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ABSTRACT

TRAIT MINDFULNESS IN COUPLES’ RELATIONSHIPS: A META-ANALYSIS AND CONDITIONAL PROCESS ANALYSIS APPROACH

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New theoretical perspectives have begun to extend the study of mindfulness beyond individual-level outcomes and to the consideration of its influence on interpersonal romantic relationships. This dissertation includes 2 studies: a meta-analysis of the empirical literature correlating mindfulness to relationship satisfaction, and an empirical study that examined the mechanisms through which mindfulness increases relationship and sexual satisfaction among midlife married Canadians. The purpose of study 1 was to estimate the population effect size of the correlation between mindfulness and relationship satisfaction, whether this effect was conditional on any moderator variables, and the plausibility of publication bias. Meta-analysis of 28 samples correlating mindfulness and relationship satisfaction indicated that the average effect was small to moderate (.24) and publication bias was not evident. Moderation analysis showed that the effect size was consistent across sample age, gender, marital status, meditation status, and mindfulness dimensionality. This study supported emerging theoretical perspectives linking mindfulness to romantic relationship outcomes and demonstrated that the association was consistent across major demographic characteristics. The purpose of study 2 was to build upon and extend theory and empirical literature concerning the Self-Determination Theory mechanisms through which mindfulness might be associated with relationship and sexual
satisfaction. A sample of 700 midlife (40-59-year-old) married Canadians was recruited from a national Qualtrics panel to test pre-registered hypotheses concerning whether need satisfaction would function as an indirect pathway of association between mindfulness and relationship and sexual satisfaction. After splitting the model by gender and controlling for age and marital duration, mindfulness was associated with increased relationship and sexual satisfaction through meeting one’s need for relatedness within the relationship. For women, indirect effects were also significant through autonomy need satisfaction and self-compassion. Together, study 1 demonstrated that mindfulness was related to relationship satisfaction across the extant literature and study 2 showed that the effect was primarily indirect. Despite these pathways being statistically significant, the effects were small and this, combined with the meta-estimate from study 1 also being small, suggests that mindfulness may be beneficial for relationships in large part because of its synergy with other variables and rather than via a direct pathway.
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General Introduction

The notion that “loving one’s self” or “knowing one’s self” predicates the ability to love or know others is not new (Branden, 1994; Campbell & Baumeister, 2001), having been engrained in person-centered and rational-emotive therapies for decades (Ellis, 1973; Rogers, 1961), and more recently Mindfulness-Based Stress Reduction, and Acceptance and Commitment Therapy (Baer, 2015; Hayes, 2004). Within the social sciences, and the discipline of psychology specifically, there has been a strong and growing interest in Buddhist theory, particularly mindfulness but with steadily growing interest in self-compassion and compassion for others (Allen & Knight, 2005; Fredrickson et al., 2008; Gilbert, 2005; Goetz, Keltner, & Simon-Thomas, 2010; Harrington, 2002). The origination of mindfulness in the Western academic world is largely attributed to Kabat-Zinn’s (1990) development of Mindfulness-Based Stress Reduction for his hospital patients, and development of contemporary self-compassion is attributed to Neff (2003a, 2003b).

Part of the interest into the interpersonal benefits of mindfulness is based on theorizing by Thich Nhat Hanh (1975) who described how mindfulness could create better relationships with others. Though there is no consensus on the definition of mindfulness, it is broadly defined as an acceptance and awareness of the present, and a tendency toward non-judgment (Baer, 2003). Self-compassion is defined by Neff (2003a; 2003b) is a “healthy attitude toward oneself” involving self-kindness and an understanding that suffering is an innate part of the human experience. Recently, researchers have focused on testing the interpersonal benefits of mindfulness and self-compassion. These studies have found that mindfulness was associated
with secure attachment style and higher relationship satisfaction (Saavedra, Chapman, & Rogge, 2010), higher sexual satisfaction (Khaddouma, Gordon, & Bolden, 2015), and less emotional communication during stressful relationship conflicts (Barnes, Brown, Krusemark, Campbell, & Rogge, 2007). In addition, preliminary research has shown that self-compassionate individuals were higher on relationship satisfaction and performed more positive relationship behaviours (Neff & Beretvas, 2013), and that self-compassion was an even stronger predictor than self-esteem or attachment style on these relational outcomes. However, a recent literature review presented a research agenda based on the existing literature (Karremans, Schellekens, & Kappen, 2017). Specifically, scholars and theorists propose that the relational benefits are primarily indirect but are uncertain as to the pathway of associations through which mindfulness is beneficial for relational outcomes, and the boundary conditions (i.e., for whom mindfulness does or does not benefit) for these beneficial effects are also largely unknown (Karremans et al., 2017). Mindfulness is already widely used as an intervention in many non-relationship contexts, for example, Kabat-Zinn’s Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990) program for depression (see Baer, 2003 for additional examples). Despite the still nascent literature on mindfulness in the romantic relationship context, mindfulness has already been used as the basis of at least one intervention targeting couples (Carson et al., 2004, 2007) and continues to be a heavily theorized about and recommended as an avenue for future couple’s interventions (Atkinson, 2013; Karremans, 2017; Kozlowski, 2013). Producing theoretically-grounded, empirical evidence for the mechanisms and boundaries of the interrelationship between mindfulness and relationship satisfaction will help in the development of interventions by clarifying if, how, and for whom mindfulness benefits relationship and sexual satisfaction. Relationship satisfaction has been a critical outcome in relationship research, as it is central to
models of relationship functioning (Funk & Rogge, 2007) and in applied settings because it is often used to assess the effectiveness of therapy and treatments (Lundblad & Hansson, 2006; Shadish & Baldwin, 2003; Wood, Crane, Schaalje, & Law, 2005). Sexual satisfaction is similarly central to models of sexual functioning and applied sexuality interventions (e.g., McClelland, 2011). Specifically, the goals of this dissertation are: (a) to estimate the direct effect of mindfulness on relationship satisfaction using meta-analysis; and (b) to investigate pathways through which mindfulness and self-compassion might benefit relationship and sexual satisfaction for individuals within romantic relationships.

This dissertation will be manuscript-style, beginning with a broad introduction, followed by the presentation of two independent studies, and ending with a conclusion integrating findings and implications from both investigations. The first study is a meta-analysis of the association between mindfulness and relationship satisfaction that is currently under revision in the journal Mindfulness. Meta-analysis is a way to synthesize quantitative knowledge from a body of work to make a more sensitive estimate of the association between relationship and sexual satisfaction by aggregating effect sizes of this relationship from existing studies on the topic. A meta-analysis involves a review of the literature and statistical analysis of observed effect sizes. The second study is a cross-sectional empirical study aimed at testing the mechanisms by which mindfulness might predict relationship satisfaction and sexual satisfaction among couples. The theoretical framework for this study is Self-Determination Theory, described later in this dissertation.

Mindfulness

The Buddhist Origins of Mindfulness
Mindfulness originates from Buddhist philosophy, yet despite the shared name, the Western conceptualization of mindfulness is distant from the Buddhist conceptualization (many of these early writings date as far back as the fourth and second centuries B.C.E.; Brown et al., 2015). Though there have been many translations of the early Buddhist literature describing mindfulness (e.g., Cox, 1992; Monier-Williams, 1899), the phrase itself changes roughly in meaning between “memory” and “paying attention” (Brown et al., 2015).

In Buddhist philosophy, mindfulness as both a philosophy and meditative practice is essential for one to achieve enlightenment (Brown et al., 2015; Gethin, Brown, Creswell, & Ryan, 2015). Buddhism proposes that human suffering is rooted in inattention to one’s present moment ownership of their own inner experiences and the “dissatisfaction (suffering) that arises from the resultant craving and aversion.” (Brown et al., 2015, p.63). In this dissertation, “mindfulness” will be used to describe the Western notion – the background on its Buddhist history is solely illustrative. Regardless of its original ancient religious interpretation, Western uses of mindfulness are generally not overtly religious (Baer, 2003), despite some questioning whether its effectiveness is reduced by removing it from its broader religious contexts (Gambrel & Keeling, 2010). As part of its transition into Western academia, the concept of mindfulness has evolved; the Western definition will be described in the next section.

Definitions, Conceptualization, and Measurement of Mindfulness

Since the early 2000s, interest in mindfulness has grown exponentially, with returns from Google Scholar increasing to more than 15,000 from 1000 between then and now (Brown, Creswell, & Ryan, 2015). There is unfortunately no single universally agreed upon definition of mindfulness in the research literature, although there are obvious similarities between
definitions. Below are four highly cited definitions of mindfulness included for illustrative purposes:

“Mindfulness means paying attention in a particular way: on purpose, in the present moment, and nonjudgementally.” (Kabat-Zinn, 1994, p. 4).

“A kind of nonelaborative, nonjudgemental, present-centered awareness in which each thought, feeling, or sensation that arises in the attentional field is acknowledged and accepted as it is.” (Bishop et al., 2004, p. 232).

“...the presence or absence of attention to and awareness of what is occurring in the present... (Brown & Ryan, 2003, p. 824)

“In mindfulness practice, the focus of a person’s attention is opened to admit whatever enters experience while at the same time, a stance of kindly curiosity allows the person to investigate whatever appears, without falling prey to automatic judgements or reactivity (Segal, Teasdale, Williams, & Gemar, 2002, pp. 322-323).

These definitions are similar, but importantly, they are not consistent about whether mindfulness consists of several distinct components (e.g., curiosity, attention, nonjudgement, reactivity, acceptance), or if it is a unitary concept. For example, the definition by Brown and Ryan (2003) indicates that mindfulness refers to “attention and awareness” of what is occurring in the moment. This contrasts Segal et al.’s (2002) definition, which alludes to mindfulness consisting of open attention, a “kindly curiosity,” and “non-judgement or reactivity.” In a review of fundamental components of mindfulness, Leary and Tate (2007) discuss mindfulness as consisting of: mindful attention, diminished self-talk, non-judgement, non-doing, and a specific set of philosophies and ethical beliefs. In Dialectic Behaviour Therapy (DBT; Linehan, 1993) mindfulness consists of six elements, three characterizing what it means to be mindful (i.e., observe, describe, participate), and three characterizing how it is done (i.e., non-judgmentally, one-mindfully, and effectively). These conceptualizations allude to a multi-faceted approach for mindfulness; however, this is again not consistent within the literature. In contrast, Brown and Ryan’s (2003) single dimensional conceptualization (corresponding to their single dimension measure; the Mindful Attention and Awareness Scale; MAAS), which is also one of the most
widely used conceptualizations (and measures), described mindfulness as attention to and awareness of events occurring in the present – its popularity is at least partly because it was one of the first self-report scales to measure mindfulness. Measurement and conceptualization cannot be separated – the way in which something is measured has important implications for how it is defined (and vice versa). Thus, it is important to consider the numerous different ways mindfulness has been conceptualized and measured. The prominence of the unidimensional conceptualization (and measurement) of mindfulness suggests that at least some scholars believe mindfulness consist of a single dimension. However, other scales featuring different conceptualizations have also been created which presuppose a multi-faceted conceptualization. Some of the most notable include the Frieburg Mindfulness Inventory (FMI; Walach, Buchheld, Buttenmuller, Kleinknecht, & Schmidt, 2006) designed for experienced meditators which measures mindfulness as a 2-factor construct, and the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004) that conceptualizes mindfulness as four different skills.

Perhaps most noteworthy (and most recently), Baer et al. (2008) conducted a study to create a multi-faceted measure of mindfulness by combining and factor analyzing the five most popular mindfulness scales: the MAAS, the FMI, the KIMS, the Cognitive and Affective Mindfulness Scale (CAM; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2004), and the Mindfulness Questionnaire (MQ; Chadwick, Hember, Mead, Lilley, & Dagnan, 2005). During exploration of the associations between these already existing measures and several validity variables, Baer et al. (2006) demonstrated that some of these commonly used scales of mindfulness (which each had different underlying operational definitions) had differential associations with other variables, including emotional intelligence, alexithymia, absent mindedness, and experiential avoidance. Together, these differential associations suggested that
the questionnaires may be measuring different facets of mindfulness. This finding provided empirical evidence that many of these scales were measuring different dimensions, supporting the multi-faceted nature of mindfulness. Baer et al., (2008) argued that development of a new measure capturing these underlying facets in a single measurement instrument would be a significant contribution to the study of mindfulness. Thus, Baer et al., (2008) developed the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2008) using a series of exploratory and confirmatory factor analysis on independent samples and testing multiple measurement models using confirmatory factor analysis (a one-factor model, five-factor model, five-factor hierarchical model, a four-factor, and a four-factor hierarchical model). The final scale measures mindfulness along five dimensions: non-reactivity, observing, acting with awareness, describing, and non-judgement. The interpretation of these facets is as follows: non-reactivity is an ability to detach from emotions; observing is the ability to attend and notice feelings in one’s body; acting with awareness is the ability to pay attention and be in the present moment, not relying on automaticity; describing is the ability to describe one’s own thoughts, feeling, and experiences; non-judging is the ability to avoid criticizing or rendering judgement on one’s thoughts and feelings. This scale has been widely adopted in the scholarly community, signifying tacit acceptance that mindfulness is multi-dimensional rather than a singular construct (e.g., Baer et al., 2008). However, the shift toward use of the FFMQ makes comparison to prior studies, many of which used the single factor MAAS, difficult. Comparisons are difficult because the construct of “mindfulness” is conceptualized quite differently in the FFMQ compared to the MAAS. More specifically, studies that measure mindfulness using the MAAS measure only the attention and awareness aspect (i.e., the single dimensional conceptualization); whereas, studies that use the FFMQ inherently measure the observing, describing, acting with awareness, non-judging of
inner experience, and non-reactivity to inner experience aspects (i.e., the multi-faceted conceptualization). There is friction between these two conceptualizations because the underlying constructs being measured are distinctive (see Pirson et al., 2012; Siegling & Petrides, 2014). Additionally, researcher conceptualization of mindfulness is rarely made transparent to the reader in papers that study mindfulness, and conceptualization tensions in the field are often not discussed. Stated differently, this problem amounts to a “jingle” fallacy – a measurement fallacy that occurs when it is mistakenly assumed that two measures sharing the same name capture the same construct (Kline, 2015). In this case, both the MAAS and the FFMQ are titled as “mindfulness”, yet “mindfulness” may refer solely to attention and awareness, or it may refer to a collection of facets including non-reactivity, observing, acting with awareness, describing, and non-judging. This is problematic due to the tendency for researchers to write of “mindfulness” broadly in their papers, obfuscating the conceptualization that was used, and mistakenly giving the reader the impression that “mindfulness” is the same across studies – hence a jingle fallacy. Furthermore, recent metric literature suggests that the FFMQ (the facet-based conceptualization) is the best and most comprehensive option (Siegling & Petrides, 2014), at least compared to less comprehensive single-dimensional measures like the MAAS.

**Mindfulness as state and trait.** Mindfulness is conceptualized as a varying individual trait, but also can be developed and cultivated through meditative practice (Brown, Ryan, & Creswell, 2007). For example, in Carson et al.’s (2004) article examining the effectiveness of Mindfulness-Based Relationship Enhancement as well as in Kabat-Zinn’s original Mindfulness-Based Stress Reduction therapy, mindfulness was conceptualized as a skill to be learned and built through meditation – not as a disposition or trait. Baer et al., (2008) and Brown and Ryan’s
(2003) scales measure *dispositional* or trait mindfulness, conceptualizing mindfulness as something that is present (to varying, measurable degrees) within each individual. Mindfulness is thought to have state and trait aspects, and research has supported the discriminant validity of state and trait measures of mindfulness, particularly related to relationship satisfaction (Barnes et al., 2007). Trait mindfulness refers to one’s predisposition toward mindfulness states in daily life whereas state mindfulness refers to the more temporary state that is typically achieved during meditation (Kiken, Garland, Bluth, Palsson, & Gaylord, 2016). The focus of this dissertation is on trait mindfulness, and not on state mindfulness.

In summary, over the last decade, there has been conceptual and measurement tension about mindfulness on whether mindfulness is a single or multi-dimensional concept. One conceptualization, measured by the MAAS, is widely used, but not necessarily because of widespread agreement that mindfulness is single dimensional, but because of cross-study comparability and a longer history of use. Another more recent stream of research proposes that mindfulness is multi-dimensional and resulting from this line of research is the Five-Facet Mindfulness Questionnaire. While there is no current consensus in the literature about the dimensionality of mindfulness, both in terms of its conceptualization and its measurement, the conceptual tension is foundational for this review of mindfulness.

**Benefits of Mindfulness**

Research suggests mindfulness can have beneficial effects on depression (Morgan, 2003), well-being (Brown & Ryan, 2003), resilience (Bonnano, 2004), autonomy (Vansteenkiste & Ryan, 2013), rumination (Jain et al., 2007), as well as positive neurocognitive effects (Bishop, 2007; Brown et al., 2015). Trait mindfulness is directly related to less depressive symptoms, anxiety, and stress, as well as higher levels of subjective and eudaimonic (e.g., meaning,
actualization-based) well-being (Brown & Ryan, 2003; Carlson & Brown, 2005). Research has also shown that mindfulness is associated with superior self-regulation capabilities, including affect regulation, and greater awareness and acceptance of emotions (Baer, Smith, & Allen, 2004; Brown & Ryan, 2003).

**Mindfulness interventions.** A variety of mindfulness interventions have been developed and, while there has been a large amount of research into the beneficial effects of mindfulness interventions, limitations have also become apparent. Review studies suggest the existence of beneficial effects of mindfulness interventions (Grossman, Niemann, Schmidt, & Walach, 2004; Khoury et al., 2013). However, intervention studies have, in the past, been considered methodologically weak and lacking in several study quality indicators (e.g., randomized control groups), though there appears to be an upward trend in study quality for this topic (Goldberg et al., 2017). In this section, the genesis of mindfulness interventions and their evidence will be reviewed, followed by a discussion of mindfulness interventions for couples. The first mindfulness intervention (and the first-time mindfulness was utilized in a scholastic and scientific sense in the West) was Kabat-Zinn’s Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990). According to Baer’s (2003) compendium of mindfulness-based treatments, the most popular mindfulness-based programs include MBSR (Kabat-Zinn, 1990), Mindfulness-Based Cognitive Therapy (Segal, Teasdale, Williams, & Gemar, 2002), and Mindfulness-Based Relationship Enhancement (Carson et al., 2004). Outside of more structured “mindfulness-based” therapies, many approaches therapeutic approaches involve the fostering of mindfulness skills; these therapies include Dialectical Behaviour Therapy (DBT; Linehan, 1993) and Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999). However, the other previously mentioned mindfulness-based programs have histories of effectiveness (see
Khoury et al., 2013 for a meta-analysis of Mindfulness-Based Therapy; see Grossman, Niemann, Schmidt, & Walach, 2004 for a meta-analysis on Mindfulness-Based Stress Reduction; see Piet & Hougaard, 2011 for a meta-analysis on Mindfulness-Based Cognitive Therapy; see Kliem, Kroger, & Kosfelder, 2010 for a meta-analysis on Dialectical Behaviour Therapy). Given that the overarching goal of this dissertation will be to test the mechanisms through which trait mindfulness is associated with relationship and sexual satisfaction, Mindfulness-Based Relationship Enhancement (MBRE; Carson et al., 2004) will be briefly reviewed. A brief discussion of MBRE is an important foundation to a review of mindfulness among couples because the publication by Carson et al. (2004) was the first study that investigated the beneficial effects of mindfulness for couples; accordingly, much of the research in subsequent years was based on these preliminary findings.

Many relationship interventions have historically focused on relationships that have gone awry or are already distressed and have brought the couples into therapy. Other relationship interventions have focused on improving relationships by building relationship skills, but these programs do not appear to be effective (Wood, McConnell, Moore, Clarkwest, Hsueh, 2012; Wood, Moore, Clarkwest, & Killewald, 2014). Mindfulness-Based Relationship Enhancement (MBRE) was influenced by the positive psychology movement and focused on enhancing relationships for couples who are already reasonably happy with one another (Baer, 2003; Carson et al., 2004). It is more focused on preventing couples from entering critical levels of relationship distress that could destabilize the relationship by boosting the satisfaction of already satisfied couples and reducing their distress (Baer, 2003; Carson et al., 2004, 2007). MBRE is derived from Kabat-Zinn’s (1990) original Mindfulness-Based Stress Reduction (MBSR) therapy and involves the same structure, but with couples rather than individuals. The couples
attend eight weekly sessions that are about 2.5 hours long as well as a lengthy 7-hour long retreat near the end of the program. During these sessions, couples practice being compassionate toward one another, and the program aims to foster awareness and attention by focusing these attentional efforts on shared experiences (instead of individual ones; Baer, 2003; Carson et al., 2004). In particular, MBRE is distinct from MBSR in that it also includes a number of couple-focused practices including: (a) emphasis on loving-kindness meditations, (b) partner yoga involving partners helping one another with yoga poses, (c) mindful touch exercises, (d) eye gazing exercises, (e) mindfulness considering relationship difficulties, and (f) becoming mindful during shared activities as well as negative/stressful activities and situations. There is very little empirical support for the effectiveness of this intervention, at least partly due to inherent ceiling effects when sampling a group of individuals who are already relatively happy with their relationships (as noted by Christensen & Heavey, 1999), but also due to relatively few studies looking at mindfulness among couples in general. Yet, Carson et al. (2007) conducted a follow up study suggesting that self-expanding activities such as mindful yoga were the therapeutic activities primarily responsible for the observed increases to relationship satisfaction and decreases to relationship distress. This dissertation is not focused on developing or evaluating a mindfulness-based couple’s intervention; however, reviewing this foundational article is critical for a thorough review of mindfulness among couples.

**Mindfulness: Intrapersonal and Interpersonal**

Much of the existing research on mindfulness has focused on its benefits for individuals (Brown, Creswell, & Ryan, 2015), although scholars have more recently applied mindfulness to

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1 The fact that MBRE focuses on increasing compassion as a core concept among couples as part of its *mindfulness program* is important to note for later.
romantic relationships (Carson et al., 2004). Perhaps because Western psychology has largely been the discipline to adopt mindfulness, and because of its use (and research) as primarily an individual-oriented therapy, much of the empirical and theoretical base for mindfulness is distant from its interpersonal and social roots in Buddhism. Mindfulness meditation techniques were historically performed alongside a Buddhist concept known as the “four immeasurables” (Wallace, 2004). In Buddhist philosophy, these immeasurables are believed to be cultivated by meditation and include compassion, loving kindness, empathetic joy, and equanimity (Wallace, 2004). These concepts are highly social and not solely individualistic pursuits - the aims of mindfulness in traditional Buddhism were to foster individual as well as social prosperity. Mindfulness was originally never conceptualized as isolated from the social and interpersonal contexts.

Earlier, one of the aims of MBRE was described as increasing compassion for one’s partner (Baer, 2003; Carson et al., 2004) and, in Buddhist theory, meditation is thought to cultivate compassion for others (Wallace, 2004). Indeed, research supports that MBSR programs increase one’s self-compassion, suggesting that resultant increases in self-compassion may be one of the primary reasons why MBSR programs influence well-being (Baer, 2010; Birnie, Speca, & Cordova, 2005; Shapiro, Brown, & Biegel, 2007). Buddhist philosophy proposes that mindfulness directly leads to insight into one’s own suffering (and that of others), and therefore the ability to be compassionate (Radhakrishnan & Moore, 1957) toward others’ suffering. Therefore, there is strong theoretical and empirical evidence to support a connection between mindfulness and compassion/self-compassion, constructs that will be described next.

**Self-Compassion and Compassion**
Neff’s (2003a, 2003b) original conceptualization of self-compassion framed it as, “an alternative conceptualization of a healthy attitude toward oneself,” in comparison to the widely-used concept of self-esteem. She argues that self-esteem involves comparisons of one’s self to a set of standards and paying attention to other’s evaluations of one’s self. In contrast, self-compassion is defined by Neff as follows:

“Self-Compassion, therefore, involves being touched by and open to one’s own suffering, not avoiding or disconnecting from it, generating the desire to alleviate one’s suffering and to heal oneself with kindness. Self-compassion also involves offering nonjudgmental understanding to one’s pain, inadequacies and failures, so that one’s experience is seen as part of the larger human experience.” (Neff, 2003a, p. 87)

In Neff’s conceptualization, self-compassion consists of three components: kindness, common humanity, and mindfulness (Neff, 2003a, 2003b). Kindness involves being kind and understanding and not harshly critical; common humanity is an understanding that all things we experience are a part of a shared “human experience” that connects all human beings together; mindfulness refers to the ability to not over-identify with one’s own pain, and also prevents one from becoming too disengaged – referring to “balanced awareness rather than over-identifying with them (Neff, 2003a, 2003b, p. 224).

Similar to mindfulness, a significant amount of research on self-compassion has focused on intrapersonal topics, finding for example, that self-compassionate people report lower levels of anxiety, higher self-esteem, higher self-efficacy, report less negative self-feelings, and less

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2 In self-compassion, mindfulness is in reference to an “equilibrated mental perspective” – a balanced state of awareness that avoids extremes and over-identification with experiences (Neff 2003a). In contrast to the mindfulness literature, where the definition is not agreed upon, but is often conceptualized as multi-faceted.
depression than less self-compassionate people did (Iskender, 2009; Leary, Tate, Adams, Allen, & Hancock, 2007; Neff, 2003; Neff, Hsieh & Dejitterat, 2005; Neff, Kirkpatrick, & Rude, 2007; Neff, Pisitsungkagarn, & Hsieh, 2008), and positive effects on well-being (Neff & Seppala, 2016), Post-Traumatic Stress Disorder (PTSD) symptoms (Dahm, 2015; Neff & Seppala, 2016), and resilience (Neff & McGehee, 2010). In relationships, self-compassion is associated with constructive problem-solving behaviours, greater motivation to correct their interpersonal mistakes, and relationship satisfaction (Baker & McNulty, 2011), as well as greater tendency toward interpersonal compromise (Yarnell & Neff, 2012). Neff and Beretvas (2013) reported that self-compassion was linked to displays of more positive relationship behaviour and was a stronger predictor of these behaviours than both self-esteem and attachment style.

