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Emotion regulation mediates the association between HRV reactivity and relationship success

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Emotion Regulation Mediates the Association between HRV Reactivity and Relationship Success

By

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Abstract

Two hundred single post-secondary students participated in a longitudinal study including online, laboratory, and speed dating components. This methodology was used to examine the link between romantic relationship formation and the heart, specifically heart rate variability. Relationship success was operationally defined as matching during a speed dating session or forming a romantic relationship over a prospective 6-month period. Both HRV reactivity and resting HRV were related to relationship success, each through different mechanisms. In a moderated mediation model, higher HRV reactivity predicted greater use of the emotion regulation strategy of reappraisal which, in turn, interacted with body mass index (BMI) to predict relationship success. Higher use of reappraisal increased relationship success amongst higher-BMI individuals, but hindered relationship success amongst lower-BMI individuals. In a separate moderation model, a pattern of increasing HRV in response to a stressor conferred an advantage in relationship success only to participants with lower resting HRV. Finally, resting HRV was found to predict relationship success through the mediator of mate value. Higher resting HRV was associated with higher mate value, which predicted higher subsequent matching and relationship formation. These results are discussed in the context of the generalized unsafety theory of stress. This investigation of human relationship formation through a biological lens provides insights into how otherwise imperceptible cardiac experiences are contributory to romantic relationship formation.

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Emotion Regulation Mediates the Association between HRV Reactivity and Relationship Success

Humans have a fundamental need for affiliation, attachment, and partnership throughout their lives (Baumeister & Leary, 1995; Bowlby, 1979; Hazan & Shaver, 1994). For some, fulfilling this need through the initiation of romantic relationships is much more challenging than for others. Human mating patterns are influenced by both environmental and individual characteristics. Individuals with higher mate value have an advantage in the search for a mate. These individuals have characteristics such as physical attractiveness, financial resources, or indicators of good parenting abilities, which are valued by potential romantic partners. Mating strategies also vary based on the availability of potential partners. For instance, a particular man or woman may prefer long-term mates, but will engage in one night stands when partners are scarce. The complexities of relationship initiation have proven difficult to recreate in a laboratory setting and researchers are increasingly relying on a speed-dating paradigm to investigate human relationship formation.

A glance, touch, or word from a potential romantic partner can be enough to send one's heart rate skyrocketing. This cardiac-love connection has been the topic of songs, poems, and books for centuries but only recently have researchers begun to investigate this connection empirically using heart rate variability (HRV). High frequency HRV is a measure of the variation in successive interbeat intervals of the heart, and represents parasympathetic dominance over the heart. HRV has been linked to numerous correlates including all-cause mortality, social skills, anxiety and depression, and relationship formation. In the 1990s, Porges postulated that HRV is related to relationship formation in that they are both controlled by the vagus nerve. Schneiderman, Zilberstein-Kra, Leckman, and Feldman (2011) empirically tested Porges's theory and found differences in HRV reactivity between singles and the newly coupled. More recently, differences in HRV were found to predict likelihood of future relationship formation (Bailey & Davis, 2017). These studies established that this link exists as well as the temporal association between HRV and relationship formation. However, little is known about how cardiac indices, that were long thought to be imperceptible to an observer, contribute to the complexity of human relationship formation. Therefore, the present study sought to replicate the connection between HRV and relationship formation using a speed dating paradigm, and to uncover underlying mechanisms responsible for this link.

Heart Rate Variability

While earlier researchers typically focused on heart rate (HR) to measure autonomic nervous system (ANS) activation, more recently researchers in diverse fields have discovered the importance of HRV. HRV refers to the variation between successive interbeat intervals of the heartbeat. HRV occurs as a result of the heart's responsiveness to its environment. A healthy heart responds more readily to environmental cues and returns to baseline more quickly, resulting in higher variability (see Figure 1). HRV is extracted through electrocardiography (ECG), and it has numerous physical and psychological correlates; for example, low resting HRV has been repeatedly linked to emotional dysregulation, increased risk of all-cause mortality, and physiological and emotional stress (Anaruma, Ferreira, Sponton, Delbin, & Zanesco, 2016; Appelhans & Luecken, 2006; Lane et al., 2009; Park & Thayer, 2014; Porges, 2003; Sinnecker et al., 2016).

Patterns of HRV result from the dynamic interplay between the two components of the ANS which regulates the vital organs of the body. The sympathetic branch of the ANS is associated with energy mobilization while the parasympathetic branch is associated with vegetative and restorative functions (Thayer & Sternberg, 2006). Increases in sympathetic activity are associated with increased heart rate and shortened interbeat intervals. Conversely, increases in parasympathetic activity are associated with decreased heart rate and lengthened interbeat intervals. Typically, the greater the average length of the interbeat interval, the greater the variability (Thayer, Ahs, Fredrikson, Sollers, & Wager, 2012), resulting in a negative correlation between HR and HRV.

Parasympathetic innervation of the heart is controlled by the vagus nerve with signals originating in the nucleus ambiguus. Signals from the vagus nerve slow heart rate by decreasing the firing rate of the sinoatrial node, the heart's natural pace-maker. When not under stress, heart rate is inhibited by the parasympathetic nervous system through the vagus, resulting inlow and variable heart rate (Watanabe & Schmidt, 2004). In this way, parasympathetic inputs serve as a ‘‘persistent brake to inhibit the metabolic potential” in mammals and the release of this brake results in the sympathetic fight or flight arousal (Porges, 1995, p. 306).

The influences of the parasympathetic and sympathetic nervous systems occur at different speeds. These speeds are most often expressed as a frequency in the standardized unit of hertz (Hz) which is calculated as the number of cycles per second (Appelhans & Luecken, 2006). Power spectral analysis allows for the measurement of HRV occurring at different frequencies. Parasympathetic components influence the entire frequency spectrum, whereas the sympathetic influences are restricted to the lower frequencies (Saul, 1990). Consequently, low frequency HRV (LF; below 0.15 Hz) represents a mixture of sympathetic and parasympathetic influences, whereas high frequency HRV (HF; between .15-.40 Hz) represents primarily parasympathetic influences (Thayer et al., 2012). The HF and LF bands are typically measured in absolute values of power (ms^2). Thus, HF ($HFms^2$) provides a noninvasive index of parasympathetic nervous system activity, specifically vagal activity (Porges, 1996; Thayer et al., 2012). The literatures on HF and LF HRV are quite distinct. The link between HRV and romantic relationships was found using HF HRV. Therefore, the following discussion of HRV will present research using HF HRV.

Within studies of HF there are two ways that HRV is typically discussed. The first is resting HRV, which is typically measured while the individual is at rest or engaging in a neutral, nondemanding task. Resting HRV measured while not engaging in a task requires participants to sit quietly with their eyes either open or closed. Alternatively, resting HRV can be measured while participants are presented with a neutral stimulus or task such as watching a neutral video or viewing neutral pictures. Whichever way it is measured, it is generally agreed that higher resting HRV is associated with positive health outcomes. Resting HRV was found to stable over a period of 8 days (Farah et al., 2016), 1 month (Borges, Mathewson, &Schmidt, 2017), and from year to year (Hinnant, Elmore-Staton, & El-Sheikh, 2011).

The second way to investigate HRV is using HRV reactivity. Reactivity always reflects a change score and necessitates the measurement of HRV during two separate blocks of time. Typically, HRV reactivity is quantified as the difference between HRV at rest and HRV in response to a stressor. However, some researchers calculate HRV reactivity as the difference between HRV during the presentation of a positive and a negative stimulus (Bailey & Davis, 2017; Schneiderman, Zilberstein-kra, Leckman, & Feldman, 2011). While it is generally agreed that higher resting HRV is associated with better physical and mental health, there is less consensus in the HRV reactivity literature.

One camp of researchers believe that HRV increasing in response to a stressor leads to better outcomes. For example, higher HRV reactivity (i.e., a larger reduction in HRV) in 1-

month old infants was found to predict emotional dysregulation at age 3 when their parents experienced caregiver stress (Conradt et al., 2016). Other theorists tout the benefits of reductions in HRV. For example, Panaite and colleagues (2016) demonstrated that larger HRV withdrawal in response to a sad film predicted an improvement in depressive symptomatology. The neurovisceral integration model (Thayer & Lane, 2000) posits that neither pattern is inherently superior, and that both HRV increases and reductions in response to a stressor can be beneficial depending on the context.

HRV and Emotion Regulation

The neurovisceral integration model (Thayer & Lane, 2000) states that cardiac vagal tone, indexed by HRV, is involved in effective emotional responding. Emotion regulation involves altering the intensity or duration of an emotion, rather than changing or eliminating the discrete emotion that is experienced (Thompson & Calkins, 1996; Thompson, 1994). This modulation of arousal serves to reduce the urgency associated with the emotion, thereby facilitating behavioural control (Gratz & Roemer, 2004). These conceptualizations of emotion regulation emphasize the ability to inhibit inappropriate or impulsive behaviours and behave in accordance with desired goals when experiencing negative emotions (Melnick & Hinshaw, 2000). Emotion regulation can be thought of as containing the following components: (a) awareness and understanding of emotions, (b) acceptance of emotions, (c) ability to control impulsive behaviours and behave in accordance with desired goals when experiencing negative emotions, and (d) ability to use situationally appropriate emotion regulation strategies to modulate emotional responses as desired (Gratz & Roemer, 2004). Difficulties with any of these components would result in emotion dysregulation.

Higher resting HRV is associated with more adaptive and functional cognitive modulation of emotional stimuli which facilitates effective emotion regulation (Park & Thayer, 2014). Lower resting HRV is associated with hypervigilant and maladaptive cognitive responses to emotional stimuli, which may impede emotion regulation. Individuals diagnosed with disorders characterised by difficulties with emotion regulation, such as borderline personality disorder, tend to have low resting HRV (Koenig, Kemp, Feeling, Thayer, &Kaess, 2016). Evidence is mounting that HRV reactivity, the phasic changes in HRV, is linked with self-regulatory effort (Butler, Wilhelm, & Gross, 2006; Park, Vasey, Van Bavel, & Thayer, 2014; Park & Thayer, 2014; Segerstrom & Nes, 2007). However, unlike the research on resting HRV, the existing literature on HRV reactivity is inconsistent. Phasic HRV increases or decreases and the exertion of self-regulatory effort may produce more or less adaptive results depending on the context and characteristics of the stressor.

Decreases in HRV have been construed as autonomic responses to stress, which reflect the withdrawal of cardiac vagal control and the activation of the defensive systems to cope with a stressor (Park et al., 2014). Watching a stressful video clip (Beauchaine, Gatzke-Kopp, & Mead, 2007; El-Sheikh, Hinnant, & Erath, 2011), performing difficult mental stress tasks (Weber, Thayer, & Rudat, 2010), and engaging in worry, fear, or anger imagery (Lyonfields, Borkovec, & Thayer, 1995; Thayer, Friedman, & Borkovec, 1996) typically results in phasic HRV decreases. Conversely, phasic HRV increases have been construed as the exertion of self-regulatory effort while engaging in emotion regulation or performing a task requiring self-regulatory effort (Butler et al., 2006; Segerstrom & Nes, 2007). For example, employing emotion self-regulation methods such as suppression or reappraisal is typically met with an increase in HRV (Butler et al., 2006). Phasic HRV increases occurred when participants were instructed to eat only carrots, which demanded greater self-regulatory effort, compared to when instructed to eat only cookies, which demanded less self-regulatory effort (Segerstrom&Nes, 2007). Increases in HRV in response to successful emotion regulation can facilitate further effective emotional management (Ingjaldsson, Laberg, & Thayer, 2003; Smith et al., 2011). Ingjaldsson and colleagues' (2003) results demonstrated an increase in HRV in recovering alcoholics who resisted a drink in response to alcohol cues.

In the literature on adults, larger phasic HRV increases have been associated with several positive factors such as higher resting HRV (Segerstrom & Nes, 2007) and greater ability to accurately perceive emotions in others (Papousek, Freudenthaler, & Schulter, 2008). Furthermore, a neuroimaging finding revealed that phasic HRV enhancement was correlated with greater activation in the subgenual anterior cingulate cortex and other areas important in emotional regulation and inhibitory processes (Lane, Weidenbacher, & Smith, 2013). However, Muhtadie, Akinola, Koslov, & Berry Mendes (2015) linked vagal flexibility, defined as vagal withdrawal to a stressor, with greater social sensitivity. In addition, Panaite and colleagues (2016) recently found that a larger HRV withdrawal in response to a sad film predicted better outcomes amongst adults with major depressive disorder. Similarly, Stange, Hamilton, Fresco, and Alloy (2017) found that vagal withdrawal to sad stimuli followed by vagal augmentation during recovery facilitates successful affective regulation.

