Sheldon et al., 2011). The tripartite influence model of body image and eating disturbance (Thompson et al., 1999) was also referenced twice in studies that examined the efficacy of social media literacy programs and body image-related outcomes (Bell et al., 2021; Gordon et al., 2021). Another 8 studies (20.5%) used psychology therapies with a theoretical underpinning, such as cognitive behavioural therapy, in their intervention design, but did not clearly outline the relevant theories.

Table 4

Theoretical Frameworks, Perspectives and Models Referenced

Authors	Theoretical frameworks, perspectives, or models	Section
Bell et al. (2021)	-The tripartite influence model of body image and eating disturbance (Thompson et al., 1999).	-Mentioned in introduction.
	-Objectification theory (Fredrickson & Roberts, 1997).	-Mentioned in introduction.
	-Critical media literacy and cognitive dissonance theory (Lewis-Smith et al., 2019).	-Intervention design.
Brown and Kuss (2020)	-Self-determination theory.	-Mentioned in introduction.
	-Uses and gratifications theory (Dolan et al., 2016).	-Mentioned in introduction.
	-Social cognitive theory of mass communication (Bandura, 2016).	- Data interpretation.
Coulthard and Ogden (2018)	-Psychosocial theory (Arnett, 2000).	-Mentioned in introduction.
	-Hyper personal theory (Walther, 1996).	-Intervention design and data interpretation.
	-Sociometer theory (Leary & Baumeister, 2000).	-Intervention design and data interpretation.
Esmaeili Rad and Ahmadi (2018)	-Choice theory (referenced as underpinning reality therapy)	-Intervention design and data interpretation.
Gordon et al. (2021)*	-Sociocultural theory (Thompson et al., 1999).	-Mentioned in introduction.
	-Constructivist learning theory (Grace & Henward, 2013).	-Intervention design.
	-Aetiological perspective (Jacobi et al., 2004).	-Intervention design.
	-The tripartite influence model of body image and eating disturbance (Thompson et al., 1999).	-Intervention design.
	-Primack's media literacy framework (Primack et al., 2006).	-Intervention design.
	-Message interpretation process model (Austin & Meili, 1994).	-Intervention design.
Przybylski et al. (2021)	-Motivational theory.	-Mentioned in introduction.
	-Displacement hypothesis (Neuman, 1988).	-Intervention design and data interpretation.
Sheldon et al. (2011)	-Self-determination theory (Deci & Ryan, 1985).	-Intervention design and data interpretation.
Stieger and Lewetz (2018)	-Technology integration model (Shaw et al., 2018).	-Data interpretation.
Weber et al. (2021) - Study 2	-Social comparison theory (Festinger, 1954).	-Intervention design and data interpretation.

Aboody et al. (2020), Soron (2015), Bettmann et al. (2021), Gobin et al. (2022), Dattilo et al. (2013), McLean et al. (2017); Shoemaker Brino et al. (2022) and Manwong et al. (2018) applied psychological therapy techniques (including social media literacy) that theoretical underpinning. However, theories were not clearly outlined in papers.
References only provided if provided by authors.
*Additional information obtained from study protocol (Gordon et al., 2020).

Intervention Program Features and Outcomes

Approaches that focus on reducing or increasing exposure to HVSNS.

Twenty-seven studies examined the effectiveness of altering the level of exposure to HVSNSs. Twenty-one of these were experimental with control group comparison, two

were double-arm studies with two comparison intervention groups and no control group, 4 were single-arm studies, and one was a case study (see Table 2). Thirteen of these studies were conducted online, and only one had a follow-up beyond 2 months (3-months; Brailovskaia, Ströse, et al., 2020). Twenty-two included investigation of the impact of abstaining or reducing HVSNS exposure and 8 included examination of the outcomes of increasing HVSNS use. Intervention duration ranged from 7 minutes to 4 weeks. Mental health outcomes varied, and findings were inconsistent. However, overall, most studies (*n*=19, 70.4%) described that their results indicated less use had small benefits for mental health outcomes. In contrast, 7 (25.9%) reported outcomes to suggest that less use may be detrimental or at least remove some positive benefits of HVSNS use. However, 5 of these latter 7 studies examined a range of social media platforms, that included but were not limited to HVSNS. A small number of studies taking a HVSNS exposure-altering approach (*n*=3, 11.1%) found no significant changes to mental health outcomes. While some studies that requested abstinence from their experimental groups required the deletion of platforms from participants' smartphones, no other instructions or strategies were provided to participants on how to reduce their use.

Seventeen of the 27 included studies in this group provided sufficient information for the calculation of effect sizes, with another two providing information that enabled a partial analysis of selected outcomes (Table 5). Effect sizes were pooled were possible, but this was only for a limited number of studies, due to the large heterogeneity in study design (e.g. length of abstinence or reduction) and outcome variables assessed. While examination of individual data indicates effect sizes ranged from small to large across a range of mental health outcomes, a general trend towards small positive effect sizes can be noted, consistent with the narrative descriptions found

in the broader sample of papers. Of the studies that reported positive impacts from reduced exposure or abstinence, benefits included increased life satisfaction (Allcott et al., 2020; Bettmann et al., 2021; Fioravanti et al., 2020; Hinsch & Sheldon, 2013; Tromholt, 2016), feelings of connection (Brown & Kuss, 2020), happiness (Allcott et al., 2020), perceived well-being (Brown & Kuss, 2020; Graham et al., 2021), positive affect (Fioravanti et al., 2020), and appearance satisfaction (Coulthard & Ogden, 2018). A number of studies found reductions in perceived stress (Turel et al., 2018), depression (Allcott et al., 2020; Bettmann et al., 2021; Brailovskaia, Ströse, et al., 2020; Hunt et al., 2021; Hunt et al., 2018; Mosquera et al., 2020), anxiety (Allcott et al., 2020; Bettmann et al., 2021), Facebook addiction symptoms (Brailovskaia, Ströse, et al., 2020), loneliness (Hunt et al., 2018), and physiological stress (Vanman et al., 2018). Consistent with these positive impacts of reduced use were negative outcomes found with increased use, including lower mood (Sagioglou & Greitemeyer, 2014), emotional well-being (Verduyn et al., 2015), and body satisfaction (Engeln et al., 2020), increased depression and stress (Shafi et al., 2021), decreased positive affect and increased negative affect (Engeln et al., 2020). Hunt et al. (2021) also found very high levels of *active* use to be associated with lower self-esteem, increased loneliness, and greater anxiety.

Of the studies that showed negative mental health impacts from abstaining or reducing use, outcomes included increased negative affect and loneliness (Vally & D'Souza, 2019), addiction symptoms (cravings and boredom), and feelings of social pressure (Stieger & Lewetz, 2018). Decreased levels of bonding social capital (Mitev et al., 2021) social connection (Mitev et al., 2021; Sheldon et al., 2011), life satisfaction (Hanley et al., 2019; Vally & D'Souza, 2019; Vanman et al., 2018), and lower positive affect (Hanley et al., 2019) were also found. A small number of studies also found

positive benefits to increasing use, such as reduced loneliness (Deters & Mehl, 2013) and improvement in face satisfaction from posting selfies when positive feedback ("likes") was received (Coulthard & Ogden, 2018). One mixed-methods study found mixed reactions to abstinence, with some feeling less connected to online peers and others feeling more connected to offline peers (Brown & Kuss, 2020).

Social media literacy programs. Four studies identified in the search examined the efficacy of social media literacy programs. These programs were similar in their focus of increasing awareness of the influential nature of social networking sites and their potential for negative impact on mental health outcomes, and strategies were presented to manage associated pressures. Two of the studies were experimental with a control group comparison and 2 were single-arm design (see Table 2). All four interventions were interactive group programs, with one also including an additional individualised session and family session. All programs were clinician-led, with three delivered face-to-face and one via telehealth. Program length ranged from 1 hour to 5 x 1-hour sessions. One social medial literacy program aimed to address problematic social media and internet use, and three focused on reducing body dissatisfaction stemming from online appearance comparisons and unrealistic ideals. While all 4 studies addressed social media generally, they made clear reference to visual platforms or images as program foci.

Overall, all 4 studies demonstrated some positive improvements in mental health outcomes following social media literacy programs, although as shown in Table 5, these improvements were only small in effect for many outcomes. This included improvements in disordered eating, fear of fat, fear of negative appearance evaluation (McLean et al., 2017), self-esteem (Gordon et al., 2021) and depression (Gordon et al., 2021; Shoemaker Brino et al., 2022). However, improvements of medium to large

effects were also found for anxiety and problematic internet use (Shoemaker Brino et al., 2022). A small negative effect was found in one study: at 12-month follow-up, boys who received the intervention showed an increased drive for muscularity and a smaller reduction in dietary restraint behaviours than those in the control group (Gordon et al., 2021).

Other psychology informed programs. Eight studies identified in the search examined the efficacy of other psychology-informed programs, with a range of designs and foci. Six studies were experimental and involved control group comparison and two were case studies (see Table 2). Of the 6 experimental studies, two were cognitive-behaviour therapy (CBT) based (Aboody et al., 2020; Weber et al., 2021), one reality therapy based (Esmaeili Rad & Ahmadi, 2018), one motivational enhancement therapy based (Manwong et al., 2018), one a self-compassion intervention (Gobin et al., 2022) and one did not outline therapeutic modality (Danthinne et al., 2022). Intervention designs included written psychoeducation (Weber et al., 2021), a writing task (Gobin et al., 2022), the use of mobile applications (Aboody et al., 2020; Esmaeili Rad & Ahmadi, 2018), an 8-week group therapy program (Manwong et al., 2018), and a brief video involving observation of a target behaviour (appearance satisfaction; Danthinne et al., 2022; Michie et al., 2011). The length of interventions ranged from only a few minutes in duration to 8-weeks. Only 2 included follow-up of up to 1 month and 5 intervention programs were delivered online. Four of the 6 experimental programs were not specifically designed to address HVSNS exposure, but their efficacy in the potential negative effects of HVSNS exposure was assessed.

Within this group, a range of mental health outcomes were of interest and assessed with a trend towards small benefits found. Six of the 8 studies (75%) demonstrated positive improvements, two (25%) did not find significant changes to

mental health outcomes (Danthinne et al., 2022; Weber et al., 2021), and none of the studies documented negative impacts to mental health outcomes post-intervention. Reported positive outcomes from these psychology-informed programs included improvements in weight satisfaction, (Gobin et al., 2022), appearance satisfaction (Aboody et al., 2020; Gobin et al., 2022), appearance-related anxiety (Aboody et al., 2020), SNS addiction (Esmaeili Rad & Ahmadi, 2018; Soron, 2015), insight (Dattilo et al., 2013), depression (Esmaeili Rad & Ahmadi, 2018; Manwong et al., 2018), emotional problems (Manwong et al., 2018), life satisfaction, and anxiety (Esmaeili Rad & Ahmadi, 2018). Both studies involving an approximate 1-month follow-up demonstrated sustained improvements to mental health outcomes (Aboody et al., 2020; Manwong et al., 2018). Five of the 8 included studies in this group provided sufficient data to calculate effect sizes, and these are provided in Table 5. Due to the large heterogeneity in treatment modalities and outcome variables assessed, no results could be pooled in this sub-group. However, among those effect sizes reported, there was a general trend towards small effect sizes, with large effect sizes noted by Aboody et al. (2020) for body satisfaction outcomes and Esmaeili Rad and Ahmadi (2018) for addiction.

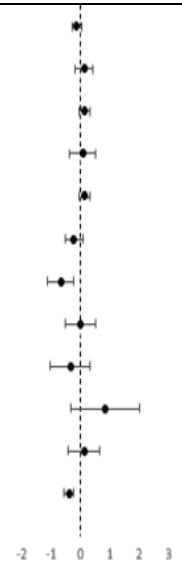
Table 5.

Effect Sizes and Pooled Data for Immediate Intervention Effects Across Mental Health Outcomes

Within and between group comparisons

Intervention: Abstinence (within and between group comparisons)												
Outcome	*Measure*	*k*	*N*	*g*	*95%CI (Lower)*	*95%CI (Upper)*	*p*	*Forest Plot*	I^2	τ	*Lead Author (Date)*	*Design*
Life satisfaction	SWLS[a]	1	80	0.80	0.35	1.25	<0.001				Fioravanti (2020)	1 week
	Single Likert item	1	167	0.02	-0.28	0.32	0.903				Mosquera (2019)	1 week
	SWLS	1	78	-0.44	-0.88	0.01	0.053				Vally (2019)	1 week
	Total g_{w}	*3*	*325*	*0.12*	*-0.51*	*0.75*	*0.703*		*86.85*	*0.52*		
How worthwhile life is	Single Likert item	1	167	-0.03	-0.33	0.28	0.870				Mosquera (2019)	1 week
Quality of day	SWLS[a]	1	54	0.32	-0.20	0.84	0.223				Hall (2019)[b]	1 week
	SWLS[a]	1	38	0.52	-0.64	1.68	0.380				Hall (2019)[b]	2 weeks
	SWLS[a]	1	57	-0.11	-0.63	0.42	0.693				Hall (2019)[b]	3 weeks
Day satisfaction	Single Likert item	1	297	-0.35	-0.51	-0.18	<0.001				Przybylski (2021)	1 day
Self-esteem	RSES	1	297	-0.04	-0.20	0.12	0.393				Przybylski (2021)	1 day
Happiness	Single Likert item	1	167	-0.03	-0.34	0.27	0.824				Mosquera (2019)	1 week
Affective wellbeing	SF-36[a]	1	54	0.38	-0.14	0.90	0.153				Hall (2019)[b]	1 week
	SF-36[a]	1	38	1.15	-0.03	2.36	0.056				Hall (2019)[b]	2 weeks
	SF-36[a]	1	57	-0.24	-0.77	0.29	0.368				Hall (2019)[b]	3 weeks
Positive affect	PANAS[a]	1	80	1.13	0.66	1.60	<0.001				Fioravanti (2020)	1 week
	PANAS	1	297	-0.07	-0.23	0.097	0.418				Przybylski (2021)	1 day
Negative affect	PANAS[a]	1	80	0.81	0.36	1.27	<0.001				Fioravanti (2020)	1 week
	PANAS	1	78	-0.59	-1.00	-0.10	0.016				Vally (2019)	1 week
	Total g_{w}	*2*	*158*	*0.13*	*-1.20*	*1.47*	*0.846*		*94.32*	*0.94*		

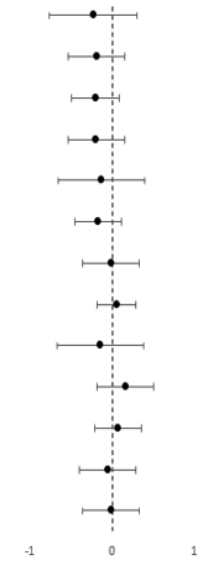
	PANAS	1	297	-0.12	-0.28	0.04	0.143				Przybylski (2021)	1 day
Depression	Single Likert item	1	167	0.13	-0.18	0.43	0.416				Mosquera (2019)	1 week
Stress (perceived)	PSS[a]	1	555	0.16	-0.04	0.35	0.110				Turel (2018)	1 week
	PSS	1	78	0.09	-0.35	0.53	0.699				Vally (2019)	1 week
	Total g_{w}	*2*	*633*	*0.15*	*-0.03*	*0.32*	*0.105*		*0.00*	*0.00*		
Level of worry	Single Likert item	1	167	-0.21	-0.51	0.10	0.180				Mosquera (2019)	1 week
Loneliness	SELSA[a]	1	78	-0.66	-1.11	-0.21	0.004				Vally (2019)	1 week
	UCLA	1	54	0.03	-0.48	0.54	0.911				Hall (2019)[b]	1 week
	Total g_{w}	*2*	*132*	*-0.33*	*-1.00*	*0.35*	*0.343*		*74.13*	*0.42*		
	UCLA	1	38	0.85	-0.32	2.09	0.155				Hall (2019)[b]	2 weeks
	UCLA	1	57	0.13	-0.40	0.66	0.633				Hall (2019)[b]	3 weeks
Relatedness needs satisfaction	BPNS[a]	1	297	-0.37	-0.53	-0.21	<0.001				Przybylski (2021)	1 day



Intervention: Reduction (within and between group comparisons)

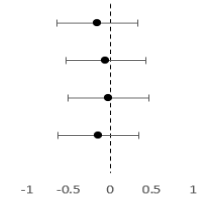
Outcome	*Measurement tool*	*k*	*N*	*g*	*95%CI (Lower)*	*95%CI (Upper)*	*p*	*Forest Plot*	*I^2*	*τ*	*Lead author (date)*	*Design*
Addiction	BFAS	1	286	-0.26	-0.49	-0.03	0.030				Brailovskaia (2020)	20 mins p/d, 14 days
Positive affect	PANAS[a]	1	76	0.017	-0.429	0.463	0.941				van Wezel (2021)	50%., 7 days
Negative affect	PANAS[a]	1	76	0.315	-0.134	0.763	0.169				van Wezel (2021)	50%., 7 days
Depression	DASS-21-D	1	286	0.11	-0.12	0.34	0.349				Brailovskaia (2020)	20 mins p/d, 14 days
	BDI-II	1	56	-0.22	-0.75	0.32	0.425				Hunt (2021)[c]	30 mins p/d 21 days
	BDI-II	1	114	0.17	-0.20	0.54	0.366				Hunt (2018)	30 mins p/d 21 days
	Total g_{w}	*3*	*456*	*0.09*	*-0.10*	*0.27*	*0.362*		*0.00*	*0.00*		
Mental wellbeing	WEMWBS	1	184	0.38	0.09	0.67	0.010				Graham (2021)	10 mins/ day, 7 days

Anxiety	STAI	1	56	-0.23	-0.76	0.30	0.400				Hunt (2021)[c]	30 mins p/d 21 days
	STAI	1	132	-0.19	-0.53	0.16	0.285				Hunt (2018)	
	Total g_{w-}	*2*	*188*	*-0.20*	*-0.49*	*0.09*	*0.175*		*0.00*	*0.00*		
Self-esteem	RSES	1	132	-0.19	-0.54	0.15	0.276				Hunt (2018)	30 mins p/d 21 days
	RSES	1	56	-0.13	-0.66	0.41	0.644				Hunt (2021)[c]	30 mins p/d 21 days
	Total g_{w-}	*2*	*188*	*-0.17*	*-0.46*	*0.12*	*0.245*		*0.00*	*0.00*		
Self-acceptance	RPWBS	1	132	-0.01	-0.36	0.33	0.948				Hunt (2018)	30 mins p/d 21 days
Life satisfaction	SWLS[a]	1	286	0.05	-0.18	0.29	0.646				Brailovskaia (2020)	20 mins p/d, 14 days
Loneliness	UCLA	1	56	-0.15	-0.68	0.38	0.590				Hunt (2021)[c]	30 mins p/d 21 days
	UCLA	1	132	0.17	-0.18	0.51	0.343				Hunt (2018)	30 mins p/d 21 days
	Total g_{w-}	*2*	*186*	*0.07*	*-0.22*	*0.36*	*0.621*		*0.00*	*0.00*		
Social support	ISEL	1	132	-0.05	-0.40	0.29	0.770				Hunt (2018)	30 mins p/d 21 days
Autonomy and self-acceptance	RBWBS	1	132	-0.01	-0.36	0.33	0.948				Hunt (2018)	30 mins p/d 21 days



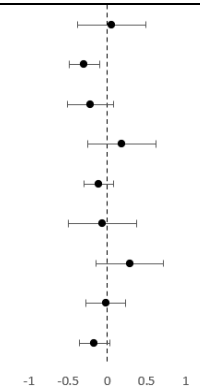
Intervention: Increase active use and restrict (Within and between group comparisons)

Outcome	*Measurement tool*	*k*	*N*	*g*	*95%CI (Lower)*	*95%CI (Upper)*	*p*	*Forest Plot*	*I²*	*τ*	*Lead author (date)*	*Design*
Depression	BDI - II	1	64	-0.15	-0.64	0.33	0.543				Hunt (2021)[c]	30 mins p/d 21 days
Anxiety	STAI	1	64	-0.05	-0.54	0.43	0.832				Hunt (2021)[c]	30 mins p/d 21 days
Loneliness	UCLA	1	64	-0.02	-0.50	0.47	0.948				Hunt (2021)[c]	30 mins p/d 21 days
Self-esteem	RSES	1	64	-0.14	-0.63	0.35	0.571				Hunt (2021)[c]	30 mins p/d 21 days

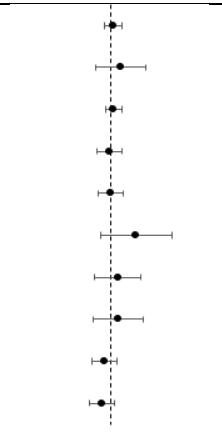


Intervention: Increase use (Within and between groups comparisons)

Outcome	*Measurement tool*	*k*	*N*	*g*	*95%CI (Lower)*	*95%CI (Upper)*	*p*	*Forest Plot*	*I²*	*τ*	*Lead author (date)*	*Design*

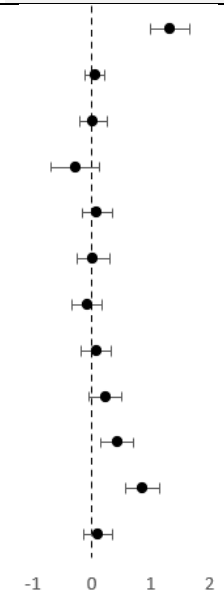
Positive mood	PANAS	1	59	0.06	-0.38	0.49	0.806				Coulthard (2018)	1 week
	PANAS	1	308	-0.29	-0.49	-0.10	0.003				Engeln (2020)	7 mins
Emotional wellbeing	PANAS	1	184	-0.21	-0.50	0.08	0.147				Sagioglou (2014)	20 mins
Depression/ neg mood	PANAS	1	59	0.18	-0.25	0.62	0.408				Coulthard (2018)	1 week
	PANAS	1	308	-0.11	-0.30	0.08	0.266				Engeln	7 min
Self-esteem	RSES	1	59	-0.06	-0.49	0.38	0.792				Coulthard (2018)	1 week
Loneliness	UCLA	1	86	0.29	-0.14	0.71	0.187				Deters (2013)	1 week
Body image / satisfaction	Likert items,BCS	1	59	-0.02	-0.27	0.23	0.889				Coulthard (2018)	1 week
	BISS	1	308	-0.17	-0.36	0.03	0.093				Engeln (2020)	7 mins

Intervention: Social Media Literacy Program (Within and between groups comparisons)

Outcome	*Measurement tool*	*k*	*N*	*g*	*95%CI (Lower)*	*95%CI (Upper)*	*p*	*Forest Plot*	*I²*	*τ*	*Lead author (date)*	*Design*
Body Image	EDE-Q, VASs	1	775	0.03	-0.07	0.13	0.572				Gordon (2021)	4 x 50 min
	BES, EDE-Q	1	101	0.13	-0.16	0.41	0.386				McLean (2017)	3 x 50 min
	Total g_{w}	*2*	*876*	*0.04*	*-0.06*	*0.13*	*0.413*		*0.00*	*0.00*		
Drive for muscularity	BCI	1	775	-0.01	-0.15	0.13	0.876				Gordon (2021)	
Dietary restraint	DEBQ[a]	1	775	0.00	-0.14	0.14	1.000				Gordon (2021	4 x 50 min
	DEBQ	1	101	0.30	-0.11	0.70	0.151				McLean (2017)	3 x 50 min
	Total g_{w}	*2*	*876*	*0.09*	*-0.18*	*0.35*	*0.525*		*45.59*	*0.14*		
Appearance related fear	[d]	1	101	0.09	-0.19	0.378	0.517				McLean (2017)	3 x 50 min
Depressive symptoms	CESDR-10	1	775	-0.07	-0.21	0.08	0.366				Gordon (2021	4 x 50 min
Self-esteem	RSES	1	775	-0.09	-0.23	0.05	0.216				Gordon (2021	4 x 50 min

Intervention: Other (Within and between group comparisons)

Outcome variables	*Measurement tool*	*k*	*N*	*g*	*95%CI (Lower)*	*95%CI (Upper)*	*p*	*Forest Plot*	*I²*	*τ*	*Lead author (date)*	*Design*
Appearance satisfaction	VASs, PASTAS[a]	1	*90*	*1.33*	*0.99*	*1.67*	*<0.001*				Aboody (2020)	4 mins/d, 2 weeks
Body satisfaction	VASs	1	*281*	*0.06*	*-0.11*	*0.22*	*0.488*				Danthinne (2021)	2 mins
Body dissatisfaction	VASs	1	*230*	*0.23*	*0.05*	*0.41*	*0.013*				Gobin (2022)	3 mins
Negative mood	VASs	1	281	*0.03*	*-0.21*	*0.26*	*0.820*				Danthinne (2021)	2 mins
	VASs	1	90	-0.28	-0.69	0.13	0.186				Aboody (2020)	4 mins/d, 2 weeks
	ESDS[a]	1	225	0.10	-0.15	0.35	0.450				Manwong (2018)	8x 50 min
Depression	BDI	1	200	0.03	-0.25	0.30	0.862				Esmaeli Rad (2018)	Self-dir, 2-weeks
Addiction	SMAT	1	225	-0.07	-0.33	0.18	0.570				Manwong (2018)	8x 50 min
Child behaviours	SDQ[a]	1	225	0.08	-0.17	0.33	0.527				Manwong (2018)	8x 50 min
Life satisfaction	SWLS	1	200	0.24	-0.04	0.52	0.091				Esmaeli Rad (2018)	Self-dir, 2-weeks.
Anxiety	BAI	1	200	0.44	0.16	0.72	0.002				Esmaeli Rad (2018)	Self-dir, 2-weeks.
Addiction	[e]	1	200	0.87	0.58	1.16	<0.001				Esmaeli Rad (2018)	Self-dir, 2-weeks.
Self-esteem	RSES[a]	1	225	0.11	-0.14	0.36	0.400				Manwong (2018)	8x 50 min



Intervention: Other (Between groups, post-test comparisons)

Outcome variable	*Measurement tool*	*k*	*N*	*g*	*95%CI (Lower)*	*95%CI (Upper)*	*p*	*Forest Plot*	*I²*	*τ*	*Lead author (date)*	*Design*
Self-esteem	SSES	1	184	0.07	-0.18	0.33	0.572				Weber (2021)	Few mins

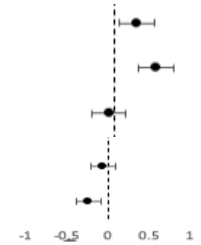


Within group comparisons (Pre and post)

Intervention: Abstinence (Within group differences)

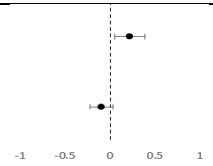
Outcome variable	*Measurement tool*	*k*	*N*	*g*	*95%CI (Lower)*	*95%CI (Upper)*	*p*	*Forest Plot*	*I²*	*τ*	*Lead author (date)*	*Design*

Life satisfaction	SWLS	1	104	0.26	0.06	0.45	0.010				Hinsch (2013) Study 2	48 hours
Mental wellbeing	WEMWBS	1	61	0.47	0.27	0.67	<0.001				Brown (2020)	1 week
Social connectedness	SCR-R	1	61	-0.0	-0.24	0.14	0.598				Brown (2020)	1 week
Loneliness	Likert items	1	87	-0.06	-0.21	0.09	0.445				Sheldon (2018)	48 hours
Positive affect	PANAS	1	104	-0.24	-0.39	-0.09	0.002				Hinsch (2013) Study 2	48 hours



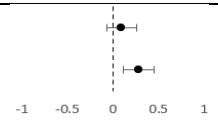
Intervention: Reduction (Within group differences)

Outcome variable	*Measurement tool*	*k*	*N*	*g*	*95%CI (Lower)*	*95%CI (Upper)*	*p*	*Forest Plot*	*I²*	*τ*	*Lead author (date)*	*Design*
Life satisfaction	SWLS	1	143	0.22	0.05	0.39	0.010				Hinsch (2013) Study 1	Self-dir, 9 days.
Positive affect	PANAS	1	143	-0.10	-0.23	0.03	0.142				Hinsch (2013) Study 1	Self-dir, 9 days.



