

The Role of Mindfulness in Alexithymia, Depression and Meditation

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Science*

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Table of Contents

Abstract	5
Declaration	6
Contribution Statement	7
Acknowledgments	8
Literature Review	9
Method	22
Results	26
Discussion	36
References	48
Appendix A	56
Appendix B	59

List of Figures

Figure 1. Simple Mediation Model	Error! Bookmark not defined.	4
Figure A1. Scatterplot of Linearity Between Alexithymia and Depression		56
Figure A2. Scatterplot of Linearity Between Alexithymia and Mindfulness		56
Figure A3. Scatterplot of Linearity Between Depression and Mindfulness		57

List of Tables

Table 1. Descriptive Statistics for Continuous Measures and Subscales	26
Table 2. Correlations Between Subscales of Continuous Measures	27
Table 3. Number and Percentage of Participants in Meditation Practice Categories	28
Table 4. ANOVA Between Meditation Categories and Variables	30
Table 5. Multiple Comparisons of TAS-20 with Meditation Categories	30
Table 6. Multiple Comparisons of CES-D with Meditation Categories	31
Table 7. Multiple Comparisons of FFMQ with Meditation Categories	32
Table 8. Indirect Effects by Mindfulness Facet	35
Table A1. Participant's Gender	56
Table A2. Simple Meditation by Mindfulness Facets	57

Abstract

Alexithymia is characterised by a difficulty in identifying and describing emotions, as well as an externally oriented style of thinking. Alexithymia particularly impacts upon social and emotional abilities, such as empathy, which can harm psychological well-being. Additionally, alexithymia increases vulnerability to mental health disorders. Alexithymia and depression have been observed as related constructs, in that alexithymia predicts depression. The characteristics of alexithymia make it difficult to treat with typical psychotherapies, however a recent systematic review has given support for mindfulness-based interventions in decreasing levels of alexithymia. The present study utilised an online survey to measure alexithymia (TAS-20), depression (CES-D), mindfulness (FFMQ) and meditation practice in 112 participants. Correlational analyses supported hypotheses that there would be a significant positive relationship between alexithymia and depression, and significant negative relationships between alexithymia and mindfulness, and depression and mindfulness. No significant relationships between meditation and the other variables were observed, credited to the low number of meditators in the study. A simple mediation model with mindfulness and depression, mediated by alexithymia had a significant indirect effect. This supports the idea that mindfulness has an impact on reducing alexithymia, which in turns has an effect on depression. The implications of this suggest that mindfulness-based interventions may be suitable in reducing both alexithymia and depression. Further research should directly test the effects of mindfulness-based interventions on alexithymia and depression.

Keywords: Alexithymia, Depression, Mindfulness, Meditation

Declaration

This thesis contains no material which has been accepted for the award of any other degree of diploma in any University, and, to the best of my knowledge, this thesis contains no material previously published except where due reference is made. I give permission for the digital version of this thesis to be made available on the web, via the University of Adelaide's digital thesis repository, the Library Search and through web search engines, unless permission has been granted by the School to restrict access for a period of time.

Signed: Jasmine Turner

Date: September 28, 2020

Contribution Statement

In writing this thesis, my supervisor and I collaborated to generate research questions of interest and design the appropriate methodology. I conducted the literature search, completed the ethics application, recruited participants and collected all of the data. My supervisor advised in the analyses of data and some analyses were performed collaboratively. I wrote up all aspects of the thesis independently.

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The Role of Mindfulness in Alexithymia, Depression and Meditation

Social and emotional skills play a critical role in success in life (Miyamoto, Huerta, & Kubacka, 2015). Alexithymia compromises the development of such skills (Leweke, 2011), thus putting individuals at risk of harmful outcomes. At its most basic definition, alexithymia encompasses an inability to recognise and describe one's emotions (Timoney & Holder, 2013). Alexithymia has both a cognitive and affective impact and has been associated with a greater vulnerability for mental illness (Leweke, 2011). Alexithymia has been observed at particularly high rates in those with mental health disorders, such as depression (Leweke, 2011). Some studies have suggested that levels of alexithymia can be decreased (Kishon et al., 2019), which points to the possibility that it may be treatable. This has important ramifications for people with alexithymia as it could lead to improved outcomes in social and emotional well-being. Alexithymia, however, presents with challenges when it comes to treatment (Ogrodniczuk, Piper, & Joyce, 2011). For this reason, alternative methods should be considered for reducing alexithymia. There is some preliminary support for mindfulness-based interventions as such an alternative (Norman, Marzano, Coulson, & Oskis, 2019). Further understanding of the relationship between these constructs is needed to determine whether mindfulness may be a viable alternative in the treatment of alexithymia, as well as in cases where people simultaneously have depression.

Alexithymia

Alexithymia is characterised by difficulty in identifying and describing emotions, as well as an externally oriented style of thinking (Fukunishi, Kikuchi, Wogan, & Takubo, 1997). Sifneos (1973) proposed the term, which originates from Greek and can be translated as: 'a',

meaning lack; 'lexis', meaning words; and 'thymos', emotion; a lack of words for emotion.

Alexithymia has a cognitive and affective impact, with affected individuals demonstrating a concrete style of thinking and a reduction in emotional experience and regulation (Timoney & Holder, 2013). It is considered to be a dimensional construct, whereby individuals present with differing degrees of alexithymia (Ogrodniczuk et al., 2011).

The four core features of alexithymia have been defined as: difficulty identifying and describing feelings; difficulty distinguishing feelings from the physical sensations of emotional arousal; reduced imagination; and an externally oriented style of thinking (Timoney & Holder, 2013). This cognitive aspect of alexithymia refers to a tendency to attend to external, practical aspects of day to day life, as opposed to paying attention to feelings, thoughts and fantasies (Ogrodniczuk et al., 2011; Timoney & Holder, 2013). Generally, the literature agrees that alexithymia is a stable personality state (Timoney & Holder, 2013); however, some have suggested that it may be a state reaction (Fukunishi et al., 1997). For example, it has been proposed that alexithymia may develop as a reaction to severe physical illness and serve as a defense mechanism (Wise, Mann, Mitchell, Hryvniak, & Hill, 1990). Freyberger (1977) defined alexithymia as either primary or secondary, with secondary alexithymia being a state reaction. Freyberger (1977) explained secondary alexithymia as being either acute, meaning it would decrease after the adverse state was removed, or as chronic secondary alexithymia, which would remain permanently alongside the adverse state, for example in the case of a chronic illness. Interestingly, alexithymia has been associated with post-traumatic stress disorder (PTSD) (Timoney & Holder, 2013). This supports the notion that alexithymia can be developed as a reaction, such as to a specific trauma. There is a clear cause for the alexithymia in this case. Whether alexithymia is solely a personality trait or if it can develop as a result of life events may

have critical impact. If it is in response to a state, it may affect how readily it will respond to intervention and treatment. Whether alexithymia can be reduced at all, either primary or secondary, is the more prominent question however.

The implications for those who present with high levels of alexithymia can be significant in many facets of life, such as health and social function. Individuals with alexithymia may lack appropriate facial expressions and body language (Grynberg, Berthoz, & Bird, 2018; Timoney & Holder, 2013). Facial expressions serve an important social function and impact how others perceive us; they provide information in social interactions about context, the individual and about future interactions between the giver and receiver (Parkinson, 2017). Further inhibiting social interactions, those with alexithymia may be more inclined to impulsivity, and may exhibit immature defence mechanisms (e.g. projection, denial, passive-aggressive behaviour, etc.) (Ogrodniczuk et al., 2011; Timoney & Holder, 2013). Socially, those with alexithymia have been found to have small social networks and fewer close friends (Timoney & Holder, 2013). Others have suggested, conversely, that individuals high in alexithymia might have relatively wide social networks but that these relationships are superficial (Grynberg et al., 2018). Grynberg et al. (2018) have also suggested that individuals with alexithymia are less likely to display self-assertiveness, and so will not necessarily communicate issues or concerns when they occur. Studies have demonstrated that empathy and the ability to understand differing perspectives to one's self may be limited in individuals with alexithymia, further impairing social function (Ogrodniczuk et al., 2011). Empathy is critical for social competence and is positively correlated to psychological well-being (Vinayak & Judge, 2018).

As previously stated, prevalence rates in the general populations have been reported up to 19% (Timoney & Holder, 2013). These prevalence rates tend to be much higher in clinical

settings, in particular. One of the recurring themes in the literature around alexithymia is that it appears to increase vulnerability to mental illness (Leweke, 2011). Higher rates of alexithymia have been observed in patients with substance abuse disorder, eating disorders, PTSD and panic disorder (Fukunishi et al., 1997). In a study of drug addicted patients, 43.5% were classified as alexithymic (Farges et al., 2004). Higher prevalence rates have been observed in a variety of mental health disorders, between: 6% to 59% for somatoform disorders, 24.1 and 77% for eating disorders, 12.5% to 58% for anxiety disorders, and 32% and 46% for depressive disorders (Leweke, 2011). In undergraduate students, alexithymia has also been linked to self-harm (Timoney & Holder, 2013).