In the literature on children, it is well documented that the parasympathetic nervous system is intimately linked to the regulation of emotion (Porges, 2003) and much of this literature demonstrates positive outcomes associated with HRV decreases in response to stressors. During demanding tasks, the withdrawal of the vagal break results in a decrease in HRV. Thompson (2008) believes that such a response reflects physiological processes that allow the child to shift focus from internal homeostatic demands to the generation of coping strategies to control affective or behavioural arousal. Thus, vagal withdrawal and the accompanying decrease in HRV is thought to be associated with active coping and emotion regulation (Porges, 1991, 1996; Wilson & Gottman, 1996). Even in infancy, greater HRV decreases during challenging situations have been found to be related to better state regulation, greater self-soothing, and more attentional control (DeGangi & DiPietro, 1991; Huffman & Bryan, 1998). Some research also suggests that children faced with a stressor exhibit significantly greater decreases in HRV when provided with parental support (Calkins & Keane, 2004; Calkins, 2007).

Even within the literature on children, vagal withdrawal is not always associated with superior outcomes compared to a pattern of increasing HRV. Preschool children who responded to a stressor with increases in HRV showed fewer behaviour problems and more appropriate emotion regulation (Calkins & Dedmon, 2000; Calkins & Keane, 2004; Porges, 1996), and school-aged children with phasic increases in HRV demonstrated greater sustained attention (Suess, Porges, & Plude, 1994). Children with elevated symptoms of anxiety or depression displayed a greater degree of vagal withdrawal to emotional challenge than did healthy children (Calkins, 2007). One explanation is that depressed and anxious individuals show exaggerated HRV reductions in an effort to maintain control of emotions that are quite labile or intense (Beauchaine, 2001; Calkins, 2007). One consequence of such a strategy, at least at a physiological level, is that the greater changes in cardiac output might be disruptive to functioning (Thompson, 2008). It may be that reducing HRV is typically an effective strategy if employed in the right context and to the right degree. Exaggerated HRV suppression, however, can disrupt homeostasis and, if experienced chronically, leads to physiological and emotional problems. Another explanation could be that the benefits of increases or decreases in HRV depend on one's resting HRV.

Two ways of describing HRV were presented earlier: resting HRV and HRV reactivity. A third method would be to look at the interactions between HRV at rest and in response to a stressor. Park and colleagues (2014) examined the extent to which individual differences in self-regulatory capacity, indexed by resting HRV, were associated with the exertion of self-regulatory effort, indexed by phasic HRV, in response to emotional versus neutral distractors under different levels of cognitive load. Participants were instructed to detect a target letter among distractor letters superimposed on either fearful or neutral distractor faces. Participants with lower resting HRV showed reductions in HRV in the conditions with fearful distractor faces, suggesting an autonomic stress response (Park et al., 2014). These participants with lower resting HRV appeared to experience disproportionally high autonomic stress responses to trivial threat cues.

Conversely, people with higher resting HRV showed phasic HRV increases, which suggested they were making greater self-regulatory effort, under low load with fearful distractors (Park et al., 2014). These same individuals experienced an absence of phasic HRV reductions under high cognitive load. It appeared that these individuals with higher resting HRV were capable of exerting emotion regulatory effort in response to fearful distractors under low load when processing resources were available; however, these same individuals did not have an autonomic stress response, even under high load when task performance could be potentially stressful (Park et al., 2014).

Park and colleagues' (2014) results are consistent with previous research. Gaebler, Daniels, and Lamke (2013) reported that phasic HRV increases were observed in healthy individuals with higher resting HRV, and phasic HRV decreases were more often noted in patients suffering from social anxiety disorder, which is characterized by low resting HRV. This research suggests that resting cardiac vagal tone is associated with the ability to flexibly control autonomic responses, which may promote further emotion regulation and autonomic flexibility (Park et al., 2014; Park & Thayer, 2014).

Emotion Regulation and Social Processes

How people regulate emotions affects their relationships, well-being, and stress (Gross, 2002; Hochschild, 2003) and it is a crucial component of emotional intelligence (Gross & John, 2002; Salovey, Mayer, & Caruso, 2002; Salovey & Mayer, 1989). Emotional intelligence is thought to be important for social interaction because emotions serve communicative and social functions, conveying information about people's thoughts and intentions, and coordinating social encounters (Keltner & Haidt, 2001). Emotion regulation is essential to a successful social interaction as it influences emotional expression and behaviour directly. A single inappropriate outburst can be enough to end a social relationship.

Emotion regulation can influence social interaction through several mechanisms. First, it sets the emotional tone of social encounters. Displays of pleasant emotions elicit favourable responses while negative emotion expression elicits negative responses from others (Argyle & Lu, 1990; Furr & Funder, 1998). This concept has been described as emotional contagion (Hatfield & Cacioppo, 1994). Emotion regulation might also promote positive expectations for social interaction (Cunningham, 1988) and the use of effective social interaction strategies (Furr & Funder, 1998; Langston & Cantor, 1989).

Emotion regulation is associated with the quality of social functioning among children (Eisenberg & Fabes, 2000) but is less well studied in adult nonclinical populations. Lopes and colleagues (2003) found that college students who scored higher on an ability measure of emotional regulation reported having more positive relationships, less conflict and antagonism in their relationships with close friends, and greater companionship, affection, and support in their relationships with parents. Individuals scoring high in the area of emotion regulation also viewed themselves as being more interpersonally sensitive and prosocial than their low emotion-regulation counterparts. High scoring emotion regulators were also viewed more favorably by their peers, as indicated by peer nominations for interpersonal sensitivity and prosocial tendencies, the proportion of positive versus negative peer nominations, and reciprocal friendship nominations. These relationships remained significant even after controlling for personality and intelligence (Lopes et al., 2003).

Two of the most often studied emotion regulation strategies are reappraisal and suppression. Cognitive reappraisal involves cognitively changing the way a potentially emotion-eliciting situation is construed to alter its emotional impact (Lazarus & Alfert, 1964); for example, when fighting constructively with a romantic partner, one might view the give and take as a process that could strengthen the relationship down the road, rather than signalling the impending dissolution of the relationship. Expressive suppression, on the other hand, is a form of response modulation that involves inhibiting emotion-expressive behaviour (Gross, 1998); for example, during a fight one might avoid raising his or her voice or frowning to avoid the behavioural expression of one's anger.

Each strategy has its own set of social consequences. Reappraisal is related positively to the sharing of both positive and negative emotions (Gross & John, 2003), though these emotions are not always directed toward a social partner. Reappraisal is not related to attachment avoidance, or social support; however, research suggests that reappraisers have closer relationships and are better liked by their peers (Gross & John, 2003). Suppression has a different pattern of social consequences. Individuals habitually using suppression are less likely to share both positive and negative emotions, and report substantially more discomfort with closeness and sharing in close relationships (Gross & John, 2003). Peer reports suggest that although their emotional distance was clearly noticed by their peers, the suppressors were not generally disliked; rather, their peers felt relatively neutral about them. The largest social cost of using suppression was decreased social support (Gross & John, 2003).

It appears that emotion regulation is intimately tied to both the fields of HRV and social relationship research. Higher resting HRV is associated with greater emotion regulation abilities while patterns of increasing or decreasing HRV in response to stressors may represent differential engagement of self-regulatory effort. These increased regulation abilities and strategies may, in turn, affect one's ability to form and maintain positive relationships. This link is best understood in the context of social psychophysiological research.

Early Social Psychophysiological Research

The field of social psychophysiology was born out of the study of psychotherapy. Initially, there was a lot of excitement when Dittes (1957) observed that a patient gave less electrodermal responses when the therapist was more permissive versus unpermissive about an embarrassing sexual statement. This was some of the first evidence that physiology could be strongly affected by psychological processes. The excitement did not last long after a review by Lacey (1967) suggested that because autonomic responses were sensitive to social contact, they would not be a reliable measure of patient progress in therapy. While Lacey was correct in that physiological measures were not very effective in evaluating the success of treatment, other researchers began investigating physiological measures as indicators of the processes occurring during treatment. This eventually led to the study of psychophysiology in an interpersonal context, now known as social psychophysiology (Gottman, 2014).

Technological advances facilitated a boom in social psychophysiological research beginning in the 1980s. Levenson and Gottman (1983) studied the longitudinal prediction of marriage dissatisfaction based on affect and ANS activity. Thirty couples spent the day apart and then both attended a laboratory session to have two conversations: one of the events of their day, and the other a high-conflict discussion about a problematic issue in their marriage. Each spouse later returned to the lab separately to review videotapes of these interactions and provide a continuous self-rating of affect throughout. Heart rate, pulse transit time to the finger, skin conductance, and general somatic activity were measured during both sessions. Satisfied and dissatisfied couples differed not only in the amount and reciprocity of negative affect, but also by a temporal predictability and reciprocity in physiology, known as physiological linkage. An association between physiological linkage and marital satisfaction was only found during the high-conflict problem-solving discussion with dissatisfied couples reciprocating the negative affect and physiology of their partners.

After three years, 21 of the original 30 couples completed questionnaires concerning their current levels of marital satisfaction. A simple change score in marital satisfaction from 1980 to 1983 was computed. Levenson and Gottman (1985) reported that both negative affect reciprocity and physiological arousal in all measures were predictive of declines in levels of marital satisfaction. Based on evidence that discrete emotions have specific effects on autonomic arousal (Ekman, Levenson, & Friesen, 1983; Kreibig, 2010), the authors suggested that unsatisfactory partnerships elicit *flooding*. Flooding is a process through which emotional conditioning leads to the production of a blend of fear, anger, sadness, preoccupation, and fight or flight responses.

Levenson and Gottman (1985) suggested that people in unsatisfactory relationships chronically experience flooding and may become hypervigilant to potentially threatening and escalating interactions. They may become likely to misattribute threat potential to relatively neutral or positive acts, thus leading to a decline in marital satisfaction and eventual marriage dissolution (Gottman, 2014). This flooding was thought to activate the fight or flight response which includes increased HR. Later work by Gottman and Levenson (1992) found couples in which the wives had higher HR and smaller finger pulse amplitudes were more likely to later divorce.

Most recently, the field of social psychophysiology has been dominated by HRV research. HRV is associated with diverse social phenomena including acculturation and physical health after a divorce. Higher resting HRV at the time of the move to a new country predicted a positive orientation towards mainstream culture at follow-up several months later, over and above individual differences in extraversion, depression, and anxiety (Doucerain, Deschênes, Aubé, Ryder, &Gouin, 2016). These data suggest that HRV promotes openness to a new social and cultural environment. HRV has also been studied in the context of health consequences following relationship dissolution. Within a sample of recently separated and divorced adults, individuals with higher resting HRV demonstrated a positive association between divorce-related distress and blood pressure reactivity (Bourassa, Hasselmo, &Sbarra, 2016); no such association existed for individuals with low resting HRV. Thus physiological arousal has been implicated not only in social interactions between romantic partners as found by Levensen and Gottman (1985), but also was shown to play a part in determining an individual's physical health consequences during marriage dissolution (Bourassa et al., 2016). Levenson and Gottman did not believe that the participants' individual physiological make-up was important, only their responses to interactions with their partners (Gottman, 2014). More recent work on HRV and romantic relationships, on the other hand, has begun to uncover the effects of each individual's physiological contributions to a social interaction. For example, Diamond, Hicks, and Otter-Henderson (2011) found that men with higher resting HRV were rated by their female partners as expressing more connectedness and understanding on average than were men with lower vagal tone. Vagal tone also moderated the association between daily negative affect and positive interaction quality for men and between daily positive affect and positive interaction quality for women (Diamond et al., 2011).

HRV and Romantic Relationship Formation

In his influential polyvagal theory, Porges (1995, 1998) described the mechanisms by which HRV is thought to influence social relationship formation. The vagus nerve is responsible for such varied tasks as regulating gastrointestinal peristalsis, sweating, some muscle movements in the mouth (including speech and keeping the larynx open for breathing), and heart rate. The vagus exerts parasympathetic control over the heart by innervating the sinoatrial node, the heart's natural pacemaker, to reduce heart rate and allow for increases in HRV.