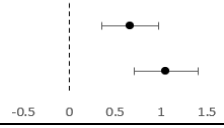
Intervention: Increase exposure (Within group differences)

Outcome variable	*Measurement tool*	*k*	*N*	*g*	*95%CI (Lower)*	*95%CI (Upper)*	*p*	*Forest Plot*	*I²*	*τ*	*Lead author (date)*	*Design*
Affect	Single Likert item	1	84	0.10	-0.07	0.26	0.252				Verduyn (2015)	10 mins
Loneliness	Single Likert item	1	84	0.28	0.11	0.45	0.001				Verduyn (2015)	10 mins



Intervention: Social Media Literacy Program (Within group differences)

Outcome variable	*Measurement tool*	*k*	*N*	*g*	*95%CI (Lower)*	*95%CI (Upper)*	*p*	*Forest Plot*	*I²*	*τ*	*Lead author (date)*	*Design*
Depression and anxiety (single measure)	PHQ-ADS	1	28	0.66	0.35	0.97	<0.001				Shoemaker (2021)	5 x 1hour
Problematic internet use	GPIUS-2	1	28	1.05	0.70	1.40	<0.001				Shoemaker (2021)	5 x 1hour



Note: k = Number of studies contributing these data; *N*: total sample size; g: Hedges' g effect size (with 95% confidence limits); *p*: significance value for g/gw; I^2: proportional estimate of true effect variance over sampling error observed; τ: tau or standard deviation of underlying true effects across studies.
Measurement abbreviations: SWLS: Satisfaction With Life Scale; BDI-II: Beck Depression Inventory-II; DASS-D: Depression Anxiety Stress Scales- Depression subscale; VAS: Visual Analogue Scale item; RSES: Rosenberg Self-Esteem Scale; SSES: State Self-Esteem Scale: PANAS: Positive and Negative Affect Schedule; STAI-S: The Spielberger State Trait Anxiety Inventory – State subscales; CESDR-10: Centre for Epidemiological Studies Depression Scale Revised; EDE-Q: Eating Disorder Examination Questionnaire; BPNS: Basic Psychological Needs Scale; BFAS: Bergen Facebook Addiction Scale; WEMWBS: Warwick Edinburgh Mental well-being Scale; UCLA: The UCLA Loneliness Scale; RPWBS: Ryff Psychological Well-Being Scale; BCS: Body Cathexis Scale; BISS: Body Image States Scale; DEBQ: Dutch Eating Behaviour Questionnaire; SF-36:Short-Form Health Survey; PSS: Perceived Stress Scale; BCI: Body Change Inventory; ESDS: Epidemiologic Studies Depression Scale; SDQ: Strengths and Difficulties Questionnaire; SMAT: Social Media Addiction Test; ISEL: International Support and Evaluation List; SCR-R: Social Connectedness Scale - Revised version; GPIUS-2: Generalized Problematic Internet Use Scale-2; PHQ-ADS: Patient Health Questionnaire and Anxiety and Depression Scale; BAI: Beck Anxiety Inventory; SELSA: Social and Emotional Loneliness Scale for Adults – Short Form.

[a] Only some items/ sub-scales were used, items were adapted from the mentioned scales, or a different version of the scale was used (e.g. language).

[b] Hall et al. (2021): Raw data was grouped according to length of abstinence, with treatment periods presented separately. Only participants with baseline measures were included in the analysis. Experimental groups were compared with the relevant assessment outcomes (i.e., timepoints) of the control group.

[c] Hunt et al. (2021): The restricted use experimental group were separated from the restricted with increased active use group.

[d] A measure of fear of fat (Goldfarb et al., 1985) and fear of negative appearance evaluation (Lundgren et al., 2004). Authors did not provide any further information.

[e] The seven-dimension online social networking addiction scale, as cited in Esmaeili Rad and Ahmadi (2017).

Discussion

The aim of the present study was to map the literature relevant to interventions that minimise the negative impact of online HVSNS on mental health outcomes. More specifically, we aimed to outline study population features, HVSNSs of focus, mental health outcomes and psychometric measurement tools, theoretical frameworks adopted, and intervention program features and outcomes. We reviewed a total of 39 studies, which employed a wide range of methodological quality. As a primary objective of a scoping review is to provide an overview of the existing evidence irrespective of methodological quality (Peters et al., 2015), all findings were considered and are summarised below according to the review aims.

The first review objective was to examine population features and characteristics of studies within the relevant literature. Parallel to the increasing use of HVSNS use over the years, research in the field appears to have gained momentum, with 74.4% of studies found published since 2018 and a greater diversity of intervention approaches within this time. Most of the research focused on western populations and 41% of the research was conducted in the USA alone. While only a few of the studies retrieved included more than one cultural cohort, some cross-cultural differences were found in program outcomes demonstrating a need for more research focusing on a greater diversity of cultures. With respect to gender, men and women participants were similarly represented in the research. However, there were 5 experimental studies that recruited only women, all of which had a focus on body image outcomes, suggesting an underrepresentation of men in this area of study.

The available literature appeared to be skewed towards university student samples (43.6%) and young adults, with no studies reporting a mean age beyond 34 years. While consistent with the highest using age groups of these platforms, 18-34 year-olds (Statista,

2022b), SNS consumption has increased over the years among both older age groups, including over 65 year-olds (Statista, 2022b), and adolescents (Rideout & Robb, 2018). Adolescents were also under-represented in the existing research, with only 15.4% of studies focusing on those under the age of 18, despite the association found between HVSNS use and poor well-being outcomes observed in this cohort, including depression (Frison & Eggermont, 2016; Maheux et al., 2021) and poor body image (Kleemans et al., 2018; Marengo et al., 2018).

Another review objective was to examine which HVSNS platforms were the focus of interventions. Exclusive focus on Facebook appeared more common than other platforms (33.3%,), including all studies published prior to 2017, reflective of its comparative maturity to other platforms, being created 7 years earlier than Instagram, and the saturation of Facebook in the market at the time (Ortiz-Ospina, 2019). Five of the more recent studies (12.8%) focused on Instagram alone, indicating a growth of interest in this platform within the field. While none focused on Snapchat exclusively, this is not inconsistent with the general scarcity of research examining the association between this platform and mental health outcomes (McCrory et al., 2020), and represents a clear gap in the field given the increasing popularity of Snapchat, especially among adolescents (Mohsin, 2021). Seventeen (43.6%) of the included studies either examined social media platforms collectively or included non-HVSNS platforms in their combined focus. However, while sharing similar visual features and pressures, findings from some studies indicated slightly different intervention outcomes between different HVSNS platforms (Engeln et al., 2020). As such, important nuances may have been missed, the comparison of findings becomes difficult and the generalisation of findings to specific platforms or the HVSNS field more generally may not be entirely appropriate.

A third aim of the review was to map the study mental health outcomes of interest and measurement tools utilised, with the considerable heterogeneity across studies making the comparison of findings difficult. Positive mental health outcomes were the most frequently examined (76.9% of studies), including subjective well-being, life satisfaction, connection, and self-esteem. While negative mental health outcomes, such as depressive or addiction symptoms, were less commonly measured (38.5%), known predictors of mental illness, such as dietary restraint and body image, were also of interest for many (28.2%). Interestingly, no studies examined the impact of interventions on substance abuse outcomes, despite alcohol abuse being recognised as one of the more common negative outcomes of some HVSNS use (Frost & Rickwood, 2017). All studies used self-report measures, except two that used physiological measures (α-amylase, cortisol levels) to evaluate impact on stress (Shafi et al., 2021; Vanman et al., 2018). Further complicating the comparison of data, a range of psychometric tools were adopted to measure specific well-being outcomes. Quantitative methods dominated, with only two studies analysing qualitative data. One of these showed contradictory findings to their quantitative data relating to perceived social connectedness, with quantitative data suggesting improvements in social connectedness with abstinence and qualitative data indicating reduced social connection for some, particularly in relation to online peers (Brown & Kuss, 2020). The other study highlighted important information about the acceptability of abstinence approaches, with participants in the abstinence intervention group expressing less positive attitudes about their assignment than those in the control group, and many expressing happiness about being able to return to Facebook post-intervention (Vanman et al., 2018). This demonstrates both the potential value of qualitative methodologies and a significant gap in this field of research.

Another objective of the current study was to examine the theoretical frameworks used to inform program design or interpret data. Wide variation in theoretical approaches was observed, potentially reflective of the varying mental health outcomes of focus. Self-determination theory and the tripartite influence model of body image and eating disturbance were the only theories or models referenced more than once. Self-determination theory proposes that one's need for connectedness may drive social media use behaviours and that use of HVSNS may or may not succeed in meeting these relatedness needs, leading to either thriving or suffering (Deci & Ryan, 1985). Both studies that referred to this framework examined the impact of abstinence interventions on connectedness outcomes. The tripartite model was also referenced in two studies. This model proposes that media are one of three primary sources of influence that contribute to the development of body image and disordered eating, with appearance comparison and internalisation of media information mediating the relationship between influences and disturbance (Thompson et al., 1999). Unsurprisingly, both studies adopting this framework examined the efficacy of social media literacy programs designed and body image-related outcomes. Less than half (43.6%) of studies either outlined a theoretical framework or utilised a psychological intervention that was underpinned by theory, with less than quarter of studies in total clearly outlining their theoretical frameworks. This highlights an area for methodological improvement within the field, with theories considered important for enhancing the rigour, robustness, and relevance of research. They provide researchers with "lenses" through which to look at complicated problems and frameworks within which to conduct their analysis (Reeves et al., 2008). Theories assist with the assimilation of findings into a larger framework of other studies and are considered important for increasing the likelihood of the research impacting practice (Stewart & Klein, 2016), an important consideration for this applied field of research.

A final key objective of the review was to provide an overview of the intervention program features and outcomes. Results suggested a general trend towards modest positive improvements in mental health outcomes, consistent with the narrative synthesis of study reported findings. For the current review, interventions were grouped into those that adopted "exposure-altering" strategies, such as abstinence, reduction of use or an increase in SNS use and/or behaviours (69.2%), social media literacy programs (10.3%) and other psychology-informed programs (20.5%). Of the exposure-altering interventions, results tended to suggest that less use was beneficial for well-being, with the most studied variables showing small improvement in depression, life satisfaction and perceived stress. However, the "exposure-altering" group also demonstrated the greatest variability in outcomes, with 25.9% of studies suggesting negative outcomes from reduced use, particularly with respect to social connectedness variables. Nonetheless, it must be highlighted that many of these studies that demonstrated reduced social connectedness examined a broad range of social media platforms and so the results must be applied tentatively to the HVSNS field, with research suggesting different well-being consequences from exposure to different types of social media platforms (Masciantonio et al., 2021). A small portion of studies that adopted "exposure-altering" strategies also had very brief intervention durations, from 7 to 20 minutes (Engeln et al., 2020; Sagioglou & Greitemeyer, 2014; Shafi et al., 2021; Verduyn et al., 2015). While useful for highlighting associations and informing intervention design, it is questionable whether insights gained from this research can be applied to interventions that require longer periods of altered behaviours. High attrition rates were most frequently found among the group of studies examining exposure-altering strategies, raising the risk of bias and concern about the accuracy of findings. It also raises questions about the feasibility and acceptability of these approaches, with people quite possibly needing to reduce their use over the longer term to

obtain sustained benefits. An area for potential intervention improvement may be the provision of support when reducing or abstaining from SNS use, with approaches to date requesting that participants alter their use without providing strategies for doing so.

A small group of studies examined the impact of social media literacy programs with a general trend towards improvements in the areas of addiction and body image/ dissatisfaction outcomes. While demonstrating promise, such facilitator-led programs are resource intensive and not always easily accessible to the public or practitioners. Furthermore, the available social media literacy programs were specific to either SNS addiction or body image-related outcomes stemming from appearance-based social comparison. A potential area for future development may be the development of social media literacy programs that address more general social comparisons, such as those relating to abilities or relationships, that underpin other negative mental health consequences such as depression and reduced well-being (Kross et al., 2021; Verduyn et al., 2020).

The remaining eight studies adopted a range of psychological approaches and varied greatly in their program design. The only therapeutic modality adopted more than once within this group was CBT, which focuses on improving mental health by identifying and modifying unhelpful thinking and maladaptive behaviours underlying emotional distress (Beck, 1970). Four of the 6 experimental programs were not specifically designed for HVSNSs, but their efficacy in ameliorating negative impacts of HVSNS exposure was assessed with some demonstrating promise. Three of these interventions were of only a few minutes in duration, with only one of these micro-interventions demonstrating positive improvements in well-being outcomes. The unremarkable findings may have been somewhat driven by the limited intervention duration, which may not have been enough to consolidate learning. For example, while focusing on different mental health outcomes, a

2-minute long CBT based intervention failed to demonstrate effect (Weber et al., 2021) while a 2-week CBT-based program led to improvements (Aboody et al., 2020). While a general trend was again observed in this group towards modest immediate improvements in well-being outcomes, a common methodological limitation was the failure to examine for delayed or maintained effects with follow-up, highlighting another area for improvement.

Implications for Future Research

With the increasing consumption of HVSNSs comes the need for interventions to minimise their negative impact on mental health while preserving any positive benefits. The current review highlights the infancy of this field of research, with a wide range of mental health outcomes considered and a variety of intervention approaches utilised. However, existing interventions appear to show promise with small benefits for a range of well-being outcomes. The current review reinforces the need in this field for further research of high methodological rigour, that incorporates theoretical frameworks in intervention design and the use of standardised psychometric measurements. The review also highlights the need for consistent terminology used to appropriately describe online platforms of study focus, particularly through the distinction between social media platforms, SNSs and HVSNSs, to help both understand nuances associated with different types of platforms and to assist with ensuring study findings are appropriately applied to the relevant online platforms. Future research should also aim to include currently under-represented cultural and age cohorts, such as non-western cultures, older adults, and child and adolescent populations. Qualitative assessment of perspectives on mental health outcomes, intervention acceptability and barriers to treatment adherence would also be likely to prove useful.

Limitations of This Study

Some methodological limitations exist in this current review. To reflect the changing terminology for HVSNSs over the years and to provide the most comprehensive search of the field, a wide range of terminologies were accepted when defining HVSNSs. This led to the inclusion of several studies that also included non-HVSNS platforms within their research or that failed to appropriately define their platforms of interest. As such it is possible that not all findings discussed are generalisable to HVSNSs as defined for the current review. Unfortunately, sufficient data was unavailable for numerous studies included in the review, so not all effect sizes could be calculated. In addition, effect sizes could not be pooled in most cases due to the heterogeneity in program approaches and design. An additional limitation to the generalisability of review findings stems from the constantly evolving nature of SNSs. While it was appropriate to define Facebook, Instagram, and Snapchat as HVSNSs at the time of the current review, the term may not be the most accurate description of their primary features 10 years prior or in the future. In addition, the search for the current review was limited to the English language, possibly contributing to the over-representation of western and English-speaking study samples retrieved.

Conclusion

In response to the increasing use of HVSNSs and findings indicating possible ensuing negative mental health outcomes, researchers have called for interventions designed to ameliorate these negative impacts. The current scoping review demonstrates the potential of interventions designed to minimise the negative impact of HVSNS on a range of well-being outcomes while also highlighting the infancy of and methodological

shortcomings within the field. These findings encourage the development of further interventions guided by theory that can be applied across a range of populations and highlight the need for higher methodological rigour, consensus in terminology, and greater consistency among measurement tools used in the field.

CRediT Authorship Contribution Statement

Zoe Herriman: Conceptualisation, Methodology, Data curation, Formal analysis, Writing – original draft. Amanda Taylor: Methodology, Validation, Writing – review & editing, Supervision. Rachel Roberts: Methodology, Writing – review & editing, Supervision.

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CHAPTER 4. SOCIAL MEDIA AWARE PROGRAM

4.1. Preamble

This chapter provides a more detailed overview of the Social Media Aware (SMA) program content that was unable to be included in manuscripts. This includes the rationale for the application of CBT, and a micro-intervention and video format. An outline of the specific cognitive restructuring techniques used in the SMA program and interactive component is then provided.

4.2. Cognitive Behavioural Therapy

4.2.1. What is Cognitive Behavioural Therapy?

Cognitive behaviour therapy (CBT) is an umbrella term, encompassing a number of cognitive and behavioural techniques that focus on improving mental health by changing the unhelpful thinking patterns and maladaptive behaviours that underly emotional distress (Beck, 1970). Many scholars consider CBT to be the best standardised psychological intervention, being an empirically based, widely researched therapy, with no other intervention approaches found to be superior to CBT when compared (David et al., 2018). CBT has been found highly effective for a range of psychological problems, including depression (Lopez-Lopez et al., 2019), anxiety, pain, and also for improving quality of life (Fordham et al., 2021). CBT-based interventions have also been found effective in targeting social comparison processes (Weber & Hagmayer, 2018), a key driver in the relationship between HVSNS use and mental health outcomes (Kross et al., 2021; Verduyn et al., 2020). In Australia, CBT is a commonly applied approach among practitioners with CBT training included consistently across Australian accredited postgraduate clinical psychology training programs (Impala et al., 2019).

4.2.2. Mechanisms of Action Behind Cognitive Behavioural Therapy

While CBT programs within the field share similar goals and principles, considerable heterogeneity in approaches exists. CBT includes a variety of techniques with different proposed mechanisms of action. Behavioural techniques, such as activity scheduling, are hypothesised to improve mood by increasing the frequency of contact with positive reinforcers and, in turn, the frequency of positive reinforcement (Ferster, 1973). With respect to the cognitive therapy model, various techniques have been developed to manage the different types of cognitive structures hypothesised to be involved in the development and maintenance of psychopathology. These cognitive structures, as outlined by Beck et al. (1979), are known as core beliefs (or schemas), dysfunctional attitudes, and negative automatic thoughts. The first category, core beliefs, refer to fundamental belief units and are overgeneralised and inflexible views about the self, others, and the world (e.g. “I am worthless”). These are typically formed during the earlier stages of development and are seen as a lens through which meaning from experiences and perceptions is obtained. Core beliefs also impact the development of dysfunctional attitudes, considered the ‘intermediate’ level of cognitive structure. Dysfunctional attitudes refer to conditional assumptions and attitudes and rules (e.g. “I need others to accept me”) that serve the function of counterbalancing the impacts of the schemas. These dysfunctional attitudes then trigger a series of automatic thoughts, which are the immediate and surface-level cognitions that arise in response to specific situations (e.g. “I’m the only one who wasn’t invited to the party”).

With respect to treatment strategies, different approaches have been developed to target the different cognitive structures. For example, schema therapy focuses on core beliefs that are developed during early childhood and is often adopted for people with personality disorders or complex developmental trauma (Zhang et al., 2023). Schema

therapy is a time intensive psychological intervention, often ranging from months to years of regular (e.g. weekly or fortnightly) sessions (Zhang et al., 2023). The short-term cognitive restructuring technique of thought challenging, on the other hand, focuses on managing the more surface-level negative automatic thoughts that are triggered by situations, which indirectly impacts the underlying dysfunctional attitudes and schema that underpin psychopathology (Beck et al., 1979). Given that reduced well-being associated with HVSNS use is thought to stem from social comparisons in the moment (Verduyn et al., 2020), targeting these more surface-level thoughts via restructuring techniques was considered the most appropriate mechanism of change.

4.3. Micro-Interventions

4.3.1. Micro-Intervention Definition and Contribution

Micro-interventions are designed to be brief and able to be administered quickly, with the goal of having an immediate and positive effect on specific symptoms (Fuller-Tyszkiewicz et al., 2019). Intervention content may be consumed on a single occasion (Danthinne et al., 2022; Gobin et al., 2022) or designed for repeated use (Elefant et al., 2017; Meinlschmidt et al., 2016). Micro-interventions can take various forms, such as a single 3-minute writing task (Gobin et al., 2022), watching a 15-minute video (Atkinson & Diedrichs, 2021), breathing exercises (Elefant et al., 2017) or thought record (Elefant et al., 2017). They are typically designed to be easily accessible through digital technologies, such as via brief videos, audios, animations or writing tasks, which enable broad access to the community at low cost (Matheson et al., 2020).

Micro-interventions serve many benefits in both clinical practice and research. They may be a more appropriate approach for prevention or for those with mild symptoms of mental ill-health, when compared to a more costly and time-intensive full course of therapy

(Bower & Gilbody, 2005). Micro-interventions can be used by practitioners to assist with therapy either within-session or as a homework task, or serve to increase consumer motivation and future engagement through noticeable symptom improvements (Atkinson & Diedrichs, 2021; Fuller-Tyszkiewicz et al., 2019). Such easily accessible interventions are also useful for helping to expand access to mental health care, particularly given the demand for individual face-to-face therapies exceeds supply in many countries (Kazdin & Blase, 2011; Rogers & Spring, 2021). Micro-interventions are also useful within the research setting. By isolating only one or two therapeutic techniques at a time, more accurate conclusions can be drawn about their efficacy. This can highlight effective core program elements that may then inform the content of more comprehensive programs (Bunge et al., 2016).

4.3.2. Cognitive Behavioural Therapy Micro-Interventions

Evidence regarding the effectiveness of CBT-informed micro-interventions has emerged across a range of mental health outcomes. This includes success with micro-interventions focusing on increasing assertiveness awareness, sleep hygiene, and increasing activity level in reducing depression and anxiety symptoms (Bunge et al., 2016). Mindfulness-based micro-interventions have also been found effective in improving mood and body image-related outcomes (Atkinson & Diedrichs, 2021; Fuller-Tyszkiewicz et al., 2019; Meinlschmidt et al., 2016). Evidence for the effectiveness of cognitive restructuring micro-interventions has also emerged. For example, Bunge et al. (2016) found that a micro-intervention aimed at increasing helpful thoughts led to reductions in anxiety and depression. The brief online intervention included psychoeducation about the role of thoughts in emotions and how to manage thoughts, before providing a list of helpful thoughts for participants to practice. In a study by Kivity and Huppert (2016), participants

undertook brief training with a research assistant in how to reappraise thoughts and were encouraged to apply the technique over the following week, with improvements in social anxiety found. While the micro-intervention approach shifts the focus to immediate improvements, with less emphasis on longer-term outcomes, some studies have continued to find evidence of maintained benefits at up to 1-week follow-up (Atkinson & Diedrichs, 2021; Bunge et al., 2016; Kivity & Huppert, 2016).

4.3.3. Micro-Interventions in the Highly Visual Social Networking Site Field

While the field is still in its infancy, micro-interventions have started emerging in the HVSNS literature, with mixed findings. As highlighted in the systematic scoping review discussed in Chapter 3, Gobin et al. (2022) found that participants who undertook a 3-minute self-compassion writing task experienced less appearance dissatisfaction after viewing thin-ideal Instagram images relative to a control group (small effect; d= 0.21). They also found that weight dissatisfaction remained unchanged among the intervention group from pre- to post- exposure to the Instagram images, while those in the control group experienced significant increases in weight dissatisfaction (d= 0.07). However, Danthinne et al. (2022) had less success with their brief intervention aimed at increasing body satisfaction. They assessed the efficacy of a 2-minute 'Dove Real Beauty ID' video that involved observation of a target behaviour (self-appreciation of bodies; Michie et al., 2011), designed to buffer the negative effects of exposure to social media celebrity images and improve body esteem outcomes. However, no positive benefits to body image were found.