Individuals with alexithymia tend to attribute emotions to physical sensations, rather than identifying the related feeling (Ogrodniczuk et al., 2011). Instead of identifying feelings of anxiety, for example, those with alexithymia may make somatic complaints, such as having an upset stomach (Ogrodniczuk et al., 2011; Timoney & Holder, 2013). This presents challenges in terms of health and communication. Alexithymia has been associated with other health outcomes, including poor diet and a lack of exercise (Timoney & Holder, 2013). While the health outcomes will not be explored in the present study, it is important to note that alexithymia is associated with a range of adverse characteristics. This study will focus more on the social impact of alexithymia, and on its connection to mental health disorders, primarily depression.

Alexithymia and Depression

More than 264 million people around the world suffer from depression each year (Organisation, 2020). Symptoms of depression include a depressed mood most of the day, diminished interest or pleasure in normal activities, significant weight loss or gain, physical or

cognitive slowing down that is observable to others, fatigue, feelings of worthlessness or guilt, an inability to concentrate or make decisions, and suicidal ideation (American Psychiatric Association, 2013). The impact of depression can be severe, and has ramifications for everyday life. A thematic analysis that explored common themes for those living with depression summarised the challenges as: having to relinquish control of everyday life; uncertainty and instability; and living on the edge of the community (Ahlström, Skärsäter, & Danielson, 2009).

Studies have reported that from 25% up to 46% of those with depression, also have alexithymia (Leweke et al., 2010). In Finland, a sample of the general population reported alexithymia was eight times more likely in depressed than nondepressed people (Timoney & Holder, 2013). This is indicative of the relationship between depression and alexithymia, which has been consistently reported in the literature (Kishon et al., 2019; Leweke et al., 2010). These correlations have been observed to a moderate degree in both clinical and non-clinical samples (Müller, Bühner, & Ellgring, 2003).

Some authors have argued that alexithymia and depression are too closely related and are actually confounding constructs (e.g. Honkalampi, Hintikka, Tanskanen, Lehtonen, & Viinamäki, 2000). This concern has arisen from unexpectedly high correlations between alexithymia and depression (Parker, Bagby, & Taylor, 1991). The Twenty-item Toronto Alexithymia Scale (TAS-20) is very commonly used in clinical and research settings for measuring alexithymia (Bagby, Parker, & Taylor, 1994). The scale consists of three subscales and one subscale in particular, Difficulty Describing Feelings (DDF), has been highly correlated with depression (Leweke, 2011). Several factor analyses have been conducted that confirm, however, depression and alexithymia to be distinct constructs (Marchesi, Brusamonti, & Maggini, 2000; Müller et al., 2003; Parker et al., 1991). These analyses were performed using the TAS-20 and a variety of

self-report measures of depression (Marchesi et al., 2000; Müller et al., 2003; Parker et al., 1991). Parker et al. (1991) explain that at times, people have presented with ‘masked’ depression, where patients primarily make somatic complaints which are likely to be misdiagnosed as a somatoform disorder. With the knowledge that alexithymia and depression are distinct constructs, this explanation could describe a patient who has both alexithymia and depression. Parker et al. (1991) suggest that it is possible that alexithymic traits may reveal themselves more fully in the presence of depression, a potential justification for why the two have been confounded. Alternatively, they suggest that a state-like alexithymia may develop in the presence of depression, similar to the secondary alexithymia previously discussed. One study found that the impact of social factors on alexithymia was largely explained by depression (Honkalampi et al., 2000). The authors went on to suggest that depression may be the most important variable in explaining alexithymia in the general population (Honkalampi et al., 2000). In addition, characteristics of depression, such as emotional numbness, may manifest in high levels of alexithymia causing them to appear very similar (Leweke et al., 2010).

Additionally, the relationship between alexithymia and depression appears to impact upon treatment. Studies have demonstrated that the level of alexithymia is associated with the severity of depression, and that a reduction in depression is accompanied by a decrease in levels of alexithymia (Kishon et al., 2019). In comparison, others have indicated that a reduction in levels of alexithymia are not correlated with a decrease in depression (Fukunishi et al., 1997). If a decrease in depression is associated with a simultaneous decrease in alexithymia this has significant clinical implications. Either eventuality is possible, and so this study will examine whether a decrease in alexithymia is in fact related to a decrease in depression.

Treatment of Alexithymia

As discussed, alexithymia has been observed at higher rates in a range of mental health disorders, such as depression. There are important considerations for treating these conditions when people also present with alexithymia, as alexithymia can create difficulties in using typical therapies. Psychotherapy is used in the treatment of a wide range of mental health disorders (Lambert et al., 2002). It can be described as a process where thoughts, feelings and behaviours are adapted in order to increase functioning in daily life (Lambert et al., 2002). Bearing this in mind, there are potential conflicts for a person with alexithymia. People with alexithymia have been found to prefer group therapy, presumably in order to avoid both the social and emotional aspects of individual therapy (Ogrodniczuk et al., 2011). Someone with alexithymia may struggle to communicate emotions and concerns to a therapist, they may revert to somatic complaints and they may struggle to build a relationship with the therapist (Ogrodniczuk et al., 2011). This makes it difficult for the therapist to construct a specific treatment plan and to build rapport with the patient (Ogrodniczuk et al., 2011), thus compromising critical features of psychotherapy. Cognitive Behavioural Therapy (CBT), for example, may successfully decrease levels of depression, but it relies heavily on these principles of rapport with the therapist. Rapport has been negatively associated with depression, and identified as a predictor of lower levels of depressive symptoms (Antunes-Alves et al., 2018). The implication of what has been discussed is that alexithymia may impede upon usual, and more importantly, effective treatment of depression. Therefore, even if a reduction in depression is linked with a reduction in alexithymia, such a therapy may not achieve this. For this reason, it may be important to consider alternative treatment methods that do not necessarily require the features of psychotherapy (e.g. expression

of thoughts and feelings, and rapport with a therapist) that conflict with alexithymic characteristics, or methods that can add to usual treatment in people who are alexithymic.

Mindfulness

Mindfulness can simply be described as intentional focus on the present moment, without judgment (Baer, 2003; Didonna et al., 2018; Teixeira & Pereira, 2015). More generally, it is considered as heightened awareness of experiences with an attitude of acceptance toward them (Teixeira & Pereira, 2015). It has been defined as an ability to monitor one's internal processes and thoughts without being reactive to them (Baer, 2003; Teixeira & Pereira, 2015).

Mindfulness is typically considered to be a set of skills that can be developed through training and practice (Didonna et al., 2019). The Five Factor Mindfulness Questionnaire (FFMQ) measures these skills and summarises them as Observing, Describing, Acting with awareness, Nonjudging of inner experience and Nonreactivity to inner experience (Baer, 2003).

There are several interventions that are based on mindfulness strategies which have gained popularity. Mindfulness-Based Stress Reduction (MBSR) is one such example. It was developed for people suffering from chronic pain and stress-related disorders, and is typically run as an 8 to 10-week intervention and primarily involves meditation practice (Baer, 2003). Mindfulness-Based Cognitive Therapy (MBCT) has mostly been utilised in treating recurrent depression, and incorporates elements of both cognitive therapy and MBSR (Baer, 2003). These interventions, along with others (e.g. Dialectical Behaviour Training and Acceptance and Commitment Therapy), have been beneficial in improving psychological function and have seen improvements in a range of mental health disorders (Baer, 2003; Didonna et al., 2019). The practice of mindfulness has also been correlated with improvements in the qualities of borderline

personality disorder, and mindfulness-based interventions have seen success in alleviating symptoms of obsessive-compulsive disorder, anxiety disorders and comorbid depression (Didonna et al., 2019).

An individual who has developed or who possesses mindful abilities is not exempt from experiencing negative thoughts, but demonstrates an ability to move on from them more readily (Teixeira & Pereira, 2015). Mindfulness has been credited with increasing well-being, improving emotion regulation, reducing stress, increasing acceptance of difficult symptoms within patient settings, and heightening metacognitive awareness (Didonna et al., 2019; Teixeira & Pereira, 2015). When considering alexithymia and mindfulness, there is a polarity between the two. In many ways, they are opposing constructs. For example, an alexithymic person demonstrates a lack of mechanisms to cope with stress, while mindfulness reduces stress (Teixeira & Pereira, 2015).

Negative correlations between mindfulness and alexithymia have previously been reported (Didonna et al., 2019; Teixeira & Pereira, 2015). This can be more specifically understood in relation to the FFMQ. Alexithymia has been found to have a negative association with the facets Describing, Acting with awareness and Non-judging (Didonna et al., 2019). Studies have shown that lower mindfulness abilities predict higher rates of clinical alexithymia (Teixeira & Pereira, 2015), and higher levels of mindfulness have also been associated with fewer symptoms of depression (Didonna et al., 2019).

