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Does Mindfulness Differ From Attentiveness? A Multitrait-Multimethod Assessment

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DOES MINDFULNESS DIFFER FROM ATTENTIVENESS? A MULTITRAIT-MULTIMETHOD ASSESSMENT

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Abstract

The present study compared differences between the constructs of mindfulness and cognitive attention using multiple measures of both constructs. These measures included several self-report and behavioral measures of both constructs. Several models were constructed to test the relationship between mindfulness and cognitive attention. Participants from an online Qualtrics subject pool sample were included ($N= 200$). Participants completed all measures of mindfulness and cognitive attention online and reported demographic information as well as previous exposure to mindfulness. Results indicated that mindfulness and cognitive attention are in fact separate constructs, however it is important that researchers conceptualize how these constructs are related by the ways in which the constructs are measured. Additionally, the present research found that length of mindfulness exposure has an influence on the level of attention seen on some behavioral measures. Future research should continue to explore these two constructs and the implications of mindfulness on increasing attentional capability.

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Chapter 1

Introduction

Mindfulness

The concept of *mindfulness* emerged in psychotherapy through various mindfulness-based treatment modalities such as mindful cognitive therapy (Badker & Misiri 2017; Segal et al., 2002; Strauss et al., 2014; Teasdale et al., 2000), dialectical behavior therapy (Linehan, 1993a, 1993b), as well as acceptance and commitment therapy (Hayes, Strosahl, & Wilson, 1999). Research on mindfulness has provided a number of differing definitions; however, there is not a standardized operational definition of mindfulness within Western culture (Van Dam et al., 2018).

Some proposed definitions of mindfulness in Western culture divide mindfulness into two different components. The first requires a person to maintain self-regulation of attention, and the second requires a person to adopt a state of mind that is open, curious and accepting (Bishop et al., 2004). However, other definitions emphasize that one must adopt more of an awareness of the current environment (Van Dam et al., 2018). In Eastern literature, Buddhist monks adhere to a definition highlighting differing components needed to achieve mindfulness, such as keeping one's consciousness attuned to the present reality and not letting one's thoughts pass unnoticed (Nilsson & Kazemi, 2016).

Scholars have speculated whether participants and clients provided with different definitions of mindfulness are conceptualizing mindfulness in the same way (Van Dam et al., 2018). Specifically, there are inconsistencies in the literature regarding whether mindfulness is a single or multifaceted construct. For example, dialectical behavior therapy proposes six key elements to mindfulness: three encompassing what someone does while being mindful (observe, describe, participate) and three relating to how to be mindful (nonjudgmentally, one-mindfully, and effectively; Linehan, 2015). Others have argued that mindfulness is a set of attentional skills comprised of an attitude of curiosity, openness, and acceptance (Bishop et al., 2004). However, some researchers have described mindfulness as attention and awareness intertwined together in

the present moment (Baer et al., 2006), whereas others have proposed that mindfulness is cultivated through the three components of intention, attention, and attitude (Shapiro et al., 2006). Given that a variety of mindfulness scales are commonly used to assess mindfulness interventions, researchers may be measuring divergent conceptualizations of this construct. Thus, it is important for researchers to examine the type of mindfulness certain techniques are supposed to enhance, the definitions of mindfulness central to the various measures used, and the essential conceptual constructs proposed to embody mindfulness.

Many researchers have attributed attention to be a key element of mindfulness and have described mindfulness as a distinct process of attending to the present moment (Kabat-Zinn, 1990). Some researchers have proposed that continuous mindfulness meditative practice can improve attentional capabilities and that attention is the primary characteristic improved by this type of practice (Zeidan et al., 2010; Jensen, Vangkilde, Frokjaer, & Hasselbalch, 2012). Mindfulness is proposed as a particular way of paying attention to the present moment distinct from the construct of attention, as noted in cognitive psychology literature. Some researchers have noted that the key feature about attention in mindfulness is the ability to self-regulate attention according to context, while suppressing other attentional stimuli in the environment (Sørensen et al., 2018). Three distinct factors of cognitive attention proposed are also considered key elements of mindfulness processes: sustained attention, attention switching, and inhibition of other stimuli (Bishop et al., 2004). Sustained attention refers to the ability to maintain attention over time, and this process and has been hypothesized in being important for keeping awareness to the current experience needed in mindfulness practices. Switching refers to the ability to hold attention on one object and then switch to another, and this practice has been theorized to be important in mindfulness when thoughts may pull an individual's focus from the present activity. Inhibition of secondary elaborative processing refers to the ability to simultaneously recognize differing incoming stimuli, such as thoughts, feelings or sensations, and keep these stimuli from entering consciousness (Bishop et al., 2004). Although the attentional component of mindfulness

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has been proposed as a distinct concept outside of attentional capabilities in cognitive literature, there are few empirical investigations of these processes.