Relationship and Sexual Satisfaction of Couples

Although scholars have studied relationships and marriages for many decades (e.g., Gottman & Krokoff, 1989), research in the study of marital and relationship satisfaction increased markedly in the 1990s (Bradbury, Fincham, & Beach, 2000), perhaps due in response to high divorce rates during this time and an imperative to characterize what makes people’s relationships happy/not happy and stable/unstable emerged. Well-being research has also continually shown that romantic relationships are key determinants of life satisfaction across cultures (Biswas-Diener & Diener, 2001; Powdthavee, 2008). A parallel stream of research into sexuality supported that the couple’s sexual relationship was also a critical component to happy relationships (Birnbaum, 2007; Butzer & Campbell, 2008; McCabe, 1999; Sprecher & Cate, 2004). Relationship and sexual satisfaction are also highly interrelated (Byers, 2005; Litzinger & Coop, 2005), and highly impactful to the relationship stability of couples (Yeh, Lorenz, Wickrama, Conger, & Elder, 2006).
Development of theory and empirical literature supporting the beneficial effects of mindfulness and self-compassion have co-occurred over the last 15 years. While there has been growing interest in the relationship and sexual benefits of mindfulness and self-compassion for couples, existing literature overlapping the study of romantic relationships with the Buddhist philosophical scholarship of mindfulness and self-compassion is sparse. Growing interest in this area has underscored broader movements in the scholarship of mindfulness and self-compassion to increase knowledge of their interpersonal benefits (Brown et al., 2013), including benefits to relationships. This dissertation contains two studies. The first is a meta-analysis of the association between mindfulness and relationship satisfaction. The second is an empirical study testing the Self-Determination Theory mechanisms through which mindfulness benefits relationship and sexual satisfaction.
Study 1

Mindfulness and Couples’ Relationship Satisfaction: A Meta-Analysis

Study 1 as currently in revision with *Mindfulness*
Abstract

New theoretical perspectives have begun to shift the study of mindfulness beyond individual processes to interpersonal romantic relationships. Viability of these pursuits is perhaps contingent on the basic assumption that higher mindfulness is associated with beneficial outcomes like relationship satisfaction. Moreover, if this association is not consistent across sample characteristics or if the available knowledge appears tainted by publication bias, then the basic assumption of this emerging research may not be tenable. Based on 28 samples of studies correlating mindfulness and relationship satisfaction the average effect was small to moderate (.24) and publication bias was not evident. The effect size was consistent across age, gender, marital status, meditation status, and mindfulness dimensionality. This study supports emerging theoretical perspectives linking mindfulness to romantic relationship outcomes.

Keywords: Mindfulness; Relationship Satisfaction; Meta-analysis; Couples; Marriage
Interest in mindfulness has grown exponentially since the early 2000s, with returns from Google Scholar increasing to more than 15,000 publications containing the term “mindfulness” (Brown, Creswell, & Ryan, 2015). Mindfulness has been shown to have beneficial effects on psychological well-being (Walsh & Shapiro, 2006), depression (Morgan, 2003), and autonomy (Vansteenkiste & Ryan, 2013), among others. Within its original Buddhist philosophical framework, mindfulness is thought to cultivate love and compassion (Wallace, 2004) and improve relationships (Thich Nhat Hanh, 1975). Yet, mindfulness research has been primarily focused on individuals, and purported interpersonal effects have only begun to be studied empirically. A subset of these studies focused on couple’s romantic relationships. Mindfulness is associated with secure attachment in romantic relationships (Saavedra et al., 2010), higher sexual satisfaction (Khaddouma et al., 2015), and lower emotional stress responses during relationship conflicts (Barnes et al., 2007). In addition to fitting within existing theoretical frameworks such as attachment (Mikulincer & Shaver, 2007) and Self-Determination Theory (Deci & Ryan, 2008), recent theorizing inspired by the relational benefits of mindfulness has situated mindfulness as part of its own framework centering its dyadic effects on relationship outcomes (Atkinson 2013; Karremans et al., 2017; Kowlowski, 2013). However, an assumption of this emerging topic is that mindfulness is beneficial to relationship satisfaction. Though it is core to existing theory, evidence supporting this very assumption is limited, and to date no research has examined the possible boundary conditions of this relationship imposed by study-level moderators. This is problematic because it is possible that mindfulness may benefit only certain kinds of people or certain kinds of relationships. For example, perhaps the beneficial effects of mindfulness are found in studies with samples of mostly women, or within studies sampling an older population. Additionally, because this is an emerging area of study with a relatively small
pool of studies, the risk of publication bias (i.e., a phenomenon whereby the availability of research is contingent on its results) should be assessed in order to identify if this emerging consensus is a result of a selection effect where only the studies with the highest effect sizes and/or statistically significant tests are published and available. Therefore, the goals of the current study are to synthesize the existing literature to: (a) estimate the population effect size of the correlation between mindfulness and relationship satisfaction, (b) test the effects of moderator variables (i.e., age, gender, marital status, publication status, mindfulness measure dimensionality, meditation status), and (c) investigate the plausibility of publication bias.

**Mindfulness and Relationship Satisfaction**

Are mindful individuals more relationally satisfied? One of the first studies to test this was Carson et al.’s (2004) seminal trial of the Mindfulness-Based Relationship Enhancement program. Mindfulness-Based Relationship Enhancement (MBRE) was influenced by the positive psychology movement and focused on enhancing relationships for couples who are already happy with one another (Baer, 2003; Carson et al., 2004). The program was focused on preventing couples from reaching critical levels of relationship distress that could destabilize the relationship (Baer, 2003; Carson et al., 2004, 2007). MBRE was derived from Kabat-Zinn’s (1990) original Mindfulness-Based Stress Reduction (MBSR) therapy and involves the same focus on meditative practice, but with couples rather than individuals. It also included several couple-focused practices including: (1) emphasis on loving-kindness meditations, (2) partner yoga involving partners helping one another with yoga poses, (3) mindful touch exercises, (4) eye gazing exercises, (5) mindfully considering relationship difficulties, and (6) becoming mindful during shared activities as well as negative/stressful activities and situations. There is very little empirical support for the effectiveness of this intervention, at least partly due to
inherent ceiling effects when sampling a group of individuals who are already relatively happy with their relationships (as noted by Christensen & Heavey, 1999), but also because there have been relatively few studies looking at mindfulness among couples. But Carson et al. (2007) conducted a follow-up study suggesting that self-expanding activities such as mindful yoga were the therapeutic activities responsible for the observed increases to relationship satisfaction and decreases to relationship distress perhaps because these activities are self-expansive.

Without tying mindfulness to relationship theories, it is difficult to understand how and why mindfulness may benefit romantic relationships. Theoretical papers by Mikulincer and Shaver (2007) and Shaver, Lavy, Saron, and Mikulincer (2007) have begun to link mindfulness to attachment theory (Hazan & Shaver, 1987; Mikulincer & Shaver, 2003, 2007). Research already supports that mindfulness and secure attachment share neurological (e.g., neural regions associated with emotional regulation; Banks, Eddy, Angstadt, Nathan, & Phan, 2007; Gillath, Bunge, Shaver, Wendelken, & Mikulincer, 2005) and psychological correlates (e.g., Shaver et al., 2007; Siegel, 2007), share common antecedents and consequences (e.g., attentive caregiving during childhood; Ryan, Brown, & Creswell, 2007), and share a positive association with one another (e.g., Goodall, Trejnowska, & Darling, 2012; Pepping, Davis, O’Donovan, 2013; Saavedra et al., 2010; Saron & Shaver, 2006). For example, the same warm and responsive caregiving that is the foundation for secure attachment is the same foundation for mindfulness, and, moreover, securely attached individuals are more attentive to their partners – mindfulness is thought to facilitate partner attentiveness (Shaver et al. 2007). Relational mindfulness theory that is independent of other frameworks has also begun to emerge. Karremans et al. (2017) theorized that individuals higher in mindfulness possess a suite of beneficial intrapersonal attitudes and cognitions (e.g., better emotional regulation, self-other connectedness). These mechanisms are
the foundation for positive relationship processes (e.g., increased dyadic coping, pro-relationship behaviours), and, because of these mechanisms, mindfulness may improve one’s own relationship outcomes (an actor effect) and one’s partner’s relationship outcomes (a partner effect; Karremans et al., 2017). Stated differently, this framework proposes that the benefits of mindfulness on relationship outcomes is primarily indirect through salutary intra and interpersonal processes.

The Current Study

Relationship satisfaction has been a critical outcome in relationship research and in applied settings because it is often used to assess the effectiveness of therapy and treatments (Lundblad & Hansson, 2006; Shadish & Baldwin, 2003; Wood, Crane, Schaalje, & Law, 2005). Though satisfaction is not the only relationship outcome examined in the extant literature (e.g., distress, coping abilities; Lundblad & Hansson, 2006; Wood et al., 2005), the immense attention that has been paid to it (and its centrality within relationship models; Funk & Rogge, 2007) underscores the importance of this construct for the science of romantic relationships. Despite the still nascent literature on mindfulness in the romantic relationship context, mindfulness has already been used as the basis of at least one couple’s intervention (Carson et al., 2004, 2007), and mindfulness continues to be heavily theorized about and recommended as an avenue for future couple’s interventions and therapies (Atkinson, 2013; Karremans, 2017; Kozlowski, 2013). Furthermore, researchers continue to theorize on the mechanisms through which mindfulness may benefit relationship satisfaction (Karremans et al., 2017; Kozlowski, 2013) and how mindfulness may fit within existing theoretical frameworks like attachment (e.g., Mikulincer & Shaver, 2003, 2007).
Yet, the viability of such pursuits rests primarily on the basic assumption that mindfulness is indeed associated with increased relationship satisfaction – an observation that has yet to be thoroughly tested outside of the results of individual studies, which may be vulnerable to sampling bias or sampling idiosyncrasies. If Atkinson (2013), Karremans et al. (2017), and Kozlowski (2013) are correct in their assertion that mindfulness is beneficial for relationship satisfaction in some way, then meta-analytic work would support that mindfulness is correlated with relationship satisfaction and that these results are not tainted by publication bias - a phenomenon whereby the availability of research is contingent on its results through a publication process that favors “statistically significant” results (Rosenthal, 1979). If meta-analytic work presents null results, it may suggest that the underlying assumptions of these theories and interventions may not constructed upon solid empirical evidence and should be questioned. Furthermore, if publication bias is evident, it would call into question the empirical basis of these assumptions. Lastly, the association may not be consistent across study level moderators (e.g., age, marital status, gender) which would suggest that the association is unstable and alert researchers to important boundary conditions for the effects of mindfulness on relationship satisfaction. Alternatively, finding that the association is not conditional on certain moderators would suggest that the association is highly stable across different types of samples and may generalize better.

Karremans et al. (2017) note that examining moderators of the beneficial effects of mindfulness is a critical next step for empirical studies. However, the focus of that discussion was on moderators within individual study samples (Karremans et al., 2017). Understanding the effect of study-level moderators is critical because it brings to light the boundary conditions of the collective knowledge itself, and not just boundary conditions of findings from individuals
within samples (results of which may already be due to sampling idiosyncrasies). There are several study-level variables that warrant investigation as moderators. Mindfulness is strongly associated with meditation experience; meditators score higher on facets of mindfulness even after controlling for demographic variables (Baer et al., 2008; Carmody & Baer, 2008). Therefore, meditation is critically important to measure to prevent blind confounding or spurious associations (Baer et al., 2008; Carmody & Baer, 2008) because it is possible that the association between mindfulness and relationship satisfaction varies between frequent meditators and non-meditators. Furthermore, increased age is associated with both meditation experience (older individuals have more meditation experience) and the acting with awareness facet of mindfulness (Baer et al., 2008), which may result in differences in the association between mindfulness and relationship satisfaction due to sample age. Gender is also important to consider, particularly in the context of romantic relationships. Barnes et al. (2007) found important interactions between gender and mindfulness; higher mindfulness was associated with positive change in respect and support after relationship conflict for female participants only. Further, research by Parent et al. (2014) has shown that beneficial effects of mindfulness on marital satisfaction were only found for women. Thus, the effect of mindfulness on relational outcomes may be conditional on gender. Lastly, different measurement instruments of mindfulness measure different conceptualizations of the construct. Indeed, the dimensionality of mindfulness is an ongoing point of contention for researchers using self-report measures (for discussion, see Siegling & Petrides, 2014). For example, two of the most commonly used trait mindfulness self-report questionnaires, the FFMQ (Baer et al., 2006) and the MAAS (Brown & Ryan, 2004) measure a multi-faceted and unidimensional conceptualization, respectively. The multifaceted conceptualization measured in the FFMQ proposes that mindfulness is characterized by several
facets including observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience aspects; whereas, the MAAS focuses only on attention and awareness. Because these measures may capture different nuances in the association between mindfulness and relationship satisfaction, the strength of that association may be conditional on the dimensionality – it is possible that only certain facets may benefit relationship satisfaction and thus measurement dimensionality (unidimensional vs. multidimensional) may be a boundary condition for the effect of mindfulness on relationship satisfaction.

There is one meta-analysis aggregating the correlation between mindfulness and relationship satisfaction (McGill et al., 2016). Methodologically, McGill et al. (2016) used the appropriate meta-analytic model (i.e., use of a random-effects model); however, the scope of the review and the methods for testing heterogeneity and publication bias were limited. McGill et al. (2016) analyzed 12 effect sizes (from 10 studies) from published ($k = 8$) and unpublished ($k = 4$) sources that investigated the correlation between mindfulness and relationship satisfaction and found that the mean weighted correlation was .279 and homogenous between studies. They also assessed publication bias using visual inspection of a funnel plot and Rosenthal’s fail-safe number (Rosenthal, 1979) and concluded that there was no evidence of publication bias - though evidence from fail-safe inferences was mixed. The only test of heterogeneity was Cochran’s $Q$, which is known to for its poor ability to detect heterogeneity, particularly in smaller meta-analyses (Field & Gillett, 2010; Higgins, Thompson, Deeks, & Altman, 2003; Higgins & Thompson, 2002). The $H$ and $I^2$ index, which are among the most useful indicators of heterogeneity (Higgins & Thompson, 2002) were not presented. Additionally, there are many studies that were not included in McGill et al.’s (2016) review - there are more than twice as many studies available and many were published earlier than 2016 (thus it is unclear why they
were not included. Analysis of publication bias was severely limited in McGill et al. (2016) because Failsafe N is not recommended as it does not directly address the question of selection bias inherent to the publication bias phenomenon (Field & Gillett, 2010; Vevea & Woods, 2005), and is not considered to be among the most accurate and empirically supported tests in simulation studies (Carter, Schonbrodt, Gervais, & Hilgard, 2017; McShane et al., 2016).

Additionally, inspection of funnel plots should only be used as part of the initial stage of assessment, as they are highly subjective because they can capture asymmetry that is not due to publication bias (Egger, Smith, Schneider, & Minder, 1997; Field & Gillett, 2010) and the method is prone to error (Vevea & Woods, 2005). Using these two methods alone does not meet methodological standards for testing publication bias, which involve sensitivity analysis using selection models (Carter et al., 2017; McShane et al., 2016). Given the need for transparency and replicability in the social and psychological sciences (e.g., Funder et al., 2014), it is critical to rigorously examine publication bias and the file drawer problem particularly in emerging topics like this one. Lastly, McGill et al. (2016) did not test any moderator variables, which leaves questions about study-level boundary conditions unaddressed. Stronger meta-analytic work can provide such information for researchers and practitioners in this field.

**The Current Study**

Meta-analysis in the current study estimated the population effect size of the association between mindfulness and relationship satisfaction using a random effects model as the primary mode of inference. Next, a mixed-effects model was used to examine the conditional nature of the effect across several moderator variables: sample average age, sample gender distribution, the dimensionality of mindfulness measure used, the proportion of sample meditating, and the proportion married. Lastly, publication bias was investigated using selection models as
sensitivity analysis – which is among the most rigorous statistical methods currently available (Carter et al., 2017; McShane et al., 2016).

Method

Inclusion and exclusion criteria. PsychNET was searched with the following search terms: “mindful* AND relation* OR marri* AND satis* OR happ*” (the * symbol represents the wildcard function) between January and April of 2017. Following this initial search, notifications were added to PsychNET and Google Scholar which would notify us of any newly available articles. Articles were backward searched (using the references list in each article as a basis to check for further studies to include) and forward searched (reviewing studies that have subsequently cited that study). All searches were repeated using Web of Science and Google Scholar to ensure adequate coverage. Forward searching was conducted from (a) Kozlowski (2013) and (b) Karremans et al. (2017). In addition, backwards searching was performed based on several highly cited articles in the field of mindfulness more generally: (a) Kabat-Zin (1982), (b) Brown and Deci (2003), and (c) Bishop et al. (2004).

The following criteria were used to judge inclusion:

1) The study contained a correlation coefficient between mindfulness and relationship satisfaction, enough information to compute the correlation coefficient, or the authors responded to an email request to provide necessary information when it was apparent that both constructs were measured.

2) The study’s sample was of individuals who were in romantic relationships of some kind.

3) The study had an English language version.
Initially, 39 studies were captured by the broad initial search. Seventeen studies were removed because they were not relevant (i.e., were unduly captured by the search criteria), or the authors did not reply when the corresponding author was contacted (because the work was not available online or through inter-library loans). Of the emails that were sent to authors to inquire about data (five inquiries), one no longer had access, and one returned the requested information. The remainder did not reply. Before this article was submitted for review, a final search was performed in April of 2018; this search produced an additional six studies that had been made available or published.

In addition to required data for the meta-analysis (i.e., sample size and Pearson’s $r$ values), the following data were recorded (determined a priori) by two coders (the first author and an undergraduate research assistant): (a) information about the study (i.e., publication year, publication status, where it was published, and which search engine it was obtained from), and (b) information about the sample and results necessary for moderation analysis (i.e., sample size, sample age, the proportion of sample that was married, the proportion of sample who were women/men, proportion of sample reporting any kind of meditation experience), as well as metric information (i.e., measure of mindfulness, measure of relationship satisfaction). If the study did not contain this information, the cell was left blank and coded as missing data. The first author and an undergraduate research assistant both checked for differences in coding, and there were no disparities. Because the protocol retrieved only very basic study data and there were no errors or discrepancies between coders, Cohen’s kappa (Cohen, 1960) inter-rater agreement was not calculated.

For the moderators, publication status was coded as a binary categorical variable—published or unpublished. Dimensionality of mindfulness was also a binary categorical variable
– any mindfulness measure that consisted of multiple underlying factors was coded as being multi-dimensional versus unidimensional. Proportional variables such as the percentage of sample married and gender (recorded as a percentage of a sample characterized by that feature) were retained as continuous variables for analysis – these continuous moderators were proportion married, the proportion who were women, and the proportion reporting any meditation experience.

**Data integration.** Each case in the meta-analysis utilized an independent sample. If a study included multiple but independent samples, they were treated as independent entities within the meta-analysis (i.e., Kappen, Karremans, Burk, & Buyukcan-Tetik, 2018). Studies with multiple timepoints assessing the association between mindfulness and relationship satisfaction were treated as dependent samples, and a single effect size was calculated by taking the average across timepoints (i.e., Barnes et al., 2007; Khaddouma & Gordon, 2018). Some studies displayed only subscale score correlations and not total score correlations (e.g., scale scores for five facets of the FFMQ) – in these cases, correlations between each subscale and mindfulness were averaged to a single correlation between mindfulness and relationship satisfaction. Few studies used a dyadic design, presenting both actor and partner correlations. In these cases (i.e., Adair, Boulton, & Algoe, 2018; Kappen, Karremans, Burk, Buyukcan-Tetik, 2018; Khaddouma & Gordon, 2018; Pakenam & Samios, 2013; Williams & Cano, 2014; Zamir, Gwirtz, & Zhang, 2017), only actor correlations were recorded to retain consistency with the majority of individual, non-dyadic studies (i.e., non-dyadic, individual level studies record only actor effects) included in the meta-analysis - the partner effect infers a very different type of effect than the actor effect and it was deemed not appropriate to combine them for meta-analysis. Lastly, one study (Barnes et al., 2007) included two measures of relationship satisfaction on the same
sample, one of which was the Dyadic Adjustment Scale (DAS; Spanier, 1987) and one was the satisfaction subscale of the Investment Model Scale (IMS; Rusbult, Martz, & Agnew, 1998). In this case, because the DAS was most commonly used in the acquired literature and is one of the most frequently used scales overall in the literature (Funk & Rogge, 2007), only the correlation between mindfulness and DAS was recorded from that study.

**Data Analysis**

Data were analyzed using the *metafor* package for R (Viechtbauer, 2010). Random effects models allow for unconditional inferences (i.e., conclusions about the relationships of interest beyond only the studies included in the meta-analytic sample; Borenstein, Hedges, Higgins, & Rothstein, 2009; Hedges & Vevea, 1998) and are recommended instead of a fixed effects model because their assumptions are generally more tenable (Field & Gillett, 2010; Viechtbauer, 2010). Therefore, it was decided a priori that the focus of this meta-analysis would be on presenting inferences based on random and mixed-effects (including moderators) models; however, a fixed effects model will briefly be presented for comparison and transparency.

The random effects models were estimated using the Restricted Maximum Likelihood (REML) estimator (Viechtbauer, 2010), and the standard errors were corrected with the Hartung-Knapp adjustment (Hartung & Knapp, 2001). REML is commonly recommended because of its positive statistical properties in a variety of meta-analysis conditions (Viechtbauer, 2005), and the Hartung-Knapp adjustment (only applicable for random effects models and mixed-models) is recommended to control for Type I error rates (Cornell et al., 2014; Hartung & Knapp, 2001). Lastly, standard approaches to significance testing of meta-analytic estimates rely on the assumption of normality. To support the conclusions of the significance testing in this meta-analysis, *p*-values based on iterative permutation tests (using 1000 iterations) which do not rely
on normality are also presented for comparison. To test for heterogeneity of effect sizes, the inconsistency index $I^2$ that represents heterogeneity percentage is presented (values above 25% suggest little heterogeneity, above 50% suggest moderate heterogeneity, above 75% suggest substantial heterogeneity; Higgins & Thompson, 2002; Higgins, Thompson, Deeks, & Altman, 2003), the Cochran’s $Q$ test that suggests heterogeneity when statistically significant (Cochran, 1954), the $H$ index (values above 1.5 suggest heterogeneity; Higgins & Thompson, 2002), and Tau and $T^2$ (study to study variance; Borenstein et al., 2009). The 95% confidence intervals for each of these indices are also provided.

**Moderators.** The effect of moderators was estimated with several mixed-effects models – one estimated separately for each moderator. The decision to pursue moderation analysis and choice of moderators was a priori and based on a review of the literature – it was not dependent on initial tests of heterogeneity (i.e., moderators were tested even if statistical tests showed that effect sizes were homogenous). It is still appropriate to explore potential moderators even when tests of heterogeneity are non-significant because these heterogeneity tests lack statistical power (Field & Gillett, 2010), and do not present information about whether there is covariate-related heterogeneity in the effect sizes (Thompson & Higgins, 2002). The moderators were not analyzed together in a single analysis because some moderators had a large amount of missing data. Were they to be aggregated and analyzed together in a single model, the cumulative amount of data after listwise deletion would reduce the overall analytic sample size dramatically and thus the power of the overall test.

**Publication bias.** In this study, publication bias was tested: (a) using publication status (Published/Unpublished) as a moderator, (b) through visual inspection of funnel plots of the standard error and sampling variance, (c) with regression tests of funnel plot asymmetry for
standard error and sampling variance (e.g., Egger, Smith, & Phillips, 1997), and (d) utilizing Vevea and Woods’ (2005) method of a priori weighted selection models used as sensitivity analysis. Vevea and Woods’s (2005) weighted selection model method is a modified version of Hedges’ (1984) original selection model method and is among the most rigorous methods currently available (Carter et al., 2017; McShane et al., 2016). Hedges’ (1984) original selection model methods involved adjusting effect size estimates for biases due to the size, direction, and statistical significance of results (Hedges, 1984; McShane, Bockenholt, & Hansen, 2016). Recent simulation studies have found that selection models perform better than all the other commonly used corrective methods including Trim and Fill, and better than recently developed methods including $p$-curve, and $p$-uniform (Carter et al., 2017; McShane et al., 2016). However, selection models are limited in smaller sample sizes and are currently recommended as sensitivity analysis – not as an explicitly corrective procedure (McShane et al., 2016; Vevea & Woods, 2005). Vevea and Woods (2005) developed a sensitivity analysis using weighted selection models, where the weights are selected a priori to curtail some of the issues introduced by small sample sizes. Using selection models as a sensitivity analysis involves adjusting for several different forms and severities of publication bias (selected a priori) to produce a range of corrected estimates reflecting different publication bias severities (McShane et al., 2016; Vevea & Woods, 2005). The researcher then compares the adjusted estimates to the unadjusted estimate - if the adjusted estimates are not substantially different from the unadjusted estimate, this suggests that the data is not particularly sensitive to publication bias (McShane et al., 2016; Vevea & Woods, 2005).

**Results**

**Descriptive Results**
Twenty-eight independent samples were included in this meta-analysis, comprising 5,541 participants total. The mean sample size was 245, with the smallest sample being 24 and the largest being 1702. Aggregated across studies, the average age of samples was 33 years \((k=24)\), with a minimum sample average age of 18, a maximum of 59 and a median of 34. Together, the proportion of samples that were married was almost 60\% (58.52\%, \(k = 19\)), with samples on average featuring mostly females (61.94\%, \(k = 26\)) and fewer men proportionally (38.02\%, \(k = 26\)). Only seven studies reported on the meditation status of their samples; the average percentage that reported any meditation experience was 36.60\% \((k = 6)\). Lastly, 20 samples (71\%) were from published sources, and eight (29\%) were unpublished (see Table 1).