While there is limited research on mindfulness interventions and alexithymia, a recent systematic review revealed that mindfulness-based interventions were significantly associated with a reduction in levels of alexithymia, compared with control conditions (Norman et al., 2019). Four studies were included in the systematic review. The interventions used included

mental training modules, cultural training, meditation training and MBSR. The authors observed that the content of the intervention seemed to be more important than the length, as some interventions were a typical 8-10 weeks whereas others were longer. The length of time, however, made little difference. One of the mechanisms that Norman et al. (2019) credit with reducing alexithymia was the increased awareness of the present, especially in regard to bodily awareness. This is logical considering the propensity for somatic complaints in people with alexithymia. Interestingly, one of the studies involved suggested that a part of the brain involved in emotional and bodily awareness increased in thickness during the study. It was also put forth that participants who had higher baseline levels in alexithymia, had a more drastic reduction than those with low levels of alexithymia (Norman et al., 2019). This is particularly relevant when considering treatment for clinical settings. These findings imply mindfulness-based interventions may be a viable approach to reducing alexithymia, and furthermore, contributing to the treatment of disorders which seem to accompany it (e.g. depression).

Considering the potential uses of mindfulness-based strategies for alexithymia, it is important to understand how mindfulness is practiced. Mindfulness is developed through the skill of focusing attention to be present in each moment, this is achieved through the practice of meditation (Baer, 2003).

Meditation

Meditation is an ancient practice that involves attentional self-regulation (Baer, 2003). There are many types, including: focused attention, such as fixation on a mantra; mindfulness meditation, involving fixation on moment-to-moment and open monitoring where one observes thoughts, emotions and sensations as they come and go without reacting to them; and yoga,

concerning balance between the body and mind (Hölzel et al., 2011; Rose, Zell, & Strickhouser, 2019). Health benefits of meditation have been reported for mental health outcomes, psychological well-being, a wide range of physical health outcomes (e.g. heart rate, blood pressure, etc.), and for chronic pain (Macinko & Upchurch, 2019; Rose et al., 2019).

Looking at the FFMQ, the impact of meditation on trait mindfulness can be observed. Meditators score significantly higher on the facets Observing, Describing, Nonjudging and Nonreactivity, but not on Acting with awareness (Baer et al., 2008). It has also been reported that interventions which increase ‘state’ mindfulness, by practicing meditation, will subsequently increase trait mindfulness and decrease distress (Kiken, Garland, Bluth, Palsson, & Gaylord, 2015). This aligns with what has been observed in the FFMQ, as meditators score higher in most facets even though it is measuring trait mindfulness.

Meditation has been associated with greater empathy and emotional regulation (Iwamoto et al., 2020), two skills which people with alexithymia typically lack. Meditation training has indeed been found to decrease levels of alexithymia, as well as improve social skills (de La Fuente Arias, Franco Justo, & Salvador Granados, 2010). A 9-month mental and meditation training study demonstrated interoceptive awareness could be improved (measured as heartbeat perception accuracy) and alexithymia simultaneously reduced. This effect was observed after 6-months of training and increased by the final month (Bornemann & Singer, 2017). Several studies involved in the Norman et al. (2019) review, such as Bornemann & Singer (2017), involved meditation training. Of interest, three of the four studies excluded participants who had prior meditation training and all saw a significant decrease in levels of alexithymia (Norman et al., 2019). This is encouraging in terms of using meditation in mindfulness-based interventions to treat alexithymia, as it suggests people do not need prior meditation experience for the

intervention to be effective. Mindfulness meditation has also been associated with a decrease in depressive symptoms, particularly rumination (Ramel, Goldin, Carmona, & McQuaid, 2004). It has been suggested that loving-kindness meditation and compassion meditation may be most successful in decreasing symptoms of depression, as they focus on reducing judgment and improving self-compassion (Desrosiers, Klemanski, & Nolen-Hoeksema, 2013).

As meditation is practiced, it stands to reason that levels of mindfulness would increase, as has been found in the literature (Kiken et al., 2015). If this is the case, then meditation may also impact upon levels of alexithymia and depression through mindfulness.

Individuals with alexithymia are faced with the challenge of reduced capacity for emotional regulation, compromised psychological and social well-being and greater mental health risks. A strong relationship can be observed between alexithymia and depression, in particular (Leweke, 2011). While the literature has revealed that alexithymia can be reduced, there remains challenges in treating it. Due to the nature of alexithymia, it can be difficult to treat with traditional methods, such as psychotherapy (Ogrodniczuk et al., 2011). Mindfulness-based interventions are one alternative that have demonstrated some evidence of reducing alexithymia (Norman et al., 2019). Mindfulness can be developed through the practice of meditation, in order to focus one's attention, non-judgmentally and non-reactively, on the present moment (Baer et al., 2008). The role mindfulness has to play in the relationships between alexithymia, depression and meditation may be able to inform the use of mindfulness-based interventions for reducing alexithymia and depression. This would be especially meaningful for those with alexithymia and depression, considering the wide range of adverse outcomes associated with these two conditions.

Research Hypotheses and Aims

It is hypothesised that alexithymia and depression will have a significant, positive relationship as they have been consistently correlated in previous literature. It is also hypothesised that alexithymia will have a significant, negative relationship with mindfulness. Similarly, it is expected that depression will have a negative correlation with mindfulness.

It is anticipated that increased meditation experience will be associated with higher levels of mindfulness, and lower levels of alexithymia and depression.

On the basis of these hypotheses, the author aims to subsequently explore a sequential mediation model, whereby meditation predicts an increase in mindfulness, which predicts a decrease in alexithymia, which predicts depression.

Method

Participants

Participants were recruited through the University of Adelaide's Research Participation System (RPS), an announcement posted on Unified (the University of Adelaide's internal communication platform) and via a promotional flyer on social media. 158 participants responded to the study, and 112 were included for analyses ($n = 112$). Exclusions were due to participants not meeting minimum age requirements, and due to incomplete responses, as complete scales are necessary for mediation analyses. Participants ranged from 18 to 76-years-old, with a mean age of 27.82 and standard deviation of 13.71. Participant's genders were identified as 70.5% female, 27.7% male and 1.8% other. Participant's countries of birth included Australia (67%), China (14.3%), India (5.4%) and the UK (3.6%), with various other Asian, Middle Eastern and European countries represented. Most participants had completed high school (33.9%), with some having completed an undergraduate degree (25%) or postgraduate degree (7.1%). The majority of participants were students from the University of Adelaide (69.6%). Some of these were first-year Psychology students recruited via the RPS (24.1% of sample). Fields of study were diverse and included Psychology, Accounting and Commerce, Animal and Behaviour Science, Arts, Criminology, Medical and Health Sciences, Nursing, Education, Sciences, Engineering, and Media/Marketing.

Measures

Three self-report measures, questions pertaining to meditation experience and practice, and demographic questions were completed by participants.

Twenty-item Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1994). The scale measures three factors of alexithymia: difficulty identifying feelings (DIF), difficulty describing feelings (DDF) and externally-oriented thinking (EOT). Questions in the TAS-20 are structured as personal statements that participants rate on a 5-point Likert scale, with 1 suggesting they strongly disagree and 5 strongly agree. An example of the DIF subscale includes, “I am often confused about what emotion I am feeling”. “I find it hard to describe how I feel about people” is an example of the DDF subscale, and “I prefer to just let things happen rather than to understand why they turned out that way” is an item from the EOT subscale. Some items in the scale are reverse scored. A score of >61 is rated as alexithymic, with a score of <51 non-alexithymic. The TAS-20 has demonstrated predictive validity (Timoney & Holder, 2013), as well as convergent and divergent validity (Bagby, Parker, & Taylor, 2020). The TAS-20 has reasonable internal consistency, with Cronbach’s alpha of 0.81 (Bagby, Parker & Taylor, 1994).

Centre for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977). The CES-D is a 20-item measure that rates depressive symptoms on a 4-point Likert scale, ranging from “Rarely or none of the time” to “Most or all of the time”. Example statements include: “I did not feel like eating; my appetite was poor.”; “My sleep was restless.”; and “I thought my life had been a failure.” Several statements are reverse-scored (e.g. “I felt hopeful about the future”). Scores may range from 0 to 60, a higher score is indicative of the presence of more symptoms. Radloff (1977) recommended a cutoff score of above 16 would suggest depressive symptoms were present. This scale has demonstrated good discriminant validity (Radloff, 1977) and factorial validity (Carleton et al., 2013). Cronbach’s alpha has been reported at an acceptable level, of 0.85 (Radloff, 1977).

Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). The FFMQ operationalises mindfulness using five-factors: Observing, Describing, Acting with awareness, Non-judging of inner experience and Non-reactivity to inner experience (Baer et al., 2008). The FFMQ includes 39-items rated on a 5-point Likert scale, where 1 is “Never or rarely true” and 5 is “Very often or always true”. Sample statements include: “I’m good at finding words to describe my feelings.”; “I am easily distracted.”; and “I notice the smells and aromas of things”. Several items are reverse-scored. The FFMQ has demonstrated predictive validity (de Bruin, Topper, Muskens, Bögels, & Kamphuis, 2012), as well as convergent and divergent validity (Gu et al., 2016). Cronbach’s alpha for the subscales has been reported as .83 (Observing), .91 (Describing), .87 (Acting with awareness), .87 (Non-judging), and .75 (Non-reacting) (Baer et al., 2006).

Meditation questions. Questions pertained to whether participants had experience with meditation, and if so, how long they had practiced meditation for. Participants were also asked how long a typical meditation session would be, if they did indeed practice meditation. Finally, participants were asked to identify what type of meditation they practiced (mindfulness, concentrative, centering prayer, other Christian meditation, or other). Questions were based on Baer et al. (2008) and Proeve (2020).

Demographic data. Demographics concerning participants age, gender, nationality, level of education and current field of study (if applicable) were collected in the survey.

Procedure

The Human Research Ethics Sub-Committee of the School of Psychology granted ethics approval for the present study (Approval No. 20/52). Participants were invited to participate

through the University of Adelaide's RPS, the Unified website or via a promotional flyer on social media. The online survey was administered through Qualtrics, which participants accessed through a link given in the various recruitment locations. Informed consent was collected from participants at the beginning of the survey after reading information about the study (Appendix B). Participants completed each measure (TAS-20, CES-D, FFMQ and meditation questions) within the survey, as well as demographic questions. First-year psychology students who completed the survey through the RPS were given 0.5 course-credit for their participation. No other incentives were offered for participation. Participation was voluntary and participants were able to withdraw at any time before completing the survey. Participants were given the opportunity to request summary results of the study.

Data analyses

Statistical analyses were performed using Statistical Packages for the Social Sciences (SPSS) version 26. Correlational analyses were used to assess the relationships between alexithymia (TAS-20), depression (CES-D) and mindfulness (FFMQ). Meditation data were sorted into categories and one-way analysis of variance were completed to detect differences in alexithymia, depression and mindfulness means for different levels of meditation experience. PROCESS (Hayes, 2018) was used for mediation analyses.

Results

Normality was visually assessed using histograms, and each continuous measure showed no clear departures from normality. The Linearity of relationships between continuous measures was assessed using scatterplots, and each of the hypothesised relationships appeared to be linear (see Appendix A). Descriptive statistics for each measure, as well as subscales, are summarised in Table 1. Independent samples t-tests revealed that there was no significant difference between genders in the TAS-20 ($t(108) = -.12, p = .91$), CES-D ($t(108) = -.43, p = .67$) or FFMQ ($t(103) = 1.03, p = .31$). Age correlated negatively with the TAS-20 ($r = -.32, p < .01$) and the CES-D ($r = -.32, p < .01$), and positively with the FFMQ ($r = .38, p < .01$).

Table 1

Descriptive Statistics for Continuous Measures and Subscales

	N	Minimum	Maximum	Mean	SD	Cronbach's <i>a</i>
TAS-20	112	22.00	91.00	54.28	13.24	.87
DIF	112	7.00	34.00	19.08	6.37	.86
DDF	112	5.00	25.00	15.12	5.35	.88
EOT	112	9.00	34.00	20.09	5.04	.65
CES-D	112	.00	57.00	22.42	12.70	.93
FFMQ	107	49.00	176.00	112.98	21.20	.91
Observing	107	8.00	37.00	24.73	6.08	.80
Describing	107	8.00	39.00	24.32	7.18	.90
Acting	107	8.00	40.00	22.25	6.17	.87
Nonjudging	107	8.00	40.00	22.04	7.91	.92
Nonreactivity	107	7.00	34.00	19.64	5.33	.83

Note. DIF, DDF and EOT are subscales of the TAS-20. Observing, Describing, Acting, Nonjudging and Nonreactivity are facets of the FFMQ.

Correlational Analyses

Correlational analyses were performed in response to the first hypotheses, which suggested that alexithymia would have a significant positive relationship with depression and that both alexithymia and depression would be negatively correlated with mindfulness. Each of these hypotheses were supported and the effect sizes were large in each case. The TAS-20 and CES-D were positively and significantly correlated ($r = .63, p < .01$). The TAS-20 was negatively and significantly correlated with the FFMQ ($r = -.68, p < .01$), as was the CES-D and FFMQ ($r = -.71, p < .01$). Correlations between subscales in the TAS-20 and FFMQ have been reported in Table 2, however, as the subscales generally agreed with the whole scale they have not been included in further analyses.

Table 2

Correlations Between Subscales of Continuous Measures

	DDF	EOT	CES-D	OBS	DES	AA	NJ	NR
DIF	.72**	.27**	.69**	.09	-.64**	-.55**	-.50**	-.30**
DDF	-	.26**	.51**	-.10	-.78**	-.48**	-.39**	-.21*
EOT	-	-	.26**	-.31**	-.34**	-.23*	-.03	-.18
CES-D	-	-	-	-.04	-.52**	-.69**	-.60**	-.46**
OBS	-	-	-	-	.18	.03	-.12	.48**
DES	-	-	-	-	-	.39**	.25**	.36**
AA	-	-	-	-	-	-	.66**	.27**
NJ	-	-	-	-	-	-	-	.27**

Note. DIF = Difficulty Identifying Feelings, DDF = Difficulty Describing Feelings, EOT = Externally Oriented Thinking, OBS = Observing, DES = Describing, AA = Acting with awareness, NJ = Nonjudging, NR = Nonreactivity. **Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed).

ANOVA Analyses with Meditation Categories

Meditation categories are shown in Table 3. The majority of participants had not experienced formal meditation (58.9%). The participants that did have meditation experience, were more likely to have been practising it for less than 5 years and be regular meditators (more than 1-2 times per week). The majority of meditators had sessions that lasted 1-20 minutes, sessions longer than 20 minutes were uncommon. Out of those who had tried meditation, the most likely type was mindfulness meditation. The meditation categories relevant for further analysis included: Duration of practice in years, Duration of session in minutes and Frequency of meditation sessions per week (Baer et al., 2008; Proeve, 2020). The categories and levels within each category were based on Baer et al. (2008). Baer et al. (2008) describes regular meditators as those who meditate more than 1-2 times per week. Fewer categories than Baer et al. (2008) are listed, due to the relatively low number of meditators in the sample.

Table 3

Number and Percentage of Participants in Meditation Practice Categories

	N (%)
Tried formal meditation	
Yes	39 (34.8)
No	66 (58.9)
Missing	7 (6.3)
Duration of practice	
Does not meditate	54 (48.2)
0-5 years	43 (38.4)
6+ years	8 (7.1)
Missing	7 (6.3)
Frequency of meditation	

	N (%)
Does not meditate	57 (50.9)
Less than 1-2 times per week	22 (19.6)
Regular meditation	23 (20.5)
Missing	10 (8.9)
Duration of meditation session	
Does not meditate	61 (54.5)
1-20 minutes	34 (30.4)
21+ minutes	9 (8.0)
Missing	8 (7.1)
Typical meditation practice	
Does not meditate	44 (39.3)
Mindfulness meditation	40 (35.7)
Concentrative meditation	7 (6.3)
Christian meditation	14 (12.5)
Other	6 (5.4)
Missing	1 (0.9)

In order to assess the relationship between the meditation categories and the continuous variables, One-way analysis of variance (ANOVA) was used. ANOVA was used to determine whether the level of meditation in the relevant categories (Duration of practice, Duration of session and Frequency of sessions) had an effect on the variables. As seen in Table 4, there was no significant variance between meditation categories in any of the continuous variables.

Table 4

ANOVA Between Meditation Categories and Variables

	Category	F (df)	Sig.	Effect size (η^2)
TAS-20	Duration of practice	.59 (2, 102)	.56	.01
	Duration of session	2.63 (2, 102)	.08	.05
	Frequency of meditation	1.15 (2, 102)	.32	.02
CES-D	Duration of practice	.01 (2, 102)	.99	.00
	Duration of session	.22 (2, 102)	.80	.004
	Frequency of meditation	.09 (2, 102)	.92	.001
FFMQ	Duration of practice	1.6 (2, 102)	.21	.03
	Duration of session	1.31 (2, 102)	.27	.03
	Frequency of meditation	2.47 (2, 102)	.09	.05

Post hoc Tukey's tests provided more detailed information about the difference between the means in each category. While these findings are not significant, the differences between means in each level will be discussed. Table 5 contains comparisons between the categories Duration of practice, Duration of session and Frequency of meditation at 3 levels in the TAS-20.