Micro-interventions that use cognitive restructuring techniques have also emerged in the field, as discussed in the systematic scoping review (Chapter 3). For example, Weber et al. (2021) assessed the efficacy of a brief intervention in the form of a short written text

that was designed to raise awareness of cognitive biases and improve positive and negative affect, envy and self-esteem. Groups were either educated about the fundamental attribution error or the ability to exert control over the development of our skills and abilities (fixed vs growth mindset), with participants requested to fill out a sentence completion task that aimed to consolidate learning. It was found that neither micro-intervention had a significant impact on psychological outcomes following Instagram exposure. However, the lack of success of this intervention may not be representative of the potential success of a range of other cognitive restructuring strategies. The intervention focused on very specific cognitive distortions that may not have been relevant to all users and included no tools or strategies to manage negative thoughts.

In contrast, Aboody et al. (2020) tested a brief mobile phone-based intervention that focused on cognitive restructuring through training in the identification of maladaptive body image-related beliefs and repeated exposure to helpful statements that challenged those beliefs. They found HVSNS exposure to have a reduced negative impact among the intervention group when compared to a control group on a range of body image and well-being outcomes. This included appearance satisfaction (d= -0.67), body image disturbance (d= 0.61), trait physical appearance anxiety (d= 0.89) and self-esteem (d= 0.55).

More recently, and also published after the systematic scoping review presented in Chapter 3, a pilot study by de Valle and Wade (2022) demonstrated effectiveness of two brief CBT-based programs, one that targeted self-criticism and the other that focussed on social media literacy. While taking different approaches, both programs comprised of four 15-minute CBT-based modules and related homework tasks (fillable pdf documents), with cognitive restructuring components. When compared to a control group, participants in the CBT based program experienced improvements with moderate effects in appearance comparisons (post-task: d= -0.51; 1-week follow-up: d= -0.7), body image flexibility (post-

task: *d*= -0.51; 1-week follow-up: *d*= 0.46), and disordered eating (post-task: *d*= 0.51; 1-week follow-up not significant). In addition, participants in the social media condition experienced improvements with moderate effects in appearance comparisons (post-task: *d*= -0.63; 1-week follow-up: *d*= -0.53), relative to the control group.

A further recent study by Stiff and Cutts (2023) examined the efficacy of a micro-intervention based on social media literacy and cognitive restructuring designed to improve body esteem among men exposed to appearance-based social networking site content. They found that the men who undertook the 10-slide PowerPoint intervention prior to being exposed to idealised appearance images demonstrated lower body dissatisfaction (small effect; η_p^2=0.03) and more positive body image (small effect: η_p^2=0.03) than those who did not undertake the intervention prior to being exposed to the idealised images. While not all these studies formally classified their programs as micro-interventions, they provide evidence for the usefulness of very brief cognitive restructuring-based interventions that assist individuals to manage a range of maladaptive thoughts.

4.4. Social Media Aware (SMA) Online Video Format

The current intervention (SMA) took the form of a short (13-minute) e-learning online video, found to be an effective format for micro-intervention delivery in related fields (Atkinson & Diedrichs, 2021; Matheson et al., 2020). Systematic reviews have found internet-delivered CBT interventions highly effective in reducing symptoms across a range of conditions, including panic disorder and agoraphobia (Stech et al., 2020), post-traumatic stress disorder (Lewis et al., 2019), depression (Wu et al., 2023), and somatic disorders (Hedman-Lagerlof et al., 2023). The video format has also been found successful across a range of studies, including Fuller-Tyszkiewicz et al. (2019) who found improvements in state body satisfaction with the delivery of eleven brief 2-3 minute mindfulness-based

videos in a 21-day period. Atkinson and Diedrichs (2021) found their 15-minute video interventions of mindfulness and cognitive-dissonance approaches useful for improving mood and body image-related outcomes. Matheson et al. (2020) further found improvements in body satisfaction, media literacy, sensitivity to appearance teasing and willingness to ignore appearance teasing from viewing 60-second videos that targeted key risk and protective factors for body image concerns, such as appearance-related comparisons. As such, the online video format was considered an appropriate method for delivering brief interventions.

4.5. Program Content

The current SMA program included a limited number of cognitive restructuring techniques; thought challenging, relevant psychoeducation, and helpful coping statements (see Appendix A for video script). An interactive task was also developed to enable participants to apply concepts introduced in the video, with the aim to consolidate learning (Appendix B). The video finished by outlining the contact details of mental health supports.

4.5.1. Psychoeducation

In the SMA program, participants were first presented with brief psychoeducation relevant to the topic, considered by many as an integral first step to CBT intervention (Chen et al., 2022). Psychoeducation refers to the process of educating a client about the causal and maintaining factors to their difficulties, and providing a rationale for treatment to be implemented (Chen et al., 2022). Assisting with both understanding of and motivation to engage in intervention, it has been implemented in both social media literacy programs (Bell et al., 2021; Gordon et al., 2020) and CBT-based micro-interventions in the

field (Aboody et al., 2020; de Valle & Wade, 2022). The SMA program first included education about the potential negative impact of passive HVSNS use and the role of social comparison processes in that relationship. Psychoeducation about some of the reasons why people present overly positive information online was then presented. Brief psychoeducation relating to the relevance of managing thoughts when using HVSNS and examples of common negative thoughts elicited from HVSNSs were then outlined, to provide explanation and justification for the subsequently provided psychological strategies.

4.5.2. Thought Challenging

Following psychoeducation, the SMA video introduced the technique of thought challenging. Thought challenging is a CBT approach with the central component of examining and reappraising negative automatic thoughts (Beck et al., 1979). It is the most commonly applied verbal cognitive restructuring intervention and is considered an integral part of cognitive therapy (Clark, 2013). Thought challenging techniques include identifying thoughts associated with intense negative emotions, evidence gathering, cost/benefit analysis, and generating more balanced or rational alternative thoughts (Beck & Beck, 2011; Traeger, 2013). In the SMA program, participants were educated on how to challenge thoughts generally through questioning and evidence gathering. Specific examples of how to challenge some negative thoughts that may be triggered by HVSNS exposure were then shown. In addition to targeting thoughts arising from appearance-based comparisons, similar to previous research (Gordon et al., 2021; McLean et al., 2017), the SMA program also provided examples of how to challenge negative thoughts stemming from other types of social comparisons that have been proposed to underpin reduced well-being (Kross et al., 2021; Verduyn et al., 2020). This included comparisons relating to

one's abilities and success, relationship quality and popularity, how exciting other people's lives look, and how happy others look, in addition to attractiveness. Thought challenging often includes Socratic questioning methods, defined as a dialectical method of inquiry and examination by a series of leading questions to assist people to stimulate rational thinking and arrive at more logical responses (Gogus, 2012). As such, participants were provided examples of Socratic questions that they could use themselves to stimulate rational thinking and helpful thoughts. For example, to challenge the thought that other people were happier, they were invited to consider "Think of people you know really well, do their lives look the same in real life as they do online?".

4.5.3. Helpful Coping Statements

As the goal of thought challenging is to generate more rational, helpful thoughts used to feel better about one's own life and experiences (Traeger, 2013), the SMA program outlined examples of some helpful thoughts that may be generated when challenging negative thoughts relating to HVSNS use. Further adding to the rationale for including this component, research has suggested that the act of generating helpful coping statements may alone be beneficial for restructuring cognitions and managing emotions. Often referred to as helpful self-talk, helpful coping statements are automatic statements that people purposefully apply to manage irrational thinking and negative emotions in the face of stress (Walter et al., 2019). This technique has shown positive impacts on a range of well-being factors, including anxiety (Damirchi et al., 2020; Miller-Matero et al., 2017; Walter et al., 2019), self-confidence (Walter et al., 2019), depression (Miller-Matero et al., 2017), and obsessive-compulsive tendencies (Damirchi et al., 2020).

4.5.4. Interactive Component

An interactive component was included in the SMA program to consolidate learning on how to identify negative thoughts and reappraise them. This is consistent with other effective micro-interventions (Atkinson & Diedrichs, 2021; Gobin et al., 2022) and recommendations for program delivery in the CBT field (Beck et al., 1979; Wright et al., 2017). Participants were requested to reflect on and record their own experiences at two time points; recording the negative thoughts they themselves experienced when using HVSNS and recording any thought challenging / helpful coping statements that may be useful for them (see Appendix B).

4.6. Chapter Summary

This chapter provided an overview of the SMA program content, including the rationale for the use of CBT and associated mechanisms of change. The rationale for the micro-intervention and video formats was outlined. A detailed discussion of specific cognitive restructuring techniques applied in the SMA program and SMA interactive task was provided. The SMA program was developed to provide an accessible, evidence-based approach to managing negative automatic thoughts stemming from HVSNS use.

CHAPTER 5. TRIAL METHODOLOGY

5.1. Preamble

This chapter provides a detailed overview of the methodological approaches and decisions that could not be discussed in breadth in specific manuscripts (Chapters 6 and 7) due to word restrictions. This includes considerations for the control video used in the randomised controlled trial, the reasons for the use of an Instagram exposure task in experimental studies, the outcomes of interest applied to assess intervention efficacy, and proposed mechanisms of change.

5.2. Control Video

To enable blinding of participants to the intervention approach in the randomised controlled trial and control for external factors that could be misinterpreted as treatment effects, such as altered expectations, an active control group was implemented in the current project randomised controlled trial (Chapter 7). This was considered particularly important as the quality assessment performed of the 39 studies in the field during the systematic review (Chapter 3) indicated that the failure to blind participants was a common shortcoming in existing studies. Best practice when designing a randomised controlled trial is to ensure that the experimental condition varies as much as possible to the control condition in its active treatment components, but the conditions are otherwise similar (Safer & Hugo, 2006). The control group video therefore needed to be similar in length, educational in nature and with a similar interactive component, without containing psychological strategies. The control group video chosen was a 10-minute compilation of two videos already publicly accessible via YouTube; one outlining information regarding the history of the development of the Instagram platform and another with content about the nature of social media platforms (see Appendix C for details). The interactive task for

the control group was also designed to be as similar in length and complexity as the intervention group task, with both groups being asked to reflect on content twice during videos. To further blind participants to the mere presence of a control (versus experimental) group, participants were informed that they would be allocated to view one of two "psychoeducational videos" at study commencement.

5.3. Highly Visual Social Networking Site Exposure Task

To examine the effectiveness of the SMA intervention in reducing the impact of HVSNS exposure, trial participants were requested to engage in passive HVSNS (Instagram) use for 10 minutes after viewing the intervention. In the single-arm pilot study all participants undertook the Instagram exposure task after viewing the SMA program, with well-being outcomes compared from pre to post intervention and exposure. In the randomised controlled trial participants engaged in the Instagram exposure task immediately after viewing either the intervention condition or control condition video. Similar to other research in the field (Aboody et al., 2020), this helped address the question of whether those who received the intervention were less likely to experience a decline in well-being outcomes when viewing HVSNSs than those who did not receive the intervention. The passive HVSNS exposure period of ten minutes was chosen as this has been found to be enough time to lead to a reduction in well-being outcomes in prior research (Engeln et al., 2020; Verduyn et al., 2015).

The effectiveness of the SMA program was examined against only one HVSNS platform for the current project due to the unique features and differing emotional outcomes of platforms and in response to criticisms of prior research that failed to examine the impact of varying social media sites individually (Engeln et al., 2020; Kross et al., 2021). Instagram was chosen for two reasons; firstly, it was one of the most popular

HVSNS sites at the time the research was conducted (Statista, 2022c). Secondly, the majority of Instagram users were between the ages of 18 to 35 (Statista, 2022d), which was a prevalent age group in the university setting that was initially intended for the current studies' recruitment (with recruitment later broadening to the wider adult Australian community in response to recruitment issues).

5.4. Assessment of Intervention Efficacy

5.4.1. Psychological Outcomes of Primary Interest

Psychological outcomes of primary interest in the current project were emotional and cognitive well-being, and state body image. While a range of psychological outcomes were noted among studies in the systematic review (Chapter 3), well-being outcomes were commonly assessed, consistent with the clear negative association between well-being and passive social networking site use (Kross et al., 2021; Verduyn et al., 2017). The concept of well-being captures the related but distinct constructs of emotional or affective well-being (how happy one is) and cognitive well-being (how satisfied with one's life one is; Diener, 1984). Well-being has been found predictive of risk for a range of mental health and physical health pathologies. This includes findings that reduced subjective well-being predicts increased depressive symptoms when under stress (Grant et al., 2013). Higher levels of well-being have also been associated with reduced risk of heart attack and stroke (Cohen et al., 2016). Consistent with the majority of the research in the field to date (highlighted in Chapter 3), the current pilot study and randomised controlled trial measured cognitive well-being via life satisfaction and emotional well-being through positive and negative affect (e.g. Fioravanti et al., 2020; Hanley et al., 2019; Tromholt, 2016; Vally & D'Souza, 2019; Vanman et al., 2018).

The second outcome of interest that was consistently observed in the systematic scoping review (Chapter 3) was body image, leading to the inclusion of state body satisfaction as an outcome in studies 2 and 3. Associations between body satisfaction measures and social networking site use have been well recognised in the literature, particularly with sites that are highly visual and/or appearance focused (such as Instagram; Holland & Tiggemann, 2016; Ryding & Kuss, 2020). Poor body satisfaction and body image are known predictors of eating disorders (Rosewall et al., 2020; Stice & Shaw, 2002), which have been increasing in incidence over recent years both in Australia and worldwide (Galmiche et al., 2019; Miskovic-Wheatley et al., 2022). Eating disorders are a significant health concern due to their longstanding psychological and physical effects (American Psychiatric Association, 2022). Eating disorders can lead to psychiatric and somatic complications, including heart problems (Sardar et al., 2015), depression, and poor quality of life (Pasold et al., 2014). They are also associated with increased risk of mortality (Bondy et al., 2020), rendering them an important area of focus.

5.4.2. Measuring the Mechanisms for Change - Negative Automatic Thoughts

As outlined in Chapter 2, negative automatic thoughts are considered to be the most likely mechanism of change for the current SMA program. When assessing the effectiveness of cognitive therapies in managing negative automatic thoughts, most have elected to measure their frequency of occurrence (Moore et al., 2016). However, another mechanism of change underlying cognitive therapies is the reduction in a patient’s belief in their negative automatic thoughts (Arch et al., 2012; Hancock et al., 2018), which may also be referred to as cognitive defusion (the ability to distance from thoughts and persue personal goals and values irrespective of one's internal events; Hayes et al., 2006). While cognitive defusion is typically targeted and assessed as an intervention outcome for

acceptance and commitment therapy (ACT), cognitive defusion has also been found to occur with CBT interventions (Hancock et al., 2018). Given that changes in the believability and frequency of negative thoughts can occur independently (Zettle & Hayes, 1986), both were considered as potential mechanisms of change for the current intervention.

5.5. Chapter Summary

This chapter provided a detailed overview of methodological decisions for the experimental studies 2 and 3 (Chapters 6 and 7). This included discussion of the rationale for the control video used and the use of an Instagram exposure task. The chapter concluded with discussion of the well-being outcomes of interest used to assess intervention efficacy and proposed mechanisms of change.

CHAPTER 6. PAPER TWO

6.1. Preamble

The aim of the second study was to assess its feasibility and acceptability of a CBT-based e-learning micro-intervention designed to minimise the negative impact of HVSNS use on mental health outcomes through a pilot test. At the time of this study, research focusing on psychology-informed interventions was in its infancy, with few easily accessible options available. The SMA program was developed, taking the form of a 13-minute e-learning video with interactive component that focused on cognitive restructuring techniques. It was considered that should the program be feasible and acceptable to participants, the pilot test would be followed by a larger randomised controlled trial.

Herriman, Z., Roberts, R. M., Amanda, T. M., & Slater, A. (2024). A pilot evaluation of a cognitive therapy micro-intervention to reduce the negative impact of online social networking site use on well-being. *Journal of Behavioral and Cognitive Therapy, 34*(2), 100494. https://doi.org/10.1016/j.jbct.2024.100494

Technical note: The manuscript as submitted was blinded for review.

6.2. Statement of Authorship

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Principal Author

Name of Principal Author (Candidate)	Zoe Herriman		
Contribution to the Paper	Conceptualisation, Methodology, Project administration, Data curation, Formal analysis, Writing – original draft.		
Overall percentage (%)	85		
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.		
Signature		Date	21.5.24

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);
ii. permission is granted for the candidate in include the publication in the thesis; and
iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

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Contribution to the Paper	Methodology, Writing – review & editing, Supervision.		
Signature		Date	22.07.24

6.3. Submitted Manuscript

Abstract

Online highly visual social networking site (HVSNS) use has been associated with a range of negative emotional outcomes. The current pilot study examined the acceptability and feasibility of a 13-minute Social Media Aware (SMA) video intervention based on cognitive restructuring strategies that was designed to improve well-being and body image following HVSNS use. A single-arm within-subjects design was used. Fifty-nine participants between the ages of 16 and 79 (*M*age=28.97, *SD*=16.04) were recruited to undertake the intervention followed by 10 minutes of passive HVSNS use. Self-report measures of well-being and body image outcomes were completed prior to intervention, immediately post-intervention and one week following. Data was gathered regarding acceptability of the program and social comparison experiences when using HVSNSs. The SMA program was highly acceptable to participants. Participants reported experiencing a range of negative social comparisons when using HVSNSs across many areas of life and self, including perceived happiness, excitement in life, success, relationships, and attractiveness. The program also led to an immediate reduction in negative affect (*p*= <0.001, Hedges *g*= 0.47), but this was no longer significant after one week. Feasibility benchmarks were not met, with 57.6% participant retention (34 participants) at 1-week follow-up, 30 complete cases available for analysis (50.9%), and initial difficulties recruiting within the university setting. The SMA program demonstrated high acceptability to users and promise in reducing negative affect following passive HVSNS use. Progress to a larger randomised controlled trial with follow-up is justified; however, participant retention issues should be addressed.

Key words: Social networking sites, well-being, micro-intervention, cognitive behavioural therapy, pilot study.

INTRODUCTION

Online highly visual social networking site (HVSNS) use has become increasingly popular worldwide (Statista, 2022b), with many associated negative psychological effects. This includes reduced well-being, decreased life satisfaction, increased body image concerns, disordered eating, depression, and anxiety (for reviews see Frost & Rickwood, 2017; Herriman et al., 2023). Passive forms of use, defined as any online activity that does not involve direct communication with others, such as scrolling, browsing or consuming information (Burke et al., 2011; Verduyn et al., 2015), have been associated with poorer outcomes than active forms of use, defined as any online activity that involves directly communicating with others, such as posting or commenting on another's post (Verduyn et al., 2015). This includes higher levels of body image issues, depression, and reduced well-being (Frost & Rickwood, 2017; Verduyn et al., 2015).

The relationship between HVSNS use and reduced well-being outcomes is driven by social comparison (Holland & Tiggemann, 2016; Verduyn et al., 2020), a process whereby people evaluate themselves and their lives by comparing themselves to similar others (Festinger, 1954). Such processes can be detrimental to well-being, particularly when one is comparing oneself to those who are perceived to be outperforming us or superior in some way (upwards social comparison; Brickman & Bulman, 1977). HVSNSs such as Instagram, Facebook, and Snapchat are a subset of social media that have the primary feature of uploading images or videos and have the option to digitally modify such images (Herriman et al., 2023; McCrory et al., 2020). This ability to carefully curate one's online presentations results in a greater frequency of self-promoting, positive images and news posted (Verduyn et al., 2015) and, in turn, a greater opportunity for upwards social comparisons (Verduyn et al., 2020). Passive use of these sites is particularly problematic as it provides ample opportunity to compare oneself negatively to others, without the benefits

that come with more active forms of use that involve communicating with others, such as an increased sense of connection (Kross et al., 2021).

A range of psychologically informed intervention designs have also emerged, with varying impact. Some have found improvements in body image outcomes through manipulating HVSNS content, such as by increasing ones exposure to body positive content (Fardouly et al., 2023) or viewing no-makeup selfies (Fardouly & Rapee, 2019). However, users may not have the foresight to carefully curate their networks in such a way and do not have control over what members of their network post. Social media literacy (SML) programs have been developed to educate users on the potentially harmful influences of social networking sites and to present strategies to manage these (Bell et al., 2021; Gordon et al., 2021; McLean et al., 2017), demonstrating small improvements in body image and disordered eating outcomes stemming from appearance-based social comparisons. However, a need remains for programs that target more general social comparisons that may stem from HVSNSs, such as those relating to relationships, popularity, or abilities, that may underpin other negative mental health consequences (Herriman et al., 2023; Kross et al., 2021).

Cognitive behaviour therapy encompasses techniques that focus on improving mental health by changing unhelpful thinking (cognitions) and maladaptive behaviours that underlie emotional distress (Beck, 1970). It is one of the most empirically supported psychological therapies (David et al., 2018), and has been found effective for treating a range of psychological problems, along with improving quality of life (Fordham et al., 2021; Lopez-Lopez et al., 2019). While research focusing on the application of a CBT approach in the social media context is scarce, there has been some success. Aboody et al. (2020) investigated a cognitive restructuring micro-intervention that trained users in the identification of maladaptive body image-related beliefs and provided repeated exposure to

helpful thoughts. While the intervention was designed to address body image disturbance more generally, as opposed to that which stemmed from social media more specifically, they found an improvement in body image disturbance symptoms following Instagram exposure when compared to a control group. More recently, de Valle and Wade (2022) piloted a brief self-guided CBT intervention designed to reduce self-criticism, using four 15-minute interactive written modules delivered over 1 week. Improvements in disordered eating and body image outcomes were shown post-intervention and at 1-week follow-up when compared to a waitlist control group. Similar improvements in an active control group who received a similar length social media literacy intervention were also found. While taking different approaches, both programs included cognitive restructuring components.

Aims

The current intervention aimed to build on existing research by designing a cognitive restructuring micro-intervention (SMA), with the aim of reducing the negative impact of HVSNS use on well-being outcomes. The SMA program also aimed to expand on existing SML programs that focused on appearance-based social comparison by targeting a range of negative automatic thoughts relating to social comparison, including of one's abilities, relationships, and the perceived happiness of others. Primary outcomes of the current study included acceptability and feasibility of the SMA program before a randomised controlled trial (RCT) is considered. Secondary outcomes included the potential impact of the intervention on self-reported well-being (emotional and cognitive) and body satisfaction outcomes, given well recognised negative associations between these measures and SNS use (Holland & Tiggemann, 2016; Kross et al., 2021; Verduyn et al., 2017). While the current study was not designed to conduct full hypothesis testing, the full

range of measurement tools to be included in a future RCT were piloted. This included trait social comparison experience (the dispositional tendency to engage in social comparisons), which was considered a potential moderating variable. Perceptions regarding negative automatic thoughts (NATs), were also examined as potential mediating variables, given the primary aim of the micro-intervention was to assist participants to manage their NATs. As changes in the believability of NATs occur independently of reductions in their frequency (Zettle & Hayes, 1986), both aspects were assessed. We hypothesised that the program would be feasible and acceptable to the Australian sample and improve measures of well-being following HVSNS exposure, reducing its potential negative impact.

Method

The trial was registered with the Australian New Zealand Clinical Trials Registry on 26.07.2022 (https://www.anzctr.org.au/ACTRN12622001057774.aspx) registration number – ACTRN12622001057774.

Intervention Program Description.

The SMA program focused on cognitive-restructuring techniques designed to manage negative automatic thoughts (NATs). This included education on the role of thoughts in emotions, how to examine and reappraise negative thoughts, and participants were encouraged to identify and reappraise their negative thoughts. Psychoeducation on the reasons why people tend to present overly positive information online was also provided (e.g. Gordon et al., 2020). Content then covered examples of how to challenge negative thoughts relevant to HVSNS and helpful coping statements. The video was narrated by the primary author, a registered clinical psychologist. Participants were requested to complete approximately two minutes of interactive written tasks during the

video. An outline of the video narrative content and interactive written task is provided in the online supplementary information (S1).

Study Design

Feasibility and acceptability were assessed via a mixed-methods, within-subjects, pre-post design. Participants watched the interactive 13-minute micro-intervention video, before passively viewing their personal HVSNS account for 10 minutes. Demographic information and psychological outcome variables were collected prior to the intervention (T1) and immediately after participants had viewed the video and completed the Instagram viewing task (T2, approximately 23 minutes after T1 completion). At T2 qualitative information regarding feasibility and acceptability was also obtained. Psychological outcome data was collected one week following intervention (T3) to assess maintenance of or delayed effects, in addition to further qualitative data regarding acceptability of the intervention. A one-week follow-up period was chosen to be consistent with other brief psychology-based programs in the field (e.g. Bell et al., 2021; de Valle & Wade, 2022).

Participants were given one week to complete the follow up survey, with only those data completed between 1-2 weeks post-intervention being included for analysis (M= 8.00, SD= 2.01 days post-intervention). Exploratory outcomes included changes in self-report measures of cognitive and emotional well-being (life satisfaction, positive and negative affect) and body satisfaction.

Recruitment Methods

Participants were recruited between August 2022 and January 2023. Recruitment included students, staff, and visitors at the University of Adelaide, and external advertisements on Instagram and Facebook platforms (Australia-wide). Eligible university

students received course credit for their participation, with all other participants eligible to win a department store voucher. Participants were eligible for the study if they were over the age of 16 and fluent in English. They were also required to have access to an Instagram account that had been active for at least one week so all participants could provide baseline information regarding recent level of use. While a goal sample size of 30 was set, a final number of 59 participants were recruited due to high attrition.