The Five Factor Mindfulness Questionnaire (FFMQ; Baer et al., 2006) was the most commonly used measure of mindfulness \((k = 16)\), and the Mindfulness Attention and Awareness Scale (MAAS; Brown & Ryan, 2003) was less common \((k = 9)\).
Table 1
Summary of Research Items for Meta-Analysis

<table>
<thead>
<tr>
<th>Sample #</th>
<th>Authors</th>
<th>Published</th>
<th>N</th>
<th>r</th>
<th>Measure</th>
<th>% Women</th>
<th>% Meditating</th>
<th>% Married</th>
<th>Average Age</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jones, Welton, Oliver, &amp; Thornburn (2011)</td>
<td>Y</td>
<td>104</td>
<td>.244</td>
<td>FFMQ</td>
<td>73</td>
<td>NA</td>
<td>100.000</td>
<td>35</td>
<td>.710</td>
</tr>
<tr>
<td>2</td>
<td>Burpee &amp; Langer (2005)</td>
<td>Y</td>
<td>95</td>
<td>.277</td>
<td>Mindfulness Scale</td>
<td>58</td>
<td>NA</td>
<td>100.000</td>
<td>NA</td>
<td>.670</td>
</tr>
<tr>
<td>3</td>
<td>Lenger, Gordon, &amp; Nguyen (2017)</td>
<td>Y</td>
<td>361</td>
<td>.24</td>
<td>FFMQ</td>
<td>52</td>
<td>NA</td>
<td>100.000</td>
<td>52.46</td>
<td>.997</td>
</tr>
<tr>
<td>4</td>
<td>Khaddmouma, Coop Gordon, &amp; Bolden (2015b)</td>
<td>Y</td>
<td>322</td>
<td>.166</td>
<td>FFMQ</td>
<td>76.4</td>
<td>NA</td>
<td>0</td>
<td>18.79</td>
<td>.994</td>
</tr>
<tr>
<td>5</td>
<td>Khaddouma, Coop Gordon, &amp; Bolden (2015a)</td>
<td>Y</td>
<td>104</td>
<td>.24</td>
<td>FFMQ</td>
<td>64.4</td>
<td>NA</td>
<td>0</td>
<td>18.06</td>
<td>.710</td>
</tr>
<tr>
<td>6</td>
<td>Asber (2015)</td>
<td>N</td>
<td>78</td>
<td>.48</td>
<td>MAAS</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>45</td>
<td>.583</td>
</tr>
<tr>
<td>7</td>
<td>Horst (2014)</td>
<td>N</td>
<td>275</td>
<td>.15</td>
<td>MAAS</td>
<td>80</td>
<td>NA</td>
<td>NA</td>
<td>20</td>
<td>.984</td>
</tr>
<tr>
<td>8</td>
<td>Pakenham &amp; Samios (2013)</td>
<td>Y</td>
<td>138</td>
<td>.31</td>
<td>MAAS</td>
<td>50</td>
<td>NA</td>
<td>NA</td>
<td>42.17</td>
<td>.827</td>
</tr>
<tr>
<td>9</td>
<td>Gambrel &amp; Piercy (2015)</td>
<td>Y</td>
<td>66</td>
<td>.121</td>
<td>FFMQ</td>
<td>52</td>
<td>54.5</td>
<td>75.800</td>
<td>31.67</td>
<td>.512</td>
</tr>
<tr>
<td>10</td>
<td>Wiggins (2013)</td>
<td>N</td>
<td>331</td>
<td>.281</td>
<td>FFMQ</td>
<td>76</td>
<td>42.6</td>
<td>NA</td>
<td>NA</td>
<td>.995</td>
</tr>
<tr>
<td></td>
<td>Study Reference</td>
<td>Sample</td>
<td>FFMQ</td>
<td>FFMQ Raw</td>
<td>MAAS</td>
<td>MAAS Raw</td>
<td>Gender</td>
<td>N</td>
<td>MAAS N</td>
<td>MAAS N Raw</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------</td>
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</tr>
<tr>
<td>11</td>
<td>Orniston (2012)</td>
<td>N</td>
<td>300</td>
<td>.18</td>
<td>MAAS</td>
<td>72</td>
<td>39</td>
<td>49.000</td>
<td>38</td>
<td>.990</td>
</tr>
<tr>
<td>12</td>
<td>Saavedra, Chapman, &amp; Rogge (2010)</td>
<td>Y</td>
<td>1702</td>
<td>.25</td>
<td>MAAS</td>
<td>79</td>
<td>NA</td>
<td>46.000</td>
<td>28.5</td>
<td>1.00</td>
</tr>
<tr>
<td>13</td>
<td>Michaels (2009)</td>
<td>N</td>
<td>24</td>
<td>.175</td>
<td>KIMS</td>
<td>66.7</td>
<td>NA</td>
<td>NA</td>
<td>45.63</td>
<td>.213</td>
</tr>
<tr>
<td>14</td>
<td>Barnes, Brown, Krusemark, Campbell, &amp; Rogge (2007)</td>
<td>Y</td>
<td>89</td>
<td>.285</td>
<td>MAAS</td>
<td>73</td>
<td>NA</td>
<td>3.000</td>
<td>19.3</td>
<td>.641</td>
</tr>
<tr>
<td>15</td>
<td>Barnes, Brown, Krusemark, Campbell, &amp; Rogge (2007)</td>
<td>Y</td>
<td>104</td>
<td>.37</td>
<td>MAAS</td>
<td>50</td>
<td>NA</td>
<td>NA</td>
<td>20.05</td>
<td>.710</td>
</tr>
<tr>
<td>16</td>
<td>Wachs &amp; Cordova (2007)</td>
<td>Y</td>
<td>66</td>
<td>.37</td>
<td>MAAS</td>
<td>50</td>
<td>NA</td>
<td>100.000</td>
<td>39</td>
<td>.512</td>
</tr>
<tr>
<td>17</td>
<td>Maniaci (2016)</td>
<td>N</td>
<td>350</td>
<td>.17</td>
<td>FFMQ</td>
<td>50</td>
<td>NA</td>
<td>100.000</td>
<td>28</td>
<td>.996</td>
</tr>
<tr>
<td>18</td>
<td>Williams &amp; Cano (2014)</td>
<td>Y</td>
<td>102</td>
<td>.285</td>
<td>FFMQ</td>
<td>47.00</td>
<td>NA</td>
<td>100.000</td>
<td>58.84</td>
<td>.701</td>
</tr>
<tr>
<td>19</td>
<td>Parent, Clifton, Forehand, Goubl, Reid &amp; Pichler (2014)</td>
<td>Y</td>
<td>242</td>
<td>.28</td>
<td>FFMQ</td>
<td>50</td>
<td>NA</td>
<td>0</td>
<td>38.5</td>
<td>.971</td>
</tr>
<tr>
<td>20</td>
<td>Smith (2015)</td>
<td>N</td>
<td>222</td>
<td>.13</td>
<td>FFMQ</td>
<td>100</td>
<td>NA</td>
<td>100.000</td>
<td>NA</td>
<td>.958</td>
</tr>
<tr>
<td>21</td>
<td>Giolzetti (2011)</td>
<td>N</td>
<td>328</td>
<td>.308</td>
<td>FFMQ</td>
<td>79</td>
<td>NA</td>
<td>0</td>
<td>NA</td>
<td>.994</td>
</tr>
<tr>
<td></td>
<td>Authors</td>
<td>Year</td>
<td>Sample Size</td>
<td>Mean</td>
<td>SD</td>
<td>Scale</td>
<td>T1 Mean</td>
<td>T2 Mean</td>
<td>Mean Difference</td>
<td>p-value</td>
</tr>
<tr>
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<td>----</td>
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<td>---------</td>
<td>---------</td>
<td>-----------------</td>
<td>---------</td>
</tr>
<tr>
<td>22</td>
<td>Kraft, Haeger, &amp; Levin (2017)</td>
<td>Y</td>
<td>138</td>
<td>.261</td>
<td></td>
<td>Philadelphia Mindfulness Scale</td>
<td>60.90</td>
<td>NA</td>
<td>36.20</td>
<td>22.59</td>
</tr>
<tr>
<td>23</td>
<td>Kappen, Karremans, Burk, &amp; Buyukcan-Tetik (2018)</td>
<td>Y</td>
<td>190</td>
<td>.32</td>
<td></td>
<td>FFMQ</td>
<td>50</td>
<td>44.21</td>
<td>44.000</td>
<td>33.66</td>
</tr>
<tr>
<td>24</td>
<td>Kappen, Karremans, Burk, &amp; Buyukcan-Tetik (2018)</td>
<td>Y</td>
<td>140</td>
<td>.33</td>
<td></td>
<td>FFMQ</td>
<td>51</td>
<td>21</td>
<td>NA</td>
<td>35.07</td>
</tr>
<tr>
<td>25</td>
<td>Kappen, Karremans, Burk, &amp; Buyukcan-Tetik (2018)</td>
<td>Y</td>
<td>118</td>
<td>.13</td>
<td></td>
<td>FFMQ</td>
<td>NA</td>
<td>60.000</td>
<td>48.7</td>
<td>.764</td>
</tr>
<tr>
<td>26</td>
<td>Khaddouma &amp; Gordon (2018)</td>
<td>Y</td>
<td>376</td>
<td>.23</td>
<td></td>
<td>FFMQ</td>
<td>50</td>
<td>NA</td>
<td>0.000</td>
<td>18.4</td>
</tr>
<tr>
<td>27</td>
<td>Adair, Boulton, &amp; Algoe (2018)</td>
<td>Y</td>
<td>254</td>
<td>.102</td>
<td></td>
<td>MAAS (State)</td>
<td>50.8</td>
<td>NA</td>
<td>27.07</td>
<td>42.1</td>
</tr>
<tr>
<td>28</td>
<td>Zamir, Gewirtz, &amp; Zhang (2017)</td>
<td>Y</td>
<td>228</td>
<td>.295</td>
<td></td>
<td>FFMQ</td>
<td>50</td>
<td>NA</td>
<td>97.80</td>
<td>35.3</td>
</tr>
</tbody>
</table>
**Power estimates.** Power estimates of each study are appended to Table 1. For these power calculations, alpha was .05, the effect size estimate was .24 (the population estimate from the random effects model below), and \( n \) was the size of the respective study’s sample. Statistical power ranged widely from .21 (Michaels, 2009) to 1.00 (Saavedra et al., 2010). Overall, 11 (39%) samples did not have adequate (> .80) power. Sampled studies appeared underpowered overall. Minimum sample requirements for adequate (80%) power to detect an effect size of .24, as well as power for the lower \( (r = .22) \) and upper \( (r = .28) \) limits of the 95% confidence intervals were calculated. Results showed that a sample size of at least 167 was required for adequate power (> .80) assuming the lower level confidence interval of the estimate \( (r = .22) \), 98 assuming the upper-level confidence interval of the estimate \( (r = .28) \), and 126 assuming the point estimate \( (r = .24) \).

**Fixed Effects Model**

A fixed effects model showed that the weighted mean effect size of the correlation between mindfulness and relationship satisfaction was \( r = .24 \) \((SE = .01, 95\% CI [.22, .27])\), and significant \((p < .001)\), and that the effect was homogenous across studies \( Q (27) = 36.96, p = .10 \). Results of significance testing were verified using a permutation procedure and \( p \)-values are compared in Table 1. According to the fixed effects model, there was a medium-sized (Cohen, 1969) positive correlation between mindfulness and relationship satisfaction. Individuals who were more mindful reported being more satisfied in their relationships.

**Random Effects Model**

The random effects model showed that the weighted mean effect size was \( r = .24 \) \((r^2 = .06)\) and significant \((SE = .02, 95\% CI [.21, .28], p < .001)\). Results of significance testing were
verified using a permutation test and p values are compared in Table 2 – permutation results were consistent. Figure 1 shows the individual study estimates and the effect size estimate in a forest plot. Thus, according to the random effects model, there was a medium-sized (Cohen, 1969) positive correlation between mindfulness and relationship satisfaction. Individuals who were more mindful reported being more satisfied in their relationships.

Table 2.

Summary of Standard and Permutation p-values.

<table>
<thead>
<tr>
<th>Method</th>
<th>p-value</th>
<th>Permutation p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed effects</td>
<td>&lt;.001</td>
<td>.001</td>
</tr>
<tr>
<td>Random effect</td>
<td>&lt;.001</td>
<td>.001</td>
</tr>
</tbody>
</table>
Figure 1. Forest Plot of the Random Effects Model. Study numbers correspond to those shown in Table 2. Values shown are Fisher’s Z-Transformed Correlation Coefficients and their 95% confidence intervals. Study number corresponds to samples shown in Table 1.

Tests of heterogeneity showed that there were minimal levels of heterogeneity (Table 3). The $Q$ test was not significant, $Q (27) = 38.91, p = .07$, suggesting homogeneity of estimates. The $I^2$ value was on the low end of the 25-50 range, suggesting that there is minimal variability between studies. $H^2$ values greater than 1 suggest that there is some unexplained heterogeneity, values greater than 1.5 suggest substantial heterogeneity – in this study, the value was greater than 1 but smaller than 1.5. Overall, heterogeneity estimates indicated that there was a small degree of heterogeneity between studies. However, it should be noted that the confidence
intervals were wide – the point estimates of heterogeneity should be interpreted with caution as they appear highly inaccurate.

Table 3.

Summary of Heterogeneity Estimates and their 95% Confidence Intervals

<table>
<thead>
<tr>
<th>RE (k=28)</th>
<th>Estimate</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T^2$ (SE)</td>
<td>.001 ($SE = .001$)</td>
<td>[.00, .01]</td>
</tr>
<tr>
<td>$I^2$</td>
<td>25.71%</td>
<td>[.00%, 67.23%]</td>
</tr>
<tr>
<td>$H^2$</td>
<td>1.35</td>
<td>[1.00, 3.05]</td>
</tr>
</tbody>
</table>

Moderator Analyses

None of the proposed moderators were significant; the correlation between mindfulness and relationship satisfaction was stable across publication status (published/unpublished), sample age, the percentage of the sample who were women, the percentage who were married, the percentage of participants who reported meditation, and dimensionality of mindfulness measure (Table 4).

Publication Bias

Funnel plot assessment. Several funnel plots are shown in Figure 2. Overall, these plots appear mostly symmetrical and the points are primarily within the white region or light grey region, suggesting no publication bias. Funnel plot asymmetry was also statistically tested using regression techniques (see Table 5). None of these tests were significant, which compliments results from visual inspection of the funnel plots. These results are suggestive of no publication bias.
Figure 2. Funnel Plots with Different Y-Axis. Panel A: standard error; Panel B: variance; Panel C: inverse standard error; Panel D: inverse sampling variance. The area within the white region represents a 90% confidence region; area within the light grey region represents a 95% confidence region; area within the dark grey region represents a 99% confidence region.

Table 4.

Summary of Regression Tests of Funnel Plot Asymmetry

<table>
<thead>
<tr>
<th>Predictor</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Error</td>
<td>.677</td>
<td>.504</td>
</tr>
<tr>
<td>Sampling Variance</td>
<td>.489</td>
<td>.629</td>
</tr>
</tbody>
</table>
Results of moderation analysis with publication status (published/unpublished) as a moderator showed that the effect size was not conditional on publication status. Figure 3 shows a box plot of the published and unpublished studies. Visual inspection of the boxplot suggested that the unpublished studies do appear to have a smaller effect size, and broader quartile range compared to those that are published, though not to such a degree as to be statistically significant per the moderation model (Table 4).

*Figure 3. Box Plots of Effect Sizes for Published and Unpublished Studies.*
Table 5.

Summary of Mixed-Models Testing the Effect of Moderator Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>k</th>
<th>Regression Coefficient [95% CI]</th>
<th>p-value</th>
<th>Permutation p-value</th>
<th>$R^2$</th>
<th>$I^2$</th>
<th>$H^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publication</td>
<td>28</td>
<td>-.021 [-.088, .046]</td>
<td>.518</td>
<td>.457</td>
<td>0%</td>
<td>28.10%</td>
<td>1.39</td>
</tr>
<tr>
<td>Age</td>
<td>24</td>
<td>.002 [-.001, .005]</td>
<td>.207</td>
<td>.184</td>
<td>23.96%</td>
<td>19.86%</td>
<td>1.25</td>
</tr>
<tr>
<td>Women</td>
<td>26</td>
<td>-.001 [-.003, .001]</td>
<td>.180</td>
<td>.198</td>
<td>0%</td>
<td>19.41%</td>
<td>1.24</td>
</tr>
<tr>
<td>Married</td>
<td>19</td>
<td>-.000 [-.001, .001]</td>
<td>.821</td>
<td>.836</td>
<td>0%</td>
<td>0%</td>
<td>1.00</td>
</tr>
<tr>
<td>Meditation</td>
<td>6</td>
<td>-.003 [-.009, .004]</td>
<td>.301</td>
<td>.254</td>
<td>0%</td>
<td>13.84%</td>
<td>1.16</td>
</tr>
<tr>
<td>Dimensionality</td>
<td>28</td>
<td>.034 [-.033, .101]</td>
<td>.310</td>
<td>.289</td>
<td>0%</td>
<td>30.78%</td>
<td>1.44</td>
</tr>
</tbody>
</table>

Note. $R^2$ shows proportion of residual heterogeneity accounted for by the moderator, $I^2$ is an estimate of the remaining heterogeneity after accounting for the moderator. Regression coefficients are unstandardized.

**Sensitivity analysis.** The Vevea and Woods (2005) a priori weighted selection model method was used to test several models of selection bias representing plausible processes by which studies are selected to be published. As seen in Table 6, under each proposed model of
publication bias, the estimate of the correlation is similar to the estimate produced by the uncorrected model. In the most severe selection models, the estimated effect size changes by only 2.04%. Therefore, the effect size estimate appears robust to the effects of moderate and severe one- and two-tailed publication bias.

Table 6.


<table>
<thead>
<tr>
<th>Model</th>
<th>Zr</th>
<th>Percent change</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unadjusted estimate</td>
<td>.245</td>
<td>-</td>
<td>.240</td>
</tr>
<tr>
<td>Moderate One-Tailed Selection</td>
<td>.242</td>
<td>1.224%</td>
<td>.238</td>
</tr>
<tr>
<td>Severe One-Tailed Selection</td>
<td>.240</td>
<td>2.041%</td>
<td>.235</td>
</tr>
<tr>
<td>Moderate Two-Tailed Selection</td>
<td>.242</td>
<td>1.224%</td>
<td>.238</td>
</tr>
<tr>
<td>Severe Two-Tailed Selection</td>
<td>.240</td>
<td>2.041%</td>
<td>.235</td>
</tr>
</tbody>
</table>

*Note.* Percent change listed is comparing each adjusted *r* estimate to the unadjusted *r* estimate. There are differences (to the 3rd decimal point) compared to the random effect estimate in the current study. This is due to unchangeable limitations of the macro used to estimate the weighted selection models because it uses the Fisher’s Z transformation of the correlation coefficient, whereas the effect size estimate in the current study was estimated with the REML estimator.

**Summary of publication bias results.** In summary, none of the methods used here to test publication bias suggest that there is bias. Most attention should be paid to the results of the sensitivity analysis, as it is considered among the premier methods of assessing for publication bias at present (Carter et al., 2017; McShane et al., 2016; Vevea & Woods, 2005), results of
which suggested that the association between mindfulness and relationship satisfaction was robust to both moderate and mild selection bias.

**Discussion**

The current study sought to estimate the population effect size of the association between mindfulness and relationship satisfaction, to examine the possibility of publication bias, and to examine potential moderators using meta-analysis. It expands on the only existing quantitative review (e.g., McGill et al., 2016) by using the most rigorous meta-analytic methods, explores new research questions related to the boundary conditions of moderator variables, and explores the effect of hypothetical selection models on the effect size estimate.

**The Association Between Mindfulness and Relationship Satisfaction**

Results showed that the average population effect size of mindfulness on relationship satisfaction was .244 and significant, constituting a medium effect size according to conventions (Cohen, 1992). However, note that this only represents approximately 5.9% of the variance in relationship satisfaction accounted for by mindfulness. In addition, the effect was homogenous, though confidence intervals for heterogeneity tests were wide suggesting that the point estimates may not be reliable assessments of homogeneity. Mixed-effects models testing moderator variables supported that none of the coded moderators were statistically significant. When considering the analyses of publication bias, all indicators seem to suggest that the estimate is robust to publication bias. Funnel plots appeared symmetrical, statistical tests supported funnel plot symmetry, and sensitivity analysis using Vevea and Woods’s (2005) method showed that the effect size was not sensitive to a variety of selection models.
Several inferences are comparable to McGill et al. (2016), though the effect size estimate in the current study is slightly lower than their .28 estimate. This minor difference is likely due to this review having more than twice as many samples and thus is likely a more stable estimate. Though inferences for publication bias are mostly the same, the methods used are different and conform with existing standards for rigor in meta-analysis. Further, findings expand on previous work by also presenting evidence for the stability of this effect across several moderators.

**Explanations and Theoretical Implications of Finding**

Though results support the connection between mindfulness and relationship satisfaction, it remains unclear about exactly how this occurs. Attachment may provide one explanation of the underlying mechanisms (Hazan & Shaver, 1987; Mikulincer & Shaver, 2003, 2007). In the attachment activation model, an individual’s perception of relational threats can trigger an attachment response, resulting in adaptive (attachment security responses) or maladaptive (anxious or avoidant responses) behaviours. Shaver et al. (2007) theorized that mindfulness may influence attachment because people higher in mindfulness may be better equipped to articulate and notice their own thoughts, needs and feelings. Due to this increased capacity to notice and be attentive to one’s internal mental state, highly mindful individuals may have a better integrated internalization of their attachment figures (Shaver et al., 2007). Regardless, future research and theorizing into the connections between mindfulness and theoretical frameworks like attachment should be continued because embedding the emerging science of mindfulness as social construct into existing social theory strengthens the network of knowledge. Findings of the current study nevertheless support the auxiliary assumptions underlying existing theory – mindfulness does appear to have a consistently positive effect on relationship satisfaction that is not conditional on idiosyncrasies of sample characteristics and this association appears robust to publication bias.
effects. This is particularly important when contextualized within growing theoretical and empirical research into the relationship benefits of mindfulness (Atkinson, 2013; Karremans et al., 2017) and the emergence of couple’s-based mindfulness programs like the MBRE (Carson, Carson, Gil, & Baucom, 2007).

As inquiry into a topic grows and evidence accumulates supporting the direct relationship between two constructs, researchers increasingly turn to the examining the indirect and/or conditional nature of these effects (Hayes, 2018). Results of this meta-analysis do suggest that the assumptions underlying Karremans et al.’s (2017) research agenda are tenable – mindfulness appears to have a significant positive association with relationship satisfaction at the population level. Researchers should continue investigating indirect mechanisms of this association. Though the results of the current study do not include dyadic partner effects the possibility of a dyadic effect – that mindfulness may also influence the outcomes and relationship processes of one’s partner (e.g., Karremans et al., 2017) is intriguing and should be investigated further.

The consistency of these findings across moderators suggests that the relationship between mindfulness and relationship satisfaction is also stable across age, gender, meditation, the dimensionality of measurement, and marital status. The stability of this relationship across gender contrasts previous results by Parent et al. (2014), which found that the association between mindfulness and relationship satisfaction was only significant for women. It is possible that Parent et al.’s (2014) results were due to idiosyncrasies of their particular sample and may not be represented in the population. Alternatively, null moderation results overall may be due to lack of power to detect moderating effects in part due to the small number of studies included in the review. Notwithstanding limitations due to statistical power, consistency across moderators suggests that the effect is widely generalizable regardless of age, gender, meditation status, and
marital status. Given this generalizability, mindfulness may be a critical relationship factor to examine in future studies and foster through interventions.

Perhaps most importantly, publication bias was thoroughly tested in this study, and no evidence for a substantial file drawer problem was found. This is critical because it suggests that this association and the theoretical assumptions which were built upon it are tenable and are robust to publication bias. Researchers and practitioners can be reasonably confident that the results of previous studies reflect a population effect and not an overrepresentation of significant studies.

**Methodological Implications, Limitations, and Future Directions**

One limitation of the existing body of work in this area is to the lack of meditation status data – a variable with the potential to serve as a significant confounder. Given that the relationship between mindfulness and meditation is well established in the empirical literature (Baer et al., 2008; Carmody & Baer, 2008), scholars should ask questions and report about meditation when considering mindfulness in any context or risk significant confounding (Baer, 2015). Though moderation analysis suggests that the effect of mindfulness on relationship satisfaction is stable across samples with different proportions of meditators, it is important to note that the amount of missing data on meditation was high \(k = 5\), and analysis of this moderating effect likely does not have adequate statistical power for reliable conclusions.

For the most part, researchers utilized common measures of both mindfulness (FFMQ and MAAS). The choice between using the FFMQ and MAAS for mindfulness is not simply one of metric validity or reliability - the choice contains assumptions about the underlying dimensionality of mindfulness. The FFMQ and MAAS conceptualizations do not entirely
overlap (see Pirson et al., 2012; Siegling & Petrides, 2014). Stated differently, researchers should be cognizant of making a “jingle” fallacy – a jingle fallacy is a measurement fallacy that occurs when it is mistakenly assumed that measures sharing the same name measure the same construct (Kline, 2015). In this case, both the MAAS and the FFMQ are titled as “mindfulness”, yet “mindfulness” may refer solely to attention and awareness (as is the case with the MAAS), or it may refer to a collection of facets including non-reactivity, observing, acting with awareness, describing, and non-judging (as is the case with the FFMQ). In this study, the FFMQ was the most commonly used measure, which does suggest that many researchers consider mindfulness to consist of multiple facets and not necessarily as a strictly unidimensional construct. This issue of measurement if further complicated by deeper methodological concerns related to measurement invariance – the underlying structure of mindfulness may be fundamentally different across important groups. Indeed, some studies suggest this is the case with the FFMQ – the describe subscale for the FFMQ appears to be supported only for experienced meditators but not for non-meditators (Baer et al., 2008). This suggests that the fundamental basis of mindfulness may be different between meditators and non-meditators – an important measurement invariance problem that should be addressed directly.

Using the population effect size estimate of the association between mindfulness and relationship satisfaction presented here as the basis, almost 40% of the samples included in this meta-analysis did not meet the .80 convention for adequate statistical power. Small sample sizes appear to be a critical issue in this area currently. This study presented guidance for future researchers – their studies need at least 98 participants for acceptable levels of power, but ideally more than 167 to detect this effect. Note that these recommendations are only for detecting the bivariate correlation between mindfulness and relationship satisfaction, and do not apply to more
complex analyses. Samples would need to be even larger to estimate indirect and/or conditional effects (i.e., Karremans et al., 2017).

**Limitations and Future Research.** One limitation to meta-analysis is that the conclusions produced by the analysis are only as rigorous as the studies reviewed. This meta-analysis included primarily cross-sectional studies using self-report measures, a minority of which were dyadic, and only one including multiple time points. While this design homogeneity is helpful for producing the level of similarity required to make appropriate meta-analytic comparisons, a valid critique of the findings is that they represent mostly the accumulated cross-sectional knowledge of low powered studies. It is possible that unaccounted-for variables may still be inducing spuriousness in the relationship between mindfulness and relationship satisfaction. In addition, the sample of studies reviewed in this meta-analysis is small, and the effects of this are evident in the wide confidence intervals for heterogeneity tests. Additionally, collation of each mindfulness score into a single “mindfulness” effect size may obfuscate differential associations between certain facets of mindfulness and relationship satisfaction. Future research should investigate these differential associations. However, ongoing debate about the underlying dimensionality of the mindfulness construct may make future investigations of facets problematic. The scope of this review has extensive coverage of the existing research on this topic; however, the body of research itself requires more studies. Future studies should embrace more nuanced methods such as experimental, dyadic, or longitudinal designs to identify the directional mechanisms through which mindfulness effects relationship satisfaction, and to test theories like that which is presented in Karremans et al. (2017). This meta-analysis does not provide any causal evidence for a directional association between the constructs. Existing theory assumes unidirectionality between mindfulness and relationships satisfaction – it is assumed that
mindfulness impacts relationship satisfaction in some way (e.g., Karremans et al., 2017). Despite the consistency of such an assumption with prevailing theory, it is nonetheless possible for the directionality to be reverse or for there to be a bidirectional relationship.

**Implications.** Mindfulness has already translated well into interventions targeting sexual dysfunction (Brotto, Basson, & Luria, 2008) and couples satisfaction (Carson et al., 2004, 2007). Though there has been preliminary work developing and theorizing relationship interventions based on mindfulness (e.g., Gambrel & Keeling, 2010; Carson et al., 2004, 2007), it has become increasingly apparent that the direct effect of mindfulness on relationship satisfaction is relatively small. Indeed, theorizing in this area suggests that the benefits of mindfulness arise through strong indirect effects on other relationship-relevant variables (Karremans et al., 2017). The minimal direct effect of mindfulness is also apparent in this study – findings showed that it accounted for 6% of the variance in relationship satisfaction. This should highlight to practitioners that the benefits of mindfulness are likely indirect and through other salutary effects. For example, in Carson et al. (2007) evaluation of a mindfulness relationship intervention, they concluded that the benefits of the program were primarily due to the couple’s joint participation in mindful self-expanding activities together - participation in these activities drove the effect of the intervention. This dovetails with theory by Karremans et al. (2017) which states that individuals who are more mindful, because of possessing a suite of beneficial cognitions and attributions, will be more likely to engage in pro-relationship behaviours such as self-expansive activities. However, even if the effect of mindfulness is indirect, it presents a uniquely versatile intervention opportunity in that it is simple to target through programs and therapy (e.g., Baer, 2015) and can even be administered over the internet (e.g., Boettcher et al., 2014).
In summary, meta-analysis of 28 samples showed that the average weighted effect size estimate of the correlation between mindfulness and relationship satisfaction was .244 and that effect sizes were homogenous across studies. Publication bias was not evident in this review. Moderator analysis showed that the effect size was not conditional on sample age, sample gender, the dimensionality of measurement, sample meditators, the proportion of sample married. This study provides quantitative evidence supporting the direct effect of mindfulness and relationship satisfaction, and the underlying assumptions of mindfulness in relationships.