Cognitive Attention

Cognitive attention is a prominent construct in cognitive psychology research and is conceptualized by a number of models (Markowska, 2013). Two models of attention involve the role of selection and the role of managing cognitive resources (Markowska, 2013). This model highlights attention and the role of attention in not only selecting which stimuli to pay attention to but implicates attention in coordinating cognitive processes. Others have referred to three distinct networks of attention, which include (a) orienting, the ability to determine important sensory information and categorize when and where the information is coming from; (b) alerting, the ability to maintain alertness over time to a stimuli; and (c) executive attention, the ability to determine which thought, feeling, or response to prioritize (Becerra et al., 2017). Cognitive psychology researchers have suggested that attention can manifest as attending to one object for a long period of time, the ability to shift focus, and the capability to inhibit additional thoughts feelings or sensations to complete a task at hand (Shapiro et al., 2006).

Although the constructs of mindfulness and attention have not been studied closely on a relational level, some researchers have investigated the effects of mindfulness techniques on attentional capabilities and have found that increased meditative mindfulness practice is beneficial for enhancing some orienting and executive control skills (Becerra, Dandrade, & Harms, 2017). In one study, researchers demonstrated that a mindfulness-based stress reduction intervention lead to improvements in the attentional facet of orienting (Jha, Krompinger, & Baime, 2007). Additionally, mindfulness practice has shown promise in improving attentional deficits among individuals with attention-deficit hyperactivity disorder compared to treatment as usual, which comprised of psychoeducation and pharmacotherapy (Janssen et al., 2019).

Effects of Mindfulness on Attention

Some studies examining the relationship between performance on attentional cognitive tasks and mindfulness practice have yielded variable results. Research comparing mindfulness-

based stress reduction to a relaxation-based intervention has shown that the mindfulness program was superior in increasing attentional skill (Jensen et al., 2012). Others examining these attentional cognitive tasks and mindfulness practices have found that mindfulness may be related to improvements in some components of attention (Becerra, Dandrade, & Harms, 2017; Bögels, Hoogstad, van Dun, de Schutter, & Restifo, 2008) but not others (Jensen et al., 2011). These variable results suggest the attentional benefits of mindfulness are not fully understood.

Purpose of Study

Although some studies have found mindfulness to increase attentional capabilities, few studies have examined the overall relationship between these constructs. One study that examined this relationship utilizing a confirmatory factor analysis did not find a clear relationship between these constructs. Specifically, these findings suggested there was no reliable relationship between the constructs of focused attention and mindfulness, and that the best fitting model involved one in which these two constructs were separate on all measures (Quickel, Johnson, & David, 2014). However, this study did not account for self-report attentional traits or ask the participants to complete any behavioral mindfulness assessments. Therefore, further research on these constructs is warranted.

Common mindfulness self-report measures include the Mindful Attention Awareness scale, the Freiburg Mindfulness Inventory, and the Toronto Mindfulness Scale among others (Brown & Ryan, 2003; Walach Buchheld, Buttenmuller, Kleinknecht, & Schmidt 2006; Lau, Bishop, Segal et al., 2006). These measures are proposed to measure traits of mindfulness that a person exhibits. Some mindfulness behavioral assessments include the meditation breath attention assessment (Frewen et al. 2008, 2011) and other focused meditation techniques that measure mindfulness by having a participant respond to how many times their mind wanders during the activity. This type of behavioral assessment has been shown to correlate strongly with self-report measures of mindfulness. Both self-report and behavioral assessments are proposed to measure the construct of mindfulness.

The present study examined the relationship between cognitive conceptualizations of attention as well as mindfulness conceptualizations by creating a multitrait-multimethod matrix design. This involved comparing both self-report and behavioral assessments of mindfulness, as well as self-report and behavioral measures of attention to test for construct validity. Specifically, convergent and discriminant validity were examined to determine whether attention and mindfulness are two distinct constructs. For example, a measure proposed to represent the construct of mindfulness should not in fact relate to measures of cognitive attention, as these should be unrelated constructs. Specifically, this study utilized the multitrait-multimethod matrix in a confirmatory factor analysis in order to provide a depiction of whether or not mindful attention fits into the model of cognitive attention or if mindful attention is a discriminant construct.

Chapter 2

Method

Participants

Participants ($N = 200$) were recruited through a national online subject pool, Qualtrics, where the study was featured. Participants had to be 18 years or older and be able to use a computer to participate in the study. The average completion time was 45 min. In addition, multiple effort checks were completed by participants throughout the study, including questions placed in measures that asked if they were paying attention, and also a captcha test. Participants were excluded from the study if they could not complete the effort checks correctly. Participants were asked to report their age, marital status, race, ethnicity, sex and to indicate their previous experience with mindfulness and meditation.

Procedure

Participants were invited through the Qualtrics online national subject pool to complete a web-based questionnaire and several behavioral assessments online. Participants read a brief description of the study, which stated that they would be asked questions about mindfulness and attention. Participants were then able to choose whether to participate in this study or others they

qualified for on the subject pool website. Once in the survey, participants were prompted to provide their informed consent via an online consent form. Within the survey, participants were presented with a number of self-report and behavioral measures in a variety of orders to control for order effect. These measures included two cognitive attentional tasks, two mindfulness meditation behavioral assessments, four self-report questionnaires, and a demographic portion.