Table 5

Multiple Comparisons of TAS-20 with Meditation Categories

Category		Mean difference	Sig.
Duration of practice			
1	2	-.66796	.968
	3	4.98611	.597
2	1	.66796	.968
	3	5.65407	.526
3	1	-4.98611	.597
	2	-5.65407	.526
Duration of session			

Category		Mean difference	Sig.
1	2	4.71456	.228
	3	-5.67760	.459
2	1	-4.71456	.228
	3	-10.39216	.099
3	1	5.67760	.459
	2	10.39216	.099
Frequency of meditation			
1	2	-.20255	.998
	3	4.67887	.327
2	1	.20255	.998
	3	4.88142	.433
3	1	-4.67887	.327
	2	-4.88142	.433

Table 6 exhibits comparisons between the categories Duration of practice, Duration of session and Frequency of meditation at 3 levels in the CES-D. The findings were not significant but the differences between means will be discussed.

Table 6

Multiple Comparisons of CES-D with Meditation Categories

Category		Mean difference	Sig.
Duration of practice			
1	2	-.23600	.995
	3	-.63426	.991
2	1	.23600	.995
	3	-.39826	.996
3	1	.63426	.991
	2	.39826	.996

Category		Mean difference	Sig.
Duration of session			
1	2	1.76663	.794
	3	.03461	1.000
2	1	-1.76663	.794
	3	-1.73203	.930
3	1	-.03461	1.000
	2	1.73203	.930
Frequency of meditation			
1	2	.57177	.981
	3	1.26545	.910
2	1	-.57177	.981
	3	.69368	.981
3	1	-1.26545	.910
	2	-.69368	.981

Table 7 includes comparisons between the categories Duration of practice, Duration of session and Frequency of meditation at 3 levels in the FFMQ. Again, these findings were not significant but the mean differences will be discussed.

Table 7

Multiple Comparisons of FFMQ with Meditation Categories

Category		Mean difference	Sig.
Duration of practice			
1	2	-2.90913	.779
	3	-14.16204	.185
2	1	2.90913	.779
	3	-11.25291	.353
3	1	14.16204	.185

Category		Mean difference	Sig.
	2	11.25291	.353
Duration of session			
1	2	-7.32257	.247
	3	-1.26047	.985
2	1	7.32257	.247
	3	6.06209	.728
3	1	1.26047	.985
	2	-6.06209	.728
Frequency of meditation			
1	2	.12201	1.000
	3	-10.80092	.090
2	1	-.12201	1.000
	3	-10.92292	.182
3	1	10.80092	.090
	2	10.92292	.182

Due to these non-significant findings, meditation was removed from the mediation model for further analyses, and a simple mediation model including mindfulness and depression with alexithymia as a mediator was used instead of a sequential mediation model.

Mediation Analyses

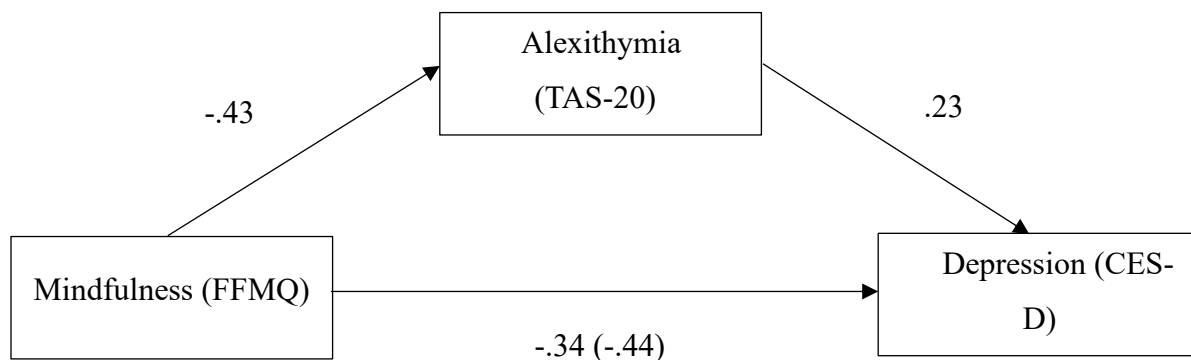
A simple mediation model includes a predictor and dependent variable, with a single mediating variable. A simple mediation model was tested with mindfulness as the predictor, depression as the dependent variable, and alexithymia as mediator, using bias corrected and accelerated confidence intervals and 10,000 samples. Bootstrapping, a nonparametric procedure, increases statistical power by resampling and simultaneously maintains control over Type I error rate (Preacher & Hayes, 2008). Bootstrapping does not require the sample to meet an assumption

of normality, which is an added benefit of this procedure (Preacher & Hayes, 2008). In the present study, bias-corrected and accelerated bootstrapping was used with 10,000 estimations.

Between mindfulness and alexithymia, as seen in Figure 1, is path a. From alexithymia to depression is path b. The direct effect, or c', demonstrates the effect of mindfulness on depression without accounting for alexithymia. The indirect effect, path ab, exhibits the effect of mindfulness on depression through alexithymia. The total effect refers to both the direct and indirect effects that may lead the predictor to have an impact on the outcome variable. In responding to the research aim, we want to know if the indirect effect is significant to determine whether alexithymia is mediating the effect of mindfulness on depression. In order to determine whether the indirect effect is significant, the recommendation is to use bootstrapping techniques (Hayes, 2009).

Figure 1

Simple Mediation Model



Path a, from mindfulness to alexithymia, was negative and statistically significant ($B(SE) = -.43(.05)$, $p = .000$). Path b, from alexithymia to depression, was positive, reflective of the relationship between the variables, and statistically significant ($B(SE) = .23(.08)$, $p = .006$).

Continuing through with the model, path c' , the direct effect ($B(SE) = -.34(.05)$, $p = .000$) decreased from the total effect (-.44) when controlling for the mediator. The indirect effect (-.10), path ab , was significant as the bootstrapped confidence intervals did not include zero (LLCI = -.19, ULCI = -.23).

Simple mediation analyses were repeated using each of the five mindfulness facets and indirect effects are reported in Table 8. For path a , b , total and direct effects, as well as significance levels for the five facets see Appendix A. Observing was the only facet which did not have a significant direct or indirect effect.

Table 8

Indirect Effects by Mindfulness Facet

	Indirect effect	LLCI	ULCI
Observing	-.16	-.4703	.0958
Describing	-.72	-.1867	-.0222
Acting	-.40	-.6756	-.1923
Nonjudging	-.30	-.5383	-.1240
Nonreactivity	-.38	-.7289	-.0940

Note: Confidence intervals include 0 for Observing facet, suggesting the indirect effect is not significant.

Discussion

It was hypothesised that alexithymia and depression would be positively correlated, alexithymia and mindfulness would be negatively correlated, and that depression and mindfulness would be negatively correlated. It was also hypothesised that meditation experience and practice would impact alexithymia, depression and mindfulness. Upon verification of these hypotheses, the research aim was to complete a sequential mediation model including meditation, mindfulness, alexithymia and depression. The overarching aim was to determine whether meditation was associated with mindfulness, with lower alexithymia, and with lower depression.

The first set of hypotheses, in regards to the relationships between alexithymia, depression and mindfulness, were well supported. The TAS-20, measuring alexithymia, was significantly and positively correlated with the CES-D measure of depression. This relationship has been well documented in the literature (Honkalampi et al., 2000; Kishon et al., 2019; Leweke, 2011; Müller et al., 2003). One of the interesting findings in this study was that the Externally Oriented Thinking (EOT) subscale of the TAS-20 also had a significant and positive correlation with the CES-D. The literature has regularly reported that the EOT subscale does not correlate with depression (Leweke, 2011). In a meta-analysis looking at the relationship between alexithymia, through the TAS-20, and depression, a weak but existing relationship was reported between EOT and depression (Li, Zhang, Guo, & Zhang, 2015). This is similar to what was found in this study, the relationship was weaker than the other two subscales but was significant. Furthermore, the Difficulty Identifying Feelings (DIF) subscale was more highly correlated with depression than the DDF subscale, in contrast to what has been previously suggested. It has been proposed that inconsistencies in the literature about whether DIF or DDF is more closely

correlated with depression may be due a range of variations in studies, such as demographics that were included in the study or even the different coping styles exhibited by people with high levels of DDF or DIF (Li et al., 2015). Overall, each subscale was significantly correlated with depression and the consistency of this scale suggests depression and alexithymia are related constructs.

Alexithymia and mindfulness, as measured by the FFMQ, had a significant negative relationship. Once again, the subscales of the FFMQ were generally consistent in suggesting a negative relationship with the TAS-20. Teixeira & Pereira (2015) found similar results and suggested that considering mindfulness skills have been reported with improved emotional regulation, a negative relationship between mindfulness and alexithymia is logical. This would be especially true for the DIF and DDF subscales, which is consistent with the findings in this study. The only facet of mindfulness that did not significantly correlate with alexithymia was the Observing facet. Baer et al. (2008) explain that the Observing facet refers to attention to both internal and external stimuli. The only subscale that Observing was significantly correlated with was the EOT subscale, which had a negative correlation with the Observing facet of the FFMQ. Considering the externally oriented cognitive style that is characteristic of alexithymia, it is conceivable that the Observing facet focuses more on attention to internal stimuli which might explain the negative relationship between these two subscales.