The vagus nerve has two branches: the evolutionary recent myelinated vagus and the older unmyelinated vagus. The unmyelinated vagus, also known as the dorsal vagal complex (DVC), is activated infrequently in mammals, but may be employed in response to a severe threat to promote behavioural strategies of sudden prolonged immobility or feigned death (Hofer, 1970; Porges, 1998). In mammals, the heart is regulated primarily by the myelinated vagus, also known as the ventral vagal complex (VVC), which controls parasympathetic activity (Porges, 1997). The VVC provides tonic control over the heart and maintains a calm state to allow for self-soothing, social engagement, and bonding (Porges, 1998). The VVC controls what is known as the social engagement system which serves as the neurophysiological basis for the courting behaviours associated with seduction. By controlling facial expression, vocalization, and head tilt, the social engagement system is intimately involved in the communication of affect, signaling of availability, and promotion of proximity to facilitate relationship formation (Porges, 1998).

In mammals, the VVC functions as a vagal brake. Under normal conditions, the vagus actively inhibits heart rate; however, under conditions of stress there is a transitory withdrawal of vagal stimulation to the heart, resulting in increased heart rate (Porges et al., 1996). This removal of the vagal brake facilitates the expression of the sympathetic nervous system and promotes mobilization for fight-or-flight behaviours. Thus, the regulatory processes required for social engagement occur only in environments perceived as safe, when the sympathetic system is inactivated (Porges, 1998). As the VVC controls the social engagement system and vagal control of the heart, monitoring dynamic changes in HF HRV provides an efficient and noninvasive method of assessing the status of the social engagement system (Porges, 1998).

When the vagal brake is removed, the sympathetic nervous system (SNS) mobilizes and provides energy to defend a partner and to facilitate proximity for reproductive behaviours when separated (Porges, 1998). However, the SNS contributes to more than just the mobilization of fight-or-flight behaviours; it also promotes the physiological activation associated with sexual arousal. During the initial phases of sexual arousal, the SNS and VVC may function together to signal reproductive availability using facial expressions and vocalizations (Porges, 1998). This cooperation between the two systems is evident when facial and vocal expressions of sexual arousal appear in concert with facial flush, sweating, and tachycardia.

As previously mentioned, the DVC's (unmyelinated vagus) main function is to produce immobilization in response to severe danger. However, Porges (1998) proposed that the oxytocin released during coitus can condition the individual and modify the DVC's main function. Instead of producing immobilization due to fear, the DVC may produce an immobilization of passion in the presence of oxytocin. This immobilization encourages reproductive behaviours and creates enduring associations between the mate and the euphoric effects of sexual intercourse. Over time, this modification leads to relatively permanent bonds between mates (Carter, 1992) creating a classically conditioned response akin to love.

Successful mating and bonding require the coordination of all three systems. The VVC promotes seductive, relationship-initiating behaviour. If courting is successful, the SNS is activated in preparation for copulation. Finally, in order to facilitate conception, post-coitus recovery, and the formation of pair bonds, the DVC stimulates an immobilization system (Porges, 1998). Germane to the present study, the VVC is the component of this system of interest as it theoretically links HRV to relationship formation.

Based on Porges's (1995, 1998) theory, Schneiderman and colleagues (2011) set out to experimentally examine the association between HRV and adult romantic relationship formation. Levenson and Gottman (1985; 1992) had already established that greater physiological activation predicted relationship dissatisfaction and dissolution. Schneiderman and colleagues' study extended these findings to the study of HRV and relationship formation rather than the maintenance of established relationships. The results of their cross-sectional study indicated that, in comparison to single participants, individuals who had recently begun new romantic relationships demonstrated lower HRV reactivity. HRV reactivity was operationally defined as the difference in HRV in response to negative and positive film stimuli. Compared to single participants, newly coupled participants showed less of a decline in HRV in response to the negative film. While these groups differed in their autonomic reactivity, recently coupled individuals rated the film stimuli to be equally distressing as did their single counterparts. This finding was taken to demonstrate that the stress buffering effects associated with higher HRV are not conscious.

Schneiderman and colleagues explained their results in the context of Porges’s (1998) polyvagal theory on love. Specifically, they postulated that HRV becomes elevated during the process of courting associated with new romantic relationships. As discussed earlier, HRV is considered a marker of the social engagement system (Porges, 1998). During seduction and the courting phase of a new relationship, the VVC and the social activation system were thought to dominate autonomic control and therefore lead to increased HRV. Schneiderman and colleagues believed that less of a decline in HRV in response to a negative film was evidence of a stress-buffering effect accompanying new romantic relationships. However, an alternative explanation of their results is also explainable using Porges's theories; it may be that HRV is a *cause*, rather than a consequence, of romantic relationship formation.

This alternative explanation for Schneiderman and colleagues' (2011) results suggests that certain patterns of cardiovascular reactivity may cause individuals to be more likely to enter into romantic relationships, either because of increased attractiveness and/or opportunity, or because of greater openness to beginning a relationship. Resting HRV and HRV reactivity have been found to be related to emotion regulation, overall health outcomes, well-being, and physical attractiveness (Karason & Mølgaard, 1999; Thayer & Sternberg, 2006; Thayer & Lane, 2007;

Vallejo & Márquez, 2005); these factors also all contribute to overall mate value. Thus, individuals with certain patterns of cardiac reactivity may be viewed as more attractive and have increased opportunity to form romantic relationships.

Dominance of the VVC over one's lifespan should promote the chronic activation of the social engagement system, and lead to increased social bonding. Studies of children diagnosed with autism have supported this association. In this population, higher baseline HRV is associated with better social functioning (Patriquin & Scarpa, 2013). Egizio, Jennings, and Christie (2008) investigated the link of both resting and HRV reactivity with social functioning in 50 healthy older women. They found that women with less stressor-induced decreases in HRV reported more positive social functioning, while resting HRV was not related to social functioning. Higher HRV also predicted increased frequency of penile-vaginal intercourse (Brody & Preut, 2003; Brody, Veit, & Rau, 2000), better communication between romantic partners (Roisman, 2007), and lasting marriages (Gottman & Levenson, 1992). Thus, it appears that individuals with heightened HRV and less HRV suppression have more opportunity and greater ability to begin and maintain romantic relationships.

A prospective study was undertaken by Bailey and Davis (2017) to clarify the direction of the romantic relationship - HRV reactivity link. A film exposure paradigm was used in this study as passive exposure to pictures and film clips is thought to enhance the effect of affective processing and produce more consistent results (Palomba, Sarlo, Angrilli, Mini, & Stegagno, 2000). The negative stimuli were made up of shorter film clips depicting a variety of relationship-related negative events including the sickness of a romantic partner, a child crying while parents fight, and a victim of domestic abuse. The positive stimuli comprised film clips depicting positive social events such as a date, a wedding, and positive social interactions between romantic partners.

Forty-seven single female participants were exposed to the video clips while their HRV was recorded. Participants were then followed for up to 6 months (*M* = 16.50 weeks, *SD* = 4.88 weeks) to assess changes in HRV and relationship status. Once participants began a romantic relationship, they returned to the lab for reassessment, and no further follow-up was undertaken. Participants who did not form a relationship returned to the lab at the end of the 6-month follow-up period. Unlike Schneiderman and colleagues' (2011) findings, no statistically significant differences in HRV during the negative clip or overall HRV reactivity were observed between the singles and newly coupled individuals at follow-up. Schneiderman and colleagues reported that the typical vagal withdrawal and stress response was absent in newly coupled individuals when exposed to relationship-related stressors. In Schneiderman and colleagues' sample, newly coupled participants exhibited higher HRV during the negative relationship film, as compared to the positive relationship film. This pattern was reversed for single participants, who showed a more typical vagal withdrawal and a decrease in HRV when presented with the negative relationship film.

Schneiderman and colleagues' (2011) contention that HRV reactivity decreases as a consequence of beginning a romantic relationship was not supported by Bailey and Davis's (2017) findings. Thus, contrary to Schneiderman and colleagues' contention, beginning a new romantic relationship does not appear to "buffer" vagal withdrawal in response to stressors. The alternative hypothesis predicted that, instead of relationships causing reduced HRV reactivity, individuals with initially lower HRV reactivity would be more likely to become coupled over the course of the study. HRV reactivity did predict later success in using long-term mating strategies, but only when the moderating influence of body mass index (BMI) and resting HRV were taken into account. Specifically, amongst those women with lower BMI, experiencing higher HRV during the negative compared to the positive film (i.e., lower HRV reactivity) was associated with higher probability of starting a romantic relationship; the reverse was true for high BMI women. For women with higher BMI, higher HRV during a positive film compared to a negative film (i.e., higher HRV reactivity) was associated with the greatest chances of starting a new relationship. In addition, for women with higher resting HRV, having higher HRV during a negative film compared to a positive film (i.e., lower HRV reactivity) resulted in the highest probability of relationship formation. This association was not found amongst women with lower resting HRV.

One explanation for Bailey and Davis's (2017) findings is that HRV reactivity may be related to women's choice of mating strategy. Mating strategy refers to a set of behaviours that evolved to select, attract, and retain sexual partners (e.g., Buss & Schmitt, 1993; Gangestad & Simpson, 2000). Consistent with social exchange and evolutionary economic theories(Converse & Foa, 1993; Huston & Burgess, 1979; Kelley & Thibaut, 1978; Thibaut & Kelley, 1959), people tend to mate with individuals who possess similar overall value as mates (Kirsner, Figueredo, & Jacobs, 2003; Miller, 2011). Mate value is defined as "the degree to which an individual would promote the reproductive success of another individual by mating with him or her" (Sugiyama, 2005, p. 296). Human mate value includes not only current fertility but also projected reproductive value across a lifespan. Thus, those who have higher reproductive value should have more offspring and offer more opportunity to spread one's genes. The traits of those who have more offspring thus become indicators of mate value and individuals will be attracted to partners exhibiting these traits in order to ensure the survival of their own offspring (Sugiyama, 2005). BMI is one of the most influential components of mate value for women.

There is a strong relationship between BMI and ratings of physical attractiveness. Tovée and Cornelissen (2001) found a BMI of 19 to be the most attractive for women in Western countries. Based on evolutionary theory, BMI serves as a marker of mate value because it provides a reliable cue to female health (Manson & Willett, 1995; Willett, Manson, & Stampfer, 1995) and reproductive potential (George & Swami, 2008; Willett et al., 1995). Physical attractiveness is also a sought after trait in men; however, women are more likely to trade off physical attractiveness to attain a partner with other mate value attributes (Gangestad & Simpson, 2000). Women's physical attractiveness, particularly bodily attractiveness, influences their mating strategy (Perilloux, Cloud, & Buss, 2013).

Humans have evolved multiple mating strategies that they may employ at different times, depending on the circumstances. These strategies include long-term committed mating, brief sexual encounters, infidelity, mate poaching, and mate guarding. Medium and long-term mating strategies are characterized by commitment to one's partner. In longer-term mating, both sexes typically invest heavily in any resultant offspring. As a consequence, sexual selection increases the level of selectivity in both sexes as described in the theory of parental investment (Buss, 2006; Trivers, 1972). Poor mate choices would result in wasting heavy investment in the partnership and offspring (Buss & Schmitt, 1993). Short-term mating lies at the other end of the temporal continuum and is characterized by low commitment.

Long-term mating strategy preferences are complex, reflecting desires for many different qualities such as kindness, intelligence, mutual attraction, love, dependability, and good health. Men place higher importance on the desire for youth and beauty, while women place higher importance on finding a mate with good financial prospects and elevated social status (Buss, 2006). These sex differences have been documented in studies of expressed preferences, actual marriages, responses to personals ads, and tactics of mate attraction, mate retention, competitor derogation, and intersexual deception (Buss, 2006). Women are more constrained than men in the number of children they can have and they tend to invest more heavily in each child. As a result, women tend to employ long-term mating strategies when they are in mate-rich environments. Despite the risks some women do pursue short-term mating encounters, either to gain access to better quality genes to pass on to their offspring or to gain material resources (Buss, 2006). For women, these short-term strategies are more frequently employed in environments where competition for males is fierce and/or their mate value is low.

As one might expect, in Bailey and Davis's (2017) sample, women with lower BMI were more likely to begin a romantic relationship; however, this proved to be true only if they experienced lower HRV reactivity (i.e., less of a decrease in HRV from the positive to negative films). In fact, among the thinner women with lower HRV reactivity, the probability of becoming coupled over the course of the study was 0.80compared to only 0.39 for thinner women with higher HRV reactivity. On the other hand, women with higher BMI showed the opposite coupling pattern; higher-BMI women with lower HRV reactivity had a probability of 0.04 of becoming coupled over the course of the study compared to 0.39 for higher-BMI women with higher HRV reactivity.