The Qualtrics survey company worked with the primary investigator to ensure 200 respondents were obtained that could complete multiple comprehension checks throughout the survey appropriately. These comprehension checks included a captcha check, timing check, attention questions, and comprehension checks. A captcha check was completed to ensure the participants were not computer bots and in fact real participants. The timing check included data on how long the participant completed the survey and was checked in order to ensure they spent an appropriate amount of time in the survey to complete all the measures needed (at least 30 minutes was required). Attention checks also included within the survey asked within the self-report measures a question such as "Are you taking this survey seriously?" and having the participant answer (yes or no). Additionally, comprehension checks were asked about both meditations participants were instructed to listen to that asked participants a question about the content of the meditation in the middle of the audio recording one would only know if they listened to the meditation. If participants did not correctly answer all of the comprehension questions correctly or meet the criteria for the captcha or timing check they were excluded from the study ($N = 26$) and were replaced by respondents who correctly passed the comprehension checks. Therefore, all participants in the present study completed all checks and comprehension checks appropriately.

Measures

    Mindful Attention Awareness Scale (MAAS). The mindful attention awareness scale (Brown & Ryan, 2003) is a 15-item scale designed to measure a state of mind encompassing attention and awareness to the present moment. Each item is scored on a 6-point scale with labels of *almost always (1), very frequently (2), somewhat frequently (3), somewhat infrequently (4),*

very infrequently (5), and *almost never (6).* Higher scores indicate a greater level of mindfulness. Participants indicated their level of mindfulness by responding to items such as, *"I find it difficult to stay focused on the present moment."* This measure has demonstrated high internal consistency, α = .80 (Brown & Ryan, 2003). In this study this measure also demonstrated high internal consistency, α = .97.

Freigburg Mindfulness Inventory Brief Version (FMI-BV). The FMI-BV (Walach, Buchheld, Buttenmuller, Kleinknecht, & Schmidt 2006) is a 14-item measure designed to assess the level of mindfulness an individual has in the present moment. Each item is scored on a 4-point scale with labels of *rarely (1), occasionally (2), fairly often (3), almost always (4;* Walach et al., 2006). Participants indicated their level of mindfulness by responding to items such as, *"I am open to the experience of the present moment."* Higher scores indicate a greater level of mindfulness. This measure has demonstrated high internal consistency, α = .86 (Walach et al., 2006). This measure also demonstrated high internal consistency, α = .90 in the present study.

Attentional Control Scale (ACS; Derryberry & Reed, 2002**).** The ACS (Derryberry & Reed, 2002) is a 20-item self-report measure comprised of questions related to shifting and focusing attention (Derryberry & Reed, 2002). Each item is scored on a 6-point scale with labels of *almost always (1), very frequently (2), somewhat frequently (3), somewhat infrequently (4), very infrequently (5),* and *almost never (6).* Participants indicated their attentional capabilities by responding to items such as, "When trying to focus my attention on something, I have difficulty blocking out distracting thoughts." This measure has demonstrated high internal consistency, α = .84 (Quigley, Wright, Dobson, & Sears, 2017). This measure also demonstrated high internal consistency, α = .94 in the present study. Due to discrepancies in inter-item correlation on item 9, researchers have excluded this item, therefore this item was excluded in the current study (Quigley et al., 2017).

The Attentional Function Index (Cimprich, Visovatti, & Ronis, 2011). The Attentional Function Index is 13 item cognitive self-report assessment that measures perceived effectiveness of daily activities in three subscales: effective attention, attentional lapses, and interpersonal

effectiveness. Participants were asked to indicate in the moment how well they felt they were functioning on different activities. Participants indicated their level of functioning by responding to items such as, "Keeping your mind on what you are doing." This measure has demonstrated high internal consistency, $\alpha = .92$ (Cimprich, Visovatti, & Ronis, 2011). This measure also demonstrated high internal consistency, $\alpha = .90$ in the present study.

Demographics. Participants were asked to report their age, marital status, race, ethnicity, sex, and indicate how much previous experience they had with meditation or mindfulness. Participants had a mean age of 49 years old ($SD = 14.1$), 65% were male and 35% were female. In terms of ethnicity, 88.5% of participants were Caucasian, 5.5% were Asian, 3.0% were African American, 1.5% were Hispanic and 1.5% identified as an ethnicity not listed. Participants were also asked how long they had exposure to meditation and mindfulness 24% percent less than a month of experience with mindfulness, while 22.5% reported never having experience, and 21.5% had five more years of experience with mindfulness. When asked about meditation experience 32% of participants reported having no experience with meditation while 22% reported having less than a month of exposure to meditation.

Behavior Assessments

Stroop Color-Word Task (Stroop, 1935). This behavioral task is a test of selective attention and cognitive control. In this task, individuals were asked to complete a series of activities involving reading words and identifying colors. In the first series, words were printed in colored font (red, blue, orange, or green) with congruent (e.g., the word *red* is written in red ink) colored words. In the second series, there were incongruent words, indicating that the word does not match the color in which it is printed (e.g., the word "red" may be written in blue text). For both tasks, participants were instructed to respond on the keyboard to the color of the word presented.