The final correlational hypothesis, that depression and mindfulness would be negatively correlated, was supported and was the strongest correlation observed. Mindfulness-based interventions have been found to be particularly useful in recurrent depression (Sorbero, 2015). It has been suggested that higher levels of mindfulness are associated with fewer residual depressive symptoms (Didonna et al., 2019). This has typically been seen in those who have had

more than three depressive episodes (Didonna et al., 2019; Sobrero, 2015). Each facet, except for Observing, had a strong negative correlation with depression. Similar results have previously been observed, where all facets but Observing have had significant relationships with depression (Desrosiers et al., 2013). Acting with awareness followed by Nonjudgment were the most highly correlated facets with depression. It has been suggested that Nonjudgment is negatively related to depression as it reduces rumination and increases acceptance and henceforth positive affect (Desrosiers et al., 2013). It is difficult to determine, however, why Acting with awareness had such a strong relationship with depression in the present study. Desrosiers et al. (2013) put forth the idea that when controlling for other facets, Acting with awareness becomes insignificant. They suggest that attention to the present is necessary for each facet as a key principle of mindfulness, but it is facets such as Nonjudgment and Nonreactivity that actually impact upon depression.

Other findings not explored in this study but worth noting include the correlation between age and the measures. The FFMQ was positively related to age, which has been supported in the literature. One study found people who are profiled as nonjudgmentally aware, as compared to those profiled with low or average mindfulness, are typically older (Zhu, 2020). Age correlated negatively with the TAS-20 and CES-D. On the contrary, it has previously been reported that alexithymia is correlated with increasing age (Mattila, Salminen, Nummi, & Joukamaa, 2006). It has been suggested that this correlation may be more indicative of an externally oriented cognitive style that older adults may adopt (Timoney & Holder, 2013). Considering our findings that age had a negative correlation with alexithymia, this would be an area worth exploring further. This study found no significant difference between genders for the TAS-20, FFMQ or CES-D. It has, however, been suggested that women have a higher rate of depression and that

among people with clinical depression, men have higher TAS-20 scores (Li et al., 2015). Again, future research could explore this further.

The hypothesis that predicted meditation would be associated with alexithymia, depression and mindfulness was not supported. The results were not significant in any of the variables. This is likely due to the lack of meditators within the sample. While the results were not significant, the differences between means revealed a pattern amongst the meditation categories. The first category was Duration of practice, in which participants were allocated into three levels: does not meditate, 0-5 years of practice or 6+ years. The second was Duration of session, which included: does not meditate, 1-20 minutes or 21+ minutes. Finally, the Frequency of meditation was divided into does not meditate, less than 1-2 times per week and regular meditation (more than 2 times per week). For both alexithymia and meditation, the duration of practice category became more important as participants were engaged in meditation for more than 6 years, with very minimal difference between the nonmeditators and those who had been meditating for 0-5 years. This was not true for depression, where the duration made minimal difference. For the Duration of session category, it appeared that an increase from one level to the next (e.g. no meditation to 1-20 minutes, 1-20 minutes to 21+ minutes) made a similar difference, rather than from no meditation to 21+ minutes. For alexithymia, the difference between 1-20 minutes and 21+ minutes was more important, whereas for depression the largest difference was between not meditating and 1-20 minutes of meditation. For Frequency, the largest difference was observed between no meditation and regular meditation, suggesting that those who meditated less than 1-2 times per week made nearly no difference. No implications can be made, however, despite these patterns as findings were not significant. These observations

are mentioned primarily to suggest that further research should aim to explore whether meditation practice does make a significant difference to mindfulness, alexithymia and depression. A greater number of meditators would be needed in the sample for such a study to occur, in order to achieve enough power.

In the literature, it has been suggested that meditation does indeed make a significant difference in these variables. As previously stated, meditation training modules have been found to reduce levels of alexithymia (Bornemann & Singer, 2017) as well as recurrent depression (Sorbero, 2015). Interestingly, it has been found that the Observing facet of mindfulness has been related to psychological adjustment in meditators but not in non-meditators (Baer et al., 2008). Others have suggested that meditators receive higher scores in the FFMQ than non-meditators, even when their dispositional or trait mindfulness is similar (Van Dam, Earleywine, & Danoff-Burg, 2009). This has been attributed to the phrasing of statements in the FFMQ, which may be more meaningful to meditators than non-meditators (Van Dam et al., 2009). Considering the much higher proportion of non-meditators in this study, this may have contributed to the findings. One possible suggestion could be to use an alternative measure of mindfulness in conjunction to the FFMQ in future studies. Baer et al. (2008) found that four of the five facets were related to meditation experience, and so it is worth replicating a similar study but with more meditators in the sample.

Due to the insignificant findings for the meditation categories, the research aim to explore a sequential mediation model involving meditation was not possible. A simple mediation model involving mindfulness and depression, with alexithymia as the mediator was explored instead.

The simple mediation model was performed in accordance to recommendations from Preacher and Hayes (2009) for a model with a single mediator, in this case alexithymia. The indirect effect of mindfulness on depression, when accounting for alexithymia was significant, as the bootstrapped confidence intervals did not include zero, suggesting the indirect effect was not zero and thus there was an effect. This insinuates that an increase in mindfulness does lead to a decrease in alexithymia, which has an impact on depression. The implications of this when considering previous literature that has suggested a decrease in depression leads to a decrease in alexithymia (Kishon et al., 2019), supports the idea that mindfulness may be an appropriate method to achieve this. In a study with an 8-week MBSR programme, significant reductions in TAS-20 as well as depression scores were observed (Norman et al., 2019). Mindfulness has similarly been found to reduce depression, particularly in recurring episodes (Sorbero, 2015). While there are only few intervention studies like Norman et al. (2019), it supports this notion that mindfulness can lead to a decrease in alexithymia and depression.

When repeating this model with each of the five facets of mindfulness, it is clear that most facets appear to be involved. The facets Describing, Acting with awareness, Nonjudging and Nonreactivity each had significant indirect effects. It is not surprising that Describing plays a role in decreasing alexithymia, as by definition they are essentially polar opposites. The Describing facet of mindfulness has been explained as “labelling internal experiences” (Baer et al., 2008), comparing this to the features of alexithymia, which include a difficulty in describing emotions, the distinctive relationship between these two constructs is pronounced. A more compelling argument, however, is that the Acting with awareness facet also had a significant indirect effect. This facet is characterised by an ability to attend to activities as they occur, as opposed to acting while thinking about something else (Baer et al., 2008). Intriguingly, it is

similar in some ways to the externally oriented thinking that is characteristic of alexithymia, yet still has an active role in reducing alexithymia. This facet of mindfulness does not compare so directly or opposingly to alexithymia, but does appear to have a role in reducing it and, consequently, impacting upon levels of depression. This supports the idea that facets of mindfulness can have an impact on alexithymia and depression, even when they are not necessarily comparable or opposite aspects. That is to say, while many components of mindfulness appear as almost opposite to characteristics of alexithymia, it is not simply these aspects that play a role in affecting alexithymia. It suggests that mindfulness itself has a role in reducing levels of alexithymia, and in turn, depression. The Nonjudging and Nonreactivity of inner experience facets also offered significant indirect effects in the mediation model, providing further support for this idea.

The Observing facet of mindfulness was the only one which did not have a significant indirect effect when put into the mediation model. As previously discussed, the Observing facet does appear to behave differently in non-meditating than meditating samples. Observing is described as paying attention to internal and external stimuli, including thoughts, feelings, sensations, sights, sounds and smells (Baer et al., 2008). It has been suggested that items that relate to the Observe subscale are more meaningful to those who practice meditation (Van Dam et al., 2009). Furthermore, Observing has been associated with good psychological adjustment in meditators and not in non-meditators (Baer et al., 2008; Proeve, 2020). In fact, in non-meditators the characteristics of the Observing facet may be maladaptive, as they can manifest as self-focused attention (Baer et al., 2008). Maladaptive forms of self-focus, like rumination, have been associated with depression; however, adaptive forms can play a role in the reduction of depression (Nakajima, Takano, & Tanno, 2017). Considering the present sample is made up of

mostly non-meditators, it is conceivable that those who scored high in Observing but did not practice meditation could have simultaneously scored more highly in depression. This could explain why Observing did not lead to a significant reduction in alexithymia and depression. This is further support that the present study repeated with a higher sample of meditators, may offer conflicting results and shed light on this issue.