It is important to remain cognizant of the manner in which HRV reactivity is calculated when interpreting these results. Unlike traditional HRV reactivity scores, which subtract HRV in response to a stressor from baseline HRV, the Bailey and Davis (2017) method of reactivity calculation takes into account HRV reactions to both the positive and negative stimuli. In

Schneiderman and colleagues' (2011) and Bailey and Davis's studies, reactivity scores were created by taking the difference between HRV during the positive and negative films. Higher positive reactivity scores thus indicate higher HRV in response to the positive film compared to the negative film. Lower negative scores indicate the opposite; namely, higher HRV during the negative versus the positive film. Due to the nature of this method of calculating HRV reactivity, reactions to the positive and negative films cannot be teased apart. Higher HRV reactivity may be due to substantial increases in HRV in response to the positive film or substantial decreases in HRV in response to the negative film. With this information in mind, Bailey and Davis's research can be said to have found that women with lower BMI who also had higher HRV in response to negative film compared to the positive film were the most likely to become coupled.

Few studies have investigated the link between BMI and HRV. Lower resting HRV has been found in obese subjects and subsequent HRV gains have been observed after weight loss (Karason & Mølgaard, 1999; Quilliot, Fluckiger, & Zannad, 2001). Hirsch, Leibel, Mackintosh, and Aguirre (1991) monitored HRV in seven adults during weight change and found that a 10% increase in body weight was associated with a decline in HRV; however, they did not observe significant change in HRV during weight loss, possibly because of the small sample size (Karason & Mølgaard, 1999). Other studies have shown that BMI in the normal weight range is associated with optimal HRV; BMI above 30 or below 19 is associated with the lowest HRV (Vallejo & Márquez, 2005). Another study of 59 healthy male and female participants found significant differences between stratified BMI groups (BMI < 20, BMI 20-25, BMI > 25; Koenig, Jarczok, & Warth, 2014). According to polyvagal theory (Porges, 2003), individuals who exhibit higher resting HRV should exhibit more social bonding, and lower resting HRV should be accompanied by more difficulties in establishing social relationships (Dufey, Hurtado, Fernández, Manes, & Ibáñez, 2011; Porges, 2003). Therefore, in addition to being considered less physically attractive, individuals with higher BMI may be less successful in their social relationships due to less activation of their social engagement systems.

Low-BMI men and women have more opportunities to begin romantic relationships. For example, thin individuals are chosen more often by their speed dating partners (Asendorpf, Penke, & Back, 2011). Low-BMI individuals also tend to be more particular when choosing a mate and look for high mate value partners. Obese individuals often engage in assortative mating with other overweight individuals (Speakman & Djafarian, 2007). Assortative mating, as defined by Speakman and colleagues (2007) is the "tendency toward nonrandom mating of individuals with respect to phenotype and cultural factors" (p. 316).

A woman's BMI reflects strongly on her mate value. Thus, in Western societies, as a woman's BMI increases, her levels of attractiveness decrease. High-BMI women compensate for their lower attractiveness by targeting potential partners with the appropriate physical attractiveness level (George & Swami, 2008). Because mating competition can be costly, it is often to an individual's advantage to assess the relative mate value of potential rivals before competing with them. As high-BMI women have a lower chance of outcompeting low-BMI women for the same high mate value partners, time and energy would be saved by avoiding competition with those rivals. Thus, an effective mating strategy for less attractive women would be to target not what they regard as the partner with the highest mate value, but rather the most attractive partners that they would be likely to successfully court (Buss, 2006; George & Swami, 2008). For example, low mate value women are often willing to sacrifice physical attractiveness in a partner for future investment in offspring (Sugiyama, 2005).

Together these results indicate that mating strategies and mate value vary with BMI. Higher-BMI women are typically less selective or choose less attractive mates to compensate for their own lower levels of mate value. For instance, McClure and colleagues (2010) found that less attractive participants were less selective during speed dating. The interaction between HRV reactivity and BMI in the Bailey and Davis (2017) study, however, points to a more complex relationship. Lower HRV reactivity was associated with reduced chances of higher-BMI women finding a romantic partner. Higher resting HRV and lower HRV reactivity are associated with characteristics contributing to a higher mate value including better mental and physical health, emotion regulation, self-esteem, and social prowess (Egizio et al., 2008; Martens et al., 2010; Park &Thayer, 2014; Thayer & Lane, 2000). Higher-BMI women with otherwise higher mate value (as evidenced by low HRV reactivity) would be more selective in regards to mate choice, a strategy typically only successful for low-BMI women. This may explain Bailey and Davis's findings that low HRV reactivity women with higher BMI had lower coupling rates. Interestingly, within the high HRV reactivity group, coupling probability remained near 0.4 regardless of BMI. Thus, higher HRV reactivity tended to overshadow the influence of other traits when predicting who would begin a romantic relationship. BMI was the only marker of mate value investigated in Bailey and Davis's study; however, all markers of mate value can influence mating strategies and mating success. It is likely that, in addition to BMI, other markers of mate value influence the HRV – relationship formation link, and studies including self- and other-reported mate value are warranted.

BMI was not the only significant moderator of the link between HRV and relationship formation in Bailey and Davis's (2017) study. In a separate statistical model, Bailey and Davis found that resting HRV also moderated the HRV reactivity – relationship formation link.

Typically, resting HRV and HRV reactivity are investigated separately; however, Lacey's (1959) classic work suggested that focusing on a single index of a physiological system may obscure the extent of individual differences. People who are similar on one physiological index of a given system (e.g., resting HRV) may differ markedly on another related index (e.g., HRV reactivity). This has led some researchers to investigate the interactions between the two measures of HRV in predicting various outcomes. These studies have produced inconsistent findings in determining which combination of resting HRV and HRV reactivity produces the most advantageous outcomes (e.g., Cribbet, Williams, Gunn, & Rau, 2011; Park et al., 2014; Yaroslavsky, Bylsma, Rottenberg, & Kovacs, 2013).

Bailey and Davis's (2017) finding of a HRV reactivity – resting HRV interaction indicates that HRV reactivity influenced coupling success only among those with higher resting HRV. Amongst those participants with high resting HRV, higher HRV during the positive film relative to the negative film predicted the lowest coupling success (probability of coupling = 0.09), whereas higher HRV during the negative film relative to the positive film was found to predict the highest rates of coupling (probability of coupling = 0.71). Bailey and Davis's findings support the combination of high resting HRV and phasic HRV increases to a stressor as being associated with the best odds of starting a romantic relationship.

If Bailey and Davis's (2017) results are interpreted according to Thayer and Lane's (2000) neurovisceral integration system model, then the benefits of emotion regulation versus activation of the defense mechanism in response to stressors depends on the individual's BMI and resting HRV. For instance, for women with lower BMI, effortful emotion regulation during the negative film resulted in a greater probability of future coupling. For women with higher BMI, the reverse was true. When examining resting HRV and reactivity in combination, individuals with higher resting HRV and a pattern of effortful emotion regulation during the negative film resulted in a greater probability of beginning a relationship. For those with low resting HRV, patterns of HRV reactivity did not affect coupling success. Therefore, it appears that the influence of HRV reactivity on coupling success depends on one's BMI and resting HRV.

While the longitudinal design of the Bailey and Davis (2017) study provides a strong methodological advancement over Schneiderman and colleagues' (2011) cross-sectional design, the study was not without limitations. High dropout rates, reliance on self-reported height and weight for BMI calculations, and short follow-ups were all potential problems that must be remedied to achieve a more accurate understanding of HRV and relationship formation.

The Present Study

Two studies have now linked HRV reactivity and romantic relationships (Bailey & Davis, 2017; Schneiderman et al., 2011); however, little is known about the nature of this link. According to Thayer and Lane's (2000) neurovisceral integration model, patterns of HRV suppression and enhancement are indicative of different emotion regulation strategies. As emotion regulation is crucial to the formation and maintenance of romantic relationships, it may be the underlying mechanism responsible for this HRV- relationship formation link. Both resting HRV and HRV reactivity are associated with several characteristics that contribute to mate value, which is well-known to strongly predict relationship success. Thus, mating variables may also underlie this HRV – relationship formation link.

Traditionally, studies on relationship formation demonstrated principles of attraction in laboratory settings. Often these studies would have participants imagine encounters with partners they would never meet. When actual interactions did occur, participants met with confederates with whom they would not be able to form a romantic relationship in reality (Finkel, Eastwick, & Matthews, 2007). The speed-dating paradigm offers several advantages over such traditional, laboratory-based studies. Speed dating methodology involves participants engaging in 10-12 actual 4-min dates with potential romantic partners. Speed dating is a relatively new procedure for investigating initial attraction and romantic relationship formation and has been shown to have strong external validity (Finkel et al., 2007; Finkel & Eastwick, 2008). Specifically, the speed dating paradigm allows researchers to measure ratings of attractiveness, social skills, or any other components of mate value from participants' actual speed dating partners. In addition, this paradigm provides objective measures of relationship success, thus providing a clear advantage over traditional laboratory methods of researching romantic relationship formation.

To investigate the possibility that emotion regulation and/or mating variables underlie the HRV – relationship formation link, this study combined online, laboratory, and speed-dating methods. The HRV reactivity of a cohort of single university students was tested in the laboratory. The participants then underwent a speed dating session with their peers. Participants also completed brief follow-up questionnaires 3- and 6-months after their speed dating sessions to determine relationship formation.

During the laboratory session resting HRV was taken while the participants sat quietly with their eyes closed. Next, they were presented with the negative followed by the positive films used in Bailey and Davis’s (2017) methodology. Each film was relationship-related and designed to induce either positive or negative emotions, as previous research has shown that film clips elicit emotions fairly consistently (Hagemann, Naumann, & Maier, 1999; Overbeek, Boxtel, & Westerink, 2012). This finding has been confirmed through self-report, facial EMG, and HR responses (Overbeek et al., 2012). HRV reactivity was defined two ways: (a) as HF HRV during the positive film minus HF HRV during the negative film ($\Delta HF_{P\text{-}N}$) to replicate Schneiderman and colleagues' (2011) and Bailey and Davis's (2017) methods, and (b) as HF HRV during the baseline recording minus HF HRV during the negative film ($\Delta HF_{B\text{-}N}$) for easier comparison with the wider literature base. Relationship success was operationally defined as matching during the speed dating session or forming a monogamous relationship during a 6-month follow-up period.

Hypotheses

This study had two primary purposes. The first was to attempt to replicate the key findings reported by Bailey and Davis (2017). Specifically, these replication hypotheses were as follows:

1. For female participants, the pattern of lower HRV reactivity would be beneficial for the relationship success of those with low BMI and detrimental to those with high BMI. As BMI is less influential in the formation of relationships for males, this predicted effect was only expected to hold for females.
2. The pattern of lower HRV reactivity would be beneficial for the relationship success of those with high resting HRV and detrimental to those with low resting HRV. This effect was predicted to occur in all sexes.

The second aim of this study was to explore the potential mechanisms underlying the HRV reactivity – relationship success link. This task was undertaken by investigating the following *mediation* hypothesis:

3. The link between HRV reactivity and relationship success, as seen in hypotheses 1 and 2, would be mediated by emotion regulation (difficulty in emotion regulation, reappraisal, and

suppression), and/or mating variables (self- and other-reported mate value, and short- and long-term mating orientation).

Methods

Participants

The statistical power analysis tool G*Power (Faul, Erdfelder, Buchner, & Lang, 2009) was used to calculate the minimum sample size required to achieve adequate power. Based on the effect size seen in Bailey and Davis (2017), in order to achieve power of .80 in the moderated mediation analyses, the required minimum sample size was 83. Some analyses were to be conducted with only the data from female participants; therefore, 83 female participants were required. Participant drop-out was expected based on Bailey and Davis's (2017) study. Two hundred post-secondary students (103 females, 97 males) were recruited for the present study. Participants were recruited through mass email and posters placed throughout campuses of Lakehead University and Confederation College in Thunder Bay ON. Participants were (a) not currently in a romantic relationship; (b) interested in forming a romantic relationship in the next 6 months; (c) between the ages of 17-29; (d) non-smokers; and (e) not currently taking cold, antidepressant, or hypertension medications. Participants in the Psychology program at Lakehead University had the opportunity to earn bonus marks toward introductory Psychology courses in return for their participation. All participants who completed all of the follow-up questionnaires were entered into a draw to win one of three prizes including dinner and a movie for two people. In the second year of data collection participants were also offered a $5 Tim Horton's® coffee card for completion of the follow-up questionnaires.

Of the 200 participants, three were excluded from all analyses; one due to a technical error resulting in no ECG recordings, one because of intentional deception, and one because he was not single at the time of the laboratory session. Technical difficulties resulted in three participants with one to three unusable ECG recordings (for a total of five recordings). These distorted recordings could not be used to create HRV reactivity scores for the three participants. As these participants could not be used in any hypothesis testing, they were dropped from further analyses. One hundred and ninety-four participants had usable HRV data for both methods of calculating HRV reactivity.