Digit Span Task (Subtests of the Wechsler Adult Intelligence Scale–Revised WAIS-R; Wechsler, 1981). This behavioral task is a test used to measure attention, concentration, sequencing, number facility, and short-term memory (Hale, Hoeppner, & Fiorello, 2002). This

task works by presenting a series of numbers and then asking the participants to recall the span by typing the numbers of the span they remember on the next screen. Participants were presented with another span of numbers and asked to recall by typing the numbers of the span they remembered on the next screen backwards. The span of numbers started with a series of three numbers and went up to a span of nine numbers.

Meditation Breath Attention Assessment (Frewen et al. 2008, 2011)**.** These assessments are referred to as a Meditation Breath Attention Tasks and have been validated as a performance-based assessments of individual differences in concentration during a mindfulness breathing exercise (Frewen et al. 2008, 2011). This task has displayed consistency over time (Frewen, Unholzere, Logie-Hagan, & MacKinley, 2014) and the rate of mind wandering in participants has shown a reliable relationship with self-report measures of mindful attention (Scheiner, Spengler, Kanske, Roepke, & Bermpohl, 2016). During these tasks participants were asked to attend to their breathing during two audio recordings instructing them and they were asked to indicate how many times their mind wandered within the time frame of the audio recordings. This measure provides a more behavioral indication of mindfulness and has been previously used in clinical and non-clinical populations as a behavioral assessment of mindfulness (Frewen et al., 2014; Scheiner et al., 2016). In this study, a 10-min guided breath meditation was separated into two five-min interventions one computer-prompted and one self-prompted. These measures have not been used outside of a laboratory setting with participants completing these fully online by themselves, however due to the nature of this experiment and the ongoing COVID-19 pandemic multiple comprehension checks were completed to ensure participants took the meditation seriously and listened to the full audio of both interventions.

Computer-Prompted. In this recording participants were asked to listen to the first half of a 10-min audio recording of a mindfulness meditative practice focused on breathing. This recording contained the sound of a meditative bell that rung every 3 min for one second until 5 min had passed. This sound prompted the participants to reflect on how often their mind wandered in the present study. Participants were provided with a place in the survey to slide on a

scale the amount of times they found their mind wander during the exercise. Participants were provided with extensive instructions about what wandering means in a meditative practice.

    Self-Prompted. In this task participants completed the second half of a 10-min mindfulness meditation. This recording contained no meditative bell interruptions. Participants had to prompt themselves to reflect on how often their mind wandered throughout the mediation. Participants were provided with a place in the survey to slide on a scale the amount of times they found their mind wander during the exercise. This task provided a way to see if there were any differences in attention during a mindfulness task that is self-guided.

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Chapter Three

Results

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    Results from this study were analyzed using a multitrait-multimethod structure in a confirmatory factor analysis. Specifically, proposed models were compared to see if convergent and discriminant validity were present for the constructs of mindfulness and attention. In this confirmatory factor analysis, differing models were constructed and then compared to see which model provided a better fit to the data and provided context to how the constructs of mindfulness and attention are understood.

    The first model constructed, which assessed for if mindfulness and attention can be conceptualized into one construct, (Figure 1), was found to have an adequate fit, CFI = .78. The second model constructed, (Figure 2), which assessed for if mindfulness and attention are conceptualized as two separate constructs, was also found to have adequate fit, CFI = .79. The third model constructed, (Figure 3), which assessed for method variance, was also found to have adequate fit, CFI = .79. The fourth model constructed, (Figure 4), which assessed for mindfulness and attention as two separate constructs, as well as both method variance constructs, was also found to have an adequate fit, CFI = .79. This indicates that each model had an adequate fit to the data collected, indicating further analyses could be conducted to see if differences between the models changed significantly depending on which constructs were present.

In order to assess if a model fit significantly better depending on the constructs in the model, a number of chi-square goodness of fit tests were conducted between models to determine which model best captured the relationship between mindfulness and attention. First, a chi square comparison test was conducted to compare the first model, in which the constructs of both mindfulness and attention are the same, and the second model, in which mindfulness and attention are their own separate and was found to be significant, X^2 (1, $N = 200$) = 175.2, $p <$ .05. This indicates the importance of including two trait factors. The second chi-square comparison test conducted included a comparison of the first model, in which the constructs of both mindfulness and attention are the same, and the third model in which captured methods variance in which the constructs included self-report and behavioral. This test was also found to be significant, X^2 (1, $N = 200$) = 500.2, $p < .05$. This test indicates the important of including the methods factors.

The third chi square comparison test was conducted which included a comparison of the second model, in which mindfulness and attention are their own separate constructs, compared to the most complex model in which all four constructs are separate. This test was found to be significant, X^2 (1, $N = 200$) = 174.9, $p < .05$. A final chi-square comparison test was conducted, which included a comparison of the third model, in which the two methods constructs are present, compared to the most complex model in which all four constructs are separate. This test was found to be significant, X^2 (1, $N = 200$) = 198.7, $p < .05$. These tests indicate the importance of including not only the trait factors, but also the methods factors when understanding the constructs of mindfulness and attention. Additionally, with the fourth model demonstrating adequate fit and the highest factor loadings (Table 2) among the models this indicates that the data in the present study are conceptualized best by the four-factor model (Figure 4).