Data Collected

At baseline (T1), demographic information was collected, including gender, age, ethnicity, and relationship status. Information regarding current level of HVSNS and other SNS use was assessed by self-reported use in the preceding week. Participants were given guidance on how to access the information recorded on SNS use on their smartphone. They were asked to report this information or estimate their use if they were unable to access accurate information, and asked to indicate whether the data entered was retrieved or estimated. Participants were also asked to indicate whether data on SNS use was retrieved from their smartphone or estimated. A percentage estimate of the amount of time spent passively using each site was also requested, with a definition of activities constituting passive use provided. Acceptability was assessed through several qualitative and quantitative measures (for details see Table 1). At T2, participant satisfaction with the video was assessed through Likert scale-type questions to give an overall score relating to acceptability. An acceptability benchmark was set at 32/40 on the scale, to give an average response of at least “somewhat satisfied” across all eight criteria. Participants were also requested to rate how useful they believed each of the video components to be and provide suggestions for video improvement through open-text entry.

Qualitative and quantitative questions were also asked at T2 to assess whether the video was targeting appropriate cognitions (see Table 1). This included collecting personalised information through open text entry about participant experiences when using HVSNSs. Participants were also asked to view the list of example negative thoughts presented in the video, such as "Other people are happier than me", and asked to record the frequency to which they experience them on a Likert-type scale. Self-reported quantitative data regarding secondary outcome and potential moderating or mediating variables was taken at all three time-points. Feasibility was assessed against a participant retention goal of 80% at 1-week follow-up, consistent with recommendations for acceptable completion rates in the literature (Thomas et al., 2004). To assess adherence to the passive Instagram exposure task, participants were requested to self-report the estimated percentage of time they spent passively engaging in the platform immediately following the task, with a definition of passive use given in the task instructions.

Table 1.
Outcome Measures and Internal Reliability

Outcome	Measure	Time data gathered	Internal reliability (Cronbach's α)
	Primary outcomes		
Acceptability – Satisfaction with video.	Eight questions (1–5-point Likert scale): (1) "How organised was the video?" (1= Quite unorganised, 5=Quite organised) (2) "How much did you like the format/design of the video?" (1=Quite disliked, 5-Quite liked) (3) "How easy was the video to follow?" (1=Quite difficult, 5=Quite easy) (4) "How well did the video address issues you have with negative emotions that arise when you use HVSNS?" (1= Quite ineffective, 5=Quite effective) (5) "How much new information did this video provide?" (1=None at all, 5=A lot of new information) (6) "Overall, how would you rate this video in helping you deal with negative emotions or thoughts that arise when using highly visual social networking sites?" (1= None at all helpful, 5=Quite helpful)	T2	0.94

	(7) “How likely would you be to recommend this training video to other people?” (1=Quite unlikely, 5=Quite likely) (8) “How likely are you to continue using the strategies in this video?” (1=Quite unlikely, 5=Quite likely)		
Acceptability – Perceived usefulness of video components	“How useful were the video training components listed below?” (1-5-point Likert scale. 1=Not at all useful, 5=Very useful): (a)The initial education about why passive use of highly visual social networking sites can be harmful. (b)Discussion about some of the reasons why people tend to post more positive news online. (c)Education about (and examples of) how to challenge some common negative thoughts. (d)The general coping statements provided.	T2	-
Acceptability – Open-ended video feedback request	“Do you have any other comments about what you found useful in the video?” “What suggestions do you have for improving the video?”.	T2	-
Acceptability – Usefulness of content – Open-ended request	“What negative thoughts typically come up for you when using HVSNS?”. “Please write down any thought challenging questions or helpful thoughts that were generated while watching the video that you think could be useful for managing any negative thoughts triggered in the future”.	T2	-
Acceptability – Participant experiences with NATs.	“How often do each of these thoughts come up for you when using HVSNSs?” (1-5-point Likert-scale. 1=Not at all, 5=Very often): (1) “I'm not attractive enough” (2) “Other people are happier than me” (3) “I'm not as successful / capable as others” (4) “Other people have better relationships than me” (5) “My friends like each other more than me / I'm missing out” (6) “Other people have more exciting lives than me / are having more fun”.	T2	-
Acceptability – Usefulness of content – Open-ended request	“Please write any negative thoughts that arose when using highly visual social networking sites in the last week. If none, please write "none"” “If any, please list any challenging questions or helpful thoughts that you used during the week when using highly visual social networking sites. If none, please write "none"” “What do you remember as the key messages from the training?”	T3	-
	Secondary outcomes		
Cognitive well-being	Five-item Satisfaction with Life Scale (SWLS; (Diener et al., 1985)	T1 T2 T3	0.90 0.93 0.92
Emotional well-being (positive emotions)	Positive (five) items from the short form of the Positive and Negative Affect Schedule (Watson et al., 1988)	T1 T2 T3	0.86 0.88 0.87
Emotional well-being (negative emotions)	Negative (five) items from the short form of the Positive and Negative Affect Schedule (Watson et al., 1988)	T1 T2 T3	0.87 0.89 0.91

State body satisfaction	Three visual analogue scales (VAS; 0-100-point Likert scale for each item. 0=Not at all, 100= Extremely. Scores added for total score 0-300): (1) "I am satisfied with my weight" (2) "I am satisfied with my overall appearance" (3) "I am satisfied with my body shape" (Adapted from Durkin & Paxton, 2002; Gordon et al., 2021; Heinberg & Thompson, 1995; Slater et al., 2019).	T1 T2 T3	0.95 0.98 0.98
	Potential moderating and mediating variables		
Social comparison orientation	The short 6-item version of the Iowa-Netherlands Comparison Orientation Measure (INCOM; Gibbons & Buunk, 1999; Schneider & Schupp, 2011)	T1	0.78
Frequency of NATs	The 15-item Automatic Thoughts Questionnaire–Negative – shortened version (ATQ-N-15; Hollon & Kendall, 1980; Netemeyer et al., 2002)	T1 T2[a] T3	0.96 0.97 0.97
Believability of NATs	The Automatic Thoughts Questionnaire – Believability – shortened version (ATQ-B-15; Netemeyer et al., 2002)	T1 T2[a] T3	0.96 0.98 0.97

NATs= Negative automatic thoughts, HVSNSs= Highly visual social networking sites, T1= Baseline, T2 = Immediately post experiment and Instagram task, T3= 7-day follow-up.
[a]T2 measures of automatic thoughts (frequency and believability) were measures of experiences during the 10-minute passive Instagram task, with T1 and T3 measures of these scales assessing experiences in the prior week.
Higher scores on the Social Comparison Orientation Scale reflect a greater tendency to engage in social comparisons. Higher scores on all other measures reflect more frequent experiences of the outcomes being assessed.

Analyses

Study data were collected using Qualtrics software (Qualtrics, 2020). Analyses focusing on changes in the psychological outcome variables over time between the three time points used a linear mixed effects model. To analyse qualitative data from open-ended questions, responses were grouped according to topic and reported in categories.

Results

Participant Characteristics

A total of 59 participants were recruited between 19th August 2022 and 25th January 2023. As outlined in Table 2, participants were aged 16-79 years (*M*=29.15, *SD*=16.10), with 74.6% aged 33 years or less. Almost two thirds of participants identified as female (66.1%) and the majority identified as being of European descent. Just over half of participants who responded identified that they were in a relationship. Table 2 also shows the type and amount of self-reported daily HVSNS use in the week prior to the study.

Instagram was the most frequently used HVSNS, followed by Facebook. Almost half (47.6%) of all recorded entries regarding amount of HVSNS use were obtained via phone records. Participants estimated using platforms passively less than half the time and reporting the highest level of passive use for Instagram, followed by Facebook.

Table 2.
Baseline Participant Characteristics

	M (SD)	*N*	
Age	29.2 (16.10)	59	
	%	*N*	
Gender:			
Female	66.1	39	
Male	27.1	16	
Non-binary/ another (please enter)	6.8	4 (no additional information provided)	
Occupation (select all that apply):			
Student	49.2	29	
Full-time employed	15.3	9	
Part-time/ casual employed	25.4	15	
Other (please enter)	20.3	12 (3 unemployed/volunteer, 4 self-employed/home duties, 5 did not elaborate)	
Ethnicity			
European Australian descent	66.1	39	
Aboriginal and/ or Torres Strait Islander	3.4	2	
Asian	20.3	12	
Another (please enter)	6.8	4 (African American/American/Australian)	
Prefer not to say	3.4	2	
Relationship status			
Single	49.2	29	
Married/ defacto	27.1	16	
In a relationship	23.7	14	
Estimated daily HVSNS use (minutes) (*n*=59)	*M*	*SD*	*Range*
Instagram (minutes)	76	83	0-323
% Passive use	46	36	0-100
Facebook (minutes)	35	55	0-250
% Passive use	33	37	0-100
Snapchat (minutes)	25	52	0-329
% Passive use	17	30	0-100
Other HVSNSs (BeReal)	0	0	-
Where HVSNS use data obtained from*	Estimate %	Phone records %	
Instagram (*n*= 53)	49.1	50.9	
Facebook (*n*=53)	56.6	43.4	
Snapchat (*n*=39)	51.3	48.7	

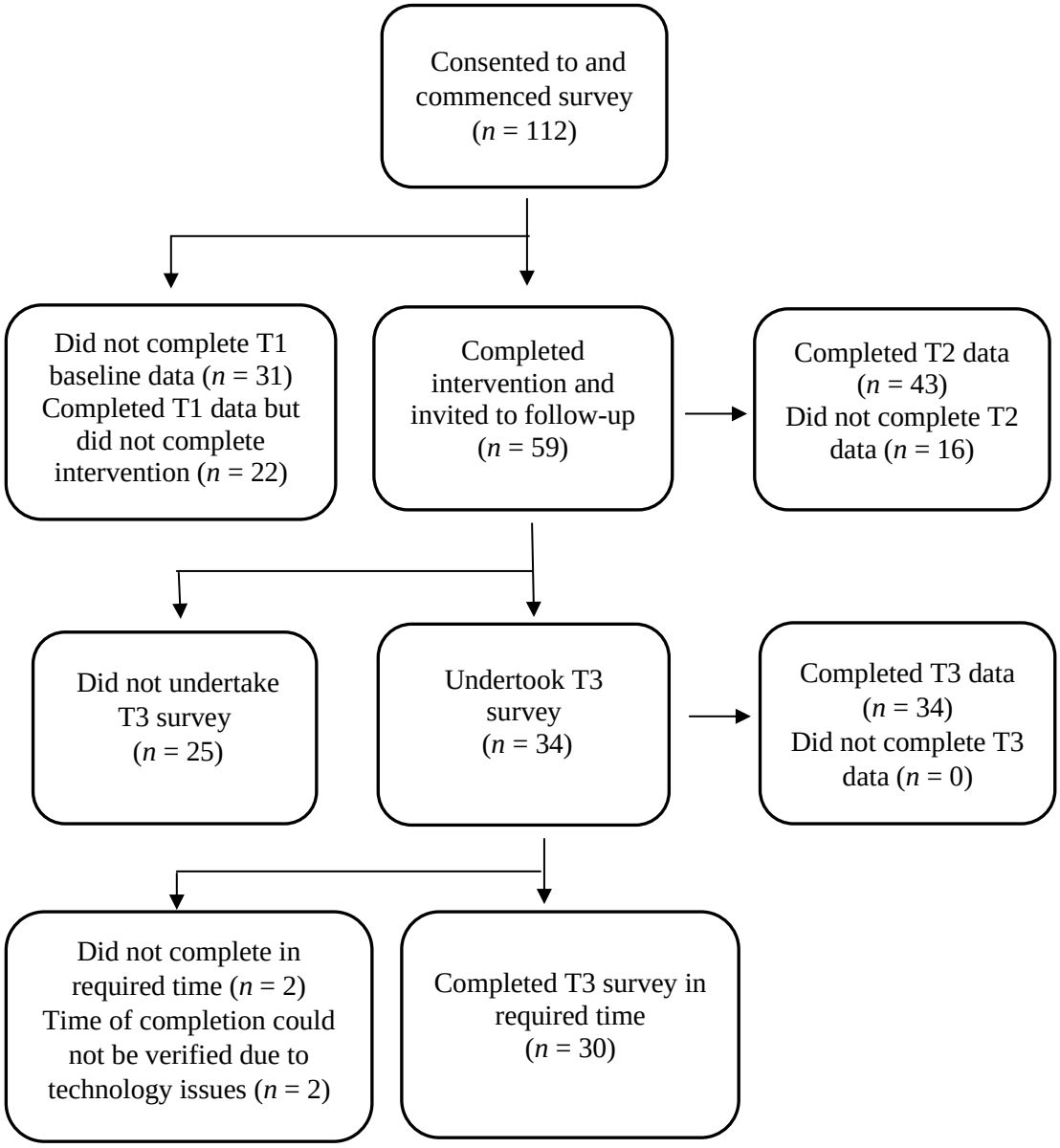
HVSNS= Highly visual social networking site
* No participants reported use of any other HVSNS (e.g. BeReal), thus no record of how the information was obtained for other HVSNS was recorded.

Feasibility

Retention

Of the 112 participants who provided written informed consent and commenced the study, 59 participants (52.7%) continued so far as to provide complete baseline data and undertake the intervention video (T1; see Figure 1). All 59 participants who watched the training video were invited to participate in the second survey (T3), with a total of 34 participants (57.6%) providing full T3 data. However, four T3 cases were removed from analyses: two removed as their time of completion fell outside of the period allowed for completion (two weeks) and the timing of two T3 cases could not be confirmed.

Figure 1.
Summary of Participant Flow



Recruitment Strategies

Initially, recruitment within the university setting was slow, which led to the addition of external advertising at the 4-month mark. Twenty-three of the 59 participants who completed the intervention and provided T1 and T2 data were recruited in the last 4-week period when strategies were broadened to include nation-wide social media advertising.

Acceptability

Participant Satisfaction with SMA Intervention

With respect to the questions regarding participant satisfaction of the training video, including factors such as video organisation and format, the acceptability benchmark was passed, with an average score of 34.12/40 (*SD*=6.37). This gave an average response between "somewhat satisfied" and "quite satisfied" for the components.

Analysis of qualitative feedback about the video provided by 43 participants (with 16 not providing feedback) confirmed that most respondents were satisfied with the content, with 39 (90.7%) having no suggestions for improvement, including three who expressed a desire for the development of further similar videos. While two participants reported that the video was too long, another participant felt it could have been more comprehensive and one commented that the video quality could have been improved upon. One participant wrote that they had autism, had found CBT unhelpful in the past and expressed concern that they may dwell on the negative thoughts discussed in the video in the upcoming week. However, most respondents reported a belief that the techniques may be of use to them. As indicated in Table 3, participants were asked to rate the usefulness of each of the video components, and over 90% of participants found the psychoeducation and cognitive restructuring components to be at least somewhat useful. Participants rated the content regarding thought challenging and general coping skills as the most useful, with average scores above "Quite Useful".

Table 3.

Appropriateness of Social Media Aware Program Content

Frequency of Responses for Perceived Usefulness of Social Media Aware Program Components (*n*=43).

	Not all useful (1)	A little bit useful (2)	Somewhat useful (3)	Quite useful (4)	Very useful (5)	Average score (SD) (1-5)
Initial education re passive use of HVSNS	2 (4.7%)	1 (2.3%)	6 (14.0%)	20 (46.5%)	14 (32.6%)	4.00 (1.00)

Education re reasons why people are overly positive online	2 (4.7%)	2 (4.7%)	11 (25.6%)	17 (39.5%)	11 (25.6%)	3.77 (1.04)
Education and examples of thought challenging	1 (2.3%)	2 (4.7%)	4 (9.3%)	14 (32.6%)	22 (51.2%)	4.26 (0.98)
General coping statements	2 (4.7%)	1 (2.3%)	5 (11.6%)	15 (34.9%)	20 (46.5%)	4.16 (1.05)

Reported Frequency of Negative Thoughts When Using Highly Visual Social Networking Sites (*n*=55).

Negative thought	Not at all (1)	A little bit (2)	Somewhat (3)	Quite a bit (4)	Very often (5)	Average Score *M* (*SD*)
Other people are happier than me	1 (1.8%)	16 (29.1%)	12 (21.8%)	17 (30.9%)	9 (16.4%)	3.31 (1.12)
Other people have more exciting lives than me/ are having more fun	4 (7.3%)	8 (14.5%)	18 (32.7%)	17 (30.9%)	8 (14.5%)	3.31 (1.12)
I'm not as successful/ capable as others	6 (10.9%)	10 (18.2%)	18 (32.7%)	12 (21.8%)	9 (16.4%)	3.15 (1.22)
Other people have better relationships than me	10 (18.2%)	15 (27.3%)	10 (18.2%)	12 (21.8%)	8 (14.5%)	2.87 (1.35)
My friends like each other more than me/ I'm missing out	9 (16.4%)	14 (25.5%)	16 (29.1%)	8 (14.5%)	8 (14.5%)	2.85 (1.28)
I'm not attractive enough	9 (16.4%)	17 (30.9%)	10 (18.2%)	13 (23.6%)	6 (10.9%)	2.82 (1.28)

Participant Reported Helpfulness of Social Media Aware Coping Strategies

	N/A - Did not attempt (0)	Not at all helpful (1)	A little helpful (2)	Somewhat helpful (3)	Very helpful (4)	Mean score (*SD*) (1-4)
Number of participants (*n*=30)	8 (26.6%)	0 (0.0%)	8 (26.6%)	7 (23.4%)	7 (23.4%)	-
Number of participants who attempted strategies (*n*=22)	-	0 (0.0%)	8 (36.4%)	7 (31.8%)	7 (31.8%)	2.94 (0.84)

Reported Negative Automatic Thoughts

Participants reported a range of negative thoughts when using HVSNSs (see Table 3). Negative thoughts about others being happier or having more exciting lives were most commonly experienced, closely followed by thoughts about not being as successful/capable as others, thoughts about others having better relationships, of friends liking each other more/ missing out, and with thoughts about not being attractive enough being least common. Participants were then requested to volunteer any additional NATs

that they felt were triggered for them via HVSNS. Twenty-nine of the 59 participants recorded additional information; however, most of these fell into one of the general categories noted in Table 3. For example, some participants reported “Others have more intact families”, or “I’m unemployable in a job market where so many jobs are available”. However, some negative thoughts were reported that were either more general or fell outside of the NATs mentioned in the training video, including: “They have got it so easy. Why do I have to work this hard?”, “I miss my daughter and life would be so much better if she was still alive”, “fear of death”, and “racism is too high”.

At T3, participants were asked to record negative thoughts that arose when using HVSNSs in the preceding week. A wide range of social comparisons were shown, consistent with the categories noted in Table 3. Of the 32 participants who recorded a response (with 11 T2 completers not responding), 18 (56.25%) reported no identified negative thoughts in the preceding week. Of the 14 who recorded information about identified negative thoughts, 8 fell into the categories noted in Table 3 (2 relating to attractiveness, 2 relating to success/ abilities, 2 relating to others having more fun/ more exciting lives, 1 relating to missing out on things with friends, and 1 relating to others appearing happier). Of the six other recorded responses, three were more general (e.g. “others have a better life”), one related to a comparison of physical capabilities, one related to others having more money/ things, and one stating “social media feeds abuse”.

Perceived Success of Applied Cognitive Strategies

At T3, participants were asked to rate how useful the applied techniques were, with ratings reported in Table 3. While 26.6% (8/30) of T3 respondents reported that they did not attempt any strategies over the preceding week, well over half of participants who

attempted strategies (63.6%; 14/22) reported finding the techniques somewhat or very helpful.

Adherence to Passive Instagram Exposure Task

Self-reported adherence to the passive Instagram exposure task was sound, with an average of 86.3% passive use (*SD*= 24.2, *n*= 43) reported among participants.

Potential Impact on Outcome Measures

Descriptive statistics for outcome measures are presented in Table 4. A linear mixed effects model was used to assess the changes in outcome across the three time points. Also shown in Table 4, analyses indicated significant reductions in negative affect from T1 to T2, of small effect size (*g*= 0.47). Scores at T3 were on average 0.35 units lower relative to T1, but the difference was not statistically significant. No other effect sizes of significance were observed between timepoints on any other variables.

Table 4.
Statistics for Well-Being Outcome Variables

Descriptive Statistics for Outcome Variables			
	T1 (n=59) *M (SD)*	*T2 (n=43)* *M (SD)*	*T3 (n=30)* *M (SD)*
Social comparison orientation	20.32 (4.59)	-	-
Automatic thoughts (Frequency)	34.68 (16.23)	24.00 (12.86)[a]	30.83 (15.63)
Automatic thoughts (Believability)	33.78 (14.76)	23.84 (13.77)[b]	30.67 (15.97)
Satisfaction with life	19.86 (7.82)	20.51 (7.85)	20.63 (7.89)
Body satisfaction	142.92 (87.61)	148.28 (93.53)	150.17 (93.63)
Positive affect	13.56 (5.21)	12.70 (5.17)	12.67 (5.00)
Negative affect	10.85 (4.86)	8.65 (4.31)	9.60 (4.64)

Linear Mixed Model Estimates and Effect Sizes of Changes in Well-Being Outcomes (*n*= 59)				
Outcome	Timepoint comparison	Estimate (95% CI)	*P* (two-tailed)	Effect size (Hedges *g*)
Automatic Thoughts (Frequency)	T3-T1	-1.97 (-6.07, 2.14)	0.348	0.238
Automatic Thoughts (Believability)	T3-T1	-1.61 (-4.94, 1.72)	0.344	0.203
Body image	T2-T1	6.03 (-1.86, 13.92)	0.134	-0.059
Body image	T3-T1	6.24 (-2.86, 15.34)	0.179	-0.080

Positive affect	T2-T1	-0.98 (-2.00, 0.05)	0.061	0.164
Positive affect	T3-T1	-0.83 (-1.99, 0.37)	0.180	0.172
Negative affect	T2-T1	-1.58 (-2.44, -0.73)	<0.001	0.471
Negative affect	T3-T1	-0.35 (-1.34, 0.63)	0.483	0.259
Satisfaction with life	T2-T1	-0.03 (-1.33, 1.27)	0.963	-0.082
Satisfaction with life	T3-T1	0.15 (-1.35, 1.65)	0.845	-0.097

T1 and T3 measures of Automatic Thoughts (Frequency and Believability) were measures of the prior week, with T2 measures of experiences during the 10-minute passive Instagram task. As such, T2 data on these measures was not compared with T1 or T3 data.

[a]n=45

[b]n=44

Discussion

Principal Findings

Acceptability

Both qualitative and quantitative data indicated a high level of acceptability of the SMA program among participants. Most participants found the video useful and easy to understand, with the acceptability benchmark of at least 'somewhat satisfied' surpassed. Findings indicated that the video targeted the relevant negative thoughts triggered by HVSNS exposure and confirmed that participants experienced a wide range of negative thoughts stemming from social comparisons across a range of life areas. Thoughts about others being happier or having more exciting lives were the most frequently experienced thoughts by participants, closely followed by thoughts about not being as successful or capable as others. Of particular interest, given that much of the research in the area to date has focused on body image, thoughts about not being attractive enough were the least commonly experienced. This confirms the appropriateness of the broad content of the SMA program and highlights the general importance of interventions that target a wide range of areas for social comparison.

Feasibility

While difficulties with recruitment and retention were encountered, outcomes were satisfactory. Recruitment strategies commenced within a university population but had to

be expanded due to the low rate of initial uptake. Subsequent external recruitment strategies, particularly via social media, resulted in improved recruitment rates. Retention rates were less than desired but were consistent with other studies in the field that had completion rates between 40-60% at 1–2-week follow-up (de Valle & Wade, 2022; Fardouly et al., 2023). Nonetheless, alternative strategies, such as increased incentives, should be considered for future studies.

Secondary Outcomes – Potential Impact

Although this study was not designed to examine program efficacy, significant reductions in negative affect post-intervention and Instagram exposure were found, albeit of small effect size. Given that even smaller amounts of Instagram exposure have been found to increase negative affect (7 minutes; Engeln et al., 2020) the intervention may have not only acted as a buffer to the exposure, but also served to reduce negative affect further. Of all the well-being outcomes, it is unsurprising to have detected the most meaningful improvement in negative affect due to the thought challenging component of the SMA program, which aimed to identify and manage a range of negative thoughts, thereby leading to a reduction in associated negative emotions. However, these results were not maintained at a meaningful level at 1-week follow-up. Future studies may consider a shorter follow-up period to obtain reliable estimates of the maintenance of effects.

No statistically significant changes were found for other outcome variables. However, the current study was not adequately powered to detect significant effect sizes and, while not reaching statistical significance, improvements were shown in the anticipated direction on some measures (automatic thoughts believability and frequency, body image). It is also important to consider that the SMA intervention may have still served as a buffer to the Instagram exposure for some well-being outcomes, with HVSNS

exposure found to be associated with decreases in affective well-being and body satisfaction variables (Engeln et al., 2020; Verduyn et al., 2015). As such, future studies may consider comparing an experimental group to an active control group who receive Instagram exposure only to compare changes in well-being outcomes.

Implications For Future Research

The current study provides support for the feasibility and acceptability of cognitive restructuring techniques in efforts to reduce the negative impact of HVSNS use on well-being. The wide range of social comparisons triggered by HVSNS use has also been highlighted, suggesting the need for SML programs to extend their focus beyond body image outcomes.