Of the remaining 194 participants, 160 (83%) participated in a speed dating session, 149 (77%) completed the 3-month follow-up questionnaire, and 128 (66%) completed the 6-month follow-up questionnaire. One hundred and seventy-four participants (90%) had usable data for either speed dating matching or relationship formation during the follow-up, or both. These completers made up the sample of interest. All statistics reported are based on this sample.

Mean participant age was 20.12 years (*SD* = 2.56). Mean BMI was 26.05 (*SD* = 5.75). The participants identified their ethnicity as Caucasian (75.3%), South Asian (6.3%), Black (5.2%), Filipino (3.4%), Chinese (3.4%), First Nations (2.3%), or other (4.1%). Of the 136 participants included in analyses of relationship formation, 77 (57%) remained single while 59 (43%) became coupled over the 6-month follow-up period. Becoming coupled was operationally defined as entering into a monogamous romantic relationship lasting at least 10 consecutive days. Of the 160 participants who completed speed dating, 105 (66%) received at least one match while 55 (34%) remained unmatched.

Materials

Mediating variables. These variables were investigated as potential mediators of the association between HRV and relationship status.

Mating variables. These variables are related to mate value and mating strategies and were measured during the online questionnaire and speed dating phases of the study.

1. Mate-Value Inventories (MVI; Kirsner, Figueredo, & Jacobs, 2003; Appendix A). Two versions of the MVI were administered. Participants rated both themselves (MVI: Self) during the online questionnaire portion of the study and their speed dating partners (MVI: Other) directly after each speed date. Ratings were made on a list of traits that are important in mate attraction (e.g., attractiveness, financial security, emotional stability). Traits were rated on a scale ranging from -3 (*extremely low on this characteristic*) to +3 (*extremely high on this characteristic*). Mate value was calculated as the summed score of these items. Studies have found all versions of the MVI to have good reliability and construct validity. Fisher, Cox, Bennett, and Gavric (2008; $\alpha = .83$) and Kirsner et al., (2003; $\alpha = .86 - .93$) found internal consistency reliability of all versions of the MVI to be high. Convergent and discriminant validity were established through the prediction of (a) assortative mating by mate value, (b) differential exchange rates of mate value for different types of partnerships, and (c) a negative relation between depressive symptoms and assessment of one's own mate value (Kirsner et al., 2003). MVI: Self and MVI: Other were investigated as possible mediators representing mate value with higher scores indicating higher mate value.

2. Multidimensional Sociosexual Orientation Inventory (MSOI; Jackson & Kirkpatrick, 2007; Appendix B). The MSOI was developed to assess short- and long-term mating attitudes on separate scales rather than a single continuum. Both the short term mating (MSOI: ST) and long-term mating (MSOI: LT) scales contain 10 items. Answers range from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). The MSOI: ST scale includes items such as "Sex without love is ok" and "Sometimes I'd rather have sex with someone I didn't care about". The MSOI: LT scale includes items such as "Finding a long-term romantic partner is not important to me," (reversed scored) and, "I can see myself settling down romantically with one special person." The internal consistency is consistently high for both MSOI: ST (α =.92 - .95) and MSOI: LT scales (α = .86 - .88; Figueredo, Cuthbertson, Kauffman, Weil, & Gladden, 2012; Jackson & Kirkpatrick, 2007). Scores on the MSOI: ST and MSOI: LT scales were investigated as possible mediating variables representing short- and long-term mating strategies. Higher MSOI: ST scores represent higher use of short-term mating strategies and higher MSOI: LT scores represent higher use of long-term mating strategies.

Emotion regulation variables. These variables are related to emotion regulation strategies and difficulties, and were administered during the online questionnaire phase.

1. Difficulties in Emotion Regulation Scale(DERS; Gratz & Roemer, 2004; Appendix C). The DERS was developed to assess emotion dysregulation reflecting difficulties within the following dimensions of emotion regulation: (a) awareness and understanding of emotions; (b) acceptance of emotions; (c) the ability to engage in goal-directed behaviour and refrain from impulsive behaviour when experiencing negative emotions; and (d) access to emotion regulation strategies perceived as effective. Example items include, "when I'm upset, I have difficulty getting work done," and, "when I'm upset, my emotions feel overwhelming." Participants were asked to indicate how often those statements apply to themselves on a scale ranging from 1 (*almost never [0–10%])* to 5 (*almost always [91–100%])*.

The DERS has strong psychometric properties. Overall DERS scores were found to have high internal consistency (α = .93) with each subscale having adequate internal consistency (αs >.80; Gratz & Roemer, 2004). Construct validity was established as both the overall DERS scores and each of the DERS subscales were significantly correlated in the expected direction with the Generalized Expectancy for Negative Mood Regulation Scale (Catanzaro & Mearns, 1990), and a measure of experiential avoidance called the Acceptance and Action Questionnaire (Haynes, Strosahl, & Wilson, 2004). Predictive validity was established as the correlations between the overall DERS scores and self-harm were significant (and in the expected direction) among both women and men, and the correlation between the overall DERS scores and intimate partner abuse (also in the expected direction) was significant among men (Gratz & Roemer, 2004). The overall DERS score had a test–retest reliability of .88 and subscale test-retest reliabilities ranged from .57 -.89 over a period ranging from 4 to 8 weeks (Gratz & Roemer, 2004). The overall DERS score was used in the current study as a potential mediating variable representing emotion regulation, where higher scores reflect poorer emotion regulation.

2. Emotion Regulation Questionnaire (ERQ; Gross & John, 2003; Appendix D). The ERQ is a 10-item self-report measure of the habitual use of two of the most researched emotion regulation strategies, namely reappraisal and suppression, each with its own subscale. A sample reappraisal item is, “when I’m faced with a stressful situation, I make myself think about it in a way that helps me stay calm”. A sample suppression item is, “I control my emotions by not expressing them”. Items are rated on a Likert-type scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Internal consistency for the Reappraisal subscale ranges from .75 - .82, and from .68 - .76 for the Suppression subscale (Gross & John, 2003). Test–retest reliability across 3 months was .69 for both scales (Gross & John, 2003). Reappraisal and Suppression subscales also correlated in the predicted directions with perceptions of successful emotion regulation, authenticity, coping through reinterpretation, coping through venting, mood repair, and rumination (Gross & John, 2003). Each of the Reappraisal and Suppression scales were investigated as potential mediating variables representing emotion regulation strategies in the current study. Higher scores on the ERQ Reappraisal subscale represent better emotion regulation abilities. Higher scores on the ERQ Suppression subscale reflect poorer emotion regulation abilities.

Variables addressing internal validity. These variables reflect upon aspects of the internal validity of the study.

1. Demographics Questionnaire. (Appendix E). The demographics questionnaire was administered as part of the battery of online questionnaires. It included questions to determine if the individual met eligibility criteria, such as age and relationship status, and information to allow for the description of relevant sample characteristics such as ethnicity. Finally, participants were asked to rate their motivation to begin a romantic relationship using a Likert-type scale ranging from 0 (*I do not want to begin a monogamous romantic relationship in the next 6 months*) to 3 (*I am currently taking action to begin a romantic relationship*).

2. Self-Assessment Manikin. (SAM; Bradley & Lang, 2007; Appendix F). Participants used the SAM to rate the emotions experienced during each film they viewed in the laboratory on the dimensions of valence (happy/unhappy) and arousal (excited/calm). Higher ratings on the valence dimension indicated happier ratings. Higher rating on the arousal subscale indicated more arousal. In the current study, these ratings were used to ensure that the video tasks elicited the targeted emotions and to measure possible self-reported differences of emotional processing between sexes.

For the valence dimension, the SAM is a graphic figure that ranges from smiling and happy to frowning and unhappy. For the arousal dimension, the SAM ranges from excited and wide-eyed to relaxed and sleepy. Ratings on each dimension were made by selecting the number corresponding to any of the figures or to the space in between any two figures. This rating method resulted in a scale ranging from 1 (*unhappy, relaxed*) to 9 (*happy, stimulated*) for both dimensions. Backs, da Silva, and Han (2005) reported the coefficient alphas for a group of college students to be .63 for valence and .98 for arousal. Studies have also shown good concurrent validity of the SAM by comparing scores to psychophysiological data (Bradley & Lang, 2007).

Speed dating and follow-up materials. These measures assessed dependent and mediating variables and were administered during the speed dating session and by email during the follow-up period.

1. Interaction Record(IR; Finkel, Eastwick, & Matthews, 2007; Appendix G). The IR was modeled on Finkel, Eastwick, and Matthews' (2007) Interaction Record and was completed after each 4-min date during the speed dating session. The IR contains several different components. First, participants read the instructions for completing both the interaction record and the note card and obtained their alphanumeric identifier. Next, participants responded to the statement, “I knew this person very well before today’s event” on a scale from 1 (*strongly disagree*) to 9 (*strongly disagree*). When a participant indicated that they knew their partner well, as evidenced by a score of 7 or higher on the item, the results were considered to be biased by previous interactions and the results were not included in the total scores.

Next, participants rated their interaction partner on their mate value using the MVI (MVI: Other; as described under *mating variables* earlier). Participants then answered “Yes” or “No” to the statement “I wish to go on another date with this partner”. If both partners answered “Yes” to this item they were considered to be a match. If a participant received at least one match in their speed dating session, they were considered to be matched. This dichotomous matching variable (matched versus unmatched) was used as one of two dependent variables in the current study to operationally define relationship success. Matched participants were invited to contact their matches after the speed dating session via email. Any relationships that began as a result of the speed dating sessions were tracked using the follow-up questionnaire (described below). Relationship formation was used as the second dependent variable of relationship success in the testing of all hypotheses.

Finally, the interaction record included an optional space for disclosing any moral, ethical, or legal reason why they could not say "Yes" to another date with that partner. Examples of reasons given were that they were in a position of power over the other participant (e.g., boss or residence leader), because they were related to one another, and because their speed dating partner had previously dated their close friend. This item was typically left blank; however, legitimate answers to this item resulted in the MVI and matching data for that speed date not being included in the total scores.

2. Follow-up questionnaire (Appendix H). The follow-up questionnaire was created for this study to track participants' relationship formation during the 6-month follow-up period. A link to the questionnaire was sent to participants via email 3- and 6-months after their speed dating session. For those participants who did not complete the speed dating session, the links were sent to them 3- and 6-months after their scheduled speed dating session. Separate questions covered romantic contact and relationship formation with speed dating matches and with partners met outside of the speed dating session. Relationship formation served as the second dependent variable representing relationship success in the current study. The relationship formation variable was dichotomized. If the participant formed at least one romantic relationship lasting at least 10 days over the course of the 6-month follow-up, they were considered to be coupled, while those who did not form relationships were considered to be single. The minimum relationship duration of 10 days was chosen to maintain consistency with Bailey and Davis's (2017) and Schneiderman and colleagues' (2011) studies.

Apparatuses.

Body Measurements. Participants were measured using a measuring tape attached to the wall to determine their height in centimeters. Weight in pounds was measured using a precision electronic scale (Brecknell LPS400). From these measurements BMI was calculated using the formula BMI = weight (lb.) / (height [in.] x height [in.]) x 703. BMI served as a moderating variable in the replication of Bailey and Davis's (2017) findings pertaining to replication hypothesis 1.

Electrocardiogram. Electrocardiogram (ECG) was recorded using a 72-channel amplifier (Advanced Neuro Technology, Enschede, Netherlands), sampled at 1024 Hz. Participants were fitted with three electrodes with snap-on Ag-AgCI placed on cleaned skin located below the right clavicle and left abdomen below the rib in a lead II configuration. A ground electrode was applied below the left clavicle. Raw ECG data was extracted and inspected using ASA-Lab software (Version 16; Advanced Neuro Technology, Enshede, Netherlands) and then imported into Kubios HRV specialized analysis software (Biosignal Analysis and Medical Imaging Group; http://kubios.uef.fi/; version 2.2) to derive HFms^2 as the metric of HRV. An eyes-closed baseline recording of HRV served as the measure of resting HRV. Resting HRV was used as a moderating variable in the replication of Bailey and Davis's (2017) findings pertaining to replication hypothesis 2. HRV reactivity was used as the independent variable in the investigation of all hypotheses in the present study.

Procedure

Data was collected in four phases: online questionnaires, a laboratory session, a speed dating session, and email follow-up questionnaires.

Phase 1: Online questionnaires. Mass emails were sent out to all students on Lakehead University Psychology course rosters, posters were placed throughout Lakehead University and Confederation College Thunder Bay campuses, and research assistants spoke directly to classrooms of students. All forms of advertisement directed participants to the online battery of questionnaires, securely hosted by SurveyMonkey.