Further analyses were conducted in order to investigate the relationship between previous exposure to mindfulness and potential effects on measures of mindfulness and attention utilized in the present study. Multiple analyses of variance tests were conducted in order to detect whether there were significant differences among participant responses to the mindfulness and

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attention measures depending upon how long they had practiced mindfulness. There were three measures that indicated a significant difference among participants who had completed at least six months or more of mindfulness practice. The mindfulness attention self-report measure indicated significant differences ($F(5, 194) = 6.90$, p < .000). Further analyses revealed a significant difference among those who had practiced mindfulness for at least six months, $M = 36.48$, compared to those who had not, $M = 58.60$, and for those who had practiced more than five years, $M = 53.54$, compared to those who had practiced a year or two years, $M = 46.96$. These analyses suggests that exposure to mindfulness longer than five years may increase self-perception of mindfulness traits. Additionally, for those never having experienced mindfulness this study may prompt participants to self-report as more socially desirable and endorse higher rates of mindful traits that contributed to the results seen in the previous analysis, therefore researchers may want to conceal the true nature of the measure when trying to test for mindfulness traits.

Significant differences were also present for the attentional control scale ($F(5, 194) = 3.65$, p < .000), the digit span task ($F(5, 194) = 4.45$, p < .001), and the Stroop task ($F(5, 194) = 3.75$, p < .003). The attentional control scale demonstrated significant mean differences among those who had experienced mindfulness for at least six months, $M = 56.65$, compared to those who had experienced mindfulness less than a month, $M = 50.18$, and compared to those who had experienced mindfulness more than five years, $M = 48.58$. This analysis suggests that perceived attentional traits may increase with mindfulness exposure within the first four years and may stagnate with longer exposure to mindfulness. This may also suggest that those who practice mindfulness longer than four years may not perceive any additional attentional benefits traits gained through mindfulness exposure.

Additionally, both of the behavioral attention measures demonstrated significant differences based on length of exposure to mindfulness. The Stroop task demonstrated significant mean differences among those who had five or more years of mindfulness exposure, $M = 13.44$, compared to those who had been less than six months to a year, $M = 6.97$, a year or two years of

exposure, $M = 9.25$, and those who had never been exposed to mindfulness, $M = 11.91$. The digit span task demonstrated significant mean differences among those who had five or more years of mindfulness exposure, $M = 4.61$, compared to those who had a year or two years of exposure, $M = 3.71$, and those who had less than six months to a year of exposure, $M = 2.84$. These results suggest that exposure to mindfulness for multiple years may enhance the behavioral aspects of cognitive attention.

Chapter Four

Discussion

The results from this study indicate that it is important not only to conceptualize mindfulness and attention as two distinct constructs but also to acknowledge how these constructs are measured. What this indicates is that mindfulness and attention are two distinct constructs, meaning they are two separate things. In addition, these results suggest that while mindfulness and attention may benefit from one another they are not the same construct, and how related the two constructs are depends on the method of measurement utilized. Additionally, it is important to note that differences among measures in the present study based on self-reported mindfulness exposure supports the notion that mindfulness can increase attentional capacity, however this relationship should be further explored by more mindfulness training, more complex measures to ask about type of mindfulness exposure and further attentional behavioral tasks.

It is also important to consider that a person's self-reported perceived mindful behavior may not hold the same relationship to actual mindful behavior relating to attentional measures. This holds a number of implications for both researchers and clinicians who study mindfulness and attention and the development of mindfulness behavioral scales. This meaning that it may be advantageous for researchers to create mindfulness behavioral measures to measure concentration and physiological traits during mindfulness exercises instead of relying on someone's perceived mindfulness traits they endorse.

A number of researchers have studied mindfulness and its effects on a number of different psychological phenomena. Additionally, some researchers have proposed that mindfulness can improve certain psychological issues such as inattention and attentional barriers of living such as attentional hyperactivity deficit disorder (Janssen et al., 2019). However, less focus has been placed on understanding mindfulness as a construct and whether attention is an important underlying factor to mindfulness. One study that aimed to study these constructs found that mindfulness and attention are two distinct constructs (Quickel, Johnson, & David, 2014); however, this study did not consider measurement variance, which the present study illustrates may be an important avenue to explore. This study provides an important empirical base for studying mindfulness as a construct and comparing it to other similar constructs in the field such as attention. Additionally, this study provides researchers with a method to understanding how accounting for measurement variance may change the ways in which we understand constructs and consider how we further develop measures for testing construct relation.