Limitations

As the sample was limited to the Australian and English-speaking population, findings must be generalised to other cultural groups with caution. The sample included a wide range of ages, which may have introduced variability in results. It should also be noted that the majority of the sample were aged under 33 years, thus findings may not be representative of SNS use in older age groups who are showing rapid increases in SNS consumption (Statista, 2022b). As there was an overrepresentation of female participants in the sample, study findings may not be fully representative of other genders (e.g. male, gender non-conforming) in the population.

Further limitations include a reliance on self-reported information to assess adherence to the passive Instagram exposure task. Observation in an experimental setting would likely have provided a more accurate measurement. Although part of the process of establishing feasibility of recruitment, there is also potential that the university sample

initially recruited (who received course credit for participation) and the later included wider community (who were eligible to receive a monetary reward) may have responded differently to the intervention and may not be fully representative of the target group (HVSNS users). While differences between populations in the current study could not be more closely examined due to the small sample size, the potential impacts on responsivity should be considered in future program implementation. The relatively low retention of participants across the study (57.6% completing follow-up) also impacts the accuracy of findings.

Conclusion

The SMA program was acceptable to participants and appropriately targeted the wide range of negative thoughts experienced by participants when using HVSNSs. Further evaluation of the efficacy of the SMA program via a full-scale RCT with a more representative group of HVSNS users is warranted to draw more definitive conclusions regarding efficacy.

Ethical statement

Research has conformed to the Declaration of Helsinki. Ethics approval was granted by The University of Adelaide Human Research Ethics Committee, reference number 22/73. Informed consent was obtained from all participants to publish.

Acknowledgements

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CHAPTER 7. PAPER THREE

7.1. Preamble

The third study involves a randomised controlled trial of the SMA program to determine its effectiveness in reducing the negative impact of HVSNS use on well-being and body image outcomes. Results of the pilot study (Chapter 3) demonstrated that the SMA program content was acceptable for Australian participants. As difficulties with retention and recruitment were initially experienced during the pilot study, efforts were made to increase recruitment through Australia-wide advertising and the use of online survey platforms. Measures of outcomes assessed were consistent with the pilot study; however, a 3-day follow-up period was instead used to help identify any delayed effects.

Herriman, Z., Roberts, R. M., Taylor, A. M., & Slater, A. (2024). A CBT-based micro-intervention to reduce the negative impact of Instagram use on well-being – A randomised controlled trial. *Psychology of Popular Media – In review.*

Technical note: The manuscript as submitted was blinded for review.

7.2. Statement of Authorship

Title of Paper	A CBT-based micro-intervention to reduce the negative impact of Instagram use on well-being – A randomised controlled trial.
Publication Status	☐ Published ☐ Accepted for Publication ☑ Submitted for Publication ☐ Unpublished and Unsubmitted work written in manuscript style
Publication Details	Submitted for publication to the journal Psychology of Popular Media.

Principal Author

Name of Principal Author (Candidate)	Zoe Herriman		
Contribution to the Paper	Conceptualisation, Methodology, Project administration, Data curation, Formal analysis, Writing – original draft.		
Overall percentage (%)	85%		
Certification:	This paper reports on original research I conducted during the period of my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.		
Signature		Date	9.9.24

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);
ii. permission is granted for the candidate in include the publication in the thesis; and
iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Prof. Rachel Roberts		
Contribution to the Paper	Methodology, Writing – review & editing, Supervision.		
Signature		Date	9/9/2024

Name of Co-Author	Dr. Amanda Taylor		
Contribution to the Paper	Methodology, Writing – review & editing, Supervision.		
Signature		Date	11/09/2024

Name of Co-Author	Assoc. Prof. Amy Slater		
Contribution to the Paper	Writing – review & editing, Supervision.		
Signature		Date	29/9/24

7.3. Submitted Manuscript

Abstract

A range of negative mental health outcomes have been associated with the use of highly visual social networking sites (HVSNSs), such as Instagram. The current study aimed to test the efficacy of the Social Media Aware (SMA) program, a cognitive therapy-based e-learning micro-intervention for improving body satisfaction and well-being. A randomised controlled trial was conducted, whereby participants (n= 167; Age: M= 25.06, SD= 9.36; 68.4% female) were randomly allocated to an intervention group that watched the 13-minute SMA video before engaging in 10 minutes of passive Instagram use, or a control group that viewed a 10-minute educational video on the history of Instagram before the Instagram exposure task. Participants completed measures at three timepoints; immediately prior to intervention, immediately following intervention and passive Instagram use, and three days following the intervention. Primary outcomes included body satisfaction, emotional well-being (positive and negative affect), and cognitive well-being (life satisfaction). Exploratory outcomes included negative automatic thoughts (believability and frequency) and social comparison orientation (SCO). Modest, statistically significant improvements in the desired direction were found for negative affect, positive affect, satisfaction with life, body satisfaction, and the frequency and believability of negative automatic thoughts (NATs) among those who received the intervention compared to the control group across the two timepoints. No effect of moderation of SCO nor mediation via NATs were shown. These findings suggest that cognitive restructuring techniques may be useful in managing the negative emotional impacts of HVSNS use and could be considered for inclusion in more comprehensive social media literacy programs.

Keywords: social media, body image, well-being, randomised controlled trial, cognitive behaviour therapy, cognitive restructuring.

Public Significance

The current study tested the efficacy of a cognitive behavioural therapy (CBT)-based micro-intervention designed to reduce the negative impact of Instagram use on well-being. The program led to improvements in negative affect, positive affect, satisfaction with life and body satisfaction. Results highlight the potential benefits of micro-interventions for managing negative impacts of social media use and the usefulness of including CBT strategies in larger social media literacy programs.

Introduction

Literature Review

Online social networking site use has been consistently increasing worldwide (Chaffey, 2023), and numerous concerns about negative psychological outcomes have been raised. Psychological outcomes of highly visual social networking sites (HVSNSs), such as Instagram, have received considerable attention (Herriman et al., 2023; Marengo et al., 2018). With the primary features of the ability to upload images or videos and to digitally modify them, HVSNSs provide users with an ability to manipulate their online presentations (Marengo et al., 2018). This has led to consumers posting more self-promoting, positive images and news than negative (Verduyn et al., 2015), and concerns relating to pressures to live up to unrealistic ideals (Rodgers, 2015) and ensuing negative judgements about the self (Verduyn et al., 2020).

Indeed, platforms are constantly evolving and there is great diversity in factors that may impact psychological outcomes of social media exposure. This includes user behaviours (e.g. problematic levels of social media use; Saleem et al., 2024), user traits (e.g. narcissism; Brailovskaia, Bierhoff, et al., 2020), and other social media experiences (e.g. nature of content viewed; Meier & Krause, 2023). Nonetheless, consistent with concerns, negative psychological outcomes have been frequently reported from HVSNS exposure. This includes reduced well-being (Faelens et al., 2021), decreased life satisfaction (Fioravanti et al., 2020), increased anxiety and reduced body satisfaction (Moujaes & Verrier, 2021), and increased disordered eating behaviour (Stein et al., 2021), to name a few.

Theoretical Framework

Social comparison processes are a central feature of the relationship between HVSNS use and negative mental health outcomes (Holland & Tiggemann, 2016; Verduyn et al., 2020). Social comparison theory (Festinger, 1954) proposes that people have an innate tendency to evaluate themselves and their lives by comparing themselves to similar others. Such processes can at times be detrimental to well-being, particularly when comparing oneself to those who are perceived as superior in some way (upwards social comparison; Brickman & Bulman, 1977). HVSNSs provide ample opportunity for upwards social comparisons due to the overly positive and unrealistic presentations curated (Verduyn et al., 2020; Verduyn et al., 2017). While upwards social comparisons on HVSNSs have occasionally been found to lead to adaptive psychological responses, such as admiration or inspiration (Tosun & Kaşdarma, 2020), negative experiences, such as such as poor self-evaluations and envy (Chen et al., 2016; Weber et al., 2021) have also often been found to be commonly invoked with HVSNS exposure. Passive forms of use, defined as online activities that do not involve direct communication with others, including scrolling or consuming information (Verduyn et al., 2015), have been found to be particularly problematic for psychological outcomes (Frost & Rickwood, 2017; Verduyn et al., 2015). Passive HVSNS use provides ample opportunity for social comparisons, without the potential benefits that can come with more active forms of use, such as an increased sense of connection with others (Kross et al., 2021).

Intervention Approaches

A range of potential intervention strategies have been attempted to minimise the negative impact of HVSNSs on well-being. To date, most attempts have taken an exposure reduction approach, with varying effect on outcomes (Herriman et al., 2023). While some found that less use was beneficial for well-being outcomes, such as positive affect and life

satisfaction (Fioravanti et al., 2020), negative outcomes from reduced use, such reduced social connection, were also shown (Mitev et al., 2021). This suggests the need for interventions that reduce the risk of harm while allowing users to continue to experience the benefits of HVSNSs. Social media literacy programs have been developed (Bell et al., 2021; Gordon et al., 2021; McLean et al., 2017), with small improvements found in body image and disordered eating outcomes stemming from appearance-based social comparisons. However, a wide range of social comparisons across many areas of life beyond appearance have been found to be elicited from HVSNS use, such as quality of relationships, popularity, abilities, and perceived happiness and excitement in life (Herriman et al., 2024). This suggests the need for programs that address the wide range of comparisons that may underpin the observed reductions in well-being outcomes (Kross et al., 2021).

Cognitive behavioural therapy (CBT)-based interventions have also emerged within the HVSNS field, with some promise. Aboody et al. (2020) tested a brief cognitive therapy-based intervention that trained participants to identify and counteract maladaptive body image-related beliefs, and found improvements in a range of outcomes. This included body image disturbance (d= 0.61), appearance satisfaction (d= -0.67), trait physical appearance anxiety (d= 0.89) and self-esteem (d= 0.55). A pilot study by de Valle and Wade (2022) examined the potential impact of a brief self-guided CBT intervention designed to reduce self-criticism. Findings suggested improvements in disordered eating (post-task: d= 0.51; 1-week follow-up not significant), appearance comparisons (post-task: d= -0.51; 1-week follow-up: d= -0.7), and body image flexibility (post-task: d= -0.51; 1-week follow-up: d= 0.46) when compared to a waitlist control group. Stiff and Cutts (2023) examined the impact of a 10-slide PowerPoint micro-intervention based on social media literacy and cognitive restructuring (psychoeducation relating to comparisons and

attributions when viewing HVSNS images) on body image. Male participants who undertook the intervention prior to exposure to HVSNS images focusing on male muscularity and leanness demonstrated improved body esteem (small effect: η_p^2=0.03) and greater reductions in body dissatisfaction (small effect: η_p^2=0.03) than participants in the control group who did not view the intervention slides prior to HVSNS exposure.

Current Study

The current project aims to expand on the existing literature by assessing the efficacy of an online CBT-based micro-intervention, the 'Social Media Aware' (SMA) program, through a randomised controlled trial (RCT) with an active control group. The SMA program takes the format of a 13-minute interactive video that teaches participants cognitive restructuring techniques. More specifically, this includes psychoeducation, helpful coping strategies, and thought challenging (where clients are taught to identify, analyse, and dispute thoughts; Beck et al., 1979). The SMA program also aims to target the broad range of social comparisons found to stem from online HVSNS use, such as judgements relating to abilities, relationships, excitement in life, the perceived happiness of others, and appearance (Herriman et al., 2024). A pilot study for this program (Herriman et al., 2024) found the SMA program showed high acceptability with participants. Preliminary findings also suggested significant, small improvements in negative affect from baseline to immediately post-intervention. However, these improvements were not maintained at 1-week follow-up and the study did not include a control group for comparison.

The current study will assess several potential psychological outcomes and proposed variables of influence. Given consistent findings in the literature show negative associations between well-being and passive social networking site use (Kross et al., 2021;

Verduyn et al., 2017), primary outcomes of the current study included self-reported emotional and cognitive well-being. As negative associations have also been found between HVSNS use and body satisfaction measures (Holland & Tiggemann, 2016), body satisfaction was also assessed. Trait social comparison orientation (the dispositional tendency to engage in social comparisons), was assessed as a potential moderating variable. As thought challenging is hypothesised to reduce the more surface-level negative automatic thoughts (NATs) that are triggered by events and underpin psychopathology (Beck et al., 1979), the frequency of NATs was assessed, consistent with many studies assessing the effectiveness of cognitive therapies (Bartucz et al., 2022). Another potential mechanism of change underlying cognitive therapies is a reduction in one's belief in NATs (Hancock et al., 2018). As such, both the frequency and believability of NATs were considered as potential mechanisms of change for the SMA program.

Study Objectives

The primary aim of the current study was to examine the efficacy of the CBT-based SMA program in reducing the negative impact of HVSNS use on well-being outcomes through a RCT. We hypothesised that:

- Participants who engaged with the SMA program would report small increases in positive affect, life satisfaction and body satisfaction, and small decreases in negative affect post-intervention and at 3-day follow-up compared to an active control group.
- Change within the intervention group would occur via reduced frequency and believability of NATs, and those with higher trait social comparison orientation were expected to experience greater benefit, in terms of improvements in wellbeing outcomes, following the intervention.

Materials and Methods

Study Design

The trial was registered prospectively with the Australian New Zealand Clinical Trials Registry (ANZCTR) on 02.05.2023 (https://www.anzctr.org.au/ACTRN12623000447651p.aspx), registration number: ACTRN12623000447651p. A RCT design with an active control condition was used to investigate whether a cognitive restructuring micro-intervention was able to reduce the negative impact of HVSNS use on well-being outcomes. Participants undertook the study remotely online and were randomly allocated to either an experimental group (EG) or control group (CG). Participants in the EG watched an interactive 13-minute e-learning video before engaging in 10 minutes of passive Instagram use (using their own Instagram account). Participants in the CG watched a 10-minute interactive educational video that discussed the history of the Instagram platform and the nature of algorithms and contained no content related to psychological principles or cognitive behavioural strategies. Participants completed surveys at three time-points: baseline (immediately prior to the EG or CG video and Instagram exposure; T1); immediately following the video and Instagram exposure task (10 minutes of passive use; T2), and 3 days following the intervention (T3). As the pilot study of the SMA program did not find evidence of maintenance effects at 7-day follow-up, a 3-day follow-up was chosen for the current study to capture potential enduring impacts. Participants were given 3 days to complete the follow-up survey to remain consistent with the short follow-up periods of other studies in the area that tested micro-interventions (e.g., Atkinson & Diedrichs, 2021; Bunge et al., 2016; Kivity & Huppert, 2016). Only those providing data between 3-6 days post-intervention were included for analysis (M= 3.53, SD= 1.57 days post-intervention). A priori power analysis

suggested that a sample of 158 completers at T2 would have adequate power (80%) to detect small effects sizes of *d*= 0.3 between groups.

Recruitment Methods

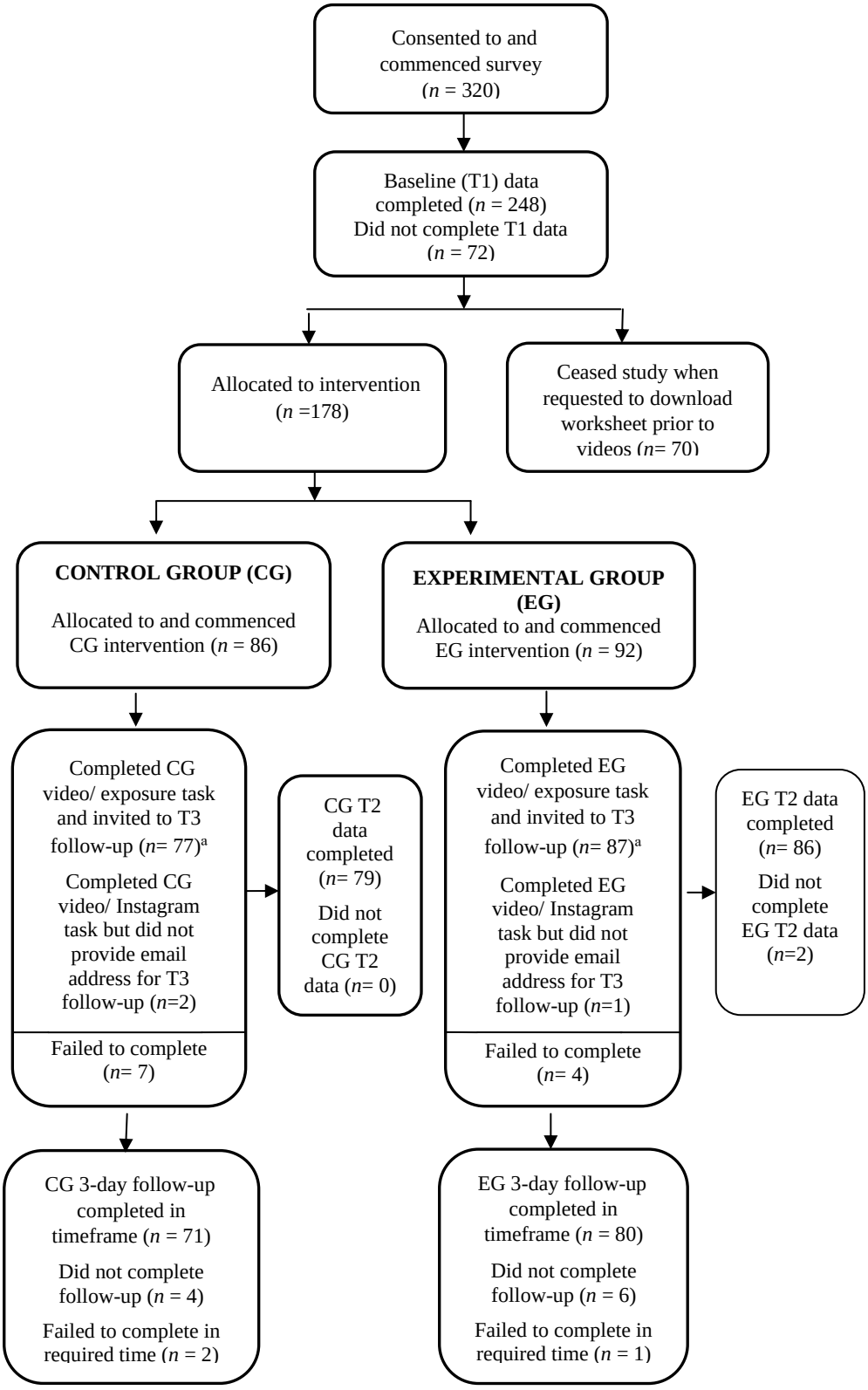
Australian-based participants were recruited between July 31st, 2023, to March 11th, 2024. Participants were recruited via the University of Adelaide, including students, staff, and visitors through electronic advertisements. Australia-wide advertisements also occurred via Meta social media platforms and other Australia-based research organisations. Eligible university students (those enrolled in an undergraduate first-year psychology course) received course credit for their participation, with all other participants eligible to win a department store voucher. Eligibility requirements included being fluent in English and over the age of 16 (the age which parental consent is not required for medical intervention; Youth Law Australia, 2018). Participants were also required to have held an accessible Instagram account for at least 1 week so that participants were able to provide information regarding recent level of HVSNS use.

Procedure

The research protocol was approved by the University of Adelaide Human Research Ethics Committee (approval no.: H-2023-154). To ensure that participants were blinded to condition allocation, they were informed that the study was to examine the impact of psychoeducational videos on social media and that they would be allocated to either one of two psychoeducational videos, without mention that the videos related to intervention and control conditions. Randomisation was completely automated via the Qualtrics online survey platform when participants clicked on the survey link. Participants in the EG viewed the 13-minute SMA program before engaging in 10 minutes of passive Instagram use. In place of the SMA video, participants in the CG viewed a 10-minute

educational video and were then required to also engage in 10 minutes of passive Instagram use. Figure 1 shows participant flow.

Figure 1.
Summary of Participant Flow



T2= immediately following the exposure task, T3= 3 days following the exposure task/ T2.

[a]All participants that completed the control group or experimental group video and Instagram exposure task were invited to complete the 3-day follow-up survey, irrespective of whether they completed all T2 data immediately following the exposure task.

SMA Program Description

The SMA program was created and narrated by the first author (ZH), a clinical psychologist. The cognitive-restructuring techniques applied included psychoeducation, thought challenging and helpful coping statements, with the aim to assist participants to manage negative automatic thoughts that may stem from HVSNS exposure. More specifically, this included education relating to the negative impact of passive HVSNS exposure, the association between thoughts and emotions, and methods for examining and reappraising negative thoughts. Examples of how to challenge negative thoughts relevant to HVSNS use were then provided (e.g. To challenge the idea that other people are happier, clients were instructed "Think of people you know really well. Do their lives look the same in real life as they do online?"). Examples of more functional thoughts that could be generated from such challenging were also outlined (e.g. "Everyone has down days, unattractive days, days on the couch with no plans, and relationship problems. They just don't post that information online"). Participants were additionally requested to complete brief written tasks during the video (e.g. recording example negative thoughts experienced and identifying possible alternative balanced thoughts) to personalise and help consolidate learning of the strategies, as recommended for the therapeutic setting (Beck et al., 1979; Wright et al., 2017). Links to the EG and CG videos and copies of the written tasks can be obtained in the online supplementary information.

Control Video Description

The control group video task was designed to control for extraneous factors that could be mistaken for treatment effects. Participants in the CG viewed a 10-minute

educational video outlining the development of the Instagram platform and the nature of algorithms. This video discussed the founders of Instagram and how the platform developed over the years, with no reference to negative mental health outcomes or psychological strategies for addressing factors that may lead to these outcomes (e.g. NATs). This was in line with recommendations in the field to ensure that the intervention and control conditions differ as much as possible in terms of the active treatment components, but are similar otherwise (Safer & Hugo, 2006).

Data Collected

At T1, demographic information was collected, including age, gender, ethnicity, employment status and relationship status. To gauge current level of passive and active HVSNS and other social networking site use (also at T1), participants were requested to enter their estimated daily use of HVSNSs over the prior week, either collected from their smartphone data or estimated from memory. Participants were also asked to estimate the proportion of time they spent passively using each site, with a definition of passive use (time spent scrolling, looking at posts and reading the content and NOT communicating with others) provided. To assess the level of adherence to the passive Instagram exposure task, participants were requested to confirm the proportion of time they spent using the site passively (immediately following; at T2), with definitions of passive use again provided prior to the task. Self-reported quantitative data regarding primary and exploratory outcome variables was taken at all three time-points, as outlined in Table 1 with their internal consistency for this study.

Table 1.
Outcome Measures and Internal Reliability

Outcome	Measure	Timepoint data gathered	Cronbach's α
Primary outcomes			

Cognitive well-being	5-item Satisfaction with Life Scale (Diener et al., 1985). 0-7-point Likert scales for each item with higher total score reflecting greater satisfaction with life.	T1 T2 T3	0.86 0.89 0.90
Emotional well-being (positive emotions)	5 items from the short form of the Positive and Negative Affect Schedule (Watson et al., 1988). 0-5-point Likert scales with higher total score reflecting greater frequency of positive emotions.	T1 T2 T3	0.77 0.77 0.77
Emotional well-being (negative emotions)	5 items from the short form of the Positive and Negative Affect Schedule (Watson et al., 1988). 0-5-point Likert scales with higher total score reflecting greater frequency of negative emotions.	T1 T2 T3	0.88 0.89 0.89
State body satisfaction	Three visual analogue scales (0-100-point Likert scales for each item; 0=Not at all, 100= Extremely. Scores added for total score 0-300, with higher total score reflecting greater body satisfaction): (1) "I am satisfied with my weight" (2) "I am satisfied with my overall appearance" (3) "I am satisfied with my body shape" (Durkin & Paxton, 2002; Gordon et al., 2021; Heinberg & Thompson, 1995; Slater et al., 2019).	T1 T2 T3	0.88 0.92 0.95
	Potential moderating and mediating variables		
Social comparison orientation	The short 6-item version of the Iowa-Netherlands Comparison Orientation Measure (INCOM; Gibbons & Buunk, 1999; Schneider & Schupp, 2011). 0-5-point Likert scales with higher total score reflecting greater tendency to engage in social comparisons.	T1	0.79
Frequency of NATs	The 15-item Automatic Thoughts Questionnaire–Negative – shortened version (ATQ-N-15; Hollon & Kendall, 1980; Netemeyer et al., 2002). 0-5-point Likert scales with higher total score reflecting greater frequency of NATs.	T1 T2[a] T3	0.96 0.97 0.96
Believability of NATs	The Automatic Thoughts Questionnaire – Believability – shortened version (ATQ-B-15; Netemeyer et al., 2002). 0-5-point Likert scales with higher total score reflecting greater belief in NATs.	T1 T2[a] T3	0.96 0.97 0.96

HVSNSs= Highly visual social networking sites, NATs= Negative Automatic Thoughts, T1= Baseline, T2 = Immediately post intervention and Instagram task, T3= 3-day follow-up.

[a]T2 measures of automatic thoughts (frequency and believability) were measures of participant experiences during the 10-minute passive Instagram task, with T1 and T3 measures of these scales assessing experiences in the three days prior.

Analyses

Study data were collected and managed using Qualtrics software (Qualtrics, 2020), hosted at the University of Adelaide. This is a secure online survey tool designed to support data capture for research studies. Independent samples t-tests were used to identify any differences in baseline characteristics between groups. Intervention effects for the full sample were calculated via linear mixed effects models to assess the changes in outcome across the three timepoints and between groups. Effect sizes for the mean difference were approximated by dividing the marginal mean differences between the timepoints and group

by the observed standard deviation. Social comparison orientation was assessed as a moderator on primary outcomes by including a three-way interaction between time, treatment group and social comparison orientation in the linear mixed model for each outcome. Mediation analysis using linear regression was conducted for the associations between group membership (EG/CG) and negative affect, positive affect, satisfaction with life and body satisfaction at T3, with negative automatic thoughts frequency (NAT-F) and believability (NAT-B) at T3 entered as mediators, using the mediate command from Stata 18 mediation package. This approach was taken due to the complexity of multiple timepoints and how the outcomes were measured (symptoms as reported in the last 3 days). The data of all participants who completed either the EG or CG video were included for analysis.