Ethical approval: This article does not contain any studies with human participants performed by any of the authors.
Study 2

Trait Mindfulness in Couples’ Relationships:
A Conditional Process Analysis Approach
Abstract

Mindfulness has only recently begun to garner attention in the field of romantic relationships. Nested within a Self-Determination Theory perspective, it was theorized that mindfulness would be associated with increased relationship and sexual satisfaction indirectly through increasing self-compassion and increasing the degree to which the relationship meets individuals needs for autonomy, competence, and relatedness needs. A sample of 700 midlife (40-59-year-old) married Canadians was recruited from a national Qualtrics panel to test several pre-registered, a priori hypotheses. Mindfulness increased relationship satisfaction through an indirect pathway including both self-compassion and through one’s relationship meeting basic needs for autonomy and relatedness. Specifically, individuals higher in mindfulness were higher in self-compassion, and through this indirect pathway of associations, reported their partners being more supportive of their autonomy and relatedness, and were higher in relationship satisfaction. For sexual satisfaction, only relatedness was a statistically significant pathway – individuals higher in mindfulness were higher in self-compassion and had partners who were more supportive of their need for relatedness and through this indirect pathway of associations were higher in sexual satisfaction. The excellent fit of the final model, combined with high percentage variance accounted for in relationship (67%) and sexual satisfaction (38%), suggests that the model in this configuration is a good representation of the dynamics underpinning relationship and sexual satisfaction. After controlling for age and marital length, and estimating the model separately by gender, the model was a better fit for women; for men the simple indirect pathways between mindfulness/self-compassion to relationship and sexual satisfaction were not statistically significant, and none of the serial indirect effects were statistically significant.
The notion that “loving one’s self” or “knowing one’s self” predicates the ability to love or know others is engrained in the empirical literature (e.g., Branden, 1994; Campbell, & Baumeister, 2001) and more recently as the foundation of Mindfulness-Based Stress Reduction and Acceptance and Commitment Therapy (Baer, 2015; Hayes, 2004). There has been a strong and growing interest in the social science applications of Buddhist theory, particularly mindfulness, but with steadily growing interest in self-compassion and compassion for others (Allen & Knight, 2005; Fredrickson et al., 2008; Gilbert, 2005; Goetz et al., 2010; Harrington, 2002). Nested within this broader growing interest, mindfulness and self-compassion have only recently begun to garner attention in the field of romantic relationships (see Deci & Ryan, 2015; Neff & Beretvas, 2013). Though studies are few, their initial results present preliminary empirical evidence for the relational effects of these variables. However, the pathway of associations through which mindfulness and self-compassion may benefit relationships and sexuality remains unsupported by empirical evidence, and incorporation of mindfulness into existing theory is an important next step. Extant literature has primarily recruited younger adults who are in low-duration relationships, leaving the effects of mindfulness mostly unknown among midlife individuals and for those in stable relationships. Moreover, if the intention is to understand the ways in which mindfulness benefits relationships then it stands to reason that some of the theory testing efforts should be performed with stable relationships that have lasted. The current study tested several hypotheses concerning the pathway of associations of mindfulness and self-compassion on relationship and sexual satisfaction within a Self-Determination Theory Framework with a sample of midlife (ages 40-59), married Canadians.

**Relationship and Sexual Satisfaction**
Romantic relationships are key determinants of life satisfaction (Biswas-Diener & Diener, 2001; Powdthavee, 2008), and romantic relationships are also important for health, finance, and longevity (Waite & Gallagher, 2000). A parallel stream of research into sexuality has supported that the couple’s sexual relationship was also a critical component to happy relationships (Birnbaum, 2007; Butzer & Campbell, 2008; McCabe, 1999; Sprecher & Cate, 2004). Relationship and sexual satisfaction are also highly interrelated cross-sectionally and longitudinally (Byers, 2005; Litzinger & Coop, 2005) and highly impactful to the relationship stability of couples (Yeh et al., 2006). Importantly, research has consistently shown that relationship and sexual satisfaction decline over the duration of a relationship (e.g., Karney & Bradbury, 1995; Schmiedeberg & Schroder, 2016), showing that they are intertwined in complex ways over time. Midlife individuals in long-term relationships are at the confluence of physiological changes (e.g., increased sexual dysfunction; Laumann et al., 1999) and social commitments (e.g., caretaking for children and aging parents; Grundy & Henretta, 2006) that may further impact the relationship and sexual satisfaction of this group. Together, these points highlight the need to study midlife individuals in long-term relationships, who are at a different stage in their relationships relative to younger individuals in shorter relationships, which are more commonly researched. Furthermore, identifying pathways of associations using a sample of highly stable couples may also be suggestive of broader mechanisms underpinning this stability.

A limited number of existing studies support that mindfulness has a positive effect on relationship satisfaction through resultant increases in empathy (Wiggins, 2012), reduced emotional stress responses to conflict (Barnes Brown, Krusemark, Campbell, & Rogge, 2007), and greater acceptance and awareness (Kraft, Haeger, & Levin, 2017). Although few studies connected mindfulness to sexual satisfaction (Khaddouma et al., 2015), there has been growth in
the literature connecting mindfulness to beneficial sexual functioning outcomes (see Brotto, Basson, & Luria, 2008; Brotto et al., 2012). The earliest empirical study appears to be a qualitative dissertation, wherein analysis of female meditators showed that some participants integrated mindfulness into their sex lives with beneficial outcomes (Mayland, 2004). These participants described being able to focus their attention on arousing and pleasurable aspects of the sexual encounter and being less attached to social expectations of sex (Mayland, 2004).

There is reason to suspect that mindfulness could enhance sexual satisfaction, particularly among midlife individuals. An emerging body of work has supported the effectiveness of using mindfulness-based treatment for sexual problems. Women presenting with Sexual Desire/Interest Disorder and/or Sexual Arousal Disorder had higher self-reported genital wetness and improved self-reported physical arousal when exposed to an erotic stimulus after a mindfulness-based treatment (Brotto, Basson, & Luria, 2008). Other studies in this area support that mindfulness interventions can improve sexual response among survivors of endometrial or cervical cancer (Brotto et al., 2012) and improve low or impaired arousal (Brotto & Basson, 2014). Furthermore, there are demonstrable improvements to interoceptive awareness which helped to overcome common barriers to sexual functioning (e.g., attention, self-judgement, and anxiety; Silverstein, Brown, Roth, & Britton, 2011) and increased subjective sexual arousal for women who were being treated for sexual distress or who have experienced sexual abuse (Brotto, Seal, & Rellini, 2012). Literature supporting the beneficial effects of mindfulness on sexual function suggests that mindfulness is also beneficial for couples’ sexual satisfaction outside of clinical samples as well; however, research has yet to determine the pathway of associations by which this might occur and if it does so for midlife individuals. Importantly, sexual problems occur more frequently among midlife individuals (e.g., Laumann et al., 1999); however, non-physiological
pathways of associations through which mindfulness may benefit sexual satisfaction are not currently known for midlife individuals. Understanding how and why mindfulness benefits sexual satisfaction, particularly among midlife individuals, is critical for researchers and therapists because there are only few studies examining these pathways of association. Furthermore, it is critical for practitioners to have an adequate evidence-base and an understanding of the specific benefits wrought by mindfulness. This is particularly important given recent theorizing that mindfulness may not be beneficial and may in fact be detrimental, in certain circumstances (Karremans et al., 2017). Though these ideas have not yet been backed by empirical support, Karremans et al. (2017) illustrates that the precise mechanisms of mindfulness remain uncertain. The same applies to self-compassion research – programs like Mindful Self-Compassion by Neff and Garmer (2013) aim to use self-compassion to improve well-being for individuals and for couples; however, given how nascent the literature in this area on couples is, further empirical evidence and theoretical saturation particularly regarding these pathways of association of mindfulness and self-compassion are required. Moreover, the existing literature is generally of younger individuals who have been in shorter relationships, and likely does not generalize to long-term, stable marriages. It is important to note that mindfulness has been adopted into broader theoretical frameworks like Self-Determination Theory to help explain its beneficial effects; however, empirical investigation into the benefits of mindfulness within relationships has frequently been absent a theoretical framework.

**Self-Determination Theory in Relationships**

Self-Determination Theory (SDT) is a macro-theory that focuses on the satisfaction of a pool of proposed internal psychological needs (Ryan & Deci, 2000). These psychological needs are the basis for an individual to develop self-motivation and well-being; these needs are
autonomy, relatedness, and competence. Meeting these needs allows for internal growth and engagement with the external, social world (Ryan & Deci, 2017). The need for autonomy is the need to be in control of and to self-regulate one’s actions. Ryan and Deci (2017) describe it not as a fervent preference for solitude, but as self-endorsed behaviours and authenticity. Stated differently, a state of autonomy in SDT is considered to be one where a person is behaving truly for themselves and authentically. Competence refers to one’s basic need to feel effective and competent within the important domains of their life. Relatedness refers to how connected and cared for one feels by other people in their lives. In addition, relatedness also captures one’s feelings of contribution and importance to other people. Under conditions where these human needs are adequately satiated, humans thrive and can function optimally; humans are stifled when these basic needs are thwarted (Ryan & Deci, 2017).

Romantic relationships are an important social context for higher need fulfilment within SDT. However, relationships can be either supportive or stifling to one’s basic needs – examining how relationships influence and are influenced by the attainment of one’s basic needs has therefore emerged recently as a field of inquiry. La Guardia, Ryan, Couchman, and Deci (2000) were one of the first to examine basic needs in relationships and found that secure attachment was predicated on need fulfillment. Other studies have supported the importance of need fulfilment in relationships, particularly the need for relatedness. Specifically, Patrick, Knee, Canevello and Lonsbary, (2007) found that overall need fulfilment was associated with individual well-being, secure attachment, higher relationship satisfaction and commitment, less perceived conflict, and more adaptive approaches to conflict. In summary, deriving need satisfaction from relationships is an important consideration for relationship and sexual satisfaction.
Mindfulness has been incorporated into SDT as an important characteristic fostering self-determination and, specifically, need satisfaction both within and outside of relationships. In SDT, awareness is critical for one’s need for autonomy, because it enables one to have awareness and insight into their own behaviours and motivations (Ryan & Deci, 2017). In SDT, awareness is thought to function as a mechanism promoting one’s ability to be autonomous – only someone who is acutely aware of their own values, thoughts, behaviours, and opportunities can be truly autonomous (Deci & Ryan, 2000; Ryan & Deci, 2008), and thus act in such a way as to have their basic needs satisfied. Individuals who are highly aware – highly mindful – understand themselves and what they require to satisfy their basic needs. Mindfulness clarity facilitates their ability to attain their own need satisfaction. In addition, awareness is a personal process that can support autonomous regulation even when the context and circumstances are not supportive of these needs (Ryan, Legate, Niemiec, & Deci, 2012). Thus, an emerging literature suggests that mindfulness may be an important contributing factor to need satisfaction within relationships. The current study aimed to understand if and to what degree mindfulness contributes to need satisfaction within relationships and if need satisfaction within relationships is part of the mechanism through which mindfulness influences relationship and sexual satisfaction.

Growing evidence supports that participation in mindfulness training programs such as MBSR and MBCT also increase self-compassion (Birnie, Speca, Carlson, 2010; Kuyken et al., 2010; Lee & Bang, 2010; Rimes & Wingrove, 2011; Shapiro, Astin, Bishop, & Cordova, 2005; Shapiro, Brown, & Biegel, 2007). Researchers have begun to theorize that self-compassion may be one of the mechanisms through which mindfulness exerts its benefits. In Buddhism, meditation cultivates compassion (and self-compassion; Wallace, 2004), and
mindfulness. In Buddhist philosophy, mindfulness is discussed as *causing or leading to self-compassion*, which, in turn, affects other beneficial outcomes (e.g., Germer, 2009). Regardless, investigating self-compassion as a critical pathway of association through which mindfulness may benefit romantic relationships is a next step. Most pertinent here, Neff and Beretvas (2013) theorize that self-compassion may be related to positive romantic relationship outcomes because self-compassionate individuals are better at balancing their own basic needs (for autonomy and relatedness), and, thus, would be better able to balance these needs in their relationships. They theorized that this is because self-compassionate people have a higher capacity to meet their own personal needs and would thus be more caring and less controlling to their partners through lesser defensiveness and greater acceptance in relationships (Neff & Beretvas, 2013). However, this specific proposition has not been empirically tested, yet it has significant implications because of the ongoing use of mindfulness and self-compassion-based interventions. In summary, there is important theoretical and empirical evidence to suggest that self-compassion is part of the pathway of associations through which mindfulness exerts its individual and interpersonal benefits.

Furthermore, self-compassion is associated with positive relationship styles, even above and beyond attachment and self-esteem – couples who were high in self-compassion were also high in relationship satisfaction and relationship well-being (Neff & Beretvas, 2013). Other research supports an indirect effect of self-compassion on relationship behaviours. Self-compassion was related to several pro-relationship characteristics such as motivation to correct for interpersonal mistakes, accommodation, and marital satisfaction (Baker & McNulty, 2011). These claims had substantive caveats; for men, self-compassion was only beneficial to the relationship if they were high in self-consciousness. For men low in self-consciousness, self-
compassion had a deleterious effect on these pro-relationship characteristics. In contrast, self-compassion was unilaterally positive for women, showing that there were moderating effects of both gender and self-consciousness (Baker & McNulty, 2011). Overall, these findings suggest that there may be differential associations between self-compassion and relationship variables depending on gender.

There are presently no studies that have investigated the beneficial effects of self-compassion on sexual satisfaction, although there is reason to suspect that they would be related. Tendencies toward being harshly self-critical and to be distracted by negative self-oriented thoughts during a sexual encounter have been strongly linked to poor sexual functioning outcomes, for example, through poor body image (e.g., Carvalheira, Godinho, Costa, 2017; Quinn-Nilas, Benson, Milhausen, Buchholz, & Goncalves, 2016). It stands to reason that self-compassion would have a similarly beneficial effect on sexual satisfaction among couples and may be an outlet through which the benefits of mindfulness occur. These considerations may be particularly salient for midlife individuals, again, because of notable increases to the prevalence of physiological health conditions and sexual problems during this time (e.g., Laumann et al., 1999). One consideration remains about how mindfulness and self-compassion might influence interpersonal outcomes such as relationship and sexual satisfaction – a mechanism through which the “self-focused” concepts of mindfulness and self-compassion directly translate to other-focused variables, such as other-compassion. Investigations including the interpersonal idea of “compassion” (rather than self-compassion) are an important next step for several reasons. Firstly, the conceptualization of both mindfulness and self-compassion is largely based on overarching Buddhist theory (Wallace, 2004), which proposes that mindfulness leads to self-compassion. Secondly, compassion is directly in focus in the relationship-focused MBRE
program (Carson et al., 2004), wherein several exercises are performed by the couples specifically to increase compassion (e.g., eye-gazing exercises). Paralleling Neff’s (2003a, 2003b) development of self-compassion, there has been development of “compassion” using Neff’s framework. Pommier (2010) developed a compassion scale using the same theoretical and measurement framework as Neff’s Self-Compassion Scale (SCS), but with a focus on other-oriented compassion (instead of self-oriented compassion). Within this framework, compassion involves a non-judgmental stance toward others, and is theorized to be natural extension of self-compassion (i.e., compassion toward one’s self is a prerequisite for showing compassion to others; Strauss, Taylor, Kuyken, Baer, Jones, & Cavanaugh, 2016). Understanding whether “self-love” in the form of self-compassion is enough to benefit relationships with or without “other-love” in the form of other-compassion is a critical step to understanding the pathway of associations.

Thus, self-compassion and other-compassion may function as an indirect pathway for the association between mindfulness and relationship satisfaction. This hypothesized process is supported by several empirical studies outside of the relationship research domain. Hollis-Walker and Colosimo (2011) found that self-compassion partially mediated the relationship between mindfulness and psychological well-being. However, it is currently unclear whether mindfulness and self-compassion directly influence interpersonal outcomes – such as relationship and sexual satisfaction – through an external variable like other-oriented compassion.

The purpose of this study was to examine the pathway of associations through which mindfulness benefits relationship and sexual satisfaction within midlife married relationships. Several specific hypotheses based on existing theoretical and empirical evidence are outlined
below. Specifically, hypotheses are tested whereby mindfulness influences relationship and sexual satisfaction indirectly through self-compassion and through need fulfilment within one’s relationship.

**Hypotheses**

This study tested the following preregistered (https://osf.io/zwy5h/) hypotheses:

1) The relationship between mindfulness and relationship satisfaction will be indirect (mediated) through autonomy, competence, and relatedness in a parallel mediation model. Individuals higher in mindfulness will report greater satisfaction of their needs for autonomy, competence, and relatedness and through this indirect pathway of associations, report increased relationship satisfaction.

2) The relationship between mindfulness and sexual satisfaction will be indirect (mediated) through autonomy, competence, and relatedness in a parallel mediation model. Individuals higher in mindfulness will report greater satisfaction of their needs for autonomy, competence, and relatedness and, through this indirect pathway of associations, report increased sexual satisfaction.

3) The relationship between self-compassion and relationship satisfaction will be indirect (mediated) through autonomy, competence, and relatedness in a parallel mediation model. Individuals higher in self-compassion will report greater satisfaction of their needs for autonomy, competence, and relatedness and, through this indirect pathway of associations, report increased relationship satisfaction.

4) The relationship between self-compassion and sexual satisfaction will be indirect (mediated) through autonomy, competence, and relatedness in a parallel mediation model.
model. Individuals higher in mindfulness will report greater satisfaction of their needs for autonomy, competence, and relatedness and, through this indirect pathway of associations, report increased sexual satisfaction.

5) The relationship between mindfulness and sexual satisfaction will be indirect through self-compassion, and the indirect effect will be moderated by gender. Individuals higher in mindfulness will report greater sexual satisfaction through greater self-compassion, however, this indirect effect will be stronger for women than for men.

6) The relationship between mindfulness and relationship satisfaction will be indirect through self-compassion, and the indirect effect will be moderated by gender. Individuals higher in mindfulness will report greater sexual satisfaction through greater self-compassion; however, this indirect effect will be stronger for women than for men.

7) The relationship between mindfulness and relationship satisfaction will be indirect through self-compassion, and compassion. Individuals higher in mindfulness will report being more self-compassionate, who, in turn, will be higher in compassion and through this indirect pathway of associations, higher in relationship satisfaction.

8) The relationship between mindfulness and sexual satisfaction will be indirect through self-compassion, and compassion. Individuals higher in mindfulness will report being more self-compassionate, which will be associated with higher compassion and through this indirect pathway of associations, higher in sexual satisfaction.
Method

Procedure

Following Research Ethics Board approval, participants were recruited through Qualtrics analytics panels. Qualified participants – individuals who were between the ages of 40-59, residing in Canada, and who were married (no restrictions based on age at marriage or length of marriage) – were sent a basic invitation to the survey. Interested participants clicked a link and proceeded to the survey package. The survey was accessed by approximately 1,917 people – the survey was made inaccessible once 700 participants were collected. Necessary power was determined a priori to be at least 500 participants (Wolf, Harrington, Clark, & Miller, 2013); therefore, this study exceeds power requirements to detect the types of indirect effects relevant here. Pre-registration occurred prior to REB approval and prior to data collection. No changes to the content of the hypotheses were performed a priori, except one methodological change to the manner in which hypotheses 1 through 4 were tested (detailed below in Results).

Measures

Mindfulness. The Five-Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2008) contains 39 items rated on a 5-point Likert type scale (1 = never or very rarely true, to 5 = very often or always true). The scale consists of five factors: Observing, Describing, Acting with Awareness, Nonjudging, and Nonreactivity. The Observing factor assesses the tendency to attend to both external and internal experiences (e.g., “I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing”). The Describing factor assesses one’s tendency to describe experiences using words (e.g., I’m good at finding the words to describe my feelings”). Acting with Awareness assesses the tendency to be fully aware of current activity or experiences
(e.g., “I find it difficult to stay focused on what’s happening in the present”). The Nonjudging factor measures one’s nonevaluative assessment of their inner experiences (e.g., I think some of my emotions are bad or inappropriate and I shouldn’t feel them.”). Nonreactivity assess one’s tendency to not be caught up with thoughts and feelings, allowing them to come and go freely (“Usually when I have distressing thoughts or images, I step back and am aware of the thought or image without getting taken over by it.”). Evidence of construct validity for this scale is extensive, and its cross-cultural validity is also supported (Cebolla et al., 2012). A total overall score of mindfulness was used in the current study – calculated as the sum of all the items (after reverse scoring).

**Self-compassion.** The Self-Compassion Scale (SCS; Neff, 2003b) assesses one’s tendency to be kind and understanding toward themselves, instead of being self-critical and judgemental. It was conceptualized as tapping into many of the same processes underlying self-esteem, without many of its negatives (i.e., over-evaluation of one’s self; Neff, 2003b). It is a 26-item scale consisting of six factors: Self-Kindness, Self-Judgement, Common Humanity, Isolation, Mindfulness, and Over-Identification. Self-kindness measures the tendency to be kind to one’s self (e.g., “I’m tolerant of my own flaws and inadequacies”), Self-Judgement refers to the tendency for people to be critical or judgmental of themselves (e.g., “When I see aspects of myself that I don’t like, I get down on myself”), Common Humanity refers to the tendency for people to relate their experiences to those of other humans (e.g., “I try to see my failings as part of the human condition”), Isolation refers to the tendency for one to feel alone in their experiences (e.g., “When I think about my inadequacies it tends to make me feel more separate and cut off from the rest of the world”), Mindfulness refers to the ability for one to see or be aware of their experiences (e.g., “When I’m feeling down I try to approach my feelings with
curiosity and openness”), and Over-Identification refers to one’s tendency to become consumed or carried away by their feelings and experiences (e.g., “When something upsets me I get carried away with my feelings”). Scores are calculated by first reverse coding the responses to the negative items, and the means of these six subscales are summed to create a total Self-Compassion Scale score (see Neff, 2003 for evidence of reliability and validity).

**Basic need satisfaction in relationships.** Need satisfaction in relationships was measured using the Basic Psychological Need Satisfaction in Relationships scale (La Guardia et al., 2000). This is a nine-item scale designed to be used and is worded in relation to a particular person (i.e., romantic partner, father/daughter). In this study, participants were directed to consider “When I am with my partner…” as the question stem. Participants are asked to respond to each item on a seven-point scale ranging from “not at all true” to “very true.” The scale measures the three basic needs, autonomy, competence, and relatedness. Scores are averaged for each subscale. An example of an autonomy item is “When I am with my partner, I feel free to be who I am.” An example of a competence item is “When I am with my partner, I feel like a competent person.” An example of a relatedness item is “When I am with my partner, I feel loved and cared about.” In the current study, internal consistency was high for the total scale ($\alpha = .91$) and the autonomy ($\alpha = .73$), competence ($\alpha = .76$) and relatedness ($\alpha = .86$) subscales.

**Relationship satisfaction.** Relationship satisfaction was assessed using the Couple’s Satisfaction Index – 4 Item version (CSI; Funk & Rogge, 2007). The measure was developed using 180 items from some of the most commonly used relationship and marital satisfaction scales; these items were pooled and analyzed using principal components analysis and Item Response Theory. The CSI is a single dimensional measure with three versions: a 36-item, a 16-item, and a four-item version, and their IRT analysis supports that the 36-item and 16-item
contain more information and measure relationship satisfaction better than all of the other commonly used measures (the four-item version being equal in quality even to the lengthiest of the other tested scales). Indeed, commonly used scales such as the MAT (Locke & Wallace, 1959) and the DAS (Spanier, 1976) present researchers with very low levels of information and high levels of measurement error particularly given their lengths (Funk & Rogge, 2007). The authors point out that it is clear from their analysis that the comparison scales (e.g., the MAT and the DAS) do measure relationship satisfaction, but they do so in an imprecise manner (Funk & Rogge, 2007). With the CSI, some items are rated on different scales (it is not uncommon for scales constructed using IRT to be like this). An example item from the CSI is “In general, how often do you think that things between you and your partner are going well?” The measure has excellent internal consistency (α = .98; Funk & Rogge, 2007), strong convergent validity with existing relationship satisfaction scales (r = .89 with the 32 item DAS; Funk & Rogge, 2007), and strong construct validity with other scales such as ineffective arguing and neuroticism that are mirrored by other well-known relationship satisfaction scales (Funk & Rogge, 2007). The four-item version was used here and had excellent internal consistency (α = .95).

Sexual satisfaction. The Global Measure of Sexual Satisfaction (Lawrence & Byers, 1995) was used to assess sexual satisfaction. The scale asks, “In general, how would you describe your relationship with your partner?” and the participant is presented with five dimensions, each along a seven-point scale: Good – Bad, Pleasant – Unpleasant, Positive – Negative, Satisfying – Unsatisfying, and Valuable – Worthless. Higher scores on this scale indicate higher sexual satisfaction. Internal consistency has consistently been high (α > .90; Byers, 2005; Lawrence & Byers, 1995). Internal consistency in the present study was excellent (α = .97)
Compassion. Compassion was measured with the Compassion for Others Scale (Pommier, 2010) which uses the same dimensions underlying self-compassion: kindness, indifference, common humanity, separation, mindfulness, and disengagement. Items are rated on a five-point scale (1 to 5) measuring agreement. Examples of items from each subscale are as follows: kindness “When others feel sadness, I try to comfort them”; indifference “When others are feeling troubled, I usually let someone else attend to them”; common humanity “Suffering is just a part of the common human experience”; separation “I can’t really connect with other people when they’re suffering”; mindfulness “When people tell me about their problems, I try to keep a balanced perspective of the situation”; disengagement “I try to avoid people who are experiencing a lot of pain.” Internal consistency was excellent ($\alpha = .92$) in this study.

Data Analysis

Data were analyzed using the PROCESS (v.3) macro for SPSS. Several different types of models were tested. A brief conceptual summary of each is provided here. The first is the simple mediation model. In this model, the mediator serves as an indirect pathway – part of the process through which X affects Y. A simple mediation model (also known as a process model) answers a “how”-type question; it attempts to answer “how” or through which pathway of associations does X influence Y. In a simple mediation model, X influences Y through a single mediating variable that carries all or part of the influence of X to Y (see Figure 8). In cross-sectional studies, using the term “mediation” to describe these models is not recommended; instead, it is recommended to refer to cross-sectional mediation as indirect effect modelling to reflect that causal assumptions underlying mediation models are not met with a single timepoint (Hayes, 2013; Kline, 2015).
The next model described includes both indirect effects (i.e., mediation) as well as moderation is called a conditional process model. In a 2nd order conditional process model, a model that combines mediation and moderation, process is another word for mediation analysis, and conditional is another word for moderation analysis. A conditional process implies that the process (the mediation or indirect pathway) is conditional (being moderated) by a variable. A conditional process model involves an indirect, mediational effect, being moderated by another variable (Hayes, 2013). Stated differently, these types of models propose that the magnitude of a proposed indirect pathway is conditional (changed or altered by) a proposed moderator. These models can be very fruitful, because they elaborate on boundary conditions of indirect pathways; whereas, simple moderation analyses only provide information about boundary conditions of direct (not indirect) pathways, and simple mediation analyses only provide information about unconditional (not conditional) indirect pathways.