Limitations

A number of limitations must be considered in the present study. One limitation is the mindfulness behavioral measures used in the present study are more novel and have not been used in a lot of empirical studies on mindfulness, unlike the cognitive attention behavioral measures that have been used and validated in a number of studies. In addition, only two measures of self-report and two measures of behavior were used for both mindfulness and attention and perhaps utilizing more measures of both constructs could provide a better understanding of the underlying measure variance found in the present study. Additionally, an online sample size was used, which provided a more robust and diverse sample size; however, this study was limited in the number of participants who completed the study online. Future studies could benefit from a larger sample size collected from multiple subject pools. Additionally, the self-report measures used for mindfulness did not correlate highly and therefore using more than two self-report measures of mindfulness may be beneficial to help prevent issues between the two measures used in the present study.

Future Directions

  Researchers who are interested in understanding the constructs of both mindfulness and attention should consider a number of factors. First, researchers should continue to build upon validated behavioral measures of mindfulness so future research can determine how well these behavioral measures are measuring mindfulness. In addition, researchers should continue to study how mindfulness may increase attention as proposed by previous studies, or if as attention is increased it is easier for participants to be mindful. Researchers should also consider important cultural factors that may influence how we measure the constructs of mindfulness and attention such as analyzing whether Western conceptualization of mindfulness line up with the Eastern tradition of mindfulness and attentional focus.

  These findings also propose a number of different implications for clinicians who may use mindfulness or attention exercises with clients. Clinicians should be aware of how they are measuring clients' levels of mindfulness and consider not just relying on typical self-report measures, but also incorporating behavioral indicators. By incorporating different measurement types clinicians may be able to capture how clients' levels of mindfulness and attention are fluctuating based on their treatment as both may be important. In addition, clinicians should be aware of how their clients conceptualize the constructs used in treatment such as mindfulness or attention, and if clients may think those constructs are the same or different and how that may relate to how they learn the skills acquired in psychotherapy.

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Table 1 Correlations for all Study Measures

	M	*SD*	1	2	3	4	5	6	7
1. MAAS	47.8	21.1	1.0	-.11	-.61*	-.62*	.35*	.42*	.21*
2. FMI	40.2	9.1	-.11	1.0	.51*	.51*	-.16*	-.23*	.09
3. ACS	49.9	13.2	-.61*	.51*	1.0	.51*	-.27*	-.36*	-.08
4. Stroop	10.6	7.2	.35*	-.16*	-.27*	.53*	1.0	.37*	.16
5. Digit Span	3.9	2.1	.42*	-.23*	-.36*	-.20*	.37*	1.0	.15*
6. Meditation	5.5	1.08	.21*	.09	-.08	-.09*.	.16	.15*	1.0

Note. N = 200. Correlations included for both self-report and behavioral measures. Measures include the Mindful Attention Awareness Scale (MAAS), the Friegburg Mindfulness Inventory (FMI), Attentional Control Scale (ACS), Stroop Task (Stroop), Digit (Digit Span Task), and the Self-Prompted and Computer-Prompted Meditation Breath Assessment (Meditation).

*p < .05.

Table 2 Factor Loadings for All Models

	MAAS	FMI	ACS	Stroop	Digit	Meditation
Single Factor	.73	-.49	-.93	.37	.48	.16
Trait	.51	-.38	-.82	.39	.50	.08
Methods	.28	.55	.65	.49	.66	.16
Trait-Methods	-.76	.77	.99	.56	.69	.25

Note. $N = 200$. Correlations included for both self-report and behavioral measures. Measures include the Mindful Attention Awareness Scale (MAAS), the Friegburg Mindfulness Inventory (FMI), Attentional Control Scale (ACS), Stroop Task (Stroop), Digit (Digit Span Task), and the Self-Prompted and Computer-Prompted Meditation Breath Assessment (Meditation).
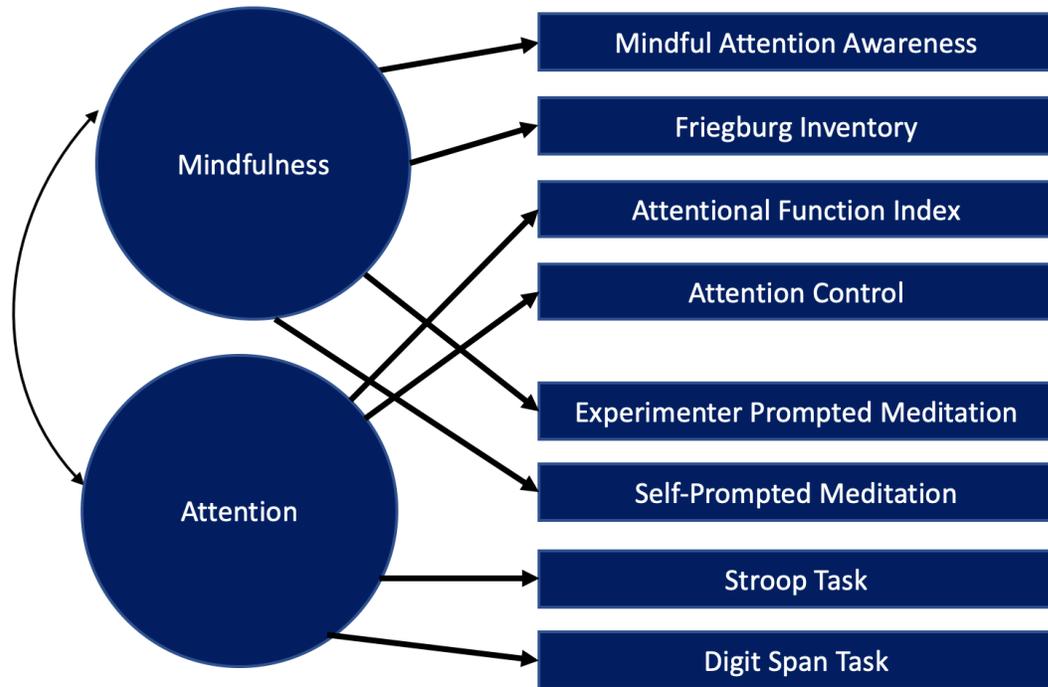
*p < .05.