Results

Participant Characteristics

A total of 167 participants consented to the study and continued so far as to provide complete T1 baseline data and undertake either the CG or EG video (see Figure 1), with 165 participants also providing full T2 data (98.8%). All 167 participants were invited to participate in the second survey (T3) 3 days later, with 151 (90.4%) providing full T3 data. The sample size was considered adequate to detect small effect sizes.

The majority of participants identified as female (70.1%) and reported their relationship status as single (59.9%). Almost two-thirds of participants who responded identified that they were students (65.9%) and of European descent (64.7%). Differences in baseline characteristics between groups are reported in Table 2, with no significant differences between groups for any demographic variables, baseline HVSNS use, baseline outcome variables, baseline passive HVSNS use, method of obtaining HVSNS data

(estimate or via phone records), time taken for follow-up, or self-reported adherence to the passive Instagram exposure task.

Table 2.

Demographic Differences at Baseline and Adherence to Instagram Exposure Task Between Control and Experimental Groups.

Demographic	Experimental		Control		Difference	
	M (SD)	*N*	*M (SD)*	*N*	*t*	*p*-value
Age	24.08 (8. 31)	88	26.15 (10.36)	79	-1.43	.154
	%	*N*	%	*N*	x^2	*p*-value
Gender:		88		79	2.53	.470
Female	73.9	65	65.8	52		
Male	22.7	20	30.4	24		
Non-binary/ another	2.3	2[a]	3.8	3[a]		
Prefer not to say	1.1	1	0.0	0		
Occupation (select all that apply):		88		79	5.49	.482
Student	67.4	59	64.6	51		
Full-time employed	21.3	19	20.3	16		
Part-time/ casual employed	33.7	29	79.9	23		
Other	2.2	2[b]	5.1	4[c]		
Ethnicity		88		79	4.57	.335
European Australian descent	58.0	51	72.5	57		
Aboriginal and/ or Torres Strait Islander	1.1	1	1.3	1		
Asian	34.1	30	24.1	19		
Another	5.7	5[d]	2.5	2[e]		
Prefer not to say	1.1	1	0.0	0		
Relationship status		88		79	1.987	.370
Single	63.6	56	55.7	44		
Married/ defacto	12.5	11	20.3	16		
In a relationship	23.9	21	24.1	19		
Outcome measures	Experimental		Control		Difference	
	M (SD)	*N*	*M (SD)*	*N*	*T*	*p*-value
Negative affect	10.56 (5.43)	88	9.72 (4.34)	79	1.09	.277
Positive affect	12.4 (3.66)	88	12.62 (4.39)	79	-.357	.722
Body satisfaction	133.57 (70.54)	88	137.28 (72.9)	79	-.334	.739
Satisfaction with life	20.15 (6.59)	88	20.92 (7.14)	79	-.731	.466
NAT-F	33.88 (15.52)	88	33.19 (14.72)	79	.292	.771
NAT- B	33.31 (15.51)	88	32.14 (14.32)	79	.504	.615
Social comparison orientation	20.76 (4.79)	88	21.38 (4.3)	79	-.87	.383
HVSNS behaviour	Experimental		Control		Difference	
	M (SD)	*N*	*M (SD)*	*N*	*T*	*p*-value
Time spent on HVSNSs						

in the week prior						
Instagram	63.29 (70.92)	87	58.54 (51.77)	78	.49	.627
Facebook	23.25 (32.89)	84	24.78 (34.07)	77	-.29	.772
Snapchat	21.39 (37.48)	84	39.25 (76.65)	76	-1.90	.059
Total HVSNS use for week prior	105.18 (98.41)	88	121.24 (115.00)	78	-.97	.334
Portion of passive HVSNS use in prior week (%)[f]						
Instagram	56.66 (34.08)	80	59.12 (33.84)	73	-.45	.328
Facebook	44.19 (37.85)	52	54.71 (38.70)	58	-1.44	.153
Snapchat	17.13 (22.73)	39	15.82 (16.42)	44	.30	.762
Average % passive use of total HVSNSs in week prior	45.88 (29.63)	80	46.35 (28.61)	76	-.10	.920
Adherence to passive Instagram exposure task (% of compliance)	88.27 (20.70)	89	92.73 (14.86)	80	-1.59	.113
Time taken to complete follow-up (T2-T3; days)	3.49 (.88)	81	3.58 (2.09)	73	-.32	.758

HVSNS data obtained from phone records (vs estimate from memory) by platform	Experimental %	*N*	Control %	*N*	Difference *t*	*p-value*
Instagram	51.7	87	48.7	78	-0.38	.702
Facebook	55.1	69	48.5	68	-0.76	.447
Snapchat	54.0	63	50.9	57	-0.34	.738

HVSNS= Highly visual social networking site.
NAT-F= Negative Automatic Thoughts – Frequency, NAT-B= Negative Automatic Thoughts – Believability
[a]No additional information was provided.
[b]Other recorded occupations were unemployed, self-employed.
[c]Other recorded occupations were 3 unemployed, 1 did not elaborate.
[d]Other recorded ethnicities were African, 2 Middle Eastern, Turkish-Mauritian, Indo-Fijian.
[e]Other recorded ethnicities were South American, Middle Eastern.
[f]Participants were also asked to record their use of any other potential HVSNS sites. While there were some entries, such as videosharing (e.g. TikTok) or microblogging platforms (X/Twitter), none met the current criteria for a HVSNSs and were not included in analyses. A HVSNS was defined as a subset of social media where one can create an online profile to build and communicate with networks, and with the primary function of sharing images or videos that can be digitally modified (Herriman et al., 2023; Marengo et al., 2018).

Primary Outcomes

Table 3 outlines descriptive information for outcome variables across timepoints. Intervention effects for the full sample are outlined in Table 4 and Figures 2-7 depict mean scores across the three timepoints for each outcome variable, showing greater changes in the desired directions among those in the EG than CG in all outcomes measured.

For negative affect, a significant decrease was shown from T1 to T2 in both the CG (p= .038, d= 0.18) and EG (p < .001, d= 0.41). However, this was only maintained at 3-day

follow-up in the EG (T3; $p < .001$, $d = 0.30$). The global test for group differences showed that the EG experienced a significantly greater reduction in negative affect across timepoints ($p = .015$).

In the control group, positive affect showed a small decrease from T1 to T2 ($p < .001$, $d = 0.24$), and this small effect was retained at T3 ($p < .001$, $d = 0.31$). However, in the EG no significant differences were found from T1 to either T2 ($p = .078$) or T3 ($p = .775$). The global test for group differences for this outcome had a p-value of .017, demonstrating that the CG experienced a significantly greater reduction in positive affect across timepoints than the EG.

For state body satisfaction, no significant differences were found in the CG from T1 to T2 ($p = .928$) or T3 ($p = .390$). However, in the EG, body satisfaction increased significantly from T1 at T2 ($p = .018$) and this was maintained at T3 ($p = .007$). The global test for group differences (i.e. a test of the null hypothesis that all group means are equal) for this outcome was significant ($p = .039$), thus the change across timepoints in body satisfaction for the EG was significantly different to that of the CG.

For state satisfaction with life, no significant differences were found from T1 to either T2 ($p = .711$) or T3 ($p = .742$) in the CG. However, in the EG, satisfaction with life increased significantly from T1 to T2 ($p = .004$) and this was maintained at T3 ($p < .001$, $d = 0.25$). The global test for group differences for this outcome was significant ($p = .010$), thus there were differences in satisfaction with life between groups across timepoints.

Exploratory Outcomes

Significant reductions in the frequency of NATs experienced were found between T1-T3 in both the EG ($p < .001$, $d = 0.42$) and CG ($p = .002$, $d = 0.21$). However, the global test for differences revealed significantly greater reductions in the EG ($p = .028$) for this

measure across these timepoints. Only the EG experienced a significant reduction in believability of NATs from T1-T3 ($p < .001$, $d = 0.46$; CG $p = .273$), with global group differences confirming that reductions were more significant in the EG than the CG ($p = .009$).

Using linear regression models for believability of NATs at T2 (adjusted for baseline measure), the EG showed on average a decrease in of -2.50 units (95% CI(-5.78, 0.79), $N = 165$, $p = .136$) compared to the control group; however, this result was not statistically significant. For frequency of NATs at T2, the EG showed an average a decrease of -1.64 units (95% CI(-4.72, 1.44), $N = 166$, $p = .294$) compared to the control group; however, this result was not statistically significant.

Table 3.

Observed Means and Standard Deviations of Outcome Measures by Experimental Group and Timepoint

Outcome	Experimental Group				Control Group			
		T1	T2	T3		T1	T2	T3
	N	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*N*	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Negative affect	79	10.57 (5.54)	8.51 (4.69)	9.04 (4.84)	70	9.61 (4.16)	8.89 (3.84)	9.19 (4.23)
Body satisfaction	79	133.35 (71.61)	140.70 (75.88)	141.84 (77.81)	70	142.83 (73.76)	141.59 (79.18)	139.14 (78.65)
Positive affect	79	12.38 (3.59)	11.77 (3.99)	12.30 (3.97)	70	12.67 (4.50)	11.43 (4.13)	11.10 (3.96)
Satisfaction with life	79	20.32 (6.70)	21.46 (7.08)	22.03 (6.75)	70	20.86 (7.24)	20.59 (7.68)	20.93 (7.44)
NAT-F	80	33.86 (15.56)	[a]23.85 (12.05)	27.87 (13.34)	71	33.11 (15.04)	[a]25.03 (14.43)	28.91 (13.80)
NAT-B	79	33.23 (15.69)	[a]26.33 (14.30)	26.54 (12.78)	71	31.77 (14.37)	[a]28.49 (15.76)	30.58 (14.64)

NAT-F= Negative Automatic Thoughts – Frequency, NAT-B= Negative Automatic Thoughts – Believability, T1=Baseline, T2= Post-video and Instagram exposure; T3= 3-day follow-up.

[a]T2 measures for NAT-F and NAT-B were measures of experiences in the last 10 minutes, while T1 and T3 NAT-F and NAT-B were measures of experiences in the preceding 3 days.

Table 4.

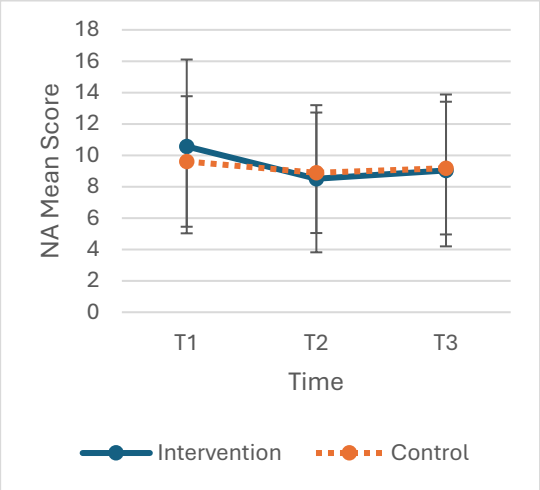
Linear Mixed Model Estimates of Treatment Effect for Each Outcome Immediately After Intervention (T2) and 3-day Following Intervention (T3), Relative to Pre-Intervention (T1).

			Control Group			Experimental Group			Control vs Experimental		
Outcome	Timepoint	*N*	Estimate (95%CI)	*p*-value	Cohen's d_{av}	Estimate (95%CI)	*p*-value	Cohen's d_{av}	Estimate (95%CI)	*p*-value	Cohen's d_{av}
Negative automatic thoughts-Believability										0.009[a]	
	T3-T1	151	-1.28 (-3.56, 1.01)	0.273	0.089	-6.65 (-8.81, -4.48)	<0.001	0.459	-5.36 (-8.52, -2.29)	0.001	0.288
Negative automatic thoughts-Frequency										0.028 [a]	
	T3-T1	151	-3.04 (-4.95, -1.13)	0.002	0.210	-5.98 (-7.79, -4.19)	<0.001	0.415	-2.95 (-5.57, -0.33)	0.028	0.318
Body satisfaction										0.039 [a]	
	T2-T1	165	-0.30 (-6.85, 6.24)	0.928	0.004	7.59 (1.33, 13.86)	0.018	0.105	7.89 (-1.17, 16.96)	0.088	0.053
	T3-T1	150	-3.01 (-9.86, 3.84)	0.390	0.040	8.88 (2.44, 15.31)	0.007	0.120	11.88 (2.58, 21.28)	0.013	0.044
Negative affect										0.015 [a]	
	T2-T1	165	-0.73 (-1.43, -0.04)	0.038	0.176	-2.06 (-2.73, -1.40)	<0.001	0.411	-1.33 (-2.29, 0.37)	0.007	0.311
	T3-T1	150	-0.45 (-1.17, 0.28)	0.229	0.104	-1.55 (-2.23, -0.87)	<0.001	0.303	-1.11 (-2.10, -0.11)	0.029	0.219
Positive affect										0.017 [a]	
	T2-T1	165	-1.29 (-2.00, -0.58)	<0.001	0.235	-0.61 (-1.28, 0.07)	0.078	0.158	0.68 (-0.29, 1.66)	0.171	0.232
	T3-T1	150	-1.58 (-2.32, -0.84)	<0.001	0.306	-0.10 (-0.79, 0.59)	0.775	0.027	1.48 (0.47, 2.49)	0.004	0.201
Satisfaction with life										0.010 [a]	
	T2-T1	165	-0.14 (-0.88, 0.60)	0.711	0.019	1.03 (0.33, 1.74)	0.004	0.153	1.17 (0.15, 2.19)	0.025	0.068
	T3-T1	150	0.13 (-0.64, 0.90)	0.742	0.018	1.69 (0.96, 2.41)	<0.001	0.254	1.56 (0.49, 2.62)	0.004	0.137

[a] is the *p*-value from interaction of time and treatment, this can be interpreted as whether is there a difference in between group changes over time.
T2 measures for Negative Automatic Thoughts – Frequency (NAT-F) and Negative Automatic Thoughts – Believability (NAT-B) were measures of experiences in the last 10 minutes, while T1 and T3 NAT-F and NAT-B were measures of experiences in the preceding 3 days. As such, T2 measurements for these outcomes could not be compared with T1 or T3 timepoints.

Figure 2.

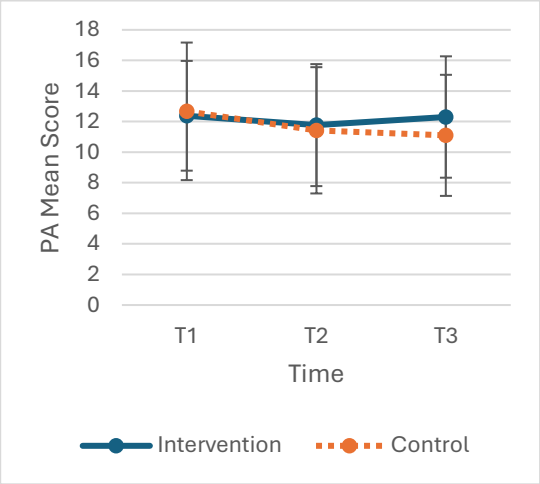
Negative Affect Means Across Timepoints



NA=Negative Affect.
Possible scores range from 5-25.

Figure 3.

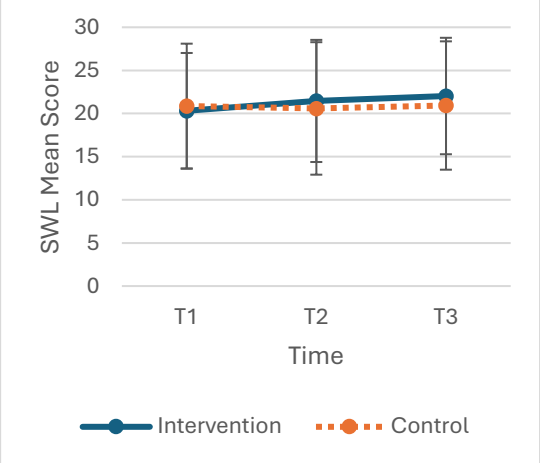
Positive Affect Means Across Timepoints



PA=Positive Affect.
Possible scores range from 5-25.

Figure 4.

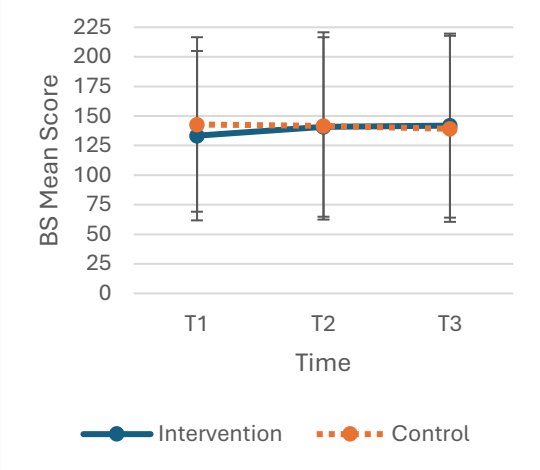
Satisfaction With Life Means Across Timepoints



SWL= Satisfaction with life.
Possible scores range from 5-35.

Figure 5.

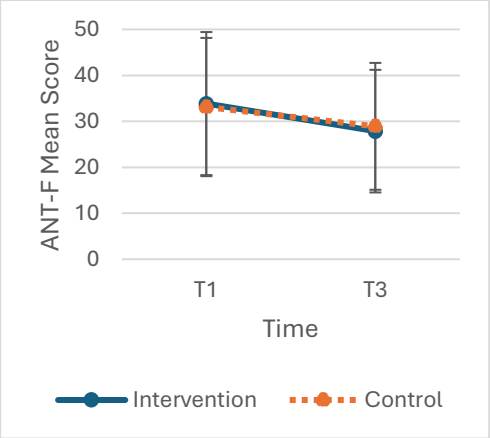
Body Satisfaction Means Across Timepoints



BS=Body satisfaction.
Possible scores range from 0-300.

Figure 6.

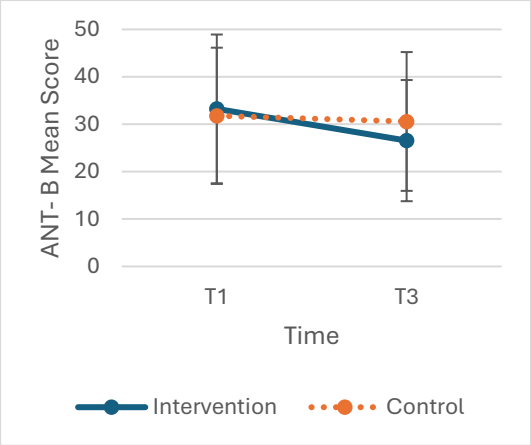
Automatic Negative Thoughts - Frequency Means Across Timepoints



ANT-F= Automatic negative thoughts (Frequency). Possible scores range from 15-75.
T2 measures were measures of experiences in the last 10 minutes, while T1 and T3 were measures of experiences in the preceding 3 days. As such, T2 measurements could not be compared with T1 or T3 timepoints.

Figure 7.

Automatic Negative Thoughts – Believability Means Across Timepoints



ANT-B= Automatic negative thoughts (Believability). Possible scores range from 15-75.
T2 measures were measures of experiences in the last 10 minutes, while T1 and T3 were measures of experiences in the preceding 3 days. As such, T2 measurements could not be compared with T1 or T3 timepoints.

Moderation Analyses

Social comparison orientation was assessed as a potential moderator on primary outcomes. Results showed (N=156) that the treatment effect over time between groups did not depend on social comparison orientation as a moderator for positive affect (p= 0.418), negative affect (p= 0.115), body satisfaction (p= 0.891), or satisfaction with life (p= 0.250).

Mediation Analyses

As can be seen in Table 5, neither the frequency or believability of NATs significantly mediated the relationships between group membership (intervention/control) and negative affect, positive affect, satisfaction with life or body satisfaction.

Table 5.
Mediating Effects of Negative Automatic Thoughts (Believability and Frequency) for Outcome Variables (N=150)

Outcome variable	Mediating variable	Total effect[a] (95%CI)	*p*-value	Natural indirect effect[b] (95%CI)	*p*-value	Natural direct effect[c] (95%CI)	*p*-value
Positive affect	NAT-B	1.2 (-0.06, 2.46)	0.062	0.03 (-0.22, 0.29)	0.794	1.17 (-0.08, 2.41)	0.067
	NAT-F	1.2 (-0.06, 2.46)	0.062	0.02 (-0.11, 0.15)	0.777	1.18 (-0.06, 2.42)	0.062
Negative affect	NAT-B	0.17 (-1.63, 1.28)	0.816	1.15 (-2.37, 0.07)	0.065	0.98 (-0.13, 2.08)	0.084
	NAT-F	0.17 (-1.58, 1.24)	0.828	0.64 (-1.82, 0.55)	0.293	0.46 (-0.63, 1.55)	0.405
Body satisfaction	NAT-B	2.76 (-22.18, 27.70)	0.828	8.48 (-2.02, 18.99)	0.621	5.73 (28.39, 16.94)	0.621
	NAT-F	2.77 (-27.94, 27.45)	0.827	5.93 (5.89, 17.76)	0.325	3.17 (25.32, 18.97)	0.779
Satisfaction with life	NAT-B	1.07 (-1.20, 3.35)	0.356	0.95 (-0.16, 2.05)	0.094	0.13 (-1.90, 2.15)	0.903
	NAT-F	1.07 (-1.17, 3.32)	0.349	0.60 (-0.56, 1.76)	0.310	0.47 (-1.42, 2.36)	0.626

[a]Total effect: Estimates the average difference in outcomes that we expect when everyone receives the treatment vs when no one receives the treatment. The total effect can be decomposed into direct and indirect effects in two ways when allowing for a treatment–mediator interaction.
[b]Natural indirect effect: Estimates the average indirect effect through a mediator.
[c]Natural direct effect: Estimates the average direct effect of the treatment on the outcome when the mediator is held at its value associated with being untreated.
NAT-B= Negative Automatic Thoughts (Believability), NAT-F= Negative Automatic Thoughts (Frequency), CI=Confidence interval.

Discussion

The present study examined the efficacy of a cognitive therapy-based online micro-intervention (SMA) in reducing the negative impact of HVSNS use on body satisfaction and well-being outcomes. When compared to the control group, those receiving the intervention experienced small to moderate improvements across all psychological outcomes assessed in the hypothesised directions, including state body satisfaction, negative affect, positive affect, satisfaction with life, the frequency of negative automatic thoughts and the believability of negative automatic thoughts.

Principal Findings

Consistent with our hypothesis, both body satisfaction and satisfaction with life improved from pre-intervention to post-intervention and at 3-day follow-up (with

satisfaction with life of small effect size) among the EG, while no changes were found in the CG for these outcomes. Also consistent with our hypothesis, the intervention was also found to have a protective effect against HVSNS exposure on positive affect. Those in the CG experienced significant, small declines in positive affect post-Instagram exposure, consistent with prior literature that shows even short periods of Instagram exposure can be detrimental to well-being (7 minutes; Engeln et al., 2020). These small effect size reductions were also shown in the CG at follow-up. However, no significant declines in positive affect were found in the intervention group. The intervention was also found to lead to improvements in negative affect, consistent with our hypothesis. While both groups experienced significant reductions in negative affect immediately post-exposure to passive HVSNS use, only those in the EG continued to experience reductions of small effect size at 3-day follow up. The immediate reductions in negative affect in the CG after the exposure task (along with declines in positive affect) were unexpected but not inconsistent with other findings of potential positive outcomes from social media use, such as escapism. For example, Mendini et al. (2022) found that frequent Instagram users more effectively 'escaped' from negative emotions than less frequent users. As the exposure task was unmonitored, it must also be considered possible that participants viewed positive content during the exercise.

While no significant differences were found between groups in changes to frequency or believability of NATs at T2, differences were found at T3. Reductions in both frequency and believability were found from baseline to 3-day follow-up for those in the EG (of small effect size). While significant reductions in the frequency of negative thoughts experienced were also found in the CG of small effect size, significantly greater reductions were shown among those who participated in the SMA program. Furthermore, only those receiving the intervention experienced significant reductions in the believability

of NATs at follow-up, albeit of small effect size. Although consistent with other research in the field that has found reductions in both the frequency and believability of NATs from cognitive interventions (Arch et al., 2012), these findings are particularly noteworthy, with most research to date electing to measure the frequency of NATs when examining the efficacy of CBT interventions and not the believability of those thoughts (Bartucz et al., 2022). However, the findings that cognitive restructuring methods such as thought challenging leads to a reduction in the believability of thoughts is not unexpected, as the technique fundamentally aims to change the meaning of automatic thoughts via reappraisal, thereby reducing one's belief in NATs in their original form.