A third type of model known as serial mediation model – wherein several mediators operate in serial to form a chain-like indirect pathway between X and Y. In a serial mediation model, the important distinguishing feature is that mediators are assumed to influence one another beyond just correlation, and this influence is represented by the unidirectional arrows used for model specification (Hayes, 2013). In Figure 9, M₁ begets M₂. If the indirect pathway for Figure 10’s model was significant, it would imply (speaking in terms of absolute value for this illustrative example) that X influences M₁, which influences M₂, in turn influencing Y. Aside from the arrows constituting the indirect pathway, additional directional arrows are present in the diagram – these represent that, when multiple mediators are included in such a model, it is encouraged to test other model-implied indirect and direct effects (Hayes, 2013). Specific application of these models to the variables of interest in this study are described in the results.
Models investigating the pathway of associations through which mindfulness influences relationship/sexual satisfaction through the three basic needs, for example, would be simple or parallel mediation models with mindfulness positioned as the X variable, the three basic needs as the M variables, and relationship/sexual satisfaction as the Y variable. An example of a conditional process model tested here would be the conditional pathway of associations, of mindfulness influencing relationship/sexual satisfaction through self-compassion, but this indirect effect is different (conditional) on gender.

**Normality.** Inspection of skewness and kurtosis data showed that all analytic variables were acceptably normal according to these indices. Analysis of outcome residuals for all regression models suggested that the outcome variable residuals were normally distributed. Concerning heteroscedasticity, methodologists recommend a proactive approach because heteroscedasticity can be difficult to detect via conventional means and has a high risk of bias for the analysis. Therefore, and in line with recommendations (see Hayes & Cai, 2007; Long & Ervin, 1999 for discussion and recommendations), each model utilizes a heteroscedasticity consistent estimator (HC3) which is consistent even in the presence of heteroscedasticity. Methodologists have increasingly recommended the widespread use of HC estimators even when conventional heteroscedasticity testing shows homoscedasticity. In analyses where bootstrapping was used, 5,000 bootstrapped samples were performed.

**Missing data.** Missing data were minimal. Per Qualtrics analytics policies, participants must complete the entire survey in order to be eligible for an incentive, but in this survey each question was accompanied by a “choose not to answer” option. We retained a high standard for the data – any participant who incorrectly answered any of the four attention check questions was discarded (\( n_{\text{removed}} = 6 \)). Also, analysis of unusual responses was conducted specifically to
look for uniform response and cases were removed if the analysis showed that the participant responded in such a way ($n_{\text{removed}} = 3$). Lastly, cases that utilized “choose not to respond” for too many items (5% or more) were also discarded ($n_{\text{removed}} = 31$). Thus, the final data set had a very small amount of missing data overall (<5%) and no data replacement was performed.

**Results**

**Description of sample.** Most participants were from Ontario ($n = 286; 44.7$%), Alberta ($n = 82; 12.8$%) and British Columbia ($n = 74; 11.6$), whereas Prince Edward Island ($n = 4; .6$%) and the Northwest Territories ($n = 1; .2$%) were the least represented. Participants were largely “White” ($n = 520; 82$%), with the second and third largest groups being “Southeast Asian” ($n = 42; 6.6$%) and “Black” ($n = 16; 2.5$%). The sample as mostly heterosexual ($n = 593; 92.8$%) with a smaller number of people were bisexual ($n = 23; 3.6$%). For gender, the sample was roughly distributed between women (including cisgender and transgender; $n = 324; 51.9$%) and men (cisgender and transgender; $n = 275; 44.1$%). Overall the sample was predominantly college/university educated ($n = 275; 43$%), but substantial minority proportions had reported that their highest education level was high school ($n = 104; 16.3$%) and trade/technical/vocational training ($n = 52; 8.1$%). The average age was 49.81 years, and most participants had children ($n = 514; 80.3$%). Of those with children, the average number of children was 2.12, with 27% ($n = 139$) of parents reporting having one child, 44.7% ($n = 230$) of parents reporting having two children, and 19.3% ($n = 99$) having three children with a smaller proportion having more than three children ($n = 44; 8.6$%). All participants were currently married, and the average duration of these marriages was 18.37 years ($SD = 9.74$). A correlation matrix with all constructs is shown in Appendix G.
Preface. Before the results are summarized verbatim and in detail, Table 1 below shows a summary of each hypothesis, the method used to test the hypothesis, whether the hypothesis was supported, and brief details concerning the support. This table shows that hypotheses 1 through 4 were supported, hypotheses 5 and 6 were only partly supported, while hypotheses 7 and 8 were not supported. The results of these 8 hypotheses were used to inform the construction of a single model that best combines each variable using Structural Equation Modeling (SEM). This exploratory model was part of the pre-registration, but the specifics of it were not hypothesized a priori as it was intended to be constructed from the pathways identified from hypotheses 1 through 8.
Table 2


<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Method</th>
<th>Supported</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1: Individuals higher in mindfulness will report greater satisfaction of their needs for autonomy, competence, and relatedness and, through this indirect pathway of associations, report increased relationship satisfaction.</td>
<td>Several simple mediation models Post-hoc modified to test each pathway in a separate model.</td>
<td>Yes</td>
<td>All indirect effects statistically significant.</td>
</tr>
<tr>
<td>H2: Individuals higher in mindfulness will report greater satisfaction of their needs for autonomy, competence, and relatedness and, through this indirect pathway of associations, report increased sexual satisfaction.</td>
<td>Several simple mediation models Post-hoc modified to test each pathway in a separate model.</td>
<td>Yes</td>
<td>All indirect effects statistically significant.</td>
</tr>
<tr>
<td>H3: Individuals higher in self-compassion will report greater satisfaction of their needs for autonomy, competence, and relatedness and, through this indirect pathway of associations, report increased relationship satisfaction.</td>
<td>Several simple mediation models Post-hoc modified to test each pathway in a separate model.</td>
<td>Yes</td>
<td>All indirect effects statistically significant.</td>
</tr>
<tr>
<td>H4: Individuals higher in mindfulness will report greater satisfaction of their needs for autonomy, competence, and relatedness and, through this indirect pathway of associations, report increased sexual satisfaction.</td>
<td>Several simple mediation models Post-hoc modified to test each pathway in a separate model.</td>
<td>Yes</td>
<td>All indirect effects statistically significant.</td>
</tr>
<tr>
<td>H5: Individuals higher in mindfulness will report greater sexual satisfaction through greater self-compassion, however, this indirect effect will be stronger for women than for men.</td>
<td>2nd order conditional process model</td>
<td>Partly</td>
<td>Indirect effect significant, but not moderated by gender. Direct not significant. Effect of self-compassion directly on Y not significant.</td>
</tr>
<tr>
<td>H6: Individuals higher in mindfulness will report greater sexual satisfaction through greater self-compassion, however, this indirect effect will be stronger for women than for men.</td>
<td>2nd order conditional process model</td>
<td>Partly</td>
<td>Indirect effect significant, but not moderated by gender. No conditional direct effects. Effect of self-compassion directly on Y not significant.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>H7: Individuals higher in mindfulness will report being more self-compassionate, will be higher in compassion and through this indirect pathway of associations, higher in relationship satisfaction.</td>
<td>Serial mediation model</td>
<td>Not supported</td>
<td>Pathway of associations does not include compassion - only self-compassion.</td>
</tr>
<tr>
<td>H8: Individuals higher in mindfulness will report being more self-compassionate, will be higher in compassion and through this indirect pathway of associations, higher in sexual satisfaction.</td>
<td>Serial mediation model</td>
<td>Not supported</td>
<td>Pathway of associations does not include compassion - only self-compassion.</td>
</tr>
</tbody>
</table>
Hypotheses 1 through 4. Concerning hypotheses 1 through 4, it became immediately apparent upon initial analysis using the parallel multiple mediation methodology that there were multicollinearity issues between the need satisfaction subscales measuring autonomy, competence, and relatedness. When looking at models with sexual satisfaction and relationship satisfaction as the dependent variables, collinearity diagnostics including the analysis of eigenvalues and their condition indices showed that the need satisfaction predictors were highly intercorrelated and that even small changes in the data of these three subscales would lead to substantial changes in the estimates. Indeed, the intercorrelations between these 3 subscales ranged from $r = .73 - .76$ (see Appendix G). Furthermore, when running the models with all 3 of these subscales simultaneously, there were suppressor effects that resulted in reversals of the direction of the associations between the subscales and the dependent variable. Specifically, competence reversed direction and was statistically significant when in bivariate analysis the direction is positive and significant. As a result of the above considerations, it was decided to test hypotheses involving these three subscales using separate mediation models, one for each need satisfaction subscale, rather than in a parallel multiple mediation model as originally stated.

Tested this way, findings supported hypotheses one through four (Tables 1 through 4). Individuals higher in mindfulness were higher in autonomy, competence, relatedness, through this indirect pathway of associations, were higher in relationship satisfaction. The same was true for sexual satisfaction – individuals higher in mindfulness were higher in autonomy, competence, and relatedness and thus were higher in sexual satisfaction. This same pattern of relationships was observed when considering self-compassion. Specifically, individuals higher in self-compassion were higher in autonomy, competence, and relatedness – and through this indirect pathway of associations, were higher in relationship satisfaction. Again, the same pattern of
results was observed for sexual satisfaction – individuals higher in self-compassion were higher in autonomy, competence, and relatedness and, through this indirect pathway of associations, were higher in sexual satisfaction.

Table 2
Summary of Direct and Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Hypothesis 1 through 4.

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect of Model 1: FFMQ → Autonomy → CSI (n = 600)</td>
<td>.063</td>
<td>.008</td>
<td>[.048, .079]</td>
</tr>
<tr>
<td>Indirect Effect of Model 2: FFMQ → Competence → CSI (n = 603)</td>
<td>.086</td>
<td>.009</td>
<td>[.070, .104]</td>
</tr>
<tr>
<td>Indirect Effect of Model 3: FFMQ → Relatedness → CSI (n = 602)</td>
<td>.078</td>
<td>.009</td>
<td>[.060, .096]</td>
</tr>
</tbody>
</table>

Note. Values are based on unstandardized estimates. Effects are regression coefficients. Also note that each indirect effect is estimated from a separate model. FFMQ = Mindfulness; CSI = Relationship Satisfaction.

*Significant indirect effect (i.e., confidence interval does not include zero)

Confidence intervals are bias corrected and of 10000 samples.

$R^2_{\text{Relationship Satisfaction, autonomy}} = .41$

$R^2_{\text{Relationship Satisfaction, competence}} = .36$

$R^2_{\text{Relationship Satisfaction, relatedness}} = .67$

$R^2_{\text{autonomy}} = .13$

$R^2_{\text{competence}} = .25$

$R^2_{\text{relatedness}} = .12$
Table 3

Summary of Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Hypothesis 3.

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect of Model 4: FFMQ → Autonomy → GMSEX (n = 600)</td>
<td>.079</td>
<td>.011</td>
<td>[.059, .101]</td>
</tr>
<tr>
<td>Indirect Effect of Model 5: FFMQ → Competence → GMSEX (n = 603)</td>
<td>.121</td>
<td>.013</td>
<td>[.096, .148]</td>
</tr>
<tr>
<td>Indirect Effect of Model 6: FFMQ → Relatedness → GMSEX (n = 602)</td>
<td>.101</td>
<td>.013</td>
<td>[.075, .127]</td>
</tr>
</tbody>
</table>

*Note. Values are based on unstandardized estimates. Effects are regression coefficients. Also note that each indirect effect is estimated from a separate model. FFMQ = Mindfulness; GMSEX = Sexual Satisfaction.

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect of Model 7: SCS → Autonomy → CSI (n = 627)</td>
<td>.056</td>
<td>.008</td>
<td>[.040, .072]</td>
</tr>
<tr>
<td>Indirect Effect of Model 8: SCS → Competence → CSI (n = 630)</td>
<td>.085</td>
<td>.009</td>
<td>[.067, .103]</td>
</tr>
<tr>
<td>Indirect Effect of Model 9: SCS → Relatedness → CSI (n = 629)</td>
<td>.088</td>
<td>.011</td>
<td>[.067, .109]</td>
</tr>
</tbody>
</table>

*Significant indirect effect (i.e., confidence interval does not include zero)

Confidence intervals are bias corrected and of 10000 samples.

Table 4

Summary of Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Hypothesis 3.

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect of Model 7: SCS → Autonomy → CSI (n = 627)</td>
<td>.056</td>
<td>.008</td>
<td>[.040, .072]</td>
</tr>
<tr>
<td>Indirect Effect of Model 8: SCS → Competence → CSI (n = 630)</td>
<td>.085</td>
<td>.009</td>
<td>[.067, .103]</td>
</tr>
<tr>
<td>Indirect Effect of Model 9: SCS → Relatedness → CSI (n = 629)</td>
<td>.088</td>
<td>.011</td>
<td>[.067, .109]</td>
</tr>
</tbody>
</table>

*Note. Values are based on unstandardized estimates. Effects are regression coefficients. Also note that each indirect effect is estimated from a separate model. SCS = Self-Compassion; CSI = Relationship Satisfaction.

*Significant indirect effect (i.e., confidence interval does not include zero)

Confidence intervals are bias corrected and of 10000 samples.
Relationship Satisfaction. autonomy = .43
Relationship Satisfaction. competence = .37
Relationship Satisfaction. relatedness = .68

\[ R^2 \text{autonomy} = .09 \]
\[ R^2 \text{competence} = .22 \]
\[ R^2 \text{relatedness} = .12 \]

Table 5

Summary of Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Hypothesis 3.

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect of Model 10: SCS → Autonomy → GMSEX ((n = 627))</td>
<td>.072</td>
<td>.011</td>
<td>[.051, .094]</td>
</tr>
<tr>
<td>Indirect Effect of Model 11: SCS → Competence → GMSEX ((n = 630))</td>
<td>.123</td>
<td>.014</td>
<td>[.097, .150]</td>
</tr>
<tr>
<td>Indirect Effect of Model 12: SCS → Relatedness → GMSEX ((n = 629))</td>
<td>.116</td>
<td>.015</td>
<td>[.089, .145]</td>
</tr>
</tbody>
</table>

*Note. Values are based on unstandardized estimates. Effects are regression coefficients. Also note that each indirect effect is estimated from a separate model. SCS = Self-Compassion; GMSEX = Sexual Satisfaction.

*Significant indirect effect (i.e., confidence interval does not include zero)

Confidence intervals are bias corrected and of 10000 samples.

\[ R^2 \text{Sexual Satisfaction. autonomy} = .31 \]
\[ R^2 \text{Sexual Satisfaction. competence} = .32 \]
\[ R^2 \text{Sexual Satisfaction. relatedness} = .51 \]
\[ R^2 \text{autonomy} = .09 \]
\[ R^2 \text{competence} = .22 \]
\[ R^2 \text{relatedness} = .12 \]
Figure 1. Hypothesis 1: The relationship between mindfulness and relationship satisfaction will be indirect (mediated) through autonomy, competence, and relatedness in 3 separate mediation models. Models 1-3 are shown.
Figure 2. Hypothesis 2: The relationship between mindfulness and sexual satisfaction will be indirect (mediated) through autonomy, competence, and relatedness in 3 separate mediation models. Models 4-6 are shown.
Figure 3. Hypothesis 3: The relationship between self-compassion and relationship satisfaction will be indirect (mediated) through autonomy, competence, and relatedness in 3 separate mediation models. Models 7-9 are shown.
Figure 4. Hypothesis 4: The relationship between self-compassion and sexual satisfaction will be indirect (mediated) through autonomy, competence, and relatedness in 3 separate mediation models. Models 10-12 are shown.
Hypotheses 5 and 6. Support for hypotheses 5 and 6 – that mindfulness would improve relationship and sexual satisfaction indirectly through self-compassion and do so differently for men and women – was less consistent. The indirect effect of mindfulness onto both relationship and sexual satisfaction was statistically significant – individuals higher in mindfulness were higher in self-compassion and, through this indirect pathway of associations, were higher in both relationship and sexual satisfaction.

The indirect effects were not moderated by gender as indicated by the index of moderated mediation not being statistically significant. Additionally, the gender interactions testing the conditional direct effects were not statistically significant – the relationships between mindfulness and self-compassion onto relationship and sexual satisfaction were not significantly different based on gender.

However, though none of the interactions were significant (nor the index of moderated mediation) suggesting that none of the effects were different depending on gender, some effects were statistically significant only for one gender group but not the other. Mindfulness was only a direct predictor of relationship satisfaction for women (i.e., there was full “mediation” for men, but partial “mediation” for women), even though the indirect effect was statistically significant for both men and women. This suggests that even though self-compassion was the primary process through which mindfulness benefits relationship satisfaction for women, mindfulness remained a direct contributor to relationship satisfaction. In contrast, the effect of mindfulness on relationship satisfaction for men was entirely indirect through self-compassion to the point that the direct relationship between mindfulness and relationship satisfaction was no longer significant. This suggests that self-compassion is part of the pathway of associations through
which mindfulness influences relationship satisfaction for men. These differences are difficult to interpret given the non-significant interaction terms.

In summary, for hypotheses 5 and 6, mindfulness and self-compassion cease to be statistically significant predictors of relationship and sexual satisfaction on their own when considered together. Instead, the indirect pathway was the only statistically significant pathway for both men and for women – meaning that mindfulness and self-compassion seem to need to operate within a pathway of associations whereby mindful individuals are more self-compassionate and, through this indirect pathway of associations, are higher in relationship and sexual satisfaction. On their own, these two variables do not contribute much to the prediction of relationship and sexual satisfaction. Regardless, the variance accounted for was only 13% for relationship satisfaction and 10% for sexual satisfaction.

Table 6

Summary of Conditional Effects for Hypothesis 5 with Mindfulness Predicting Sexual Satisfaction Through Self-Compassion

<table>
<thead>
<tr>
<th>Specific pathways predicting GMSEX</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditional Direct Effect for Women</td>
<td>.061</td>
<td>.034</td>
<td>[-.007, .128]</td>
</tr>
<tr>
<td>Conditional Direct Effect for Men</td>
<td>.069</td>
<td>.036</td>
<td>[-.001, .139]</td>
</tr>
<tr>
<td>Conditional Indirect Effect for Women</td>
<td>.057</td>
<td>.023</td>
<td>[.013, .102]</td>
</tr>
<tr>
<td>Conditional Indirect Effect for Men</td>
<td>.052</td>
<td>.024</td>
<td>[.005, .101]</td>
</tr>
</tbody>
</table>

Note. GMSEX = Sexual Satisfaction. MIndex = -.005, [-.071, .060]. Conditional direct effects: Women (.061 [-.007, .128], p = .077), Men (.069 [-.000, .139], p = .051). Conditional Indirect effects: Women (.057 [.012, .102]), Men (.052 [.005, .139])
Table 7

Summary of Conditional Effects for Hypothesis 6 with Mindfulness Predicting Relationship Satisfaction Through Self-Compassion

<table>
<thead>
<tr>
<th>Specific pathways predicting CSI</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditional Direct Effect for Women</td>
<td>.051</td>
<td>.023</td>
<td>[.006, .097]</td>
</tr>
<tr>
<td>Conditional Direct Effect for Men</td>
<td>.027</td>
<td>.026</td>
<td>[-.023, .078]</td>
</tr>
<tr>
<td>Conditional Indirect Effect for Women</td>
<td>.046</td>
<td>.015</td>
<td>[.017, .077]</td>
</tr>
<tr>
<td>Conditional Indirect Effect for Men</td>
<td>.045</td>
<td>.016</td>
<td>[.017, .077]</td>
</tr>
</tbody>
</table>

Note. CSI = Relationship Satisfaction. MIndex = -.001 [-.042, .041], Conditional direct effects:

Women (.051 [.006, .097], p = .027), Men (.027 [-.023, .078], p = .286). Conditional Indirect effects: Women (.046 [.017, .077]), Men (.045 [.017, .077])

Figure 5. Hypothesis 5: The relationship between mindfulness and sexual satisfaction will be indirect through self-compassion, and the indirect effect will be moderated by gender.
Figure 6. Hypothesis 6: The relationship between mindfulness and sexual satisfaction will be indirect through self-compassion, and the indirect effect will be moderated by gender.

Hypotheses 7 and 8. Hypotheses 7 and 8 were focused on testing the pathways of association for mindfulness. Multiple pathways of association were tested within each hypothesis. It is important to note that all directional lines shown in Figures 7 and 8 are hypotheses that were tested. Specifically, all possible simple mediated relationships are assessed between X and Y; meaning that there were 3 indirect effect models being tested. The first is the indirect effect of mindfulness on relationship/sexual satisfaction through self-compassion. The second is the indirect effect of mindfulness on relationship/sexual satisfaction through compassion. And the third is the indirect effect of mindfulness of relationship/sexual satisfaction through an indirect pathway of association including self-compassion and compassion.

To summarize these models, for relationship satisfaction, the proposed pathway of associations of mindfulness through self-compassion was supported. However, the extended pathway of associations including compassion was not supported. Specifically, results suggested
that individuals who were more mindful were also more self-compassionate and, through this indirect pathway of associations, were more relationally satisfied. However, there was no support for a pathway including compassion for others in this pathway of associations. This suggests that the pathway of associations connecting mindfulness to both relationship and sexual satisfaction is self-compassion – not other-oriented compassion. Mindfulness benefits relationship and sexual satisfaction through increases to self-compassion, not because mindfulness increases other-compassion, nor because self-compassion increases other-compassion.

The identical pathway of associations was supported in the model predicting sexual satisfaction. Specifically, the serial indirect effect was not statistically significant – only self-compassion was a significant indirect pathway connecting mindfulness to sexual satisfaction. Individuals higher in mindfulness were higher in self-compassion and, through this indirect pathway of associations, were higher in relationship satisfaction.

Table 8

Summary of Direct and Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Hypothesis 7

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect 1: FFMQ → SCS → CSI</td>
<td>.047</td>
<td>.011</td>
<td>[.027, .068]</td>
</tr>
<tr>
<td>Indirect Effect 2: FFMQ → CS → CSI</td>
<td>.005</td>
<td>.010</td>
<td>[-.003, .014]</td>
</tr>
<tr>
<td>Indirect Effect 3: FFMQ → SCS → CS → CSI</td>
<td>.000</td>
<td>.004</td>
<td>[-.001, .001]</td>
</tr>
</tbody>
</table>

*Note. Values are based on unstandardized estimates. Also note that each indirect effect is estimated from a separate model. SCS = Self-Compassion; CSI = Relationship Satisfaction; CS = Compassion (N = 586).

*Significant indirect effect (i.e., confidence interval does not include zero)

Confidence intervals are bias corrected and of 10000 samples.

\[ R^2_{\text{Relationship Satisfaction}} = .09 \]
\[ R^2_{\text{SCS}} = .41 \]
\[ R^2_{\text{CS}} = .10 \]
\[ R^2_{\text{Relationship Satisfaction, SCS, CS}} = .13 \]
Table 9

Summary of Direct and Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Hypothesis 8

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect 1: FFMQ → SCS → GMSEX</td>
<td>.056</td>
<td>.016</td>
<td>[.025, .087]</td>
</tr>
<tr>
<td>Indirect Effect 2: FFMQ → CS → GMSEX</td>
<td>.006</td>
<td>.016</td>
<td>[-.006, .019]</td>
</tr>
<tr>
<td>Indirect Effect 3: FFMQ → SCS → CS → GMSEX</td>
<td>.000</td>
<td>.006</td>
<td>[-.002, .002]</td>
</tr>
</tbody>
</table>

Note. Values are based on unstandardized estimates. Also note that each indirect effect is estimated from a separate model. SCS = Self-Compassion; GMSEX = Sexual Satisfaction; CS = Compassion. (N = 586).

*Significant indirect effect (i.e., confidence interval does not include zero)

Confidence intervals are bias corrected and of 10000 samples.

\[
R^2_{\text{Sexual Satisfaction}} = .08 \\
R^2_{\text{SCS}} = .41 \\
R^2_{\text{CS}} = .10 \\
R^2_{\text{Sexual Satisfaction.SCS.CS}} = .08
\]
Figure 7. Hypothesis 7: The relationship between mindfulness and relationship satisfaction will be indirect through self-compassion, and compassion.
Figure 8. Hypothesis 8: The relationship between mindfulness and sexual satisfaction will be indirect through self-compassion, and compassion.
Exploratory Analysis

As previously indicated, the final analysis involved combining the findings of the a priori hypotheses into a single, larger model, which purports a conjoint pathway of associations predicting relationship and sexual satisfaction simultaneously. Specification of this model was informed by the results of hypotheses 1 through 8. Furthermore, another goal of this analysis was to understand how best to include both relationship and sexual satisfaction because existing literature has suggested that they are bidirectionally related (McNulty et al., 2016) or should be treated as co-varying outcomes (Quinn-Nilas, in prep.). Thus, one goal was to systematically test which conceptualization of the interrelationship between sexual and relationship satisfaction best fit.

Method. The lavaan package for R was used to estimate this SEM model. This was an observed variable model, estimated using a robust estimator and with missing data handled using Full Information Maximum Likelihood (FIML; see Enders, 2010).

Model description. Specification of this model was informed dually from theory and from the results of the hypotheses tested prior. Specifically, the prior analyses indicated that compassion was not an important direct or indirect variable – nor was it part of the pathway of associations through which mindfulness and self-compassion influenced relationship and sexual satisfaction. Thus, compassion was not included in the model. The model was constructed to best represent the direct and indirect pathways tested in the prior hypotheses – the goal being to test a model of the collection of pathways on the whole rather than piecemeal. If this model fit well, it would suggest that the specified relations between variables is a good representation of the real-life phenomena.
**Analysis of dependency between relationship and sexual satisfaction.** First, a systematic test of the hypothesis that relationship and sexual satisfaction should be treated as correlated outcomes is presented. Within the literature on relationship and sexual satisfaction, there has been continued debate concerning the directionality of the association between relationship and sexual satisfaction (i.e., does relationship satisfaction predict sexual satisfaction? Does sexual satisfaction predict relationship satisfaction? Are they bidirectionally related?). Establishing the best way to model these variables together has been of interest to researchers for several decades, but the results have been inconsistent, and this inconsistency perhaps speaks to inherent bidirectionality between the two constructs (i.e., Byers, 2005; McNulty, Wenner, & Fisher, 2016). Additional research in preparation has introduced an approach called the covarying outcome approach (Quinn-Nilas, in prep.) – where relationship and sexual satisfaction are estimated as dual correlated outcomes. Improperly modeling the interrelationship between relationship and sexual satisfaction is tantamount to a specification error and because the empirical literature at large has been inconclusive, further testing is required before the substantive model of mindfulness and self-compassion is tested. To test this, I first constructed a nested model comparison estimating both a covarying model (Figure 9) and a restricted model (where relationship and sexual satisfaction disturbances were constrained to have 0 covariance) and compared it to a model where relationship and sexual satisfaction disturbances were free to covary as covarying outcomes.