Participants began by reading and completing the Participant Information Letter and the Consent Form (Appendix I). Participants signified their voluntary consent to participate by clicking a box at the bottom of the screen. Participants then completed the Demographics questionnaire (Appendix E), the self-rated Mate-Value Inventory (MVI: Self; Appendix A), the Multidimensional Sociosexual Orientation Inventory (MSOI; Appendix B), the Difficulties in Emotion Regulation Scale (DERS; Appendix C), and the Emotion Regulation Questionnaire (ERQ; Appendix D). Total time to complete the questionnaires was approximately 20 min. Participants were then directed to sign up for a laboratory session.

Phase 2: Laboratory session. Participants were asked to refrain from eating and exercising for 2 hours, and drinking alcohol for 24 hours, before the laboratory session as these variables are known to suppress HRV. Participants were also asked not to consume caffeinated beverages for 2 hours prior to the laboratory session[1]. A timeline of experimental procedures for the laboratory session is presented in Figure 2. First, the experimenter greeted participants who then reviewed and signed a hard copy of the consent form (Appendix I) identical to the one they

[1]Evidence published after data collection in the present study suggests that caffeine does not affect HRV in habitual coffee drinkers (Zimmermann-Viehoff et al., 2016).

had previously signed electronically. Researchers then offered a brief explanation of the activities in which the participants would be engaging over the next 50 min, and offered instructions for attaching the ECG electrodes (Appendix J) before pantomiming the placement of electrodes on themselves. Skin was cleaned by participants with an alcohol solution prior to attaching the electrodes. Participants were instructed to attach the electrodes to themselves in a lead-II ECG configuration, which consisted of electrode placement below the right clavicle (positive), below the left rib (negative), and below the right clavicle (ground). Participants attached the electrodes. Electrode placement and contact with skin was checked by the experimenter before proceeding. Participants were then seated and asked to remain still during the ECG recordings. Participants sat quietly for 5 min with their eyes closed while HRV was recorded. This measurement was used as the index of resting HRV.

Film stimuli. Next, participants had HRV recorded while watching a negative and then a positive 4:45-min film presented on a 72-in. DLP television, separated by a 1-min block of sitting quietly. The films were compilations of thematically related shorter film clips (10 – 60 s) freely available from Gettyimages.com, an online digital media database. These clips were used previously in Bailey and Davis’s (2017) study to produce transient states of positive and negative affect. The positive and negative films depicted heterosexual couples engaging in various nonsexual activities chosen to elicit the target affective valence. After each film, participants rated the valence of their emotions and their emotional arousal using the Self-Assessment Manikin (Appendix F). After the film viewing task the participants completed tasks related to a separate study for 15 min.

Body measurements. At the end of the laboratory session, the experimenter recorded participants' height using a measuring tape attached to the wall and recorded their scale weight.

Participants then confirmed their availability for the speed dating session. Before departing the laboratory, participants read a debriefing form for the laboratory session (see Appendix K). This laboratory session took approximately 50 min to complete.

Phase 3: Speed Dating Session. The speed dating events followed the procedure set out by Finkel and colleagues (2007) who set the standards for using speed dating as a tool for investigating relationship formation. A speed date consisted of a 4-min conversation between two previously unacquainted speed dating partners. These daters later decided, on the basis of their brief encounter, if they wished to have any further contact. The daters were free to discuss whichever topics they wished. During a speed dating session, 7-13 of these speed dates occurred in quick succession. Sessions lasted approximately 1.5 hours. Heterosexual speed dating sessions had 8-13 females and 8-13 males present. The same-sex speed dating session for men seeking men was run in conjunction with Pride Central, Lakehead University Student Union's service centre for lesbian, gay, bisexual, transgender, two-spirit, and queer issues. Eight men attended this session, each having a speed date with all of the other participants. A session for women seeking women was also planned but was not run due to low numbers of participants.

The Study, a coffee shop located on Lakehead University campus, was the setting for all speed dating sessions. The Study was set up to allow for 13 separate two-place seating areas with a number identifying each area. The Study was closed to all nonparticipants. For the speed dating sessions, only the consenting participants from phases 1 and 2 were permitted to participate.

Experimenters greeted each participant as they arrived, assigned each an alphanumeric ID (numbers for women, letters for men) and a seat, and gave out name tags for participants to display their first names or nicknames and alphanumeric IDs. Experimenters also provided each participant with a clipboard holding the IR and Note Cards (Appendix G) that were filled out after each 4-min date. The IRs were collected at the end of the night and were used to calculate measures of mate value (MVI: Other) and matching. Matching was calculated based on participants' responses to the question "I wish to go on another date with this partner" on the IR. A match occurred when both speed dating partners mutually indicated 'yes' on the matching question for one another. The Note Card was provided for participants' personal note-taking during the session. Participants were encouraged to use the notes when they contacted their matches after the speed dating session.

As participants arrived, females were shown to one room and males to another in order to minimize the chance of contact prior to the dates. During the same-sex events, participants were asked to not interact with one another until the event began. Once all participants arrived, the experimenter invited everyone to take their assigned seats and gave a brief introductory speech explaining the procedure. The sound of a bell then signalled the beginning of the first date, with a second bell 4 min later signalling the end of the date. The movement of male or female participants to the next seat was determined in a counterbalanced order. After partners had taken their new seats, both partners completed their IR and Note Cards for the dates they had just finished. The IR and Note Cards were confidentially filled out on clipboards. After completion of the questionnaires, participants waited until they heard another bell signalling the beginning of the next date before interacting with their new partner. This process continued until each individual had been on a date with each partner. The number of speed dating partners at each event varied from 7-13.

After the IR and Note Cards were filled out for the last date, the IRs were turned in to the experimenters, and participants kept their Note Cards. Participants were reminded to keep confidential the information disclosed to them by their speed dating partners. They were also reminded that participants in the study were not tested for sexually transmitted infections and to use the same level of caution when beginning relationships with speed dating partners as they would with strangers met outside of speed dating. Participants received a debriefing form (Appendix L) containing instructions for viewing their matches and their personal study email address and password. Participants were then invited to stay and mingle with fellow daters over light refreshments until the end of the session.

Post-event procedure. Researchers assessed the IRs for matches which were defined as occurring whenever two individuals mutually answered "Yes" to the question "I wish to go on another date with this partner". The researchers then emailed participants using their pre-assigned anonymous study email address with their matches' alphanumeric identifier and study email addresses, and informed them that they may contact their matches through their study email addresses. Email addresses were created for the purposes of the study using mail.com, a free web-based email service. No personal information of any participant was revealed by the experimenter to any other participant. This email address allowed participants to contact their matches without revealing any personal contact information.

Phase 4: Email follow-up. Experimenters sent out follow-up emails 3- and 6-months after the speed dating sessions. The email contained a link to a brief follow-up questionnaire (Appendix H) hosted on SurveyMonkey assessing relationship formation since the speed dating session. After all questionnaires had been completed, participants read a debriefing sheet (Appendix M) explaining the purpose of the study, and whom to contact with questions or concerns regarding the study. In the present study, the dichotomous dependent variable of relationship formation was calculated based on the participants' answers during the email follow-up. Individuals who reported having at least one romantic relationship lasting at least 10 days were coded as coupled. Individuals who did not form a romantic relationship over the course of the follow-up period were coded as single.

Results

Resting HRV and HRV Reactivity Calculations

Throughout the results section high frequency HRV is denoted as HF, with subscripts indicating the period of recording (HF_B = HRV during the baseline recording, HF_P = HRV during the positive film, and HF_N = HRV during the negative film). Resting HRV (baseline HRV) was operationally defined as HF_B. HRV reactivity was defined two ways: (a) as HF during the positive film minus HF during the negative film (ΔHF_{P-N}) to replicate Schneiderman and colleagues' (2011) and Bailey and Davis's (2017) calculations, and (b) as HF during the baseline recording minus HF during the negative film (ΔHF_{B-N}) for easier comparison with the wider literature base. For both measures of HRV reactivity, positive scores indicate higher HF during the positive or baseline recordings, and a drop in HF during the negative film. Negative scores indicate higher HF during the negative film and an increase in HF from the positive or baseline recordings to the negative film. Scores closer to zero indicate little reactivity or change.

Change scores. Reactivity scores are by definition change scores. As described above, in the current study ΔHF was calculated using change scores (difference scores). The use of change scores has been criticized by some researchers on the basis of two main arguments. First, it has been argued that change scores suffer from low reliability (Edwards, 2001). Low reliability and its related statistical issues were not of concern in the present study as the internal consistency of both reactivity measures was high (ΔHF_{B-N} $\alpha = .94$, ΔHF_{P-N} $\alpha = .96$). To test internal consistency, Cronbach's alpha was calculated using each of the two component HF scores for each reactivity score (e.g., using HF_B and HF_N for ΔHF_{B-N}).

Secondly, it can be argued that difference scores often conflate the passage of time and baseline differences with actual effects. Difference scores are correlated with the scores that comprise them. Therefore, it is difficult to determine whether the change scores reflect actual change in the construct of interest; instead, they may reflect associations with the original baseline scores or a multitude of potential confounds that could arise when there is time between the two scores that make up the change score. In the current study, the confounding effects of time were minimized as the measurement of HF_N directly followed HF_B and directly preceded HF_P, rather than having days, weeks, or even years in between the measurement occasions.

The standard in HRV reactivity research is to calculate HRV reactivity by subtracting HF during a stressor from HF_B (Manuck, Kasprowitcz, Monroe, Larkin, & Kaplan, 1989; Ottaviani et al., 2015). Change scores were also used in both previous studies investigating relationship formation and HRV reactivity (Bailey & Davis, 2017; Schneiderman et al., 2011). Nevertheless, an alternative to the traditional HRV reactivity analysis was also conducted in the present study; HF_B was added to the main analyses as a covariate. In theory, covarying out baseline scores should reduce the conflation of differences in baseline scores with changes in time (Fleeson, 2007). This alternative calculation was included to determine if the non-traditional change calculations produced the same results as typical change scores. These alternative calculations are presented in brief in footnotes.

Data Analytic Approach

The primary analytic techniques used for this study were moderated logistic regression, moderated moderation logistic regression, and moderated mediation logistic regression[2]. In the 1980s, Baron and Kenny (1986) popularized the causal steps approach to mediation analysis that necessitated the use of several separate analyses conducted in sequential steps to test for mediation. Hayes (2013) argues this approach is flawed on several grounds. First, the causal steps approach does not have a formal quantification of the indirect effect. This lack of quantification leads to interpretation of the indirect effect in qualitative terms (mediates or does not) rather than asking more refined questions such as comparing the sizes of the mediation effects. Their method is also low-powered because it requires the successful rejection of three null hypotheses in order to claim that mediation has occurred. Finally, it requires a significant direct effect from *X* to *Y* to test for mediation. The logic of requiring a significant direct effect to find an indirect effect is flawed. The total effect is not a good estimator of *X*'s effect on *Y* under some circumstances. The total effect equals the direct effect plus the sum of all indirect effects. Therefore, if there are multiple indirect effects, some positive and others negative, they may sum to zero and result in the calculation of a nonsignificant total effect. Even with a single mediator this can occur. For instance, different subpopulations may exert opposite effects on *Y* and the total effect may again sum to zero.

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[2] Multilevel modeling (MLM) is a popular alternative analytic approach for analyzing speed dating data as it allows for the investigation of dyad-level interactions (e.g., Eastwick &Finkel, 2008a; Eastwick & Finkel, 2008b; Eastwick, Finkel, Mochon, & Ariely, 2007). For instance, MLM allows for the investigation of whether the similarity between personality variables in two partners influences whether they match. The current study was not concerned with the results of each individual date or pair of speed daters. Instead, matching was summed across all speed dates and then dichotomized into categories of received at least one match = 1 or unmatched = 0. For example, if Jane went on ten speed dates and received 3 matches, overall she would be coded as 1. As dyad-level matching was not being investigated, MLM was not used.