Single Factor Model
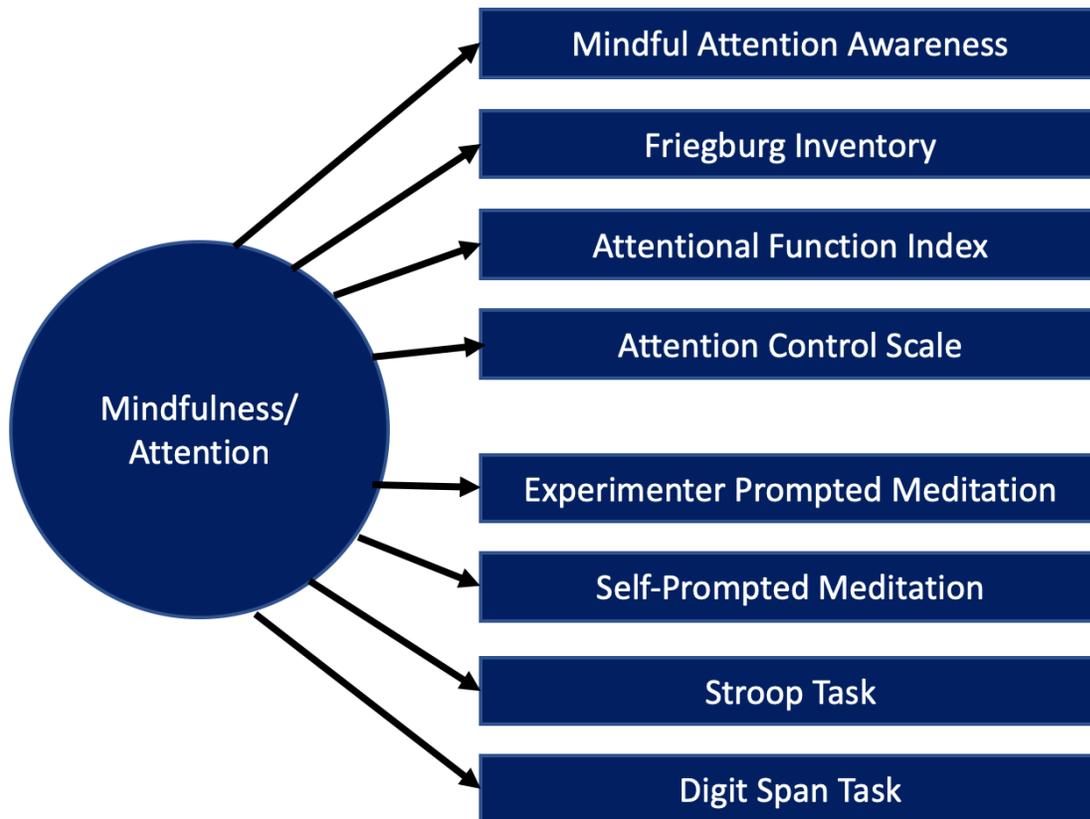
Figure 1. In this model discriminant validity is not present as all measures load strongly on only one trait factor, mindfulness. This model suggests that these observed variables all encompass one construct which could be mindfulness or attention.

Trait Model

Figure 2. In this model discriminant validity is present and this model suggests that both factors of attention and mindfulness load on to their observed variables.