A chi-square difference score using the Satorra-Bentler scaled chi-square test was performed – this test showed that the restricted model was a significantly worse fit than the covarying model ($X^2 = 37.14, \text{df} = 1, p < .001$, scaling correction factor = 1.71). Furthermore, the fit of the constrained model was quite poor when considering the RMSEA and the TLI ($X^2, \text{df} =$
In contrast, the fit of the covarying-outcome model (shown in Figure 8) was excellent by all indices ($X^2$, df = 4, n = 640) = 14.42, $p = .01$; CFI = .98; TLI = .98; RMSEA = .06, 90% CI [.03, .10]; SRMR = .02; AIC = 21613.66; BIC = 21741.32). Concerning variance accounted for of the outcome variables, a notable 68% of the variance was accounted for in relationship satisfaction, and 38% for sexual satisfaction. Indeed, the contrast is stark particularly in comparison to the poor fit displayed by the more restrictive model and supports that relationship and sexual satisfaction should be modeled as correlated outcomes rather than assumed to not share mutual common cause.

To further support this point, non-nested model comparisons were also performed. Though these models cannot be tested as comparatively as those above, they can be compared against standards for fit indices. Two models were estimated that: (1) removed sexual satisfaction as an outcome and held only relationship satisfaction as an outcome but included sexual satisfaction as a predictor and (2) removed relationship satisfaction as an outcome and held only sexual satisfaction as an outcome while retaining relationship satisfaction as a predictor. This emulates what happens when entering each of these respective ‘satisfactions’ in as a predictor (or as a covariate) of the other in a standard multiple regression model. Both of these models displayed exceptionally poor fit according to $X^2$, TLI, RMSEA, and SRMR (Model 1: $X^2$, df = 6, n = 640) = 216.68, $p < .001$; CFI = .90; TLI = .67; RMSEA = .27, 90% CI [.24, .30]; SRMR = .15; AIC = 16894.23; BIC = 16999.88; Model 2: $X^2$, df = 6, n = 640) = 586.80, $p < .001$; CFI = .76; TLI = .20; RMSEA = .41, 90% CI [.39, .44]; SRMR = .19; AIC = 18525.34; BIC = 18630.98). This suggests that modeling each as a direct predictor of the other is not supported.
Together, findings are consistent with a co-varying outcome hypothesis and this framework and model (was used for subsequent analyses).

**Summary of path coefficients.** Standardized coefficients, unstandardized coefficients, and 95% confidence intervals for each path are shown in Figure 8.
Figure 9. Path Coefficients for the Combined Covarying Outcome Model. Standardized coefficients are shown in parentheses, unstandardized estimates and 95% confidence intervals are shown subsequently.

**Analysis of indirect effects.** Indirect effects were estimated for pathways of associations for self-compassion influencing both relationship and sexual satisfaction through the three basic needs, and pathways of association for mindfulness associated with both relationship and sexual satisfaction through the basic needs.

**Mindfulness indirect pathways.** Mindfulness appeared to influence relationship satisfaction indirectly through autonomy and relatedness – individuals higher in mindfulness were higher in relatedness and were higher in autonomy and, through this indirect pathway of associations, were higher in relationship satisfaction. For sexual satisfaction, only the indirect pathway through relatedness was significant – individuals higher in mindfulness were higher in relatedness and through this indirect pathway of associations, were higher in sexual satisfaction (Table 10).
Table 10

Summary of Direct and Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Exploratory SEM Model

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect 1: FFMQ → Autonomy → CSI</td>
<td>.010*</td>
<td>.004</td>
<td>[.002, .018]</td>
</tr>
<tr>
<td>Indirect Effect 2: FFMQ → Competence → CSI</td>
<td>-.008</td>
<td>.004</td>
<td>[-.016, .000]</td>
</tr>
<tr>
<td>Indirect Effect 3: FFMQ → Relatedness → CSI</td>
<td>.045*</td>
<td>.012</td>
<td>[.021, .069]</td>
</tr>
<tr>
<td>Indirect Effect 4: FFMQ → Autonomy → CSI</td>
<td>-.007</td>
<td>.013</td>
<td>[-.033, .019]</td>
</tr>
<tr>
<td>Indirect Effect 5: FFMQ → Competence → CSI</td>
<td>.024</td>
<td>.016</td>
<td>[-.009, .056]</td>
</tr>
<tr>
<td>Indirect Effect 6: FFMQ → Relatedness → CSI</td>
<td>.092*</td>
<td>.027</td>
<td>[.040, .144]</td>
</tr>
</tbody>
</table>

Note. Values are based on unstandardized estimates. Also note that each indirect effect is estimated from a separate model. FFMQ = Mindfulness; CSI = Relationship Satisfaction. *Significant indirect effect (i.e., confidence interval does not include zero). (N = 620).

**Self-compassion indirect pathways.** For self-compassion, only the indirect pathways including relatedness were statistically significant. Specifically, individuals higher in self-compassion were higher in relatedness and, through this indirect pathway of associations, were higher in both relationship and sexual satisfaction (Table 11).
Table 11

Summary of Direct and Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Exploratory SEM Model

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect 1: SCS → Autonomy → CSI</td>
<td>.004</td>
<td>.003</td>
<td>[-.001, .009]</td>
</tr>
<tr>
<td>Indirect Effect 2: SCS → Competence → CSI</td>
<td>-.006</td>
<td>.003</td>
<td>[-.013, .000]</td>
</tr>
<tr>
<td>Indirect Effect 3: SCS → Relatedness → CSI</td>
<td>.053*</td>
<td>.015</td>
<td>[.024, .081]</td>
</tr>
<tr>
<td>Indirect Effect 4: SCS → Autonomy → GMSEX</td>
<td>-.003</td>
<td>.005</td>
<td>[-.013, .007]</td>
</tr>
<tr>
<td>Indirect Effect 5: SCS → Competence → GMSEX</td>
<td>.019</td>
<td>.013</td>
<td>[-.008, .045]</td>
</tr>
<tr>
<td>Indirect Effect 6: SCS → Relatedness → GMSEX</td>
<td>.108*</td>
<td>.033</td>
<td>[.044, .172]</td>
</tr>
</tbody>
</table>

*Significant indirect effect (i.e., confidence interval does not include zero)

Note. Values are based on unstandardized estimates. Also note that each indirect effect is estimated from a separate model. SCS = Self-Compassion; CSI = Relationship Satisfaction; GMSEX = Sexual Satisfaction. (N = 620).

Serial indirect pathways. Several serial indirect effects were estimated which reflected a pathway of associations through which mindfulness is associated with self-compassion, which increased one’s feelings of autonomy, competence, and relatedness, and through this indirect pathway of associations, was associated with relationship and sexual satisfaction. This analysis showed that the serial indirect effect was significant through relatedness, autonomy, but not competence for relationship satisfaction. For sexual satisfaction, the pathway was significant only for relatedness.
Table 12

Summary of Serial Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Exploratory SEM Model

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect 1: FFMQ → SCS → Autonomy → Relationship Satisfaction</td>
<td>.007*</td>
<td>.003</td>
<td>[.001, .012]</td>
</tr>
<tr>
<td>Indirect Effect 2: FFMQ → SCS → Competence → Relationship Satisfaction</td>
<td>-.004</td>
<td>.002</td>
<td>[-.008, .000]</td>
</tr>
<tr>
<td>Indirect Effect 3: FFMQ → SCS → Relatedness → Relationship Satisfaction</td>
<td>.026*</td>
<td>.007</td>
<td>[.012, .041]</td>
</tr>
<tr>
<td>Indirect Effect 4: FFMQ → SCS → Autonomy → Sexual Satisfaction</td>
<td>-.004</td>
<td>.007</td>
<td>[-.017, .010]</td>
</tr>
<tr>
<td>Indirect Effect 5: FFMQ → SCS → Competence → Sexual Satisfaction</td>
<td>.005</td>
<td>.004</td>
<td>[-.003, .013]</td>
</tr>
<tr>
<td>Indirect Effect 6: FFMQ → SCS → Relatedness → Sexual Satisfaction</td>
<td>.063*</td>
<td>.019</td>
<td>[.025, .101]</td>
</tr>
</tbody>
</table>

*Note. Values are based on unstandardized estimates. SCS = Self-Compassion; FFMQ = Mindfulness. (N = 620).

*Significant indirect effect (i.e., confidence interval does not include zero)

$R^2$ Relationship Satisfaction = .67; $R^2$ Sexual Satisfaction = .38

**Model summary.** In summary, in the current sample, mindfulness had an indirect effect on both relationship and sexual satisfaction. Individuals higher in mindfulness were higher in self-compassion, higher in relatedness – and through this indirect pathway of associations, higher in both relationship and sexual satisfaction. However, a similar serial indirect pathway was observed through autonomy leading to increased relationship satisfaction – suggesting that autonomy is part of a differential pathway leading to increased relationship satisfaction but not sexual satisfaction. The excellent fit of this model, combined with high variance accounted for, suggested that the model in this configuration was a good representation of the dynamics for understanding relationship and sexual satisfaction.

**Covariate Analysis**
An additional aim was to expand on the model to test if these effects were consistent across gender groups and after controlling for age and marital duration. To do this, age and marital duration were mean centered prior to analysis. The multi-group model fit was excellent by all indices: $X^2 (df = 24, N = 599) = 32.743, p = .110; CFI = .997; TLI = .991; \text{RMSEA} = .036, 90\% \text{CI} (.000, .064); \text{SRMR} = .034; \text{AIC} = 19358.333; \text{BIC} = 19644.563$. Neither age nor marital duration were statistically significant predictors of relationship and sexual satisfaction for either group.

There are a few differences to note from the multi-group model with covariates. Firstly, none of the autonomy pathways were statistically significant in these models for both men and for women. For women, relatedness was a statistically significant indirect pathway of association for relationship and sexual satisfaction in both the simple and serial indirect models (Tables 13 through 15). For men, only the simple indirect pathways of association between mindfulness and relationship and sexual satisfaction through relatedness were statistically significant – none of the other simple and serial indirect pathways of association were statistically significant (Tables 16 through 19). Note that all these pathways are in the same direction as those stated previously.

Lastly, the men’s model accounted for 61% of the variance in relationship satisfaction and 48% of the variance in sexual satisfaction but the women’s model had 75% of the variance in relationship satisfaction and 54% of the variance in sexual satisfaction accounted for. The model seemed to fit better for women, accounting for more variability in the satisfaction outcomes.
Table 13

Summary of Direct and Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Exploratory SEM Model for Women

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect 1: FFMQ → Autonomy → CSI</td>
<td>.013</td>
<td>.006</td>
<td>[.001, .025]</td>
</tr>
<tr>
<td>Indirect Effect 2: FFMQ → Competence → CSI</td>
<td>-.004</td>
<td>.005</td>
<td>[-.013, .005]</td>
</tr>
<tr>
<td>Indirect Effect 3: FFMQ → Relatedness → CSI</td>
<td>.042*</td>
<td>.017</td>
<td>[.009, .075]</td>
</tr>
<tr>
<td>Indirect Effect 4: FFMQ → Autonomy → GMSEX</td>
<td>.010</td>
<td>.010</td>
<td>[-.009, .029]</td>
</tr>
<tr>
<td>Indirect Effect 5: FFMQ → Competence → GMSEX</td>
<td>-.002</td>
<td>.010</td>
<td>[-.021, .017]</td>
</tr>
<tr>
<td>Indirect Effect 6: FFMQ → Relatedness → GMSEX</td>
<td>.058*</td>
<td>.023</td>
<td>[.012, .104]</td>
</tr>
</tbody>
</table>

Note. Values are based on unstandardized estimates. Also note that each indirect effect is estimated from a separate model. FFMQ = Mindfulness; CSI = Relationship Satisfaction. (N = 324).

*Significant indirect effect (i.e., confidence interval does not include zero). For indirect effects, p-values are not considered a safe inference.

Table 14

Summary of Direct and Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Exploratory SEM Model for Women

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect 1: SCS → Autonomy → CSI</td>
<td>.004</td>
<td>.004</td>
<td>[-.003, .011]</td>
</tr>
<tr>
<td>Indirect Effect 2: SCS → Competence → CSI</td>
<td>-.004</td>
<td>.004</td>
<td>[-.012, .004]</td>
</tr>
<tr>
<td>Indirect Effect 3: SCS → Relatedness → CSI</td>
<td>.062*</td>
<td>.020</td>
<td>[.022, .102]</td>
</tr>
<tr>
<td>Indirect Effect 4: SCS → Autonomy → GMSEX</td>
<td>.003</td>
<td>.004</td>
<td>[-.004, .010]</td>
</tr>
<tr>
<td>Indirect Effect 5: SCS → Competence → GMSEX</td>
<td>-.001</td>
<td>.003</td>
<td>[-.006, .005]</td>
</tr>
<tr>
<td>Indirect Effect 6: SCS → Relatedness → GMSEX</td>
<td>.085*</td>
<td>.029</td>
<td>[.029, .142]</td>
</tr>
</tbody>
</table>

Note. Values are based on unstandardized estimates. Also note that each indirect effect is estimated from a separate model. SCS = Self-Compassion; CSI = Relationship Satisfaction; GMSEX = Sexual Satisfaction. (N = 324).

*Significant indirect effect (i.e., confidence interval does not include zero)
Table 15
Summary of Serial Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Exploratory SEM Model for Women

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect 1: FFMQ → SCS → Autonomy → CSI</td>
<td>.002</td>
<td>.002</td>
<td>[-.002, .007]</td>
</tr>
<tr>
<td>Indirect Effect 2: FFMQ → SCS → Competence → CSI</td>
<td>-.002</td>
<td>.002</td>
<td>[-.007, .003]</td>
</tr>
<tr>
<td>Indirect Effect 3: FFMQ → SCS → Relatedness → CSI</td>
<td>.037*</td>
<td>.012</td>
<td>[.013, .061]</td>
</tr>
<tr>
<td>Indirect Effect 4: FFMQ → SCS → Autonomy → GMSEX</td>
<td>.002</td>
<td>.002</td>
<td>[-.002, .006]</td>
</tr>
<tr>
<td>Indirect Effect 5: FFMQ → SCS → Competence → GMSEX</td>
<td>-.001</td>
<td>.005</td>
<td>[-.011, .009]</td>
</tr>
<tr>
<td>Indirect Effect 6: FFMQ → SCS → Relatedness → GMSEX</td>
<td>.051*</td>
<td>.017</td>
<td>[.017, .085]</td>
</tr>
</tbody>
</table>

*Significant indirect effect (i.e., confidence interval does not include zero)

\[ R^2 \text{ Relationship Satisfaction} = .75; \ R^2 \text{ Sexual Satisfaction} = .54 \]

Note. Values are based on unstandardized estimates. SCS = Self-Compassion; FFMQ = Mindfulness; CSI = Relationship Satisfaction; GMSEX = Sexual Satisfaction. (N = 324).

Table 16
Summary of Direct and Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Exploratory SEM Model for Men

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect 1: FFMQ → Autonomy → CSI</td>
<td>.011</td>
<td>.006</td>
<td>[-.000, .022]</td>
</tr>
<tr>
<td>Indirect Effect 2: FFMQ → Competence → CSI</td>
<td>-.017</td>
<td>.008</td>
<td>[-.033, -.000]</td>
</tr>
<tr>
<td>Indirect Effect 3: FFMQ → Relatedness → CSI</td>
<td>.052*</td>
<td>.018</td>
<td>[.017, .087]</td>
</tr>
<tr>
<td>Indirect Effect 4: FFMQ → Autonomy → GMSEX</td>
<td>.005</td>
<td>.009</td>
<td>[-.012, .022]</td>
</tr>
<tr>
<td>Indirect Effect 5: FFMQ → Competence → GMSEX</td>
<td>.019</td>
<td>.014</td>
<td>[-.010, .047]</td>
</tr>
<tr>
<td>Indirect Effect 6: FFMQ → Relatedness → GMSEX</td>
<td>.057*</td>
<td>.021</td>
<td>[.016, .098]</td>
</tr>
</tbody>
</table>

*Significant indirect effect (i.e., confidence interval does not include zero)

Note. Values are based on unstandardized estimates. Also note that each indirect effect is estimated from a separate model. FFMQ = Mindfulness; CSI = Relationship Satisfaction. (N = 275).
*Significant indirect effect (i.e., confidence interval does not include zero). For indirect effects, $p$-values are not considered a safe inference.

Table 17

Summary of Direct and Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Exploratory SEM Model for Men

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect 1: SCS → Autonomy → CSI</td>
<td>.008</td>
<td>.006</td>
<td>[-.004, .019]</td>
</tr>
<tr>
<td>Indirect Effect 2: SCS → Competence → CSI</td>
<td>-.011</td>
<td>.006</td>
<td>[-.022, .000]</td>
</tr>
<tr>
<td>Indirect Effect 3: SCS → Relatedness → CSI</td>
<td>.038</td>
<td>.021</td>
<td>[-.004, .079]</td>
</tr>
<tr>
<td>Indirect Effect 4: SCS → Autonomy → GMSEX</td>
<td>.004</td>
<td>.007</td>
<td>[-.009, .017]</td>
</tr>
<tr>
<td>Indirect Effect 5: SCS → Competence → GMSEX</td>
<td>.009</td>
<td>.008</td>
<td>[-.007, .026]</td>
</tr>
<tr>
<td>Indirect Effect 6: SCS → Relatedness → GMSEX</td>
<td>.041</td>
<td>.023</td>
<td>[-.004, .087]</td>
</tr>
</tbody>
</table>

*Note. Values are based on unstandardized estimates. Also note that each indirect effect is estimated from a separate model. SCS = Self-Compassion; CSI = Relationship Satisfaction; GMSEX = Sexual Satisfaction. ($N = 275$).

*Significant indirect effect (i.e., confidence interval does not include zero)

Table 18

Summary of Serial Indirect Pathway Coefficients, Standard Errors, and Bias Corrected 95% Confidence Intervals for Exploratory SEM Model for Men

<table>
<thead>
<tr>
<th>Specific indirect pathways</th>
<th>Effect</th>
<th>Standard error</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Effect 1: FFMQ → SCS → Autonomy → CSI</td>
<td>.005</td>
<td>.004</td>
<td>[-.002, .012]</td>
</tr>
<tr>
<td>Indirect Effect 2: FFMQ → SCS → Competence → CSI</td>
<td>-.006</td>
<td>.003</td>
<td>[-.013, .000]</td>
</tr>
<tr>
<td>Indirect Effect 3: FFMQ → SCS → Relatedness → CSI</td>
<td>.023</td>
<td>.013</td>
<td>[-.002, .048]</td>
</tr>
<tr>
<td>Indirect Effect 4: FFMQ → SCS → Autonomy → GMSEX</td>
<td>.002</td>
<td>.004</td>
<td>[-.005, .010]</td>
</tr>
<tr>
<td>Indirect Effect 5: FFMQ → SCS → Competence → GMSEX</td>
<td>.007</td>
<td>.006</td>
<td>[-.004, .018]</td>
</tr>
<tr>
<td>Indirect Effect 6: FFMQ → SCS → Relatedness → GMSEX</td>
<td>.025</td>
<td>.014</td>
<td>[-.002, .052]</td>
</tr>
</tbody>
</table>

*Note. Values are based on unstandardized estimates. SCS = Self-Compassion; FFMQ = Mindfulness CSI = Relationship Satisfaction; GMSEX = Sexual Satisfaction. ($N = 275$).

*Significant indirect effect (i.e., confidence interval does not include zero)
$R^2$ Relationship Satisfaction = .61; $R^2$ Sexual Satisfaction = .48

**Discussion**

This study aimed to test 8 distinct hypotheses testing the pathways of association through which mindfulness and self-compassion influence midlife married relationship and sexual satisfaction by recruiting 700 midlife, married Canadians through Qualtrics panels. In summary (and as shown in Table 1), hypotheses 1 through 4 were supported, hypotheses 5 and 6 were partially supported, and hypotheses 7 and 8 were not supported. A final exploratory model was constructed based on the results of these analyses which tested a dual-outcome model of the mechanisms through which mindfulness benefits relationship and sexual satisfaction. This model fit well suggesting that it is a good representation of the interrelationships between these constructs. This final model showed that, estimated wholly, mindful individuals were more self-compassionate, and through this indirect pathway of associations, reported having partners who were more autonomy and relatedness supportive – and thus, had higher relationship satisfaction. This model also showed that for sexual satisfaction, only the relatedness indirect pathway was statistically significant – individuals higher in mindfulness were more self-compassionate and through this indirect pathway of associations, reported their partner as more relatedness supportive and thus were more sexually satisfied. When covariates were added to this model, findings suggested that the indirect effects of mindfulness and self-compassion were wider reaching for women than for men. Specifically, the autonomy pathway was only a statistically significant indirect effect for women, and the serial indirect effects through relatedness were only statistically significant for women. For men, autonomy did not function as a statistically significant indirect pathway through which mindfulness and self-compassion was associated with relationship and sexual satisfaction. Additionally, none of the serial indirect effects were statistically significant for men. Together with high variance accounted for in the outcome
variables for both gender groups, this suggested that the pathways through which mindfulness is associated with relationship and sexual satisfaction differed between men and women but was nonetheless impactful. Furthermore, findings highlighted the importance of relatedness as a pathway for mindfulness because it was the only pathway that was statistically significant for both men and women.

Findings are largely consistent with emerging theory of the relational features of mindfulness. That said, this theorizing has only emerged within the last decade. Perhaps most notably of these theoretical perspectives is that of Karremans et al. (2017). In that study, a theoretical model was presented featuring mindfulness as a primarily indirect predictor of relationship satisfaction. One’s dispositional mindfulness is directly responsible for improvements to what are called basic mechanisms—such as executive control, awareness of implicit processes, emotional regulation, self-other connectedness—which in turn—influence relationship specific processes. It is these relationship specific processes such as pro-relationship motives and behaviours that directly increase relationship satisfaction. Through this indirect mechanism, mindfulness is theorized to benefit relationship satisfaction.

This model can be adapted to aid in the interpretation of findings from the current study. Here mindfulness is directly associated with self-compassion, which is in turn associated with increased basic needs for autonomy, competence, and relatedness being met by their partner. Within the context of SDT theorizing, these findings suggest that it is likely that one’s basic need satisfaction should be considered as a Basic Mechanism. Yet the SDT pathways included in the current study may also be considered a relationship-based process, too, because the Need Satisfaction in Relationships Scale (NSIR) measures how well one feels their partner/relationship helps meet their needs for autonomy, competence, and relatedness. Thus, the rating of the degree
to which one’s partner satiates needs for autonomy, competence, and relatedness can be considered a relationship process, and, indeed, an outcome of a reciprocal and dynamic system of variables promoted by mindfulness.

The findings of this study must also be contextualized by the sample, which was of midlife, married Canadians between the ages of 40 and 59. Not only is this the largest demographic in Canada, but individuals within this age range are at the confluence of increased rates of sexual problems (e.g., Laumann et al., 1999), experiencing increased stress due to dual roles of caregiving for their parents and their own children (Grundy & Henretta, 2006), while also experiencing relationship habituation alongside empirically supported declines in relationship satisfaction over time (Christopher & Sprecher, 2000; Karney & Bradbury, 1995).

That the findings accounted for a substantial amount of variance is a noteworthy finding because it exemplifies the ways in which mindfulness contributes to important outcomes within stable marriages. Thus, these findings may serve to reveal the mindfulness and SDT-based pathways supporting satisfaction in long-term marriages.

Though there is a growing theoretical landscape concerning how mindfulness might influence relationship satisfaction, research and theorizing in this area is scant related to sexual satisfaction. Recently, an emerging body of work supports the effectiveness of using mindfulness-based treatment to help women with sexual difficulties. Women presenting with sexual desire/interest disorder and/or sexual arousal disorder had higher self-reported genital wetness and improved self-reported physical arousal when exposed to an erotic stimulus after a mindfulness-based treatment (Brotto, Basson, & Luria, 2008). These participants reported that the mindfulness component of the treatment was the most effective aspect of it (Brotto, Basson, & Luria, 2008). Other studies in this area support that mindfulness interventions can improve
sexual response among survivors of endometrial or cervical cancer (Brotto et al., 2012), improve low or impaired arousal (Brotto & Basso, 2014), and improve interoceptive awareness. Further, the improvements in this awareness domain were associated with improvements to common barriers to sexual functioning (attention, self-judgement, and anxiety; Silverstein et al., 2011) and increased subjective sexual arousal for women who were being treated for sexual distress or who have experienced sexual abuse (Brotto, Seal, & Rellini, 2012). There is ample evidence to suggest that mindfulness does benefit sexuality with clinical samples, but its application broadly to the sexual activities and sexual satisfaction of long-term married couples has been mostly unknown (though has been explored by Brotto & Heiman, 2007).

One theoretical perspective contextualizing the connection between mindfulness and sexual satisfaction is the concept of Good Enough Sex (McCarthy & Wald, 2013). Good Enough Sex (GES) broadly emphasizes a flexible approach to desire and satisfaction by focusing less on individual performance during sexual encounters by doing away with detrimental normative notions of sex (e.g., which focus on perfectionism, performance anxiety, and fears of inadequacy). As McCarthy and Wald (2013) emphasize – there is substantial overlap between the goals of GES and mindfulness for sexuality: a positive and realistic approach, requiring practice, emphasizing the relationship, emphasizing relaxation, and avoiding an over-focus on sexual performance and the spontaneity of sexual desire as “showing up.” Theoretical connections as proposed by McCarthy and Wald (2013), combined with empirical literature by Brotto and colleagues and others (e.g., Khaddouma et al., 2015; Lazaridou & Kalogiannim, 2013) highlight that mindfulness compliments many mental processes that are beneficial for sexuality. Results of the current study are supportive and showed that: a) self-compassion is also an important factor, and b) that similar to with relationship satisfaction, the benefits of
mindfulness onto sexual satisfaction appear to be primarily indirect through Self-Determination Theory variables.

**Self-Determination Theory**

Within SDT, mindfulness is thought to directly support a person’s need for autonomy, primarily by supporting the individual’s awareness of what their needs are, and of the specific ways to meet their needs. This mindful awareness allows mindful individuals to be agentic in their approach to satisfying their basic needs. Because the NSIR need satisfaction measure measures one’s perception of their need support in the presence of their partner, it functions as a proxy for both one’s own sense of need fulfilment but also the degree to which their partner is supportive (or a proxy for how fulfilling/supportive the relationship is). Importantly, findings of the current study suggest that mindfulness is supportive of autonomy and relatedness within relationships. Relatedness support was part of the indirect pathway through which mindfulness and self-compassion were associated with both relationship and sexual satisfaction, and it was also the strongest indirect pathway of the three needs subscales. Importantly, the indirect relatedness pathway of association between mindfulness and relationship and sexual satisfaction was the only indirect pathway that was statistically significant for men. Thus, this was the only pathway that was statistically significant for both men and for women. The need for relatedness drives people to be engaged in close relationships, including couple relationships, and it is a critical need that underpins high quality relationships (Deci & Ryan, 2010).

Experiencing relatedness means “to feel personally accepted by and significant to others, and to feel cared for by others and caring of them” (Deci & Ryan, 2000). In the context of a romantic relationship, relatedness is a central proposition and is purported to be a significant predictor of relationship satisfaction (Deci & Ryan, 2014). It fits with this theoretical
perspective, then, that relatedness would be the strongest predictor of both relationship and sexual satisfaction for both men and women. However, in SDT, competence and autonomy are also critical for relationships – with research showing that they also contribute independently to relationship outcomes (La Guardia et al., 2000). This was not consistently observed in this study. Competence was not an independent predictor of either relationship or sexual satisfaction (and was not an indirect pathway), and autonomy was only an independent predictor of relationship satisfaction (and only for women). The exact connections between the three basic needs and relationship/sexual satisfaction are not well established in the literature. One of the few studies that found a connection between competence and relationship satisfaction used a single item measure of relationship satisfaction – which may explain the disparate results (La Guardia et al., 2000). And even within La Guardia et al. (2000), competence was the weakest predictor. Differences may also be due to sampling – La Guardia et al. (2000) and Patrick et al. (2007) based their relationship satisfaction inferences on young samples of mostly women; whereas, this study is of midlife, married Canadians in long-term marriages.