Mediation analyses indicated that reductions in neither the frequency nor believability of NATs were found to significantly mediate the relationship between intervention and outcome variables, suggesting that the positive impact that the intervention had on outcomes occurred via another mechanism. This was unexpected, as cognitive restructuring techniques such as thought challenging target surface level negative automatic thoughts (Beck, 1979). However, it is possible that the measurement of NAT's employed in the current study was not able to appropriately capture mediating effects for outcome variables. The Automatic Thoughts Questionnaire – Negative and the Automatic Thoughts Questionnaire – Believability (Hollon & Kendall, 1980; Netemeyer et al., 2002) were originally developed to assess the frequency and believability of depressed cognitions (e.g. "my future is bleak") and are most commonly applied in studies relating to depression. While findings demonstrated positive change in these depressogenic NATs from the intervention, they may not have been the most relevant tools to assess the changes in NATs underpinning other outcome variables assessed in the current study, such as state body satisfaction. Future studies could perhaps consider employing a way to more appropriately capture the NATs relevant to other outcome variables. For example,

participants could be asked more generally “how often in the last 10 minutes did you experience negative thoughts relating to your body or appearance”.

Moderation analyses did not provide evidence that trait social comparison orientation moderated the relationships with outcomes, inconsistent with other studies relating to psychological outcomes of media exposure (de Vries et al., 2017; Tiggemann & McGill, 2004). While trait social comparison orientation is expected to predict actual social comparisons in the moment, it is possible that the trait measure failed to capture such changes. Indeed, research focusing on the negative impact of media exposure on body image, has found trait appearance comparison to have the larger influence in relationships between media exposure and body image than state appearance comparison. However, actual (state) appearance comparison has also been found to mediate relationships (Tiggemann & McGill, 2004) and has been assessed as a potential mediator within studies in the field. Future research could consider adopting this approach. Finally, it is also possible that the self-reported social comparisons made by participants did not reflect the actual extent of social comparisons taking place, with such processes at times occurring automatically and outside of conscious awareness (Want, 2009).

Implications

Both theoretical and practical implications arose from this research. Although trait social comparison orientation was not found to moderate relationships with psychological outcomes via the chosen measure, the current SMA program focused on managing unhelpful upward social comparisons across a range of areas that are triggered by HVSNSs. This provides support for the appropriateness of applying social comparison theory (Festinger, 1954) in the field. While social comparison theory has often been applied when examining the psychological impacts of traditional forms of media, the

current findings provide further support for the notion that the same processes may be evident for digital forms of media. The current study also highlights the importance of targeting a broad range of areas for social comparison beyond body satisfaction, which has been the focus of much research to date, to include comparisons relating to abilities/ success, relationships and happiness and excitement in life, to improve well-being outcomes.

The appropriateness of integrating cognitive restructuring strategies into larger social media literacy programs has also been highlighted. While only modest improvements in outcomes measured were found, these findings are noteworthy given the SMA program was limited to a 13-minute video with brief interactive activities. Findings also highlight the utility of the e-learning program format, which can allow the SMA program to be easily disseminated. For example, the program could be integrated into social media literacy education within schools, used as a resource for mental health practitioners during individual therapy sessions, or as a tool to support waitlist management. It could also be made freely accessible online via a video-sharing platform and potentially shared by social media content creators/ "influencers" to assist with reach with the target population of social media users.

Implications further arise regarding measuring mechanisms of change when examining the efficacy of cognitive therapies. As the cognitive therapy model emphasises the form and frequency of cognitions as primary factors that sustain psychopathology, most research examining the effectiveness of CBT interventions to date have elected to measure the frequency of NATs (Bartucz et al., 2022). On the other hand, the believability of NATs has most commonly been applied when measuring the effectiveness of acceptance and commitment therapy (ACT) interventions (Zettle et al., 2011), with reductions in NAT believability considered an indicator of cognitive defusion (the ability to distance oneself

from ones thoughts; Hayes et al., 2006). However, the current results suggest that the believability of thoughts is also impacted with cognitive interventions and should be considered in future research examining CBT interventions.

Directions for future research

The current study becomes the first known study to isolate the impacts of cognitive restructuring techniques and demonstrate their effectiveness in reducing the negative impact of HVSNS use on well-being and body satisfaction. The inclusion of cognitive restructuring techniques, such as thought challenging, should be considered in larger social media literacy programs. The current research should be extended to examine a range of moderating variables to help identify those most likely to benefit from the program, including socioeconomic status and age across the lifespan. Of particular importance, this should include adolescents younger than 16 years not captured in the current study and older age groups also underrepresented in the current sample, with 85.6% of participants between the ages of 16 and 35 years. Assessment of efficacy among clinical samples may also be beneficial. With research suggesting that individuals experiencing depression are more likely to experience negative mental health outcomes with social media use than those who are not experiencing depression (Appel et al., 2015), there is a need for effective and easily accessible packages that can be applied in therapeutic setting. A follow-up period longer than 3 days could also determine the length of maintenance of effects, further adding to potential clinical usefulness. While the pilot feasibility study of the SMA program (Herriman et al., 2024) failed to identify improvements in outcomes at 7-day follow-up, that single-arm study was not appropriately powered to detect changes of small effect.

Limitations

The current study had numerous strengths, including that it was an appropriately powered randomised controlled trial with active control intervention and with participants blinded to group allocation. However, limitations to the current study also exist. As mentioned above, the current study did not include a state assessment of social comparison processes, which may likely have more accurately captured real-time changes. The use of a measurement tool for NATs that focused on measuring depressogenic thoughts may not have captured all changes to NATs that may have underpinned changes in outcome measures assessed. With the sample limited to the English-speaking and Australian population and the majority of participants female, students, not in a relationship, of European descent, and under the age of 35 years, findings must also be generalised to other groups with caution.

Additional limitations arise with the design and measurement of the passive Instagram exposure task used in the study. This includes the reliance on participants self-reporting their adherence to the task. While a sound adherence was reported (90.3% across the full sample), observation in an experimental setting would have provided a more accurate measurement. Furthermore, the content viewed by participants during the passive Instagram exposure task was not recorded, thus exposure to differing types of content, and therefore differing wellbeing impacts, was likely to have occurred. For example, studies have found that women who viewed athletic ideal body images along with self-compassion quotes were found to report higher body satisfaction and less negative mood than women who viewed only ideal body images (Slater et al., 2017). The success of the program in mitigating the negative impact of content that triggers negative social comparisons may have been more accurately assessed by asking participants to only view such higher-risk content during the Instagram exposure task. As such, program effectiveness may be

understated within the current study. However, by testing the impact of the SMA program following self-directed use, the present study findings are considered likely to more closely reflect ‘real world’ impacts on psychological outcomes.

Conclusions

The present study examined the efficacy of a brief, CBT-based intervention in reducing the negative impact of HVSNS use on well-being and body satisfaction. When compared with a control group, those receiving the intervention experienced statistically significant improvements in the desired direction on all psychological outcomes assessed, including body satisfaction, satisfaction with life, negative affect, positive affect, and a reduction in negative automatic thoughts (believability and frequency). While many of these improvements observed were of small effect size, the current study provides support for the use of CBT-based strategies and brief, online interventions when designing interventions to reduce the negative impact of social media exposure.

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CHAPTER 8. GENERAL DISCUSSION

8.1. Preamble

The overall aim of this research was to design and assess the effectiveness of a psychologically informed intervention designed to reduce the negative impact of HVSNS use on mental health outcomes among an Australian population. This research was conducted through three sequential studies. Firstly, a systematic scoping review was conducted to map the existing literature on interventions designed to reduce the negative impact of HVSNS use on mental health outcomes. An e-learning micro-intervention, Social Media Aware (SMA), was then designed and a pilot study conducted to examine acceptability and feasibility of the SMA intervention. Finally, a randomised controlled trial was conducted to examine the effectiveness of the SMA program when compared to a control group from pre- to post-intervention and at three-day follow-up. This chapter presents a discussion of the findings reported in previous chapters and their contributions to the overall research aims of this program of research. A summary of findings is first presented, with an interpretation of these findings with consideration to the broader literature. The clinical and theoretical implications are identified, in addition to strengths and limitations of the research program. The chapter concludes with recommendations for future research.

8.2. Summary of Key Findings

A systematic scoping review with meta-analysis was first conducted to map existing interventions designed to reduce the negative impact of HVSNSs on psychological outcomes due to the limited amount of work in the field to date. This was done to develop an up to date understanding of the status of existing evidence-based intervention programs and inform the design of the intervention and trial methodologies. Results indicated a wide

variation in intervention design and mental health outcomes of interest. Most intervention strategies were of an exposure-altering approach, with trends towards small improvements in mental health outcomes, such as depression, life satisfaction and perceived stress. However, a quarter of these studies also found some negative outcomes from exposure-altering or abstinence-based approaches, particularly with respect to variables related to social connectedness. This highlights the potential benefits of other intervention approaches that reduce the negative impacts of HVSNS use without removing potential benefits. The small group of identified studies that assessed the efficacy of social media literacy programs demonstrated small improvements in social media addiction and body image related outcomes. While many studies addressed appearance-based comparisons, none of the programs identified amongst the included studies focused on more general social comparisons that may underpin reduced well-being (Kross et al., 2021; Verduyn et al., 2020). Of the small group of studies that adopted other psychological approaches, CBT-based programs were utilised in only two studies. A brief (3-minute-long) CBT-based intervention (Weber et al., 2021) failed to demonstrate effect on positive affect, negative affect, envy or self-esteem. However, a slightly longer (4 minutes daily for 2 weeks) CBT-based intervention led to improvements in body image disturbance outcomes (Aboody et al., 2020), highlighting the potential for the therapeutic approach in the area.

Informed by the systematic scoping review (Chapter 3), a CBT-based e-learning micro-intervention, Social Media Aware (SMA) was then developed, which targeted a range of negative thoughts stemming from social comparisons across many areas of the self and one's life. The SMA program took the form of a 13-minute video with an interactive component to consolidate learning. A single-arm pilot study (see Chapter 6) assessed the feasibility and acceptability of the SMA program. Participants found the SMA program to be acceptable, with both quantitative and qualitative data indicating that most

found the video easy to understand, informative and useful. The appropriateness of the program content was also confirmed via participants recording the negative thoughts they experienced when using HVSNSs. Due to the nature of these recorded thoughts, the study also became the first known research to demonstrate the wide range of social comparisons elicited from HVSNS use. While many interventions developed to date had focused on addressing body image issues stemming from social networking site use, participant feedback suggested that negative comparisons were also frequently made regarding the perceived happiness of others, relationship quality, abilities, success, and excitement of one's own life. Preliminary outcome measurements also demonstrated immediate reductions in negative affect following the SMA intervention and Instagram exposure.

The high acceptability of the program, as determined by the pilot study, led to a randomised controlled trial (see Chapter 7). Results indicated that the SMA program was superior to a control educational video that was not informed by psychological strategies, in improving all outcomes assessed in the desired directions. This included negative affect, positive affect, satisfaction with life, state body satisfaction, and negative automatic thoughts (frequency and believability). When looking more closely at changes within groups, both the intervention and control groups experienced significant reductions in negative affect immediately post-exposure. However, only the reductions in the intervention group were maintained at 3-day follow-up. Results also showed statistically significant small increases in satisfaction with life and body satisfaction from pre-intervention to post-intervention and at 3-day follow-up among those receiving the intervention. In contrast, no changes were found in the control group for these measures. A protective effect against HVSNS exposure for positive affect was also found. Those in the control group experienced significant small declines in positive affect post-Instagram exposure and at follow-up, consistent with other research demonstrating negative impacts

of even small amounts of HVSNS exposure (Engeln et al., 2020). However, no significant declines in positive affect were found among the intervention group, suggesting that the intervention had a protective effect.

Although not a primary outcome of interest, greater improvements in negative automatic thoughts (both frequency and believability) were also noted from baseline to follow-up among those receiving the intervention. While significant reductions in the frequency of negative automatic thoughts were found in both the control and intervention groups of small effect size, significantly greater reductions were found among the intervention group. With respect to the believability of negative automatic thoughts, only those in the intervention group experienced significant reductions (of small effect size). The findings that the cognitive intervention reduced both the frequency and believability of negative automatic thoughts are particularly noteworthy as most of the CBT literature neglects to measure the believability of thoughts as an outcome, favouring the measurement of the frequency of negative automatic thoughts (see Bartucz et al., 2022). While few studies have researched the impact of the believability of thoughts in CBT interventions the current results are consistent with other studies that have included this measure. For example, Arch et al. (2012) found the believability of thoughts to mediate therapeutic outcomes for anxiety with both acceptance and commitment therapy (ACT) and CBT.

Unexpectedly, we did not find the frequency or believability of negative automatic thoughts to mediate the impact of the intervention on outcomes. This suggested that frequency and believability may not represent mechanisms of change for the SMA intervention. Also contrary to expectations, trait social comparison orientation was not found to moderate relationships with well-being or body satisfaction, inconsistent with prior findings (de Vries et al., 2017; Tiggemann & McGill, 2004). However, it is possible

that the failure to identify these moderating or mediating associations may be reflective of limitations imposed by the measurement tools utilised (the ATQ-N-15, ATQ-B-15 and INCOM), as discussed in more detail below (see section 8.4.2.).

Collectively, the present program of research demonstrated the usefulness of psychology-informed interventions for managing the negative impact of HVSNS use on psychological outcomes. The potential benefits of cognitive restructuring strategies for improving well-being and body image were also highlighted. Such approaches, including the SMA program, may therefore contribute to larger social media literacy programs or potentially be adopted as a stand-alone intervention. The utility of brief e-learning interventions was also demonstrated, providing an easily accessible and cost-effective approach that can be broadly disseminated and reach the target population of social media users.

8.3. Implications

8.3.1. Theoretical Implications

Social comparison theory (Festinger, 1954) postulates that people use others as an external guide against which to evaluate aspects of themselves and their lives, such as their social standing, abilities, and attractiveness. Evidence to date has shown support for social comparison theory in relation to traditional media use (Crusius et al., 2022), and has also more recently been applied to the social media field (Kross et al., 2021; Verduyn et al., 2020). In the current project trait social comparison orientation (the general tendency to compare oneself with others) was not found to moderate relationships with well-being and body image. However, the SMA program was designed to manage unhelpful upward social comparisons that are triggered by HVSNSs in the moment. As such, the success of the

SMA program in the current project may provide further evidence for the appropriateness of social comparison theory in the social media field.

A surprising finding from the present program of research was that changes to the nature of participant experience with negative automatic thoughts were not mechanisms of change for the outcomes arising from the current cognitive intervention. The cognitive therapy model emphasises the form and frequency of cognitions as primary factors that sustain psychopathology (Beck, 1970). This led to a trend for research examining the effectiveness of CBT interventions electing to measure the change in frequency of negative automatic thoughts as a marker of intervention effectiveness (see review by Bartucz et al., 2022). It also led to the development of the Automatic Thoughts Questionnaire's (ATQ-N-15 and ATQ-B-15; Hollon & Kendall, 1980; Netemeyer et al., 2002), as applied in much CBT research and used in the current study. The finding that the frequency of negative automatic thoughts did not mediate changes in outcome variables with the cognitive intervention was therefore unexpected. However, it is possible that the ATQ-N-15 and ATQ-B-15 were not the most appropriate measures to appropriately capture participant experiences with negative automatic thoughts as a mechanism for change in the current research program (see Limitations for further discussion).

The findings that the cognitive intervention led to significant reductions in both the frequency *and* believability of negative automatic thoughts also has theoretical implications. As noted above, the reduction in the frequency of negative automatic thoughts found from the cognitive intervention in the randomised controlled trial was consistent with other research examining CBT intervention efficacy (see Moore et al., 2016). However, the believability of negative automatic thoughts has more commonly been used to assess the effectiveness of acceptance and commitment therapy (ACT) interventions (Zettle et al., 2011), with believability considered an appropriate proxy

measure of ‘cognitive defusion’ (the ability to distance onself from thoughts and persue goals and values irrespective of one's internal experience; Hayes et al., 2006). Furthermore, the Automatic Thoughts Questionnaire – Believability (ATQ-B and ATQ-B-15; Hollon & Kendall, 1980; Netemeyer et al., 2002), as used in the current study, has been found a reliable measure of cognitive change in response to ACT (Hayes et al., 2006). While the findings that the believability of negative automatic thoughts were also reduced following the current CBT-based intervention are therefore noteworthy, they are not entirely surprising. Firstly, these findings are consistent with other findings that thought challenging may lead to cognitive defusion (Arch et al., 2012; Hancock et al., 2018). Furthermore, the fundamental aim of the thought challenging approach used in the current study is to elicit a shift in automatic thoughts via reappraisal. It follows, therefore, that the mechanism for this is a reduction in the believability of the thought in its original form. As such, shifts to the *believability* of negative automatic thoughts should also be considered an important mechanism of change in CBT interventions.

8.3.2. Practical Implications

The findings from the present project have a number of practical implications, including for the design of future interventions in the field. Firstly, the current research highlights the importance of targeting a range of negative automatic thoughts stemming from social comparisons across many areas of life, as suggested by (Kross et al., 2021), with many programs to date instead focusing on appearance-based comparisons. The current study also suggests that rather than trying to anticipate and target specific types of social comparisons that may be experienced by individuals, a more appropriate approach may be to generally educate people on how to identify and manage their own unique social

comparisons. The usefulness of cognitive restructuring strategies to target such social comparisons has also been highlighted.

Secondly, practical implications arise with respect to the potential longevity of the SMA intervention impact. While the SMA micro-intervention was found to produce enduring impacts at 3-day follow-up, there was no evidence in the pilot study to suggest that benefits were maintained at 7 days. Indeed, the pilot study had a small sample size and was not powered to reliably analyse outcome data. However, concerns remain that any benefits gained by the SMA program may not be enduring enough given the regularity of social media use for many users. This suggests the need for more comprehensive programs to reduce the negative impact of social media use or follow-up sessions to consolidate learning. Nonetheless, while small in impact, the significant improvements in well-being outcomes with only a 13-minute intervention are notable. The current findings point to the benefit of including cognitive restructuring strategies within larger programs. This is particularly noteworthy as cognitive restructuring techniques, such as thought challenging, are rarely used in social media literacy programs. The current findings also point to the benefits of exploring the impact of other CBT-based strategies.

Thirdly, the success of the current SMA program also supports the appropriateness of e-learning formats for delivering brief psychological interventions. Programs available online can also be easily accessed by practitioners who are seeking programs to use as an adjunct to their individual therapy plans, or to provide to clients awaiting treatment. The use of e-learning within the social media field is particularly relevant as such approaches can be disseminated and accessed via social media platforms themselves, such as YouTube and other video sharing platforms. As such, the target audience of social media users can be more easily reached. With concerns in many countries that people are missing out on the opportunity to engage with a psychologist in person due to financial pressures and

lengthy wait times (Australian Psychological Society, 2022, 2024; Canadian Institute for Health Information, 2024; Stringer, 2024) and with demand for individual face-to-face therapies exceeding supply (Kazdin & Blase, 2011; Rogers & Spring, 2021), the ability to access online programs that are appropriately tailored to ones needs is becoming increasingly important.

8.4. Strengths and Limitations

8.4.1. Strengths

The current research provided unique contributions to the literature in a number of ways. It was the first known research to perform a systematic scoping review of existing intervention aimed at reducing the negative impact of HVSNS use in the field (Chapter 3), with no such reviews previously published. This enabled the identification of gaps within the literature and highlighted directions for future research. In addition, the pilot study (Chapter 6) was the first known study to provide information regarding the types of negative automatic thoughts experienced when viewing HVSNS use. While most interventions to date focused on appearance-related comparisons, the current project highlighted the need to also target social comparisons relating to ability, popularity, perceived excitement in life, success, and relationships. This information is useful for informing the design of future programs intended to reduce the negative impact of social media use on well-being outcomes by targeting the appropriate psychological processes that underpin changes in well-being with social media use.

The current research also added to the small pool of research focused on developing and evaluating the efficacy of a psychology-based intervention designed to reduce the negative impact of HVSNS use that did not require exposure reduction. As highlighted in the systematic review (Chapter 3), some of the prior exposure reduction attempts had

negative impacts on psychological outcomes, such as those relating to social connectedness (Mitev et al., 2021; Vally & D'Souza, 2019). Furthermore, qualitative data suggested that the approach was not acceptable to participants, with social media use becoming a normal part of daily life for many (Vanman et al., 2018). The development of evidence-based programs, such as the current SMA program, to assist people to manage the psychological impact of social media use has therefore become crucial.

The current research also had methodological strengths. The randomised controlled trial was appropriately powered, with a well-designed active control group to control for extraneous factors that could be mistaken for treatment effects. The control group video and interactive task did not include any active treatment components but was otherwise similar to the intervention group activities, consistent with recommendations for a credible control group (Safer & Hugo, 2006). Furthermore, participants were blinded to the presence of a control group and to their group allocation, thus overcoming common methodological shortcomings of intervention research in this area (as highlighted in the systematic review, Chapter 3).

A further strength to the study design was the isolation of Instagram use during the exposure tasks of the pilot study and randomised controlled trial. Many earlier studies that examined potential interventions to reduce the negative impact of social networking site exposure assessed the impact of the intervention on numerous platforms collectively (as outlined in the systematic review, Chapter 3). This includes numerous studies that examined the impact of reducing exposure to social media use (e.g. Brown & Kuss, 2020; Hunt et al., 2018; Mitev et al., 2021) by requesting that participants abstain from several platforms at once. Such an approach has attracted criticism (Kross et al., 2021), due to the recognition that different social media platforms may have unique psychological outcomes

(Beyens et al., 2020). In turn, reliable conclusions about the impacts of reducing exposure to individual platforms could not be drawn.

Strengths relating to the content of the SMA program also exist. Firstly, the program demonstrated effectiveness in reducing the negative impact of HVSNS use on well-being outcomes, suggesting that the program content appropriately targeted some of the underlying psychological mechanisms. The brief e-learning nature of the current program addresses the current need for brief, cost-effective and easily accessible treatment options, unlike many of the more time intensive face-to-face social media literacy programs available to date (Bell et al., 2021; Gordon et al., 2021; McLean et al., 2017). The micro-intervention format that isolated just a few cognitive restructuring techniques also allows for more accurate conclusions to be drawn about technique effectiveness when compared to multi-component programs where it is more difficult to isolate the contribution of each technique.

8.4.2. Limitations

While limitations to individual studies are mentioned in respective papers, the following section both elaborates on some limitations that could not be discussed in full and outlines more general limitations to the overall project. Firstly, project limitations include those relating to the generalisability of findings. While the randomised controlled trial obtained a sample that was culturally representative of the Australian population (Australian Bureau of Statistics, 2022a, 2022b), the findings may not be generalisable to other cultural groups world-wide. This is important to note as research suggests that different cultural groups respond psychologically in different ways to social media use (Mitev et al., 2021; Przybylski et al., 2021). The sample was also drawn from two different recruitment sources (a university sample and community sample), who may have

responded differently to the program. Unfortunately, we did not record which setting participants were from during data collection, thus an analysis between groups could not be conducted and generalisations across groups must be made with some caution.

Further limitations arise with the overrepresentation of younger adults in both the pilot and randomised controlled trial studies (Chapters 6 and 7), with the majority of participants under the age of 35. This likely occurred due to the recruitment of many participants from within the university setting, and the need for participants to have an Instagram account to be eligible for participation. Social networking site consumption has increased over the years among older age groups, including over 65 year-olds (Statista, 2022b; Technology for Seniors, 2024), warranting research across the age span. Nonetheless, the high prevalence of participants under the age of 35 years in the current studies is consistent with the age group most frequently using Instagram (Statista, 2024b). As such, and the current samples may therefore overall be considered reflective of the Australian Instagram user population. Finally, it must also be recognised that the current findings may not be generalisable to the impacts of other social media platforms, with evidence suggesting that they may operate differently and therefore have different psychological outcomes (Beyens et al., 2020).

Methodological limitations to the current project were also present. As the experiments in both the pilot and randomised controlled trial (Chapters 6 and 7) were conducted remotely, it was not possible to fully ensure that participants were appropriately attending to the video or abiding to the Instagram task instructions. Efforts were made to measure instruction adherence, such as using follow-up questions that asked participants to confirm the portion of time they spent using Instagram passively during the exposure task. However, assessment via observation in an experimental setting would have been more methodologically sound, providing objective data regarding instruction adherence. In

addition, requiring all participants to view the same content that was more likely to draw social comparisons (e.g. ideal body images), may have enhanced the impact of the program on well-being outcomes, relative to the CG, but also would have reduced the real-life applicability of the findings. While SMA program instructions included requesting that participants complete a private writing task to consolidate learning, that writing task did not have to be returned to the researcher and therefore program adherence again could not be fully assessed. In turn, the results of the randomised controlled trial could be an underestimation of the potential impact of the SMA program among a fully engaged group, such as those seeking therapeutic help.

Another potential limitation comes with the request for participants to use their Instagram accounts only passively during the exposure task, potentially failing to accurately reflect how people may use their accounts in the real-world setting. Participants in the current randomised controlled trial estimated using their HVSNSs passively 46.1% of the time, with the remaining use active. As such, the current project may not accurately reflect the true usefulness of the SMA program in the real-world. However, to meet the aims of the current research study, it was considered necessary to isolate this type of social media use due to the understanding that passive use tends to be the most detrimental due to the negative social comparisons more commonly elicited during such use (Nisar et al., 2019; Yoon et al., 2019).

Potential limitations with the design of the active CG tasks may also exist. As the CG did not experience declines in body or life satisfaction following Instagram exposure, contrary to expectations, it is also possible that the CG was potentially too active. The educational video content shown to the control group related to the history of Instagram and algorithms, thus it is possible that viewing this video changed participants' experience

of the subsequent Instagram exposure task. The randomised controlled trial may have benefited from the inclusion of both an active and waitlist control group for comparison.