Methods Model
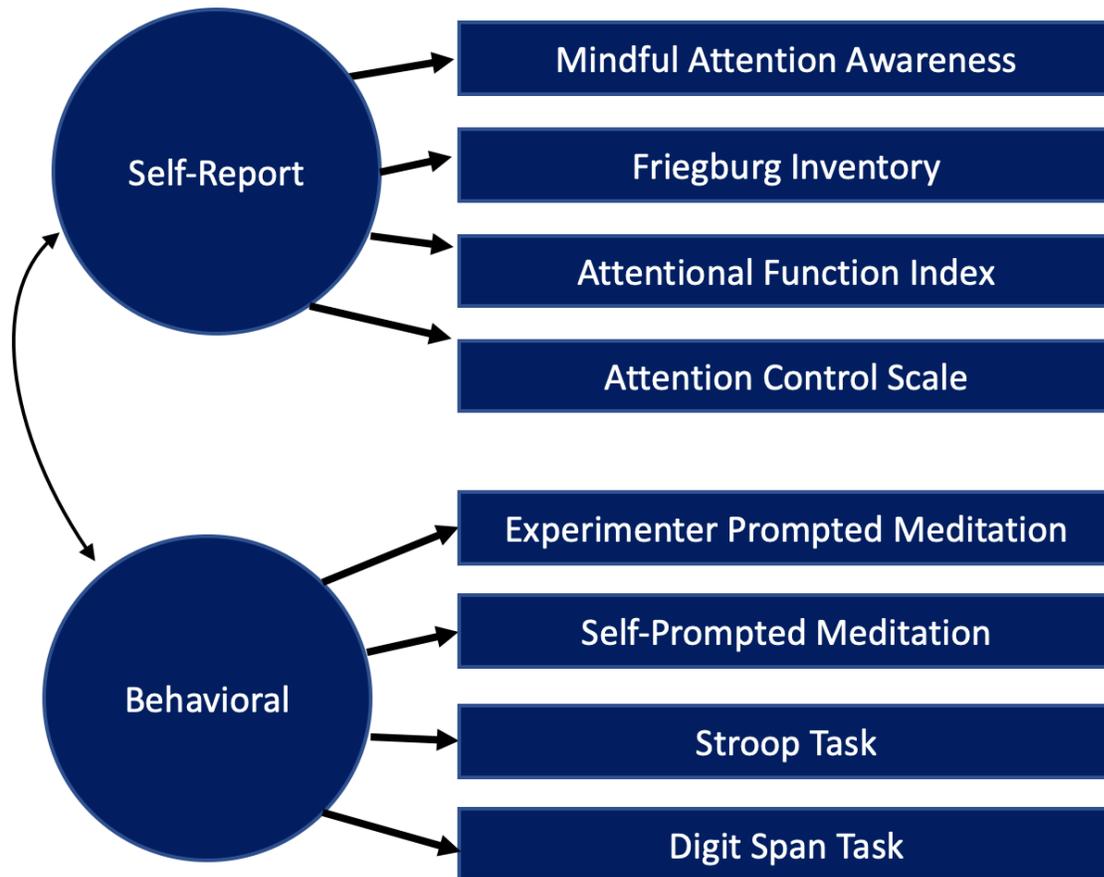
Figure 3. In this model the measures loaded more strongly on the factors related to the method in which the variables were collected. This model proposes that a methods variance is present.

Trait-Methods Model
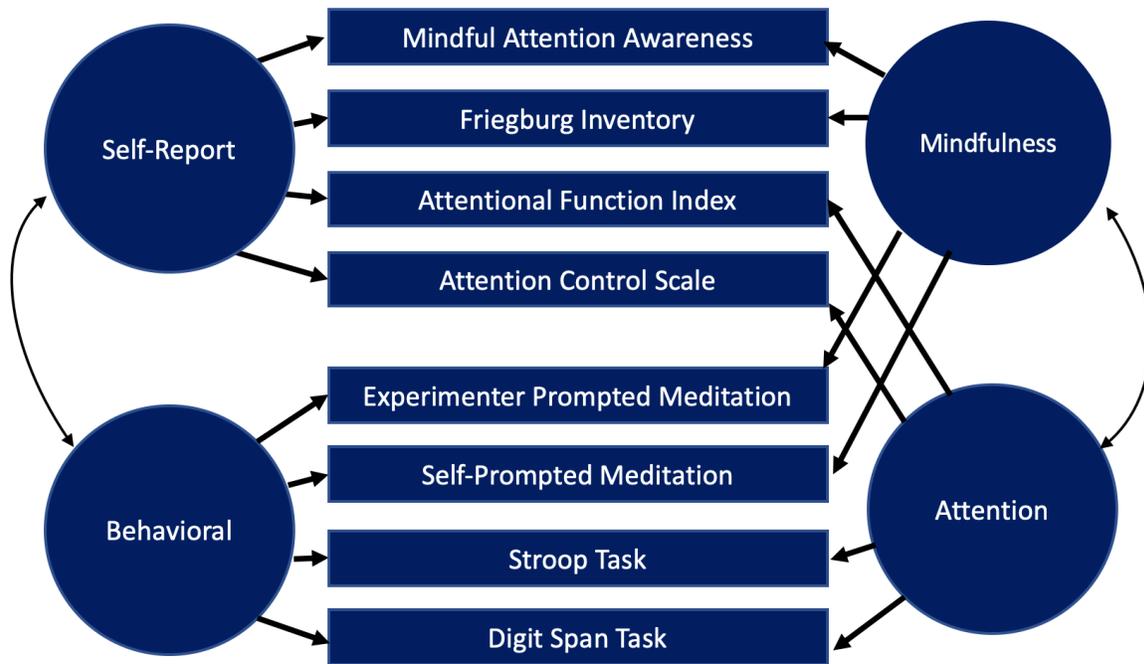
Figure 4. In this model the measures load on the factors related to the method in which the variables were collected as well as their respective constructs. This model proposes that a methods variance is present and accounts for variation in the model aside from the main construct.