The overall question of this study has been explored in that the mediation model yielded a significant indirect effect. Mindfulness does have a role to play in decreasing alexithymia and can have an impact on depression as well. It appears that most aspects of mindfulness have a role to play in this model, with the exception of the Observing facet. This is likely due, however, to the higher proportion of non-meditators in the sample and the Observing facet may have a similar impact when people have had experience with and actively practice mindfulness.

Limitations and Strengths

While this study has seen some promising results, there are a few limitations to be addressed. The main limitation is the sample size. We aimed to find a sample that was wider than merely university students, and hence recruited via social media as well. It was anticipated that this would lead to a greater number of participants, as well as a higher proportion of meditators. Due to the unexpectedly small sample size, however, the meditation related analyses were underpowered. If this study were repeated, it would be important to gather a larger sample size. One important thing to note, however, is that it should not be advertised in a way that is directed at meditators, as this may also skew results. Considering the fact that meditators and non-meditators may respond differently to the FFMQ, such as the Observing scale, it is important that both are represented in the sample. It would also be beneficial to compare samples of meditators

and non-meditators separately, to see whether there is significant difference in the way they respond to the FFMQ and whether this impacts upon the mediation model observed in this study.

Furthermore, mean levels of alexithymia ($M = 54.26$) and depression ($M = 22.42$) were quite high in this sample, considering the cutoff points of 51 and 16 respectively. This may have increased the negative relationships with mindfulness, especially considering the low number of meditators in the sample. Ironically, if there had been more meditators these means may have been lower in support of the very idea this study has presented, that mindfulness will reduce levels of alexithymia and depression. In future, it may be worth comparing samples with clinical and nonclinical levels of alexithymia and depression.

Due to these limitations, it was not possible to achieve the research aims initially suggested. Meditation was removed from the sequential meditation model and it was revised to a simple mediation instead. While the simple mediation model still offered insight into the role of mindfulness in alexithymia and depression, we are not able to comment on how meditation may impact upon this relationship. Therefore, this study may not offer the whole picture about how mindfulness can have an impact on these constructs.

It was a strength of this study, however, that participants were recruited outside of simply a student population in order to generalise to the general population more accurately. Another strength of this study is that it offers relatively novel insight into the role of mindfulness in alexithymia and depression. We have not seen past literature that looks at this precise relationship. Norman et al.'s (2019) systematic review suggested that mindfulness-based interventions may be successful in reducing alexithymia, and this study has contributed to knowledge in this area in support of Norman et al.'s (2019) claim. Further research addressing the limitations outlined above can continue to develop the understanding of what role

mindfulness has to play in alexithymia and depression, and whether it would be suitable as a treatment option or in addition to other treatments.

Implications

It seems that this study has supported the role of mindfulness in affecting alexithymia and depression. Considering the adverse outcomes for people with alexithymia and depression, these findings have important and relevant implications. The adverse outcomes alexithymia has on social and emotional abilities has been previously discussed, such as difficulty with appropriate facial expressions, impulsivity, immature defence mechanisms, small or superficial friendships networks, lack of self-assertiveness and lack of empathy. These challenges clearly impede on psychological well-being, and a reduction in them could have profound implications for people with alexithymia. More than this, those who concurrently experience depression have the compounding effect of both alexithymia and depression. It is understood that alexithymia occurs in conjunction to depression in up to 46% of cases (Leweke, 2011). Others have also suggested that alexithymia may be a predisposing factor in people experiencing residual depressive symptoms (Ogrodniczuk et al., 2011). Mindfulness-based strategies have been most successful in treating recurrent depression specifically, and so may be of benefit in such cases of alexithymia where depressive symptoms have persisted as well. Importantly, mindfulness-based interventions do not have the same complications that psychotherapies present with in treating alexithymia. These findings, alongside the recent literature in this area, make a case for using mindfulness-based interventions in the reduction of alexithymia, and consequently, in reducing depressive symptoms in those who present with both. Some have previously inferred that CBT may be appropriate for individuals with alexithymia (Kishon et al., 2019). MBCT, incorporating aspects

of both cognitive therapy and MBSR and used in treating recurrent depression, may therefore be an example of mindfulness-based interventions that could be successful in this area.

Future Research

Further research, as previously recommended, could focus on repeating a similar research design but with a higher sample in order to increase power. It would also be important for a larger percentage of meditators to be included in the study, in order to successfully determine whether meditation also plays a role in the relationships that have been explored. The sequential mediation model could then also be explored, if meditation does have an effect on mindfulness, alexithymia and depression. Covariates, such as age and gender, could be important to account for in the mediation model. This is particularly true for age, as gender did not appear to make a meaningful difference in the measures, however, age did have significant correlations with the TAS-20, CES-D and FFMQ. Some literature has suggested there may be gender difference in alexithymia and depression however, so this could be explored in future. It may also be beneficial to utilise another scale to measure mindfulness in conjunction with the FFMQ, due to the impact meditation experience appears to have on the Observing subscale.

In addition to this, future research should examine direct tests of mindfulness-based interventions on alexithymia and depression. An example of this could be use of an MBCT or MBSR programme in clinical and non-clinical settings. This would allow more practical application of mindfulness-based interventions to be assessed and further implications about its effectiveness to be made.

Conclusions

The hypotheses put forth in this study have partially been supported, particularly the direction of relationships between alexithymia, depression and mindfulness. The relationship between meditation and these constructs has not been determined, likely due to the lack of meditators in the study. This is a point that could be refined in further research in order to determine what role meditation has to play. The sequential meditation model was henceforth adapted to be a simple mediation model, which supported an indirect effect of mindfulness on depression mediated by alexithymia. This suggests that increased mindfulness can lead to a reduction in alexithymia, and therefore affect depression. This has implications for the use of mindfulness-based interventions in potentially treating alexithymia and depression. The impact of a treatment that is effective in reducing alexithymia is relevant due to the nature of alexithymia, which may prevent the success of typical therapies. Further research should focus on replicating this study, with a larger sample, and on directly testing the effectiveness of mindfulness-based interventions on alexithymia and depression. For people with alexithymia and depression, the social and emotional impact of such findings could be profound for both psychological well-being and success in life.

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Appendix A

Table A1

Participant's Gender

	Frequency	Percent
Male	31	27.7
Female	79	70.5
Other	2	1.8
Total	112	100.0

Figure A1

Scatterplot of Linearity Between Alexithymia and Depression

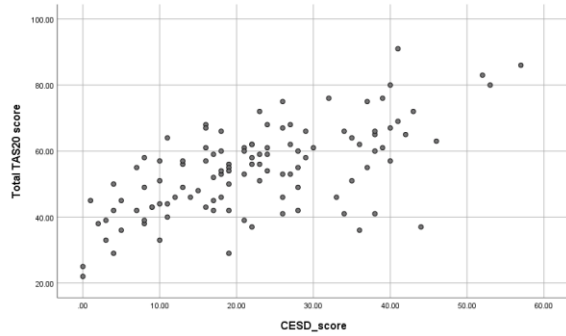


Figure A2

Scatterplot of Linearity Between Alexithymia and Mindfulness

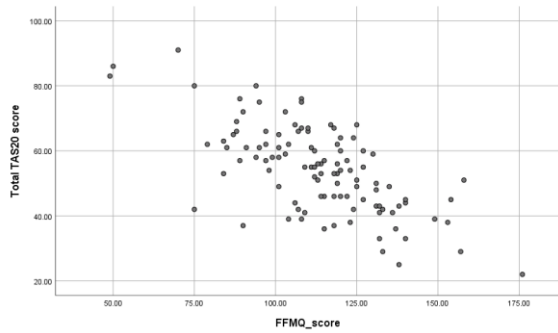


Figure A3

Scatterplot of Linearity Between Depression and Mindfulness

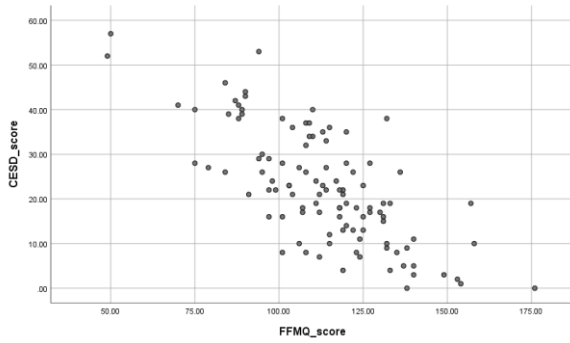


Table A2

Simple Mediation by Mindfulness Facets

Facet	B(SE)	<i>t</i>	<i>p</i>
Observing			
Path a	-.26 (.21)	-1.22	.23
Path b	.60 (.07)	8.20	.00
Direct effect	.07 (.16)	.43	.67
Indirect effect	-.16	-	-
Total effect	-.09	-	-
Describing			
Path a	-1.4 (.12)	-11.74	.00
Path b	.51 (.11)	4.68	.00
Direct effect	-.20 (.21)	-.97	.33
Indirect effect	-.72	-	-
Total effect	-.92	-	-
Acting			
Path a	-1.18 (.18)	-6.62	.00
Path b	.34 (.07)	4.67	.00
Direct effect	-1.01 (.16)	-6.31	.00
Indirect effect	-.40	-	-
Total effect	-1.41	-	-

Facet	B(SE)	<i>t</i>	<i>p</i>
Nonjudging			
Path a	-.70 (.15)	-4.62	.00
Path b	.43 (.07)	6.22	.00
Direct effect	-.67 (.12)	-5.71	.00
Indirect effect	-.30	-	-
Total effect	-.97	-	-
Nonreactivity			
Path a	-.75 (.23)	-3.22	.002
Path b	.51 (.07)	7.20	.00
Direct effect	-.71 (.18)	-3.99	.0001
Indirect effect	-.38	-	-
Total effect	-1.09	-	-

Appendix B

Participant Information Sheet



Welcome! Please read the below information before giving your consent to participate in this study.