Concerning sexual satisfaction, results of the current study also contrast those of Smith (2007), who found that each of autonomy, competence, and relatedness predicted increased sexual satisfaction, whereas in the current study only relatedness predicted sexual satisfaction. Differences may again be due to sampling – Smith (2007) used a young sample with an average age of 21.78 years, who were mostly female – whereas the current sample was a midlife Canadian sample of only married individuals.

Given the fit of this model, and the large amount of variance accounted for in relationship and sexual satisfaction for both men and women (primarily by the need satisfaction scales), the fit of the model is suggestive that this model is a good representation of the ways in which
mindfulness and self-compassion influence these outcomes. This is notwithstanding differences in sampling that were implied earlier. Much of the extant literature on this topic utilizes undergraduate samples, and/or samples of individuals who have not been in longer relationships (e.g., La Guardia et al., 2000) such as within long term, married couples. In the current study, the relationships of participants are longer, and participants are older and thus may be difficult to compare to extant studies that are based on shorter relationships. Furthermore, research suggests that both relationship and sexual satisfaction both decline steadily over time in relationships (Glenn, 1998; Schmiedeberg & Schroder, 2016), thus individuals in the current sample are already several years into this decline process. It is possible that the strong connections between all of the three basic needs and both relationship and sexual satisfaction observed in the extant literature are specific to the short length of those relationships and the young age of the participants. In contrast, older individuals in marital relationships have a high degree of stability and have already experienced numerous changes in their relationship (e.g., on average, decreases to their relationship and sexual satisfaction), and therefore, it is possible that having one’s partner meet their competence needs within their relationship ceases to be as significant a concern independent of autonomy and relatedness.

Concerning the psychometric qualities, it is also possible that the NSIR scale measuring need satisfaction in relationships is not longitudinally invariant – meaning that individuals of different ages are responding and interpreting the items in fundamentally different ways. For example, it is possible that a younger individual in a relationship confronted with a question like “When I am with my partner, I feel like a competent person.” from the competence subscale of the NSIR will interpret and respond to it differently than a midlife married individual. In the absence of longitudinal measurement invariance of this scale, it is impossible to rule out such
effects and is thus a limitation of these types of cross-study inferences. It is also worth noting that it is not necessarily clear precisely what NSIR is measuring – whether it is measuring how one perceives their partner as contributing to these needs, or whether they are simply part of the context supporting their needs. Validation efforts on this scale should be conducted to refine and understand precisely what it is measuring.

Similarly, neither the FFMQ scale of mindfulness, the SCS scale of self-compassion, nor the GMSEX or CSI sexual and relationship satisfaction outcome scales have been tested for invariance over time in marriage. This severely limits cross-study comparisons that involve different age-populations and populations of different relationship durations, as it is possible that individuals interpret these scales quite differently across different cohorts, and across different relationship durations. It is therefore possible that different interpretations of these scales drive the differences between the stable married groups and the younger relationship groups – rather than “true” differences in the constructs. Assuming that these scales are actually invariant, results would imply that the Self-Determination mechanisms may be different or of different strengths among midlife, married individuals who have been with their partners for a long duration.

Important age-based considerations should also be made when interpreting mindfulness and self-compassion – older individuals meditate more, are more mindful (Baer et al., 2008), and are higher in self-compassion (Homan, 2016). This further confounds comparisons across the literature, particularly because most studies on mindfulness use relatively young samples (see Study 1, this dissertation) meaning that the preponderance of literature is based on the findings of samples from young relationships. Though understanding young peoples’ relationships is important, future studies should seek to increasingly understand how mindfulness, self-compassion, and SDT need satisfaction variables contribute to relationship outcomes for older
individuals in longer-term relationships and marriages. In particular, future research should expand on findings from the current study by utilizing dyadic and/or longitudinal methods or experimental designs.

**Other-oriented compassion.** Of note is the finding that other-compassion was weakly related to need satisfaction and weakly related to relationship and sexual satisfaction in bivariate analyses. Further analysis also indicated that other-compassion was not an indirect pathway through which self-compassion exerted any influence on relationship or sexual satisfaction. This is contrary to the hypotheses, which were formulated upon the idea that mindfulness and self-compassion are both self-oriented concepts, and that other-oriented compassion might be an important mechanism transmitting these self-oriented concepts to interpersonal constructs like relationship and sexual satisfaction. Much of the impetus for this other-compassion based hypothesis was based on findings that have suggested that individuals high in self-compassion have more compassionate relational goals, and are more socially supportive (Crocker & Canevello, 2008). Applied evidence also pointed to the importance of compassion – for example, Carson et al.’s (2006) Mindfulness Based Relationship Enhancement intervention focused on increasing mindfulness and compassion for one’s partner within the relationship. Combined with theoretical rationale supporting compassion as an important mechanism and outcome of mindfulness (Wallace, 2004), there were empirical and theoretical reasons to support testing compassion in this way. However, this compassion-based pathway was not supported in the current study, and, indeed, it was much more important that individuals were self-compassionate rather than other-compassionate. This finding dovetails with the idea that humans, even in relationships, are inherently self-focused. Even in circumstances involving relationship sacrifices
– foregoing one’s own self-interest for the well-being of one’s partner – studies suggest a strong personal benefit for the individual who is sacrificing (Kogan et al., 2010).

Alternatively, these effects might be idiosyncratic to the individual nature of this study – partner effects were not studied. Therefore, it may be that other-compassion might benefit one’s partners’ relationship outcomes, but not so strongly one’s own. This again coincides with research into relationship sacrifices – which suggest that the motivations behind individuals’ relationship sacrifices are crucial. Other-compassionate individuals might be more likely to endorse approach motives for sacrifices in their relationships – and these effects would be seen only by examining partner effects. Future research should again examine other-compassion using dyadic methods to determine if there may be partner effects of other-compassion or if, indeed the relational benefits come primarily from the self-compassion. Regardless it stands to reason that one’s own satisfaction in their relationship and with the sexual components would be primarily a function of self-oriented constructs rather than other-oriented ones, and thus it should not be surprising given the individual nature of this study.

It is important to note again the way in which the NSIR measure needs satisfaction – it asks to what degree does one’s partner help meet those needs for autonomy, competence, and relatedness. The finding that there is a relationship between these self-oriented constructs like mindfulness and self-compassion and whether one’s partner is supportive of their needs (or how supportive one perceives their partner) suggests that being mindful and being self-compassionate is interpersonally relevant. Notwithstanding the non-dyadic nature of this study, these results provide some preliminary evidence for the interpersonal effects of mindfulness and self-compassion, such that individuals higher on these two constructs also have more autonomy, competence, and relatedness supportive partners. This is precisely why mindfulness and self-
compassion are related to having partners who are more supportive of these needs is an interesting future avenue.

A potential future avenue along these lines concerns whether individuals higher in mindfulness and self-compassion are better at communicating exactly what their needs are to their partners, and whether these individuals are also better at maintaining and being vigilant about ensuring that their partners are needs-supportive (or finding need-supportive partners in the first place). According to mindfulness theory, individuals higher in mindfulness are keenly aware of the contexts and behaviours that are supportive of their well-being and, because of that awareness, they are better equipped (compared to low mindfulness individuals) to behave in such a way to satiate those needs (Deci & Ryan, 2000; Ryan & Deci, 2008). Perhaps one of those behaviours is related to communicating with one’s partner, being open about what makes them happy, and being communicative and/or instructive about with one’s partner about what they can do to be a supportive partner. This theorizing is part of the impetus for testing the current study’s hypothesis to begin with, and in that way, findings are consistent. Future studies need to elaborate on how, why, and for whom these effects occur.

**Interventions and Application**

Results of this study suggest that mindfulness- and/or self-compassion-based interventions that increase trait mindfulness and self-compassion also may contribute to improvements within relationships as well – but that these changes are primarily driven by increases to feelings of relatedness. Although the methodology of the current study does not allow inferences directly about any interventions, nor about any sort of mindfulness/self-compassion manipulations, results at least highlight that endeavors aiming to increase mindfulness and self-compassion may also benefit relationships. This is particularly interesting
when considered alongside findings from research using existing mindfulness-based interventions.

The Mindfulness-Based Relationship Enhancement program (MBRE; Carson et al., 2004) attempts to increase mindfulness in an effort to increase relationship satisfaction. Many relationship interventions have historically focused on relationships that have gone awry, or are already distressed – thus, bringing them into treatment. MBRE was influenced by the positive psychology movement and is instead focused on enhancing relationships for couples who are already reasonably happy with one another (Baer, 2003). It is more of a preventative program used to prevent couples from entering the types of relationship distress that would bring them to couple’s therapy for other reasons (Baer, 2003). MBRE is derived from Kabat-Zinn’s (1990) original MBST therapy and involves the same structure but is developed for use with couples rather than individuals. The couples attend eight weekly sessions that are about 2.5 hours long as well as a lengthy 7-hour long retreat near the end of the program. During these sessions, couples practice being compassionate toward one another, and the program aims to foster awareness and attention by focusing these attentional efforts on shared experiences (instead of individual ones; Baer, 2003; Carson et al., 2004). Empirical support for this treatment is lacking at least partly due to inherent ceiling effects when sampling a group of individuals who are already happy with their relationships (as noted by Christensen & Heavey, 1999). Findings from the current study compliment applied studies like Carson et al.’s (2004) by illuminating potential mechanisms of action for mindfulness.

Concerning sexual satisfaction, results support Brotto and colleagues’ work (e.g., Brotto & Basson, 2014) demonstrating that mindfulness benefits sexual functioning. There has not been an MBRE equivalent for the sexual components of a relationship, and no sexual components
were measured in Carson et al. (2004; 2007). Given the strong interconnection between relationship and sexual satisfaction (Byers, 2005; McNulty et al., 2016) and contextualized with the results of the current study, it is likely that MBRE also had some effect on the sexual component of the relationship although it is unclear how and to what degree. Considering that many of the exercises in the MBRE are similar to those described by Brotto (e.g., partner yoga, mindful touch exercises) it stands to reason that, if mindfulness is truly a driver of relationship and sexual benefits, MBRE would improve sexual satisfaction as well. Future research should seek to clarify if, how, and for whom programs like MBRE might broadly improve both the relationship and sexual components of a long-term partnership.

One caveat to the findings as a whole is the fact that mindfulness (and self-compassion) contributes very little variance directly to the prediction of relationship and sexual satisfaction – the variance accounted for was driven primarily by need satisfaction. This means that, based on the current findings, if there are benefits to using interventions to increase mindfulness and/or self-compassion, that the consequent relationship/sexual benefits are primarily indirect – it is not necessarily the increase to mindfulness or self-compassion that is solely driving the changes in relational variables per se. This is consistent with theorizing by Karremans et al. (2017) whose purported model is primarily indirect. Alternatively, it is important to note that mindfulness and self-compassion have been linked to benefits in many other psychosocial variables as well – thus, increasing mindfulness in the context of a relationship may also have a network of benefits, like decreases to depression and anxiety, which may have other indirect benefits to overall well-being, mental health, as well as to the relationship. Thus, it is already likely that mindfulness supports relationships by supporting individual’s mental health and overall well-being (Brown & Ryan, 2003; Segal, Williams, & Teasdale, 2018) – but the current study highlights that
mindfulness and self-compassion may also help through other mechanisms (Williams, 2008). Self-compassion-based interventions are newer and currently there are no studies deploying self-compassion interventions focused specifically on improving couples’ relationships. Though, Neff and Germer’s (2013) Mindful Self-Compassion Program effectively increases both mindfulness and self-compassion, with gains remaining at both 6-month and 1-year follow-ups. Indeed, Neff – the originator of the contemporary self-compassion conceptualization – is focusing on developing programs that combine both mindfulness and self-compassion, rather than self-compassion on its own (e.g., Neff & Germer, 2013). This intersects well with the impetus for the current study – which was founded upon the idea that the constructs should be considered simultaneously.

In summary, further work needs to be conducted to demonstrate and elaborate on the precise mechanisms through which mindfulness and self-compassion benefit relationship and sexual satisfaction. The current study is the first to highlight that part of this mechanism may include their partner’s ability to satisfy their needs for autonomy, competence, and relatedness. How exactly one’s own mindfulness and self-compassion are related to one’s partner’s need fulfilling tendencies – or an increased perception of their need fulfilling tendencies – needs to be explored.

Lastly, this study also put into practice an emerging bidirectional conceptualization of relationship and sexual satisfaction and performed several tests to systematically test the optimal way to model these outcomes. Results supported that relationship and sexual satisfaction should be considered as simultaneous outcomes, and allowed to covary (i.e., as a covarying outcome model). Directly comparing the covarying outcome model to the more restricted models showed that using them as predictors was not appropriate. Future researchers should be mindful of
emerging literature and theorizing that increasingly conceptualizes these as covarying outcomes (e.g., McNulty et al., 2016; Quinn-Nilas, in prep.) and to model them accordingly or risk model misspecification.

Limitations

The primary limitations of this study surround the cross-sectional and individual level design, which prohibits inferences about partner effects and limits inferences about temporal precedence. Both of these are important, but particularly the analysis of dyadic effects within the context of couple relationships. Another limitation of this study is that there was no experimental manipulation of mindfulness, because there is a distinction between state and trait mindfulness – though there is, of course, overlap. Though the state versus trait distinction is an ongoing area of research, the current study can only speak to trait-based effects, and not necessarily to state effects (although it is likely that they are highly interconnected; i.e., individuals higher in state mindfulness more frequently experience states of increased mindfulness). Indeed, much of the empirical literature has found that increasing state mindfulness through interventions has long-term effects increasing trait mindfulness – and that it is the overall trait that tends to drive the well-being effects (e.g., Kiken, Garland, Bluth, Palsson, & Gaylord, 2015). But future work should attempt to further disentangle the effects of state vs. trait mindfulness within relationships.

This study also is limited in that if focuses on how mindfulness might benefit relationship and sexual satisfaction. Though both outcome variables are frequently used to gauge treatment outcomes (e.g., McClelland, 2011; Wood et al., 2005), measurement of these outcomes assumes that they reflect an intra-individual reflective process. However, recent research has shown that, when queried, participants do not always respond to satisfaction items in line with this
assumption (McClelland, 2011). Though analyzing relationship and sexual satisfaction as outcomes and understanding the mechanisms contributing to them, there are limitations to using relationship and sexual satisfaction as the sole gauges of relationships.

**Conclusion**

Current findings indicate that mindfulness influences both relationship and sexual satisfaction. However, these effects are primarily indirect through self-compassion, and having a partner who satiates one’s needs for autonomy, competence, and relatedness. Indirect effects modeling showed a serial indirect effect pathway for both relationship and sexual satisfaction. For relationship satisfaction, individuals higher in mindfulness were higher in self-compassion and, through this indirect pathway of associations, had partners who were more supportive of their autonomy and relatedness – resulting in increased relationship satisfaction. For sexual satisfaction, individuals higher in mindfulness were higher in self-compassion and, through having a more supportive partner for their relatedness needs, and thus had increased sexual satisfaction. When adjusting estimates for age and marital duration and splitting the model by gender, relatedness was the only statistically significant indirect pathway for both men and for women. For women, the indirect pathway of autonomy was statistically significant, and the serial indirect effects were statistically significant through relatedness. Taken together, these findings indicate that mindfulness does have interpersonal relevance and the pathways of association revealed here contextualize the ways in which mindfulness-based relationship programs benefit relationships.
General Discussion

This dissertation consisted of two studies. The first was a meta-analysis of the association between mindfulness and relationship satisfaction. Results of the meta-analysis showed that the association between mindfulness and relationship satisfaction was low to medium strength, but statistically significant and consistent across moderators. Study 2 was an empirical study of the pathways of association through which mindfulness benefits relationship satisfaction and sexual satisfaction of midlife married Canadians. Several pre-registered hypotheses tested mechanisms involving by Self-Determination Theory’s three basic needs in relationships – autonomy, competence, and relatedness. Results supported that autonomy and relatedness were important indirect pathways through which mindfulness influences relationship satisfaction. For sexual satisfaction, only relatedness was an indirect pathway. The final SEM model fit the data exceptionally well, suggesting that the configuration of these variables was an adequate representation of their real-world mechanisms. When the model was estimated as a multigroup model based on gender and covariates were added (age and marital duration), findings suggested that the indirect pathways were more nuanced for women than for men, but highlighted that relatedness was a statistically significant pathway for both.

Studies 1 and 2 are highly enmeshed. Study 1 established the foundational knowledge – that mindfulness at a basic bivariate level was associated with a critical relationship variable – relationship satisfaction. Furthermore, the two studies happened sequentially with study 1 forming the base for power analyses of study 2. Combined with the results of study 2, which elaborated on the pathways of association between mindfulness and relationship and sexual satisfaction, this dissertation suggests that mindfulness is relationally relevant primarily indirectly. On the one hand, study 2 is complimentary to study 1 because it replicates the
bivariate associations showing that mindfulness is associated with relationship satisfaction. On the other hand, study 2 shows that the bivariate relationship is a shallow summary of the more nuanced indirect pathways that connect the association between mindfulness and relationship satisfaction (and sexual satisfaction). The studies therefore reveal a nuanced and perhaps contradictory set of results with study 1 concluding that mindfulness is a statistically meaningful correlate of relationship satisfaction. But study 2 concluding that mindfulness is relevant primarily because it is associated with other intermediary indirect effects that carry the association. Stated differently, study 2 reveals the weaknesses of relying too heavily on bivariate meta-analysis broadly for inference.

Importantly, this study was of midlife, married Canadians. In addition to being the largest demographic in Canada that is projected to further increase (Statistics Canada, 2014), this is a demographic that routinely deals with high levels of stress because of dual caretaking responsibilities for both children and aging/ill parents (Grundy & Henretta, 2006), habituation within their relationship (Christopher & Sprecher, 2000), and increased prevalence of sexual problems (e.g., Laumann et al., 1999; Quinn-Nilas et al., 2018). Therefore, it is critical to understand mechanisms of relationship and sexual satisfaction of midlife, married Canadians.

**Mindfulness**

Mindfulness has primarily been researched within an individual context, with existing evidence supporting numerous personal benefits such as improvements to anxiety, mood symptoms associated with depression (Hoffman, Sawyer, Witt, & Oh, 2010), and well-being (Brown & Ryan, 2003). Interest in the interpersonal benefits of mindfulness have been recent. Carson et al. (2004; 2007) theorized that mindfulness is a strong concept within relationships because of its generality to numerous beneficial outcome variables, which coalesce to benefit
relationships. This is echoed by other reviews and research agendas (e.g., Karremans et al., 2017). In Study 2, mindfulness did not have a strong direct effect on relationship or sexual satisfaction and this complimented Study 1 where the meta-estimate of the direct association was shown to be a small effect size. But Study 2 showed that self-compassion and the SDT needs mechanisms drove the association between mindfulness and relationship satisfaction.

Importantly, the variance accounted for in relationship satisfaction was very high, though driven primarily by the need satisfaction variables. For sexual satisfaction, a similar effect was observed compared to relationship satisfaction – the effect of mindfulness was primarily indirect, although the variance accounted for was smaller (per the SEM model). Together, Study 1 and Study 2 are consistent with a conceptualization that mindfulness is beneficial because of its generality. This dissertation showed that although mindfulness on its own may have a significant but small effect on relational outcome variables like relationship satisfaction (study 1), it does nonetheless appear to be associated with a broad range of relationally relevant variables such as need satisfaction within relationships (i.e., the results of study 2). Specifically, the benefits of mindfulness arise from its associations with a range of positive intrapersonal and interpersonal outcomes, not solely due to its direct influence upon relationship and sexual satisfaction (Carson et al., 2004).

Indeed, other research suggests that mindfulness is strongly associated with attachment (Saavedra et al., 2010), for example, which is one of the most highly researched and consistent conceptualizations in relationship research warranting further exploration as a pathway of association.

However, results of studies 1 and 2 also underscore a broader critique of mindfulness concerning whether researchers or therapists should attend to mindfulness as relationally relevant given that its effects appear small at the bivariate level and primarily indirect. For example,
effect sizes are far larger between variables such as need satisfaction (e.g., study 2) or attachment (e.g., Saavedra et al., 2010) and relationship/sexual satisfaction. It is also important to consider that although variables like attachment are more proximal to romantic relationships in that they deal specifically with relationship cognitions and attitudes, there has been considerable theorizing regarding the complimentary effects between mindfulness and attachment (i.e., Saavedra et al., 2010). In summary, the two studies of this dissertation suggest that mindfulness is strong because of its generality but this is also its weakness. Mindfulness theoretically facilities a host of beneficial relationship processes (e.g., Karremans et al., 2017), however, this is countered by its conceptualization and measurement being unclear. Given these conceptualization and measurement problems, mindfulness may be critiqued as being a “catch all” of beneficial cognitive processes, without enough distinguishing it. In the absence of additional empirical evidence combined with the remnant difficulties of conceptualization, it is difficult to interpret the literature reviewed in study 1 and the results found in study 2 absent further replication. This replication should be aimed specifically at understanding the way in which mindfulness is interrelated to other dominant relationship models such as attachment and, furthermore, examining the dyadic effects of mindfulness. One important consideration of both study 1 and study 2 is that neither infers anything about dyadic effects of mindfulness (i.e., whether one partner’s mindfulness can influence their partner’s outcomes and vice versa) and this is a critical area for future research into the relationship effects of mindfulness.

Self-compassion. Existing research into the effectiveness of mindfulness-based programs have proposed that self-compassion may be one of the primary reasons why Mindfulness-Based Stress Reduction programs benefit well-being (e.g., Baer, 2010). This is supported also by Buddhist philosophy, on which both mindfulness and self-compassion are conceptually based,
which suggests that mindfulness directly leads to insight into one’s own suffering, increasing compassion (Radhakrishnan & Moore, 1957). These considerations within the context of relationships were tested directly in Study 2, which supported this purported mechanism (i.e., that mindfulness leads to self-compassion). Neff (2003a; 2003b) conceptualized self-compassion as a healthy attitude to one’s self through self-kindness, an understanding that humans are all part of a shared experience, and a tendency to not over-identify with one’s own pain. Though investigations into the relational benefits of self-compassion are scant, that literature does suggest that self-compassion is associated with motivations to correct interpersonal mistakes in relationships and problem-solving behaviour (Baker & McNulty, 2012), and with positive relationship behaviour (Neff & Beretvas, 2013), and relationship satisfaction (Baker & McNulty, 2012; Neff & Beretvas, 2013). Study 2 replicates studies showing that self-compassion is associated with relationship satisfaction, but also expands to show that it benefits sexual satisfaction. Furthermore, Study 2 also provides evidence suggesting that self-compassion, together with the three needs measures of SDT, is part of the mechanism through which mindfulness benefits these relationship outcomes. Most pessimistically, evidence for small bivariate effect size (study 1) and evidence for the effect being primarily indirect (study 2) taken together may suggest that self-compassion is the real driver of relational benefits and that the focus on mindfulness has perhaps been unwarranted. Considering the findings of Carson et al. (2004, 2007) which purported that compassionate shared activities were the primary drivers of the benefits of their mindfulness relationship enhancement program, this further supports the proposal that mindfulness may not be the primary driver of these effects and that it is salutary to other constructs.
**Self-Determination Theory.** Within Self-Determination Theory, mindfulness is thought to be supportive of the needs for autonomy, competence, and relatedness (Ryan & Deci, 2017). In Study 2, this theory is expanded on by showing that mindfulness does support these needs within relationships, and that the effect of mindfulness on relationship and sexual satisfaction is mostly due to its effect on the three basic needs in that relationship. Findings from Study 2 support the proposition under SDT that relatedness should be most critical within interpersonal relationships like long-term marriages. Combined with context provided by Study 1, this dissertation as a whole supports that mindfulness contributes to relatedness in a relationship – which is in turn a critical pathway for both relationship and sexual satisfaction. Similar to mindfulness, the SDT basic needs are strong because of their generality, but it is important to note that a critical component of self-determination concerns what individuals do to have their needs satisfied in relationships. SDT is founded on an Aristotelian view of human development wherein individuals are assumed to be active and agentic toward needs satisfaction (Ryan & Deci, 2002). This means that the needs are only part of the perspective – they are an innate driving force which precipitates individuals to act in ways they perceive to be in accordance with those needs. SDT assumes that humans have an innate tendency toward personal growth and authenticity, and that the purported three basic needs are integral to that (Ryan & Deci, 2017). Study 2 expands on this by showing that Mindful individuals report having higher need satisfaction in relationships; this finding is consistent with theorizing in this area. In particular, Study 2’s findings concerning autonomy and relatedness being important mechanisms for mindfulness are consistent with findings from Carson et al. (2004) – wherein participants in a mindfulness-based couple’s intervention increased in autonomy and relatedness. However, Study
2 expands on this by directly supporting that autonomy and relatedness are part of a mechanism through which mindfulness exerts its benefits on relationship satisfaction.

Given the magnitude of variance accounted for by the SDT variables in study 2, it is possible that these need satisfaction variables would account for the bivariate association observed between mindfulness and relationship satisfaction in other studies (i.e., such as the ones reviewed in study 1). However, considering that meta-analyses synthesize the results across many different studies’ samples, it would be specious to assume that the results of a single study (study 2) in this dissertation necessarily nullify the aggregate bivariate results found in study 1.

None of the literature reviewed in study 1 considered need satisfaction and Self-Determination Theory. This was puzzling considering that SDT is a frequently used well-being framework that has fully incorporated mindfulness (i.e., Deci & Ryan, 2000; Ryan & Deci, 2008). This may be due to the limited use of SDT within the field of relationships broadly, as it has primarily been used within fields of well-being and mental health (Deci & Ryan, 2010) thus it may make more intuitive sense for researchers to include variables like attachment which have longer histories within relationship research. However, considering the broader interest in mindfulness within relationships (i.e., study 1) alongside results from study 2 which showed a high degree of utility from SDT, researchers should consider its inclusion in future studies of mindfulness in relationships. Study 2 showed that including the need satisfaction variables resulted in an excellent fit of the model and a large amount of variance accounted for in the outcome variables suggesting that that these variables are likely a good reflection of the pathways through which mindfulness is associated with relationship and sexual satisfaction.