Hayes's (2013, 2015) regression-based path-analytic framework avoids the many flaws of the Baron and Kenny (1986) mediation approach and it was therefore adopted as the analytic strategy to test the hypotheses of the present study. All predictors in the regression models were mean centered prior to the creation of product terms in order to aid interpretability (Hayes, 2013). Hypotheses 1 and 2 were tested using moderated moderation analyses. Simple moderation analyses test whether the effect of a predictor variable *X* on an outcome variable *Y* depends on the level of a moderator variable *M* (Hayes, 2013; Figure 3). Moderated moderation adds a second moderator *W* and tests whether the moderation effect of *M* depends on the level of moderator *W* (Figure 4). The first replication hypothesis tested the prediction of relationship status or matching *Y* from $\Delta HF_{B\text{-}N}$ or $\Delta HF_{P\text{-}N}$ *X* moderated by BMI *M* and sex *W*. The second replication hypothesis was also evaluated using moderated moderation logistic regressions in the prediction of relationship status or matching *Y* from $\Delta HF_{P\text{-}N}$ *X* moderated by HF_B *M* and sex *W*. These moderated moderation analyses were conducted using Hayes's (2013) PROCESS macro model 3. Follow-up tests for hypothesis 1 were conducted using PROCESS model 1 for simple moderation. These same analyses were also run using SPSS logistic regression and linear regression in order to check for violations of parametric assumptions, a task that cannot be accomplished using the PROCESS macros.

The third hypothesis was evaluated using moderated mediation regressions, which added the potential mediators of emotion regulation (ERQ: REAP, ERQ: SUP, DERS), and mating variables (MVI: Other, MVI: Self, MSOI: ST, MSOI: LT) to the moderation models when found to be statistically significant in hypotheses 1 and 2. Mediation focuses on *how* the predictor variable *X* exerts its effect on the outcome variable *Y* through a causal mediator variable *M*. That is, variation in *X* causes variation in the mediator *M*, which in turn causes variation in *Y* (Figure

5). Simple mediation models allow for examination of the direct and indirect effects of *X* on *Y* through an intervening variable *M*. Hayes's (2013) PROCESS macro models 8 and 15 were employed to investigate first- and second-stage moderated mediation (Figures 6-7), which allows for the integration of moderation and mediation techniques in a single model. PROCESS model 15 tests second-stage moderated mediation wherein the moderator interacts with the mediator to predict the outcome variables (Hayes, 2015). PROCESS model 8 tests first-stage moderated mediation wherein the predictor variable interacts with the moderator to predict the mediator.

Emotion regulation and mating mediators were tested separately, each using PROCESS models 8 and 15. Including all of one family of mediators in a single model allowed for the comparison of the size of the indirect effects through the different mediators (Hayes, 2013). The calculation of the specific indirect effects for each mediator holds any parallel mediators constant. The two families of mediators were tested independently.

Bootstrapping procedures with 10,000 iterations were used to calculate 95% confidence intervals (CI) for the unstandardized regression coefficients *b* for predictor variable *X* as estimated in the mediation models described above. In bootstrapping the sample data are used as the distribution from which smaller bootstrap samples are taken. These bootstrap samples can then be ordered and used to construct 95% confidence intervals which do not rely on the assumption of normality. When the bootstrapped CIs did not straddle zero, then the regression coefficient *b*, which tests the indirect effect of *X* on *Y* through *M*, was determined to be different from zero with 95% confidence.

Evidence of significant moderated mediation in these models came from a significant index of moderated mediation which determines the strength and direction of association between an indirect effect and a moderator (Hayes, 2015). A significant value of this index indicates that any two conditional indirect effects estimated at different values of the moderator differ significantly. The moderated mediation model as a whole could not be reproduced using SPSS due to its complexity involving a moderator and multiple mediators. Therefore, in order to check parametric assumptions using SPSS logistic and linear regression analyses, the moderated mediation models were broken down and run as three separate models representing the simple effects from *X* to *M*, *M* to *Y*, and *X* to *Y*. Each of the three models were checked for violations of parametric assumptions as discussed below.

Effect size for main analyses. The PROCESS macro cannot produce effect size measures in models with multiple mediators, moderators, covariates, or dichotomous *Y* variables (Hayes, 2013). However, the PROCESS macro does produce R^2 which was converted into Cohen's f^2 using the formula $f^2 = R^2 / 1 - R^2$. Cohen's f^2 is the most common measure of effect size in tests of moderation (Aiken & West, 2001). For moderation, Cohen's f^2 equals the unique variance explained by the interaction term divided by the sum of the error and interaction variances. Cohen (1988) suggested that f^2 effect sizes of 0.02 denotes a small effect, 0.15 denotes a medium effect, and 0.35 evidences a large effect.

Logistic regressions were also used to replicate the findings of each PROCESS model in order to obtain odds ratios (ORs). For dichotomous data, ORs are the preferred measure of effect size for use in meta-analyses (Haddock, Rindskopf, & Shadish, 1998). ORs are considered to be unstandardized measures of effect size because they indicate the strength and direction of the relationships between variables on a scale that varies depending on the variables. ORs measure how many times greater the odds of an outcome are for one value of a predictor, compared to another value (Field, 2013). Imagine a scenario where the dependent variable is relationship formation with 0 = remained single and 1 = formed a relationship. If the OR for a predictor is

1.12, that means that for each one-unit increase in the predictor, the odds of forming a relationship are 1.12 times as large, after controlling for any other predictors. In the present study, the ORs are presented as a measure of effect size for the results of statistically significant regressions with dichotomous dependent variables.

Parametric assumptions. Data for all analyses were assessed for violations of parametric assumptions to ensure accurate generalizations of the findings. Moderated logistic regression and moderated mediation, like any linear model, require that the assumptions of normality, additivity and linearity, homogeneity of variance, and independence of errors be met. All continuous variables were assessed for normality using z_{skewness}, calculated as skewness / *SE*. Any z_{skewness} scores of 1.96 and above were considered significantly skewed at $p < .05$ (Field, 2013) and subsequently transformed. When a transformation remedied or significantly reduced the skew, the transformed variables were retained. Each of the hypothesis tests were conducted with the transformed and untransformed variables. When no significant differences appeared between the two models, the results using the original untransformed variables are reported for ease of interpretation. Finally, hypothesis 3 was tested using bootstrapping which does not require the assumption of normality (Hayes, 2013).

For each logistic regression, the assumption of linearity was tested by checking that the continuous variables were linearly related to the log of the outcome variables; i.e., the linearity of the logit. Nonsignificant interactions were found between each of the predictors and their logs which indicated linear relationships (Hayes, 2013). The assumption of homoscedasticity of residuals assumes that the variance of the outcome variable is stable at all levels of the predictor variable (Field, 2013). As suggested by Aguinis (2004), scatterplots were visually inspected and revealed no violations of the assumption of homoscedasticity. Further, heteroscedasticity-consistent SEs are also presented in the results which reduce concerns over heteroscedasticty (Field, 2013; Hayes, 2013). Regression models assume that there is less than complete multicollinearity, or perfect correlation, between predictors. Multicollinerarity diagnostics cannot be produced for logistic regression; therefore, linear regressions using the same variables were produced to test this assumption. All tolerance statistics had values over 0.1 and VIF values well below 10 which indicated that there were no multicolinearity concerns (Field, 2013). Residuals were also investigated to isolate points for which the model may fit poorly or that exert an undue influence on the data.

The assumption of independence of errors assumes that the errors in estimation are statistically independent. Essentially, two things can be said to be independent if information about one gives no information about the other (Hayes, 2013). Hayes explains that "if the errors in estimation are independent, this means that for all (*i*, *j*) pairs of observations, there is no information contained in the error in estimation for case *i* that could be used to estimate the error in estimation for case *j*" (p. 56). Speed date matching could theoretically violate this assumption of independence. To receive a match, a "*Yes*" is required from both the participant and their speed dating partner. Therefore, at the dyad-level, a match is dependent on other participants' answer. If one participant on a speed date does not match with their partner, then their partner will invariably also not match during that same speed date. The matching variable in the present study ignores the dyad-level matching and looks only at a dichotomized total of all the dyad-level matching scores. If a participant received at least one match from any speed dating partner, then he or she is considered to have matched, while those participants who received no matches are considered to be unmatched. Knowing that Jane was unmatched does not offer any information about whether John or Tim in the same speed dating session matched or remained unmatched.

Independence of errors can be assessed statistically using the Durbin-Watson test. This test identifies any serial correlations between errors (Field, 2013). For the main analyses in the present study, the Durbin-Watson tests did not identify any concerns that the assumption of independence of error had been violated. Therefore, the theoretical concerns over lack of independence were assuaged by the finding of statistical independence of errors.

Data Preparation

Data was entered into SPSS v. 20. Technical errors rendered eight HRV recordings across four participants unusable; these participants were dropped from all analyses. A flow chart illustrating participant drop out and exclusion can be found in Figure 8. There were no missing data from the psychometric self-rated variables. However, 18% of the MVI: Other items were left blank during the speed dating session[3]. These missing values were prorated from the data provided by other speed dating partners. If participants listed a moral, ethical, or legal reason why they could not date their partner (e.g., he/she is my boss, he/she is related to me, or he/she is my best friend's ex-partner), their answers were not included in the average MVI: Other score. Thirteen (1%) of 1,503 ratings were excluded on such grounds. Similarly, answers were not included in the average from partners who knew each other well prior to the speed dating session (93 [6%] out of 1,503 ratings excluded). Knowing each other well was operationally defined as a score of 7 or higher on the item "I knew this person very well before today's event", with possible answers ranging from 1 (*strongly disagree*) to 9 (*strongly agree*). BMI data were

[3] The large number of items left blank may have resulted from the fast-paced and distraction-rich speed dating environment. Participants only had 2 minutes to complete the IR and did so sitting across from their next speed dating partner. The dates were back-to-back with no breaks in between except the time to complete the IRs. This issue should be addressed in future speed dating studies.

missing for one participant. His data was used in all analyses that did not include BMI. One participant listed their sex as "Transgender – Male to Female". This participant was excluded from analyses of sex. Sex was treated as a dichotomous variable and coded as 0 = male, 1 = female. Separate analyses for the men-seeking-men speed dating session were not conducted; data from all speed dating sessions was combined and analyzed together.

ECG recordings. Recordings were visually inspected for ectopic heart beats. None of the participants' recordings breached the convention of five percent threshold for ectopic heart beats relative to total beats and all recordings were retained in the analyses. Using a fast Fourier transform (FFT) method, a distinct peak known as an R-spike was identified throughout the recording. Interval series between R-spikes were then calculated for each recording by power spectrum density (PSD), yielding HF as a continuous measure of HRV expressed in absolute power (ms^2) within the high frequency band (.15-.4).

Psychometric variables. Descriptive information and indices of internal consistency pertaining to the psychometric variables are presented in Table 1. These seven variables represent all the potential mediators to be explored in sections that follow. Z_{Skewness}, was used to determine the skew of each variable using a *z* score; a score of +/-1.96 represented significant skew. MVI: Self exceeded the cutoff for z_{Skewness} of 1.96 and was therefore subjected to the reverse score transformation and the square root (sq) transformation, which produced a z_{Skewness} statistic of 0.65, and remedied the skew. The sqMVI: Selfwas used in all further analyses. MSOI: LT was reverse score transformed and subjected to a natural log (ln) transformation, sq transformation, and reciprocal transformation. Each attempt to transform MSOI: LT resulted in greater skew. As a result, the original variable was retained in all analyses. The DERS was positively skewed. A ln transformation remedied the skew and produced a z_{Skewness} statistic of

0.74. To correct ERQ: REAP's negative skew, the variable was reverse score transformed and underwent a sq transformation resulting in a z_{Skewness} statistic of 0.43. These transformed variables were used in all analyses; however, when the original variables produced the same results, the original variables were reported to aid interpretability. The *z* scores for all psychometric variables were analyzed for univariate outliers defined as ± 3.29 (Field, 2013); none were detected.

An intercorrelation matrix of the mediator variables can be found in Table 2. As expected, several of these variables exhibited low but significant positive and negative correlations with each other which is consistent with the theories described in the introduction and materials sections. Nevertheless, the limited shared variance, as reflected in these low-order correlations, suggested there is a fair degree of independence among the mediator variables.

Body mass index. BMI was $M = 26.03$, $SD = 5.72$, range = 16.08 – 47.18, with $N = 175$. Health Canada (2003) provides the following guidelines for interpreting BMI for individuals of all genders: BMI less than 18.5 indicates that an individual is underweight, BMIs 18.5 to 24.9 indicate normal weight, BMIs 25 to 29.9 indicate that an individual is overweight, and BMI over 30 indicates obesity. As is typically found with BMI data, the BMI distribution in the present study was found to be significantly skewed in the positive direction, $z_{\text{Skewness}} = 6.76$. A logarithmic transformation reduced the skew to $z_{\text{Skewness}} = 3.47$, and examination of *z* scores revealed no outliers. The sq and reciprocal transformation resulted in more severe skew. Consequently, the ln BMI variable was used in all analyses.