PROJECT TITLE: The role of mindfulness in the relationship between alexithymia, depression and meditation

HUMAN RESEARCH ETHICS SUB-COMMITTEE OF THE SCHOOL OF PSYCHOLOGY:
20/52

PRINCIPAL INVESTIGATOR: Dr Michael Proeve

STUDENT RESEARCHER: Jasmine Turner

STUDENT'S DEGREE: Honours degree

This project is about alexithymia (the inability to identify and describe emotions) and depression, and how mindfulness might impact upon these two problems. Some research has suggested that mindfulness-based strategies may be a successful form of treatment for alexithymia. We aim to find out what role mindfulness has to play in the presence of these psychological problems and whether it might be successful in decreasing their severity.

If you agree to participate, you will complete a survey that asks questions pertaining to alexithymia, depression, mindfulness and meditation practice. It is expected the survey will take 20 minutes to complete. Due to the language demands of the survey, we invite you to participate if you are fluent in English.

There is a small risk that you may experience discomfort when answering some of the survey questions. You are able to withdraw from the study at any time, without penalty or further required contact. If you experience discomfort as a result of participating, you may wish to seek support from Lifeline on 13 11 14 or from the University of Adelaide counselling service on 08 8313 5663 or via counselling.centre@adelaide.edu.au.

The study has been approved by the Human Research Ethics Sub-Committee of the School of Psychology at the University of Adelaide (approval number 20/52). If you have any complaints or concerns please contact the student researcher, Jasmine Burfield, or the primary investigator, Dr Michael Proeve. If you wish to speak with an independent person regarding concerns or a complaint, the University's policy on research involving human participants, or your rights as a participant, please contact the Head of the Human Research Ethics Sub-Committee of the School of Psychology, Professor Paul Delfabbro, on:

Phone: (08) 8313 4936

Email: paul.delfabbro@adelaide.sa.edu.au

Any complaint or concern will be treated in confidence and fully investigated. You will be informed of the outcome.

All information collected will be anonymous. The data will be stored by the University of Adelaide for 5 years. The data will be published in the student researcher's Honours thesis and may be published in a journal article. Your information will only be used as described in this participant information sheet and it will only be disclosed according to the consent provided, except as required by law.

To take part in this research, please continue to the next page to give your consent.

End of Information Sheet

Survey on Qualtrics



Please read the following statements:

1. I have read the information on the previous page and agree to take part in the following research.
2. I understand that I am free to withdraw from the project at any point before submitting my survey

Do you agree with the statements above?

Yes

No

I hereby provide 'extended' consent for the use of my data in future research projects that are:

- an extension of, or closely related to, the original project
- in the same general area of research

Yes

No

If you would like to be sent the summary results of this study, please provide an email address below (your email will not be associated with the results of your survey).

Thank you for your participation!

If you are a first year University of Adelaide School of Psychology student, please enter your 5-digit Research Participation System ID

Please also enter your University of Adelaide student ID number

What is your age in years?

What is your gender?

Male

Female

Other

Prefer not to say

What language is spoken at home?

What is your country of birth?

What is your country of residence?

What is the *highest* level of education you have completed?

- Primary school
- High school
- Graduated from high school
- TAFE or technical diploma
- Undergraduate degree
- Postgraduate degree
- Other

What is your current education status?

University of Adelaide Psychology student in first year

University of Adelaide student (please specify your course)

None of the above

Please indicate how much you agree or disagree with the following statements.

	Strongly disagree	Moderately disagree	Neither agree nor disagree	Moderately agree	Strongly agree
I am often confused about what emotions I am feeling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is difficult for me to find the right words for my feelings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have physical sensations that even doctors don't understand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am able to describe my feelings easily	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer to analyse problems rather than just describe them	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I am upset, I don't know if I am sad, frightened, or angry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am often puzzled by sensations in my body	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I prefer to just let things happen rather than to understand why they turned out that way	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have feelings that I can't quite identify	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being in touch with emotions is essential	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find it hard to describe how I feel about people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People tell me to describe my feelings more	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I don't know what's going on inside me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I often don't know why I am angry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer talking to people about their daily activities rather than their feelings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer to watch "light" entertainment shows rather than psychological dramas	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is difficult for me to reveal my innermost feelings, even to my close friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can feel close to someone, even in moments of silence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I find examination of my feelings useful in solving personal problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Looking for hidden meanings in movies or plays distracts me from their enjoyment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Below is a list of ways you may have felt or behaved. Please indicate how often you have felt this way in the past week.

	Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
I was bothered by things that usually don't bother me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I did not feel like eating; my appetite was poor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt that I could not shake off the blues even with help from my family or friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt I was just as good as other people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had trouble keeping my mind on what I was doing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt depressed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt that everything I did was an effort	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I felt hopeful about the future	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I thought my life had been a failure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt fearful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My sleep was restless	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was happy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I talked less than usual	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt lonely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People were unfriendly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoyed life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had crying spells	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I felt that people dislike me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I could not get "going"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please rate each of the following statements.

	Never or very rarely true	Rarely true	Sometimes true	Often true	Very often or always true
When I'm walking, I deliberately notice the sensations of my body moving.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm good at finding words to describe my feelings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I criticise myself for having irrational or inappropriate emotions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I perceive my feelings and emotions without having to react to them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I do things, my mind wanders off and I'm easily distracted.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I take a shower or bath, I stay alert to the sensations of water on my body.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I can easily put my beliefs, opinions, and expectations into words.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I watch my feelings without getting lost in them.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I tell myself I shouldn't be feeling the way I'm feeling.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It's hard for me to find the words to describe what I'm thinking.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am easily distracted.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe some of my thoughts are abnormal or bad and I shouldn't think that way.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I pay attention to sensations, such as the wind in my hair or sun on my face.

I have trouble thinking of the right words to express how I feel about things.

I make judgments about whether my thoughts are good or bad.

I find it difficult to stay focused on what's happening in the present.

When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it.

I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.

In difficult situations, I can pause without immediately reacting.

When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words.

It seems I am "running on automatic" without much awareness of what I'm doing.

When I have distressing thoughts or images, I feel calm soon after.

I tell myself that I shouldn't be thinking the way I'm thinking.

I notice the smells and aromas of things.

Even when I'm feeling terribly upset, I can find a way to put it into words.

I rush through activities without being really attentive to them.

When I have distressing thoughts or images I am able just to notice them without reacting.

I think some of my emotions are bad or inappropriate and I shouldn't feel them.

I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.

My natural tendency is to put my experiences into words.

When I have distressing thoughts or images, I just notice them and let them go.

I do jobs or tasks automatically without being aware of what I'm doing.

When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about.

I pay attention to how my emotions affect my thoughts and behavior.

I can usually describe how I feel at the moment in considerable detail.

I find myself doing things without paying attention.

I disapprove of myself when I have irrational ideas.

Have you had any experience with formal meditation practice?

Yes

No

How long have you practiced meditation?

Never

Less than 1 year

1-5 years

6-10 years

More than 10 years

How long, on average, do you practise meditation?

Never

If less than 1 time per month, how many times per year?

If less than 1 time per week, how many times per month?

If at least 1 time per week, how many times per week?

When you practise meditation, how long is a typical meditation session?

I don't practise meditation

If you do practise meditation, how many minutes do you spend in a meditation session on average?

If you do practise meditation, what type of meditation do you typically practise?

Mindfulness meditation (Involves acknowledgement and nonjudgmental observation of thoughts, feelings and sensations in order to gain awareness and insight)

Concentrative meditation (Involves predominantly single-pointed concentration on thought, objects, sounds or entities, including use of mantras; e.g. Transcendental meditation)

Centering prayer (Method of meditation used by Christians with strong emphasis on interior silence)

Other Christian meditation (including Lectio Divina, the Jesus Prayer, Spiritual Exercises of St Ignatius of Loyola, and concentrative 'Christian Meditation' in the John Main tradition). Please specify:

Other meditation approach. Please specify:

End of Survey