**Sexual and Relationship Satisfaction as Covarying Outcomes**
Relationship and sexual satisfaction have largely been investigated by separate fields of research. This is evident when you consider that there were an adequate number of studies investigating the association between mindfulness and relationship satisfaction, but far fewer studies of the association between mindfulness and sexual satisfaction. Partly because of this, conclusions based on longitudinal research on exactly how relationship and sexual satisfaction are interconnected have been inconsistent (e.g., Cao et al., 2018; Fallis et al., 2016; Henderson-King & Veroff, 1994; Sprecher, 2002; Vowels & Mark, 2018, Yeh et al., 2006), leaving it unclear precisely how these constructs are related. Indeed, therapists see relationship and sexual satisfaction as strongly interconnected in complex ways (Wincze & Carey, 2001) that are perhaps more illustrative of bidirectionality rather than unidirectionality. Recent literature, including a study of my own (McNulty et al., 2016; Quinn-Nilas, in prep.) increasingly conceptualize relationship and sexual satisfaction as being related bidirectionally and as covarying outcomes. Thus, an added benefit of this study was the ability to systematically test the interrelationship between relationship and sexual satisfaction using SEM. Results supported a covarying outcome conceptualization, which is in line with what was found in Quinn-Nilas (in prep.) considering that the covarying outcome model fit the data best. This has important implications for conceptualization and modeling going forward. If two variables are interrelated in a non-causal, but parallel way, then it may be inappropriate to model them as predictors of each other in analyses like multiple regression. This was tested in Study 2, where each was regressed onto the other, emulating what is done when “controlling” for them in multiple regression, and this was not a good fit as evidenced by fit indices. Researchers should be very deliberate in their inclusion of relationship satisfaction when sexual satisfaction is of interest, and vice versa, and perhaps increasingly view them as co-occurring outcomes.
Importantly, the connections between relationship and sexual satisfaction that were revealed in study 2 were not discussed or included by any of the studies reviewed in study 1. Despite studies like Karney and Bradbury (1995) finding sexual satisfaction to be among the most highly correlated with relationship satisfaction longitudinally, the connections between these two types of satisfaction have not been simultaneously considered in the mindfulness literature. As more studies emerge correlating mindfulness to sexual satisfaction, researchers should meta-analyze this association to ensure that it is reliable and replicable.

**Limitations**

Study 1 showed that the effects of mindfulness on relationship satisfaction was consistent across studies, consistent across demographic moderators, and that the effect was not vulnerable to publication bias. Study 2 tested the Self-Determination mechanisms through which mindfulness influenced relationship and sexual satisfaction. However, these conclusions must be considered alongside methodological and sample limitations of Study 1 and Study 2 and against conceptual limitations to both mindfulness and Self-Determination Theory.

**Limitations of this dissertation.** This dissertation is limited in several ways. Firstly, with Study 1 it is notable that the sample of studies is quite small. This reflects that interest in the relational relevance of mindfulness is only beginning, but this means that the meta-analysis is only a representation of the preliminary results on the topic. These preliminary results, and what they mean collectively, could change as more studies are conducted investigating mindfulness and relationship satisfaction. Additionally, and as stated earlier, those studies were generally low power, meaning that the meta-analysis is representative of preliminary studies of unknown quality. One methodological limitation of Study 1 concerns the use of meta-regression to estimate the moderation model. The conclusion of Study 1 was that the effect of mindfulness on
relationship satisfaction was consistent across moderators; however, this conclusion is limited by the small sample size, which biases the estimates of meta-regression. Furthermore, considering how quickly interest in mindfulness has increased within the last decade, it may be the case that a meta-analysis into the association between mindfulness and relationship is too preliminary and representative only of the initial studies into this topic.

Conclusions of Study 2 are limited in several ways. Firstly, it is important to note that Study 2 only sampled individuals and not dyads. This is a substantial limitation to any study seeking to investigate couples relationships because in the absence of dyadic analysis it is not possible to make inferences about the ways in which one partner reciprocally influences outcomes of the other. Furthermore, investigations into the mechanisms between mindfulness and outcomes such as relationship and sexual satisfaction are heavily restricted by the cross-sectional nature of the study. Without temporal precedence, it is difficult to make firm conclusions about these mechanisms because causal inferences are not possible from this cross-sectional study. Additional limitations concern the demographics of the sample of Study 2. This study analyzed a sample of midlife married Canadians, most of whom had stayed with their partner for a substantial amount of time. While this is an important group to study because they are at the intersection of numerous physiological (e.g., Laumann et al., 1999) and relational (Byers, 2005; Quinn-Nilas, in prep.) issues, it means that the results might not generalize to different age groups and to relationships of different durations. Age-based considerations are particularly important when considering sexual satisfaction as an outcome variable. Research has consistently shown that as individuals get older they experience more sexual problems, such as low desire or erectile difficulties (Laumann et al., 1999; Quinn-Nilas et al., 2018). Substantial physiological considerations may underscore the lower variance accounted for in Study 2 in the
prediction of sexual satisfaction, as the presence of sexual problems (and the degree of distress they are causing) was not considered in this study.

Both studies 1 and 2 are limited in that they are likely samples of individuals who are comfortable enough to talk about their relationships, who have enough time day-to-day to partake in a scientific study of mindfulness in relationships, and in parallel, are likely high enough in socio-economic status that they can spend time participating. Furthermore, both studies utilize quantitative methods and, importantly, only quantitative studies were summarized and used as a basis for literature review (study 1) and as a basis for hypothesis construction (study 2). This practice may have privileged the types of knowledge most amenable to quantitative measurement and analysis while obfuscating understandings that could be discovered using a qualitative framework. This reflects a bias toward quantitative research in both the field of relationship research and of the author. Future studies in this area should be performed with different perspectives and theoretical frameworks that are perhaps more amenable to qualitative research.

Trait mindfulness is conceptualized as a varying individual trait that can be developed and cultivated through meditative practice (Brown et al., 2007). However, mindfulness is also conceptualized as a state – one that is generated (for various amounts of time) by mindfulness practice. Increasingly being in a state of mindfulness is thought to contribute to the development of trait mindfulness – the predisposition toward mindfulness in everyday life (Kiken, Garland, Bluth, Palsson, & Gaylord, 2015). Both studies within this dissertation focused on trait mindfulness, and it is therefore not possible to discriminate between the effects of state vs. trait from these results.
**Research considerations regarding mindfulness.** Mindfulness as a concept has been the subject of much celebration, but also of critique. As Grossman, Niemann, Schmidt, and Walach (2004) indicate, most studies assessing MBSR (Mindfulness-Based Stress Reduction) had methodological flaws and concluded that the benefits of mindfulness treatments to be “suggestive rather than definitive.” (Grossman, et al., 2004, p. 35). Poor methodology of the supportive studies is a common critique levied at the mindfulness literature and one of the central criticisms concerns measurement. There is no single universally agreed upon definition of mindfulness in the research literature, although there are commonalities across definitions. Although there are benefits to most studies using the same measure (such as the MAAS) for cross-study comparability, researchers should consider whether their conceptualization of mindfulness is multi-faceted or unidimensional. If they conceptualize mindfulness as more than attention and awareness, then the MAAS and its unidimensional measurement should not be used. As discussed in the introduction, the FFMQ is a recent multi-dimensional conceptualization that captures a wide breadth of purported mindfulness sub-concepts, and thus was appropriate for use in the current study wherein mindfulness was not conceptualized solely as attention and awareness.

**Research considerations related to SDT.** In Study 2, the SDT needs satisfaction in relationships scales accounted for a very large proportion of variance in relationship satisfaction (67%). This is very high and may be suggestive that the two concepts overlap too closely. Other studies using the same scale and other measures of relationship satisfaction have found similarly high correlations. Sadikaj et al. (2015) used the NSIR overall score and found similarly high correlations with relationship satisfaction (.57 for men and .47 for women). This suggests that the strong associations observed in Study 2 are not necessarily outliers and that the NSIR is
indeed highly related to relationship satisfaction. Alternatively, the strong relationships may be suggestive that relatedness, in the context of a romantic relationship, is measuring ideas that are very similar and perhaps practically indistinguishable from relationship satisfaction. Future research should seek to refine and further validate the NSIR in more refined detail.

**Implications for Intervention**

Contextualized alongside Carson et al.’s (2004; 2006) studies supporting the effectiveness of the Mindfulness-Based Relationship Enhancement (BMRE) program for stress inoculation of couples, Study 2 suggests that at least some of these benefits are to do with increases to self-compassion. This is consistent with the underlying development of MBRE, which was theorized to result in increases to compassion for the self (Carson et al., 2004). Although Study 2 was not in the context of an intervention, results do support this underlying theory of the mechanism through which mindfulness benefits relationship satisfaction. Broadly, findings from this dissertation support mindfulness-based relationship endeavors by demonstrating that: a) mindfulness is associated with relationship satisfaction consistently across studies, across demographic moderators, and is reasonably robust to publication bias estimates (Study 1); and b) that mindfulness contributes to a series of beneficial mechanisms, including self-compassion, autonomy, and relatedness, and through this pathway of associations are associated with increased relationship and sexual satisfaction.

Within the context of sexuality there is substantial intervention-based research supporting the benefits of mindfulness. This research has been primarily conducted within clinical contexts treating, for example, sexual distress among women who have experienced sexual abuse (Brotto et al., 2012). Contextualized by numerous research studies showing benefits for mindfulness in these clinical scenarios involving sexual satisfaction (e.g., Brotto & Basson, 2014), results of
Study 2 suggest that there may be applications for mindfulness outside of clinical context. For example, Carson et al. (2004) did not measure any sexuality variables, but given the results of Study 2, it is possible that sexual satisfaction also increased in parallel with relationship satisfaction. Not only is the effect of mindfulness onto sexual satisfaction shown within this dissertation (and its mechanisms) and within extant literature (Khaddouma et al., 2015), but it must be emphasized that relationship satisfaction and sexual satisfaction are closely intertwined (Byers, 2005; McNulty et al., 2016). Contextualized within the literature connecting relationship and sexual satisfaction cross-sectionally and longitudinally, it stands to reason that increases in one may precipitate or closely follow increases in the other (Quinn-Nilas, in prep.). Future research should expand upon these mechanisms perhaps by expanding on the theorizing concerning Good Enough Sex (GES) and how highly Mindful individuals might embrace this philosophy more-so than low Mindful individuals in long-term romantic relationships.

**Future Research**

Future research in this area needs to make methodological improvements. Firstly, results of the meta-analysis revealed that a substantial number of studies were under-powered and future studies should remedy this. Secondly, most studies (including Study 2 of this dissertation) were cross-sectional, and individual level. Moving this topic forward requires longitudinal data that is amenable to inferences based on temporal precedence. For example, a longitudinal study examining mindfulness at an earlier timepoint would be able to make stronger causal claims about the actual benefits of mindfulness to future relationship trajectories and outcomes – beyond what is possible in a cross-sectional study. A dyadic study would be able to make inferences regarding the partner effects of both mindfulness and the SDT need satisfaction variables. Questions concerning the dyadic effects of mindfulness are particularly relevant given
the apparent interest in its dyadic effects contextualized by Karremans et al.’s (2017) dyadic-based research agenda. The partner effects of mindfulness are mostly unknown and exploring the dyadic effects would be a next step to identifying precisely if and how relevant it is for relationship outcomes for one individual to be high (or low) in trait mindfulness. One particularly interesting avenue would be to explore if mindfulness has an inter-partner multiplicative effect. Stated in a different way, perhaps partnerships where both individuals are high in mindfulness have uniquely positive outcomes and are fundamentally different from partnerships with low mindfulness or are mixed. This could be tested by estimating an APIM model with an interaction between partner 1 and partner 2’s mindfulness scores related to the outcomes of that study. Such an aim would be consistent with emerging calls-to-action to explore if there are conditions to the benefits of mindfulness (e.g., Karremans et al., 2017).

Though the meta-analysis presented in this dissertation is a thorough review of the existing literature, it is limited in scope in that it includes only individual-level correlation studies. Similar to the need to pursue dyadic research questions, future meta-analysis will be needed to analyze the partner effects of mindfulness on relationship satisfaction and also sexual satisfaction. When a topical area is not highly saturated, for example with the connections between mindfulness and sexual satisfaction, it is possible for the small pool of existing studies to be a representation of only the largest effect sizes. A similar analysis to what was done with Study 1 should be performed with sexual satisfaction.

**Conclusion**

These two studies demonstrated and elaborated on the relational benefits of mindfulness. Across both studies, findings supported the association between mindfulness and relationship/sexual satisfaction and demonstrated that the association was primarily indirect.
Study 1 was a meta-analysis that showed that the effect of mindfulness on relationship satisfaction was statistically significant, and consistent across moderators, albeit of a small effect size. Importantly, analyses suggested that these findings were not due to or vulnerable to publication bias, but also suggested methodological issues in the extant literature of this topic, such as low power. Study 2 investigated the association between mindfulness and relationship satisfaction further by analyzing a sample of 586 midlife married Canadians to test a priori hypotheses concerning the Self-Determination mechanisms through which mindfulness exerts an influence on both relationship and sexual satisfaction. Results suggested that individuals higher in mindfulness were more relationally satisfied because they were higher on self-compassion, and through this pathway of associations, reported relationships higher in autonomy and relatedness. In parallel, individuals higher in mindfulness were higher in sexual satisfaction because they were higher in self-compassion, and through this pathway of associations, had higher relatedness in their relationships. When controlling for age and marital duration and estimating this as a multi-group model separately by gender, findings showed that relatedness was the indirect pathway of associations shared for both men and for women. Furthermore, women’s pathways of association were more complex, inclusive of both autonomy and a serial indirect pathway through self-compassion and relatedness. Findings complement existing theory and literature, suggesting that the strength of mindfulness is in its generality to a milieu of positive outcomes, indirectly contributing to outcomes such as relationship and sexual satisfaction. Findings also complement existing theorizing and research agendas in the area, by highlighting that mindfulness has relational relevance to both the relationship and sexual components of long-term marriages.
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Meta-Analysis References

* References marked with an asterisk indicate studies included in the meta-analysis.


Appendix A: Five-Facet Mindfulness Questionnaire

Five Facet Mindfulness Questionnaire

Description:

This instrument is based on a factor analytic study of five independently developed mindfulness questionnaires. The analysis yielded five factors that appear to represent elements of mindfulness as it is currently conceptualized. The five facets are observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience. More information is available in:

Please rate each of the following statements using the scale provided. Write the number in the blank that best describes your own opinion of what is generally true for you.

```
1   2   3   4   5
never or very rarely sometimes often very often or
rarely true true true true always true
```

1. When I’m walking, I deliberately notice the sensations of my body moving.
2. I’m good at finding words to describe my feelings.
3. I criticize myself for having irrational or inappropriate emotions.
4. I perceive my feelings and emotions without having to react to them.
5. When I do things, my mind wanders off and I’m easily distracted.
6. When I take a shower or bath, I stay alert to the sensations of water on my body.
7. I can easily put my beliefs, opinions, and expectations into words.
8. I don’t pay attention to what I’m doing because I’m daydreaming, worrying, or otherwise distracted.
9. I watch my feelings without getting lost in them.
10. I tell myself I shouldn’t be feeling the way I’m feeling.
11. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.
12. It’s hard for me to find the words to describe what I’m thinking.
13. I am easily distracted.
14. I believe some of my thoughts are abnormal or bad and I shouldn’t think that way.
15. I pay attention to sensations, such as the wind in my hair or sun on my face.
16. I have trouble thinking of the right words to express how I feel about things
17. I make judgments about whether my thoughts are good or bad.
18. I find it difficult to stay focused on what’s happening in the present.
19. When I have distressing thoughts or images, I “step back” and am aware of the or image without getting taken over by it.
20. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.
21. In difficult situations, I can pause without immediately reacting.
22. When I have a sensation in my body, it’s difficult for me to describe it because I can’t find the right words.
23. It seems I am “running on automatic” without much awareness of what I’m doing.
24. When I have distressing thoughts or images, I feel calm soon after.
25. I tell myself that I shouldn’t be thinking the way I’m thinking.
26. I notice the smells and aromas of things.
27. Even when I’m feeling terribly upset, I can find a way to put it into words.
28. I rush through activities without being really attentive to them.
29. When I have distressing thoughts or images I am able just to notice them without reacting.
30. I think some of my emotions are bad or inappropriate and I shouldn’t feel them.
31. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.
32. My natural tendency is to put my experiences into words.
33. When I have distressing thoughts or images, I just notice them and let them go.
34. I do jobs or tasks automatically without being aware of what I’m doing.
35. When I have distressing thoughts or images, I judge myself as good or bad, depending what the thought/image is about.

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

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

38. I find myself doing things without paying attention.

39. I disapprove of myself when I have irrational ideas.

Scoring Information:

Observe items:
1, 6, 11, 15, 20, 26, 31, 36

Describe items:
2, 7, 12R, 16R, 22R, 27, 32, 37

Act with Awareness items:

Nonjudge items:

Nonreact items:
4, 9, 19, 21, 24, 29, 33
Appendix B: Self-Compassion Scale

Coding Key:

Self-Kindness Items: 5, 12, 19, 23, 26
Self-Judgment Items: 1, 8, 11, 16, 21
Common Humanity Items: 3, 7, 10, 15
Isolation Items: 4, 13, 18, 25
Mindfulness Items: 9, 14, 17, 22
Over-identified Items: 2, 6, 20, 24

Subscale scores are computed by calculating the mean of subscale item responses. To compute a total self-compassion score, reverse score the negative subscale items before calculating subscale means - self-judgment, isolation, and over-identification (i.e., 1 = 5, 2 = 4, 3 = 3, 4 = 2, 5 = 1) - then compute a grand mean of all six subscale means. Researchers can choose to analyze their data either by using individual sub-scale scores or by using a total score.

(This method of calculating the total score is slightly different than that used in the article referenced above, in which each subscale was added together. However, I find it is easier to interpret the total score if a mean is used.)
HOW I TYPICALLY ACT TOWARDS MYSELF IN DIFFICULT TIMES

Please read each statement carefully before answering. To the left of each item, indicate how often you behave in the stated manner, using the following scale:

Almost never 1 2 3 4 5
Almost always

1. I’m disapproving and judgmental about my own flaws and inadequacies.
2. When I’m feeling down I tend to obsess and fixate on everything that’s wrong.
3. When things are going badly for me, I see the difficulties as part of life that everyone goes through.
4. When I think about my inadequacies, it tends to make me feel more separate and cut off from the rest of the world.
5. I try to be loving towards myself when I’m feeling emotional pain.
6. When I fail at something important to me I become consumed by feelings of inadequacy.
7. When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.
8. When times are really difficult, I tend to be tough on myself.
9. When something upsets me I try to keep my emotions in balance.
10. When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.
11. I’m intolerant and impatient towards those aspects of my personality I don't like.
12. When I’m going through a very hard time, I give myself the caring and tenderness I need.
13. When I’m feeling down, I tend to feel like most other people are probably happier than I am.
14. When something painful happens I try to take a balanced view of the situation.
15. I try to see my failings as part of the human condition.
16. When I see aspects of myself that I don’t like, I get down on myself.
17. When I fail at something important to me I try to keep things in perspective.
18. When I’m really struggling, I tend to feel like other people must be having an easier time of it.
19. I’m kind to myself when I’m experiencing suffering.
20. When something upsets me I get carried away with my feelings.
21. I can be a bit cold-hearted towards myself when I’m experiencing suffering.
22. When I’m feeling down I try to approach my feelings with curiosity and openness.
23. I’m tolerant of my own flaws and inadequacies.
24. When something painful happens I tend to blow the incident out of proportion.
25. When I fail at something that’s important to me, I tend to feel alone in my failure.
26. I try to be understanding and patient towards those aspects of my personality I don’t like.
Appendix C: Basic Need Satisfaction in Relationships Scale

Note: This questionnaire was designed for use with respect to need satisfaction in particular relationships. For example, it is to assess the degree to which a person experiences basic need satisfaction while relating to his or her spouse, or best friend, or mother, or children, or whomever. So, to use the questionnaire to assess need satisfaction in a relationship, replace the XXXXXXX with the relationship you are studying. Although we have never done so, you could try using it for relationships in general if that is the question that interests you.

In My Relationships

Please respond to each statement by indicating how true it is for you. Use the following scale.

1. not at all true
2. somewhat true
3. very true

1. When I am with XXXXXXX, I feel free to be who I am.
2. When I am with XXXXXXX, I feel like a competent person.
3. When I am with XXXXXXX, I feel loved and cared about.
4. When I am with XXXXXXX, I often feel inadequate or incompetent.
5. When I am with XXXXXXX, I have a say in what happens, and I can voice my opinion.
6. When I am with XXXXXXX, I often feel a lot of distance in our relationship.
7. When I am with XXXXXXX, I feel very capable and effective.
8. When I am with XXXXXXX, I feel a lot of closeness and intimacy.
9. When I am with XXXXXXX, I feel controlled and pressured to be certain ways.

Scoring Information. Form three subscale scores by averaging item responses for each subscale after reverse scoring the items that were worded in the negative direction. Specifically, any item that has (R) after it in the code below should be reverse scored by subtracting the person’s response from 8. The subscales are:
autonomy: 1, 5, 9(R)
competence: 2, 4(R), 7
relatedness: 3, 6(R), 8
Appendix D: Couple’s Satisfaction Index

Scale:

1. Please indicate the degree of happiness, all things considered, of your relationship.

<table>
<thead>
<tr>
<th>Extremely Unhappy</th>
<th>Fairly Unhappy</th>
<th>A Little Unhappy</th>
<th>Happy</th>
<th>Very Happy</th>
<th>Extremely Happy</th>
<th>Perfect</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Most people have disagreements in their relationships. Please indicate below the approximate extent of agreement or disagreement between you and your partner for each item on the following list.

<table>
<thead>
<tr>
<th></th>
<th>Always Agree</th>
<th>Almost Always Agree</th>
<th>Occasionally Disagree</th>
<th>Frequently Disagree</th>
<th>Almost Always Disagree</th>
<th>Always Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Amount of time spent together</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>3. Making major decisions</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4. Demonstrations of affection</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Question</td>
<td>All the Time</td>
<td>Most of the Time</td>
<td>More often than Not</td>
<td>Occasionally</td>
<td>Rarely</td>
<td>Never</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------------</td>
<td>------------------</td>
<td>---------------------</td>
<td>--------------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>5. In general, how often do you think that things between you and</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>your partner are going well?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. How often do you wish you hadn’t gotten into this relationship?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Not at all True</th>
<th>A little True</th>
<th>Somewhat True</th>
<th>Mostly True</th>
<th>Almost Completely True</th>
<th>Completely True</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. I still feel a strong connection with my partner</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8. If I had my life to live over, I would marry (or live with/date) the</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>same person</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Our relationship is strong</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. I sometimes wonder if there is someone else out there for me</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>11. My relationship with my partner makes me happy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. I have a warm and comfortable relationship with my partner</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13. I can’t imagine ending my relationship with my partner</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Question</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>14. I feel that I can confide in my partner about virtually anything.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. I have had second thoughts about this relationship recently.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>16. For me, my partner is the perfect romantic partner.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17. I really feel like part of a team with my partner.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>18. I cannot imagine another person making me as happy as my partner does</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Not at All</th>
<th>A little</th>
<th>Somewhat</th>
<th>Mostly</th>
<th>Almost completely</th>
<th>Completely</th>
</tr>
</thead>
<tbody>
<tr>
<td>19. How rewarding is your relationship with your partner?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20. How well does your partner meet your needs?</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>21. To what extent has your relationship met your original expectations?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. In general, how satisfied are you with your relationship?</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Worse than all others (extremely bad)</th>
<th>Better than all others (extremely good)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. How good is your relationship compared to most?</td>
<td>0</td>
<td>1</td>
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</tbody>
</table>
For each of the following items, select the answer that best describes how you feel about your relationship. Base your responses on your first impressions and immediate feelings about the item.

<table>
<thead>
<tr>
<th>Item</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Scoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>24. Do you enjoy your partner’s company?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. How often do you and your partner have fun together?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>INTERESTING</th>
<th>BAD</th>
<th>FULL</th>
<th>LONELY</th>
<th>STURDY</th>
<th>DISCOURAGING</th>
<th>ENJOYABLE</th>
<th>Scoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>GOOD</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td></td>
<td></td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>EMPTY</td>
</tr>
<tr>
<td>29.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>FRIENDLY</td>
</tr>
<tr>
<td>30.</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>5</td>
<td>0</td>
<td>FRAGILE</td>
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<tr>
<td>31.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>5</td>
<td>HOPEFUL</td>
</tr>
<tr>
<td>32.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>5</td>
<td>Miserable</td>
</tr>
</tbody>
</table>

Scoring:

For the 16-item version use 1, 5, 9, 11, 12, 17, 19, 20, 21, 22, 26, 27, 28, 30, 31, 32.

For the 4-item version use 1, 12, 19, 22. Scoring is kept continuous.
Compassion Scale

HOW I TYPICALLY ACT TOWARDS OTHERS

Please read each statement carefully before answering. To the left of each item, indicate how often you behave in the stated manner, using the following scale:

Almost

Never

1 2 3 4 5

1. When people cry in front of me, I often don’t feel anything at all.

2. Sometimes when people talk about their problems, I feel like I don’t care.

3. I don’t feel emotionally connected to people in pain.

4. I pay careful attention when other people talk to me.

5. I feel detached from others when they tell me their tales of woe.

6. If I see someone going through a difficult time, I try to be caring toward that person.

7. I often tune out when people tell me about their troubles.
8. I like to be there for others in times of difficulty.

9. I notice when people are upset, even if they don’t say anything.

10. When I see someone feeling down, I feel like I can’t relate to them.

11. Everyone feels down sometimes, it is part of being human.

12. Sometimes I am cold to others when they are down and out.

13. I tend to listen patiently when people tell me their problems.

14. I don’t concern myself with other people’s problems.

15. It’s important to recognize that all people have weaknesses and no one’s perfect.

16. My heart goes out to people who are unhappy.

17. Despite my differences with others, I know that everyone feels pain just like me.

18. When others are feeling troubled, I usually let someone else attend to them.

19. I don’t think much about the concerns of others.

20. Suffering is just a part of the common human experience.

21. When people tell me about their problems, I try to keep a balanced perspective on the situation.
22. I can’t really connect with other people when they’re suffering.

23. I try to avoid people who are experiencing a lot of pain.

24. When others feel sadness, I try to comfort them.

Coding Key:
Kindness Items: 6, 8, 16, & 24
Indifference Items: 2, 12, 14, & 18 (Reversed Scored)
Common Humanity: 11, 15, 17, & 20
Separation: 3, 5, 10, & 22 (Reversed Scored)
Mindfulness: 4, 9, 13, & 21
Disengagement: 1, 7, 19, & 23 (Reverse Scored)

To reverse-score, change the following values: 1 = 5, 2 = 4, 3 = 3, 4 = 2, 5 = 1

To compute a total Compassion Score, take the mean of each subscale (after reverse-scoring) and compute a total mean.

Please remember that if you plan to examine the subscales separately, you should not reverse-code. Before reverse-coding, for example, higher indifference scores represent more indifference, but after reverse-coding higher indifference scores represent less indifference. This is why the subscales of indifference, separation, and disengagement are reverse-coded before taking an overall compassion mean.
**Appendix F: Correlation Matrix of Study Variables**

Correlation Matrix

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex. Sat.</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aut</td>
<td>.539*</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Comp.</td>
<td>.560*</td>
<td>.757*</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Related.</td>
<td>.703*</td>
<td>.725*</td>
<td>.749*</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Compass.</td>
<td>.128*</td>
<td>.345*</td>
<td>.312*</td>
<td>.289*</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mindful</td>
<td>.277*</td>
<td>.358*</td>
<td>.497*</td>
<td>.333*</td>
<td>.318*</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rel. Sat.</td>
<td>.735*</td>
<td>.626*</td>
<td>.602*</td>
<td>.821*</td>
<td>.145*</td>
<td>.290*</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>SC</td>
<td>.299*</td>
<td>.301*</td>
<td>.465*</td>
<td>.345*</td>
<td>.203*</td>
<td>.646*</td>
<td>.345*</td>
<td>1</td>
</tr>
</tbody>
</table>