While being the first known study to collect information regarding the types of social comparisons experienced when using HVSNSs, the study would have benefited from improvements in the methodological approach for this. In the current project this information was collected in the pilot study via both quantitative and qualitative questions post-intervention, with some qualitative feedback also sought one week later. In addition to having a small sample size, data were collected over a short period of time and participants may not have had awareness of the full range of different types of negative social comparisons usually made. Future research could request such information from a group of participants over a longer period (e.g. several weeks) to obtain more data, such as through an ecological momentary assessment design. Other research methodologies, such as focus groups, could also be considered to further examine the social comparisons often made during HVSNS exposure.

Another methodological limitation comes from the approach taken for assessing negative automatic thoughts as a mediating variable in the pilot study and randomised controlled trial. The examination of both the frequency and believability of negative automatic thoughts required participants to assess their experience over a particular period of time, on three occasions, with no known measure of current status of thoughts available for use. However, the periods of time differed (either 3 days or 20 minutes) and as such they could not be accurately compared.

Further limitations arise regarding the appropriateness of the use of the Automatic Thoughts Questionnaire – Negative – Short Form (ATQ-N-15; Hollon & Kendall, 1980; Netemeyer et al., 2002) and the Automatic Thoughts Questionnaire – Believability – Short Form (ATQ-B-15; Netemeyer et al., 2002) in the pilot study (Chapter 6) and randomised

controlled trial (Chapter 7). These measures were specifically designed to assess the frequency and believability of possible depressive cognitions, thus applying the measure to the context of social media use may be less relevant. This is because the range of thoughts that can occur during social media use, as noted in our present research, are likely to not be limited to depressive thoughts. It is possible, therefore, that the measures used may have failed to capture the process of change to thinking. For example, the depressogenic focus of the cognitions measured in items, such as "I can't stand this anymore" and "my future is bleak" may not have been relevant to some of the outcome measures chosen, such as body image. Furthermore, the thought content captured by the items measured may not have been sensitive enough for the non-clinical sample. For example, those in a non-clinical sample may be more likely to endorse items such as "Things feel difficult" instead of items such as "I can't stand this anymore", as listed in the ATQ questionnaires. While changes in the assessed depressogenic thoughts were still found in the randomised controlled trial, greater changes in underlying negative thoughts may have been found if the cognitions assessed were more relevant to the content. Future research could instead attempt to measure the frequency and believability of negative automatic thoughts more generally. For example, participants could be asked "how often were you disturbed by negative thoughts relating to your appearance in the last 10 minutes?" and "to what extent did you believe any negative thoughts that arose relating to your appearance in the last 10 minutes?". Alternatively, a qualitative or ecological moment assessment study could be considered to capture the breadth of thoughts experienced when using HVSNSs, with data used to develop a more targeted measure.

Another limitation exists related to the use of a trait-based social comparison orientation measure, rather than a state-based social comparison orientation measure. The unexpected finding that trait social comparison orientation did not moderate outcomes may

have been due to the inability of a trait-based measure to accurately capture more subtle changes in social comparison orientation occurring moment-to-moment. While trait social comparison is expected to predict state (actual) social comparisons (Tiggemann & McGill, 2004) and has been used in other studies examining social comparison tendencies and social media (e.g. Nisar et al., 2019; Rozgonjuk et al., 2019; Weber & Hagmayer, 2018), a repeated measurement of state-based social comparisons may have been more accurate.

Despite the measured benefits of the SMA program for reducing the negative impact of HVSNS use on well-being and body satisfaction, difficulties exist regarding the practical implementation and integration of a program like SMA into the regular routine of social networking site users. While the content could be integrated into social media literacy programs being made available within schools, there remains an overwhelmingly large portion of the social media user population that may not be able to access these programs. This raises larger issues regarding the accessibility of social media education and psychological supports within the community. The SMA program could be made freely accessible online via a video-sharing platform, thereby more easily reaching the target population of social media users than other practitioner-led interventions. However, this still requires users to be aware of the program, and to seek it out. Another mode for program awareness and access could be via a social media content creator/ "influencer" who could potentially share the program. However, the problem remains that users need to be motivated to engage with the program content to gain benefit. Unfortunately, the difficulties experienced across the present project in terms of recruiting sufficient numbers for participation may indicate that the perceived attractiveness and usefulness of the program to the public is questionable. As such, the SMA program may be most useful as part of a larger social media literacy program, or as a resource for mental health clinicians to use during individual therapy sessions or as waitlist management.

8.5. Future Research Directions

The current research demonstrates that individuals experience a range of negative social comparisons and thoughts when using HVSNSs that can impact their well-being. While negative thoughts stemming from appearance-based social comparisons have been the primary focus of social media literacy programs to date, the current research suggested that social comparisons and negative thoughts relating to success, perceived happiness, excitement in life and quality of relationships occurred just as, if not more, frequently. It would be beneficial to further explore such comparison processes and expand the focus of future interventions to address the emotional sequalae of this wide range of negative thoughts. Future research should also more closely examine whether differences exist according to the type of social media platform (e.g. Instagram, Snapchat, Tik Tok), or user characteristics, such as age or gender, to tailor intervention programs more appropriately.

Recommendations also relate to the further investigation of the SMA program effectiveness. This includes assessment of how long the intervention impacts last, by following up beyond 3 days. Further research into the potential effectiveness among older populations is also suggested, in addition to younger age groups. The current project assessed efficacy on individuals aged 16 years and over; however, many individuals under the age of 16 are also using social media regularly and are an important group of focus for prevention and early intervention.

Recommendations for future research also include a closer analysis of the effectiveness of the SMA program in populations known to be especially vulnerable to the negative impacts of HVSNS exposure, such those who are experiencing depressive symptoms (Appel et al., 2015) or young women who are experiencing poor body image and endorse thin-ideal internalisation (Linardon, 2023). With research in eating disorder

prevention suggesting that such programs are most effective among those of elevated risk (Muller & Stice, 2013; Stice et al., 2019), a closer examination of the potential moderating variables to the SMA program effectiveness is warranted. This will serve to identify those who are most likely to benefit from the program and obtain information on the effectiveness of the SMA program in these higher-risk groups. Including low-risk populations in the current analyses may have diluted the observable benefits of the SMA program, with the current results potentially an underestimation of the potential of the program to generate improvements in the most relevant clinical populations.

Another research area for consideration includes the combination of psychologically informed (e.g. CBT-based) interventions with social media exposure reduction strategies. The systematic review (Chapter 3) identified numerous studies that examined the impacts of abstaining from and/or reducing HVSNS exposure without any psychological strategies included to assist participants with implementing that reduction or with managing the potential negative impacts of reducing their HVSNS exposure. Indeed, many studies reported high attrition rates due to difficulties with reducing use and some found negative impacts relating to lower feelings of social connection. Following the publication of the systematic review (Chapter 3) in the current research program, Stinson and Dallery (2023) published a study that demonstrated the potential for additional behavioural strategies (to instruction to reduce exposure alone) to reduce social media addiction. Their intervention included requesting participants to identify alternative activities to social media use in advance, automated notifications regarding daily use, and contingency management (including monetary rewards). While only a small single-arm study, all participants reduced their use to goal levels and 8 of the 9 participants demonstrated significant decreases in internet addiction scores. Another consideration could be to incorporate behavioural activation strategies which emphasise engaging in pleasurable and personally

meaningful activities (Lejuez et al., 2011) and have long been applied in the management of mood disorders (for review see Malik et al., 2021). Other psychological-informed strategies, such as the current SMA program, could also be incorporated to help reduce the negative impact of their remaining social media use on psychological outcomes.

8.6. Final Comments

This research identified and responded to the need for brief, accessible psychology-informed interventions that may reduce the negative impact of HVSNS use on psychological outcomes. It introduced the newly designed CBT-based SMA program and provided validation and effectiveness data for the Australian population in reducing the negative impact of HVSNS use on well-being and body satisfaction, including sustained benefits at three-day follow-up. The current project was also the first known study to demonstrate the wide range of social comparisons relating to the self and one's life that occur when using HVSNS platforms, including perceived happiness of others, excitement in life, relationship success, popularity and appearance. Overall, the findings suggest that the psychology-informed e-learning micro intervention, Social Media Aware, is a useful therapeutic tool for reducing the negative impact of HVSNS use on well-being and body satisfaction. The findings further demonstrate the usefulness of cognitive restructuring techniques for reducing the negative psychological impacts of social media use and highlight the potential benefits of their inclusion in larger social media literacy programs.

APPENDIX A: SOCIAL MEDIA AWARE (SMA) VIDEO SCRIPT

Micro-intervention video script
Narrated by Zoe Herriman

Hello, I'm Zoe Herriman, a Clinical Psychologist and PhD candidate at the University of Adelaide. This is a brief training video designed to help people manage the negative feelings that can sometimes arise from using online highly visual social networking sites, through teaching cognitive therapy strategies. Research shows that online social networking site use can sometimes have a negative impact on our emotional wellbeing. Asking people to not use it isn't always realistic, but there are many things that we can do to reduce the negative impact that it has on us, which we will touch upon here. The good news is that it doesn't always make us feel worse and it can at times have a positive influence.

When we use social media to communicate positively with others and receive support, for example by organising catchups, posting and commenting on other people's posts, it can lead to improvements in our wellbeing. This is because we're engaging in a social relationship and, just like in real-life, this can make us feel better. However, when we're just scrolling through, reading, and passively observing other people's images and posts, we're not engaging in a relationship, but instead we're engaging in social comparison. And just like in real life, this tends to make us feel worse about ourselves, our appearance and our lives. Engaging in social comparison online can be even more problematic than when we do it in the real world because we're not comparing our realities with other people's realities, like we can do more easily offline, but we're comparing our real lives to people's overly positive, unrealistic portrayals of their lives. People often post pictures of the highlights of their weeks, filter images, write overly positive descriptions of events and can present only what they want others to see.

So, why do so many people do this?
There are many reasons. Sometimes people do this out of social pressure, as everyone else is being so positive online it may not feel like an appropriate place for honesty. We are also aware that it (in many cases) social networking sites are a permanent record and that anything negative we post is there to stay, so it's not always the best place to air your grievances and can lead to what people call "posters remorse".
Sometimes people intentionally post overly positive images to try and keep up with everyone else or to gain acceptance from others, which can come from a place of insecurity.
Some people paint overly positive pictures because they're quietly feeling unhappy with their lives and they're trying to make themselves feel better.
Sometimes it can just be out of politeness. For example, it would be rude to post a picture of someone's birthday event and then write that it wasn't that great a night.
And then, of course, we have those who are intentionally posting unrealistic images and information for profit – because they're trying to sell something, advertise their business, to maintain the status of an "influencer", or just trying to increase their celebrity status.

So, it's helpful to avoid comparing our lives to these overly positive, idealised images as it's not quite reality and it can lead to negative feelings. An obvious solution to this problem is to avoid passive use as much as possible, where we're just scrolling and

looking at other people's lives, and instead focus on using it as a medium for communicating with others. However, it's hard to completely avoid seeing these overly positive presentations on certain platforms and we may inadvertently find ourselves engaging in social comparisons and forming negative judgements about the self, so we need to come up with strategies on what to do if we've been caught in the trap, which I'll go through next.

So, what do you do if you've been trapped?

First, it's important to understand that the reason why this social comparison elicits negative feelings is because of the negative thoughts that are triggered about ourselves and our lives. If we're wanting to manage our negative feelings, we must identify and address these underlying thoughts. While this probably different for everyone, here are some of the common thoughts triggered:

- I'm not attractive enough.
- Other people are happier than me.
- I'm not as successful/ capable as others.
- Other people have better relationships than me.
- My friends like each other more than they do me / or the thought that I'm missing out.
- Everyone else is having more fun than me/ or the thoughts that people have more exciting lives.

Now I'd like for you to think about how this relates to you. In section A of the Social Media Aware worksheet, please write down any negative thoughts that you may experience when using highly visual social networking sites.

So, how can we manage these negative thoughts. A successful technique that psychologists like to teach people is to analyse our thoughts, which we call thought challenging. I'll give you a brief explanation of how this technique works before I give examples of how to apply this to the examples I just gave.

Usually, we just implicitly believe our thoughts without questioning them, but in psychology we find that when we encourage people to objectively review the truthfulness of their thoughts in an unbiased way, it can change their thinking (and how they feel). Now, this isn't just positive thinking. We can tell ourselves that everything will be fine, but our mind isn't always going to believe that, because it's not true. But what the mind doesn't reject, is fact. So, when reviewing our thoughts, we ask people to stick to reality and look at the whole picture. So, let's apply this technique to the examples of some negative thoughts I mentioned previously and discuss some questions you could pose to yourself. And, when I'm going through this, try to imagine a time when you've had a similar thought and try to think of some answers to the questions that apply for you.

Thought: Everyone else is having more fun than me, their lives are more exciting. Some questions you could ask yourself to challenge this thought are:

- Is it possible that the night out/ event that I'm focusing on wasn't actually as fun as what it looked?
- Have there been times when people commented that my night out looked amazing, but it wasn't that great? (I just presented it that way).
- Do I know other people (close to me) who make their events look more exciting on social media than what they describe them to be in person? Is it possible that everyone's doing that?
- I may not be doing much at the moment, but do I go out sometimes / have nice events too? How often have I been out this month? Is that the same/ more/ less than other people I know well (who's lives you REALLY know)?
- Are there any good reasons why I'm not out as much as I'd like/ holidaying as much? (e.g. Am I busy with work, study, have young kids, sick, am I saving, etc). Could this change for me?
- Could looking at everyone's posts at once make it seem like everyone is out all the time? If I were to look at just one person's posts at a time, may it feel different?
- Am I comparing myself to the very few lucky people (for example, who don't have as many commitments right now) or the average person?

Here are some questions to challenge another thought- I'm not attractive enough:
- Am I also able to take nice photos to put up online if I wanted to?
- Could others be using their filters on their phone or photo-shopping?
- When was the last time I saw them in real life? Is it possible that this isn't really how they look day-to-day?
- Is it possible that others have bloated, bad skin, etc days too that they just don't put up?
- Think of your friends (who you really know). Do their photos look better online than they do in real life?
- Even though I don't have all the physical traits that I want, are there other parts of me/ qualities that I'm happy with? What parts of me/ qualities do others compliment me on?
- Do I know other people who are critical of their appearance? Could this just be something that everyone is thinking about themselves?
- What valued activities does my body help me do? For example, am I healthy and strong enough to undertake the hobbies or sports I want.

Other people are happier than me:
- Do I intentionally post images/ comments to make it seem that my life/ days are better than what it really is? Is it possible that others are doing the same?
- Think of people you know really well, do their lives look the same in real life as they do online?
- Do I know anyone who is quietly going through a hard time, but online life looks great?
- Have you ever found yourself shocked to hear about someone's break-up or another hardship because there was no sign of an issue online?
- Even though life isn't everything I want it to be right now, is there something I could do to work on that? Could that change?

Again, I'd like for you to think about how this applies to you. In section B of the worksheet, please write down any thought challenging questions generated that could be useful for you for managing any negative thoughts in the future.

You may have identified some other thoughts that applied to you that we didn't go through today, or there could be many other thoughts triggered about yourself when passively using highly visual social networking sites, but hopefully this gives you a good example of the kinds of challenging questions that you can pose to yourself. And, hopefully you have found that by actively questioning the truthfulness of your upsetting thoughts you can see that one's thoughts are not necessarily true.

But, if you're finding it hard to examine your thoughts on your own, it can be useful to just remind yourself of some helpful coping statements.

- People never present their real selves/ life on social media, they only post the highlights of their weeks, what they want people to see/ believe about them and many edit their photos.
- Even if I don't have everything in life that I want right now, there are things I can do/ are doing to get them.
- Everyone has down days, unattractive days, days on the couch with no plans, and relationship problems, they just don't post that information.
- Many people have the same negative reaction to all of these idealised images and feel bad about themselves. There are probably people out there who think you have the perfect life.
- Remind yourself of the good things that you have in life, of your abilities and qualities.

On the worksheet provided, please write down any coping statements that could be useful for you in the future.

I hope this has been helpful. Please continue to reflect on this thought challenging and coping statements as much as possible in the week. And, I just want to add as another example of how online material may not be an accurate reflection of reality, is that I had to do so many takes to do this video right. Thank you very much for your time.

APPENDIX B: SOCIAL MEDIA AWARE (SMA) WORKSHEET

Social Media Aware record sheet

This record sheet outlines some of the training video key points. Communicating with others online can sometimes promote a sense of connection with others and improve our wellbeing. However, passively using many social media platforms (just observing) can lead to social comparison, which can reduce our well-being. Online social comparison can be more problematic than when we do it offline, as people tend to post overly positive presentations of themselves and their lives. It is relatively common for negative thoughts to come up as we use forms of social media. This training video provides some ideas to help respond to or manage negative thinking linked to highly visual social networking site use.

The video will also prompt you to record information most relevant to you in the sections below to enhance your learning. *Please wait for the video to prompt you before making any notes in the boxes below.*

If we want to manage how we feel we need to identify and manage our thoughts. While different for everyone, some common negative thoughts that arise with highly visual social networking site use that impact our well-being include thoughts about others being more successful, attractive, having better relationships, having more exciting lives and being happier than us.

SECTION A- Please record some of the negative thoughts that you sometimes experience (if any):

A technique called 'thought challenging' can be helpful to manage negative thoughts. This is when people analyse their negative thoughts objectively. This is not just positive thinking, as it focuses on looking for evidence in your life and sticking to reality. It can be useful when using highly visual social networking sites to analyse the assumptions we make about other people's lives and ourselves.

SECTION B- Please record any of the 'thought challenging' questions given in the examples that you may find useful for yourself (please record two, if possible):

However, if you find it hard to challenge your thoughts, some general coping statements may be useful.

SECTION C- Please record any of the suggested coping statements that may be useful for you:

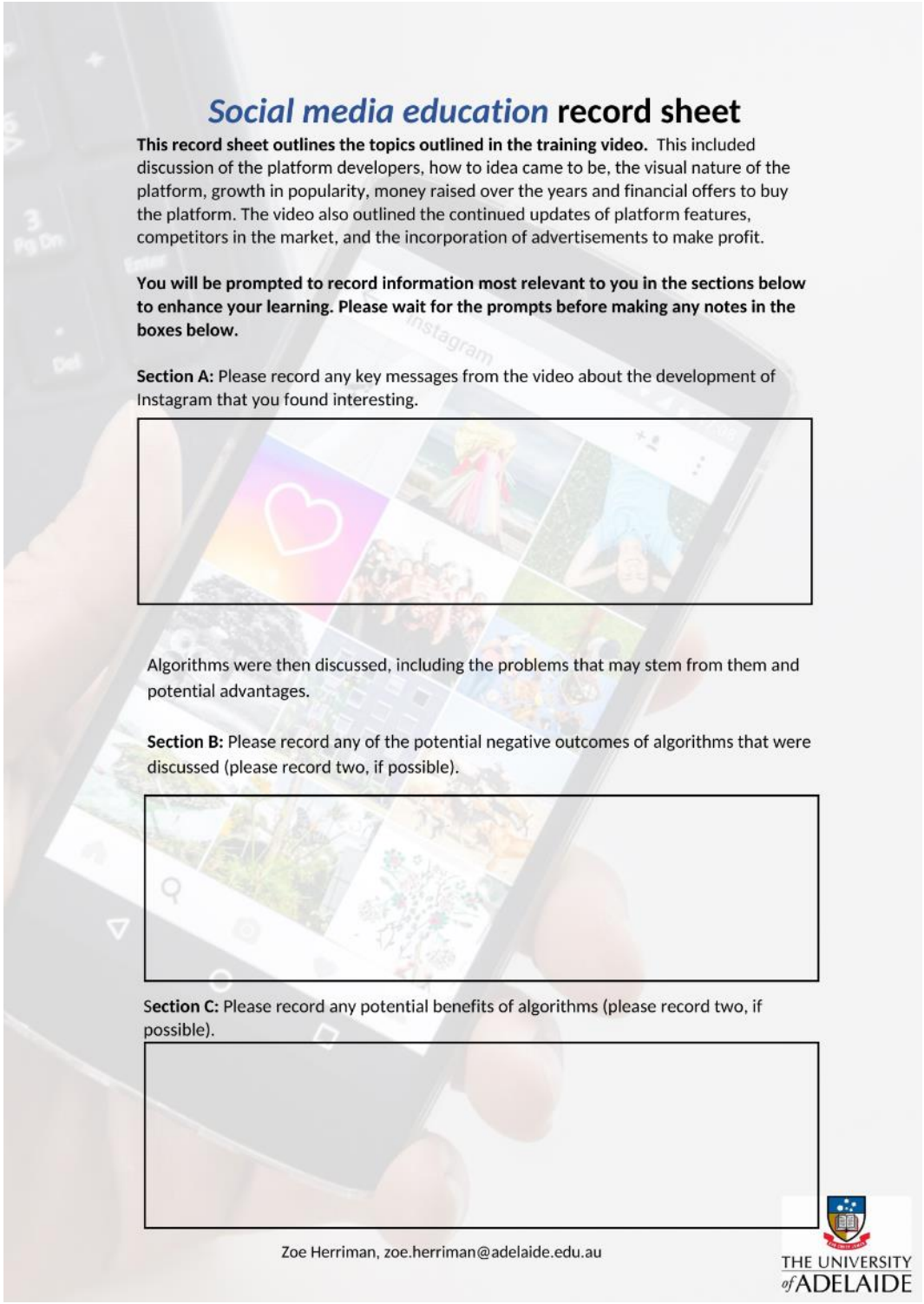
Zoe Herriman, zoe.herriman@adelaide.edu.au

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APPENDIX C: LINKS TO CONTROL GROUP VIDEOS AND WORKSHEET

The Story Behind the Rise of Instagram (youtube.com)

https://www.youtube.com/watch?v=wjpFPsdfuVA



Social media education **record sheet**

This record sheet outlines the topics outlined in the training video. This included discussion of the platform developers, how to idea came to be, the visual nature of the platform, growth in popularity, money raised over the years and financial offers to buy the platform. The video also outlined the continued updates of platform features, competitors in the market, and the incorporation of advertisements to make profit.

You will be prompted to record information most relevant to you in the sections below to enhance your learning. Please wait for the prompts before making any notes in the boxes below.

Section A: Please record any key messages from the video about the development of Instagram that you found interesting.

Algorithms were then discussed, including the problems that may stem from them and potential advantages.

Section B: Please record any of the potential negative outcomes of algorithms that were discussed (please record two, if possible).

Section C: Please record any potential benefits of algorithms (please record two, if possible).

Zoe Herriman, zoe.herriman@adelaide.edu.au

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APPENDIX D: COPY OF ETHICS APPROVAL FOR PILOT STUDY

Zoe Herriman

From: Paul Delfabbro
Sent: Wednesday, 27 July 2022 1:52 PM
To: Zoe Herriman
Subject: Re: Ethics proposal - LOW RISK

Hi Zoe,

Approval is 22/73

A bit of feedback from Diana below.

No need to submit any more paperwork

regards
Paul

I would suggest the following relatively minor modifications:

- Revise project title so that the results are not implied – i.e. remove the word 'reduce' (the intervention is a trial so we do not know whether a reduction will be seen – it is also a single arm trial so treatment effectiveness is not the primary aim)
- Avoid scientific jargon in information sheet, e.g. 'CBT-based psychoeducational…'
- In this same sentence, remove or replace '…to ameliorate…' we do not know whether the program will have this effect. Best to say the focus is on feasibility etc. Similarly, under 'potential benefits': avoid emphasising the impact of the findings. The findings will help research in this area…but may not necessarily help people manage their wellbeing.

Professor Paul Delfabbro
School of Psychology
The University of Adelaide, AUSTRALIA 5005
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WEB: https://researchers.adelaide.edu.au/index.php/profile/paul.delfabbro

APPENDIX E: COPY OF ETHICS APPROVAL FOR RANDOMISED CONTROLLED TRIAL

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RESEARCH SERVICES
OFFICE OF RESEARCH ETHICS, COMPLIANCE AND INTEGRITY
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CRICOS Provider Number 00123M

Our reference 37597

17 July 2023

Professor Rachel Roberts
Psychology

Dear Professor Roberts

ETHICS APPROVAL No: H-2023-154
PROJECT TITLE: A cognitive behavioural therapy-based micro-intervention to reduce the negative impact of social networking site use on well-being.

The ethics application for the above project has been reviewed by the Human Research Ethics Committee and is deemed to meet the requirements of the *National Statement on Ethical Conduct in Human Research 2007 (Updated 2018)*.

You are authorised to commence your research on: 17/07/2023
The ethics expiry date for this project is: 31/07/2026

NAMED INVESTIGATORS:

Chief Investigator:	Professor Rachel Roberts
Student - Postgraduate Doctorate by Research (PhD):	Ms Zoe Herriman
Associate Investigator:	Dr Amanda May Taylor
Associate Investigator:	Associate Professor Amy Slater

CONDITIONS OF APPROVAL: Thank you for your considered responses to the matters raised. The revised application provided on 13/07/2023 has been approved.

Ethics approval is granted for three years and is subject to satisfactory annual reporting. The form titled Annual Report on Project Status is to be used when reporting annual progress and project completion and can be downloaded at http://www.adelaide.edu.au/research-services/oreci/human/reporting/. Prior to expiry, ethics approval may be extended for a further period.

Participants in the study are to be given a copy of the information sheet and the signed consent form to retain. It is also a condition of approval that you immediately report anything which might warrant review of ethical approval including:

- serious or unexpected adverse effects on participants,
- previously unforeseen events which might affect continued ethical acceptability of the project,
- proposed changes to the protocol or project investigators; and
- the project is discontinued before the expected date of completion.

Yours sincerely,

Professor Paul Delfabbro
Convenor

The University of Adelaide

CHAPTER 9. REFERENCES

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