Dependent variables. Two dichotomous measures of relationship success were used as dependent variables. Matching was measured during the speed dating session. To receive a matching score of one, the participant had to receive at least one mutual match during the speed dating session. A matching score of zero denotes that the participant was unmatched. Relationship formation was measured during the 6-month follow-up period via online questionnaires. To receive a relationship formation score of one, the participant had to have at least one monogamous romantic relationship lasting at least 10 days over the course of the follow-up period. Participants who remained single over the follow-up period were coded as zero.

To examine the relationship between these two theoretically-related dependent variables, a simple moderated regression was conducted using PROCESS model 1 (Hayes, 2013). To produce odds ratios (ORs), Cramer's *V* statistics, and unmoderated follow-up analyses for each sex, a Pearson chi-square test was also performed on matching and relationship formation. Of the unmatched participants 66.7% remained single over the 6-month follow-up while 33.3% formed monogamous romantic relationships. Of the matched participants, 50.6% remained single while 49.4% formed relationships over the follow-up period. The overall association between matching and relationship formation showed a trend towards statistical significance, b = 0.890, SE = 0.483, p = .063, Cramer's V = 0.151. The OR indicates that the odds of matched participants forming relationships was 1.95 times higher than for the unmatched participants. In the overall sample there was also a significant main effect of sex, b = 1.099, SE = 0.415, p = .008, and a trend towards a significant matching × sex interaction, b = -1.869, SE = 0.483, p = .059. Amongst males the relationship between matching and relationship formation was statistically significant, $\chi^2(1)$ = 5.647, p = .016, Cramer's V = 0.320, with matched males being 6.05 times more likely to form relationships than their unmatched counterparts. Matched women were no more likely to start a romantic relationship than their unmatched counterparts, $\chi^2(1)$ = 0.001, p = .595, Cramer's V = 0.003, OR = 1.01.

Comparison by Relationship Success

Psychometric variables, age, motivation, and BMI, were analyzed for potential group differences as a function of relationship formation and speed dating matching. Number of partners during the speed dating session was also included in analyses comparing matched and unmatched participants. MANOVA results indicated statistically significant differences between coupled and single participants, $F(9, 112) = 2.055$, $p = .040$; Wilk's $\Lambda = 0.858$, partial $\eta^2 = .14$. Follow-up univariate ANOVAs revealed that coupled participants were significantly younger and had higher mate value as rated by speed dating partners compared to those who remained single (see Table 3). In these and all following ANOVAs, the assumption of homogeneity of variances was evaluated with Levene's test. The within-participant sphericity assumption was verified using Mauchly's test and where violations occurred, the Greenhouse-Geisser corrected results were reported (Field, 2013). Results of a chi-square test showed that females (55%) were more likely to form romantic relationships over the follow-up period than their male counterparts (29%), $\chi^2(1) = 9.444$, $p = .002$.

A MANOVA also revealed statistically significant differences between matched and unmatched participants, $F(9, 150) = 2.726$, $p = .006$; Wilk's $\Lambda = 0.859$, partial $\eta^2 = .14$. Follow-up ANOVAs found that matched participants had significantly lower BMI, higher mate value as rated by their speed dating partners, higher self-rated short-term mating orientation, and a higher number of speed dating partners than their unmatched counterparts (see Table 4). Results of a chi-square test show no association between participant sex and matching, $\chi^2(1) = 0.148$, $p = .700$, with 67% of males and 64% of females matching.

Comparison of Completers and Noncompleters

A chart showing the flow of participants through each portion of the study is found in Figure 8. Study completers were defined as participants who completed speed dating and/or the follow-up questionnaires. Completers therefore had data for matching and/or relationship formation, which are the two main dependent variables. Noncompleters were defined as participants who dropped out of the study prior to providing data for either dependent variable. A MANOVA was conducted to determine whether study completers differed from noncompleters on psychometric variables, age, motivation, and BMI. As only completers have MVI: Other data, it was not included in the MANOVA.

The results of the MANOVA found no statistically significant difference found between completers and noncompleters, $F(8, 185) = 0.972$, $p = .459$; Wilk's $\Lambda = 0.960$, partial $\eta^2 = .04$. This MANOVA was followed up with separate ANOVAs (see Table 5). As the results of the analyses using transformed and untransformed variables were similar, the results of the original untransformed variables are presented in the table. No variables reached statistical significance indicating no differences between completers and noncompleters. Finally, a Pearson chi-square test found that completion status was not significantly associated with the sex of the participant, $\chi^2(1) = 0.064$, $p = .801$.

Affective Responses to Films

Descriptive statistics pertaining to the valence and arousal ratings of film clips can be found in Table 6. Some of the valence and arousal distributions exhibited significant positive or negative skew. No transformations remedied the skew for all affective variables; therefore, the untransformed valence and arousal ratings were used in all analyses. Two outliers, defined as *z* scores equivalent to or exceeding ± 3.29, were identified for the valence ratings of the positive film. These outliers were replaced with the next highest nonoutlier value (Field, 2013).

Two 2 (task) × 2 (sex) × 2 (relationship status) mixed model ANOVAs were conducted to determine whether valence and arousal ratings varied as a function of task (negative film, positive film), participant sex (male, female), or relationship formation (single, coupled). As there are only two levels of the repeated-measure task, Mauchly's test for sphericity was not required. For valence, a main effect was found for task, $F(1, 130) = 580.25$, $p < .001$, $\eta^2_{partial} = .83$, with higher valence reported during the positive than the negative film. The remaining main effects on valence were nonsignificant for sex, $F(1, 130) = 1.34$, $p = .249$, $\eta^2_{partial} = .01$, and relationship status, $F(1, 130) = 0.21$, $p = .647$, $\eta^2_{partial} = .002$. All interaction terms were also nonsignificant (*p*s > .05).This ANOVA was repeated with matching replacing relationship status and yielded similar results. These results confirm that the films evoked the intended valence that was not affected by sex of the participant or their eventual relationship success.

The second mixed model ANOVA was conducted for arousal scores. There was again a main effect of task, $F(1, 130) = 90.45$, $p< .001$, $\eta^2_{partial} = .41$, and the other main effects were nonsignificant for sex, $F(1, 130) = 0.42$, $p = .519$, $\eta^2_{partial} = .003$, and relationship status,$F(1, 130) = 0.05$, $p = .830$, $\eta^2_{partial}< .001$. However, there was also one significant interaction for task × sex, $F(1, 130) = 7.78$, $p = .006$, $\eta^2_{partial} = .06$ (see Figure 9). This interaction indicated that males reported higher arousal during the negative film while females reported higher arousal during the positive film. All other interaction terms were nonsignificant (*p*s > .05).This analysis was repeated with matching replacing relationship status; similar results were found with the exception that the task × sex interaction was trending at $p = .070$. The films therefore differed in the arousal they produced depending on the participants' sex but not on participants' eventual relationship success.

HRV Responses to Film Clips

HF. Across all tasks HF was significantly skewed in the positive direction with $z_{skewness}$ statistics exceeding the convention of 1.96 (see Table 7). As is customary with HF data, these data distributions were subjected to the ln transformation which remedied the skew. The ln transformed variables were used in the remainder of the analyses. No outliers were detected in the transformed data.

A 3 (task) × 2 (sex) × 2 (relationship status) mixed model ANOVA was conducted to determine whether HF varied as a function of task (baseline, positive film, and negative film), sex of the participant (male, female), or eventual relationship success (single, coupled). Mauchly's test indicated that the assumption of sphericity had been violated, $\chi^2(2) = 23.96$, $p < .001$, therefore Greenhouse-Geisser corrected scores were reported ($\varepsilon = .86$). There was a significant main effect of task, $F(1.71, 222.31) = 35.06$, $p < .001$, $\eta^2_{partial} = .21$. Simple contrasts revealed that HF was higher during baseline compared to the negative film, $F(1, 130) = 51.69$, $p < .001$, $\eta^2_{partial} = .29$, and higher during the negative film compared to the positive film, $F(1, 130) = 41.01$, $p < .001$, $\eta^2_{partial} = .24$. Neither sex, $F(1,130) = 3.24$, $p = .074$, $\eta^2_{partial} = .02$, nor relationship status, $F(1, 130) = 0.00$, $p = .946$, $\eta^2_{partial} < .01$ produced significant main effects. Further, the three two-way and one three-way interaction terms were nonsignificant (ps> .05). The same analysis was performed replacing relationship formation with matching; the results remained the same. Overall, task systematically affected HF, with HF decreasing from baseline to the negative film and again from the negative to the positive film. This effect was not dependent on sex or relationship success.

ΔHF. Recall that ΔHF was calculated two ways: (a) $\Delta HF_{P\text{-}N}$, and (b) $\Delta HF_{B\text{-}N}$. The $\Delta HF_{B\text{-}N}$ calculation will not be used in tests involving moderator HF_B as this is one of the components that constitute the change score. A positive difference score indicates a reduction in HF from baseline to the negative film or from the positive to the negative film. Negative scores indicate that HF increases during the negative film. Descriptive statistics for these change scores are presented in Table 8. The *z* scores were analyzed and one outlier was found for $\Delta HF_{B\text{-}N}$; it was replaced with the next lowest nonoutlier.

Hypotheses

The primary analyses served two main purposes: (a) to replicate key findings linking HRV reactivity (ΔHF) to relationship success from Bailey and Davis's (2017) study; and (b) to extend these findings by investigating possible mediators of the HRV reactivity - relationship success link.

Replication hypothesis 1. The first *replication* hypothesis predicted that for female participants the pattern of lower ΔHF would be beneficial for the coupling success of those with low BMI and detrimental to those with high BMI. As BMI has less influence on the coupling success of men, this effect was not expected to hold for male participants. Coupling success was defined in two ways: (a) relationship formation over the 6-month follow-up period, and (b) matching during the speed dating session. ΔHF was calculated as (a) $\Delta HF_{P\text{-}N}$, and (b) $\Delta HF_{B\text{-}N}$.

To examine this prediction, four omnibus moderated moderation analyses were performed on data from both sexes. In all analyses sex was coded 0 = males, 1 = females. Hayes' (2013) PROCESS macro, model 3 was used. The two calculations of ΔHF*X* were used to predict the two dichotomous dependent variables representing relationship success *Y,* moderated by BMI *M* and sex *W*. In all analyses, relationship formation was coded 0 = remained single, and 1 = formed at least 1 relationship (i.e., coupled). Similarly, dichotomous matching during the speed dating session was coded 0 = unmatched, and 1 = received at least one match (i.e., matched) in all analyses. The number of speed dating partners each participant had ranged from 7 – 13 across the nine separate speed dating sessions. To control for the advantage offered by having more dates, the number of speed dating partners was statistically controlled in models of *Y* in each analysis that used matching as the dependent variable. Analyses were conducted using both transformed and original untransformed variables. In the analyses with untransformed variables, ΔHF remained transformed as the ln transformation is customary for HF data. The results of the hypothesis testing remained the same for the transformed and untransformed variables; however, some of the nonhypothesized effects (e.g., the prediction of *Y* from a covariate) differed appreciably. As a result, the regression coefficients from the transformed variables are presented in Table 9.

The overall model was significant for three of the four regressions ($ps < .05$). A significant overall model indicates that the predictors as a set reliably distinguished between matched and unmatched or coupled and single participants (Field, 2013). The overall model for $\Delta HF_{P\text{-}N}$ predicting relationship formation was not significant, indicating that it was no better than the constant-only model in predicting relationship status at follow-up (Hayes, 2013). When using a simultaneous regression model, as in the present study, it is suggested that a significant overall effect be required before examining individual effects (Bedeian & Mossholder, 1994). In light of this recommendation, the main effect found in this nonsignificant model cannot be interpreted.

The $\Delta HF_{B\text{-}N}$ model predicting relationship formation showed a main effect of sex *W* with females being more likely to form relationships than males. Both models that predicted matching showed significant main effects of partners (*C*, the covariate) with individuals who had more speed dating partners being more likely to have matched. Of the four models tested, only ΔHF_{B-N} predicting matching produced a significant main effect of BMI *M,* and the predicted significant ΔHF_{B-N} $X \times$ BMI *M* interaction.

Sex was not a significant moderator in the ΔHF_{B-N} predicting matching model. Nevertheless, there were two reasons to further investigate the influence of sex in this model: (a) an a priori hypothesis predicted that this effect would only be exhibited by females and not males; and (b) the conditional effect of $X \times M$ interaction was only significant for females, p = .034, and not males, p = .686. Therefore, sex was dropped as a moderator and the $\Delta HF_{B-N} \times$ BMI interaction was further probed by calculating two simple moderated regressions using PROCESS model 1; one for males and one for females. Analyses were conducted using both transformed and original untransformed variables, again with the exception of ΔHF_{B-N} which remained transformed as is customary with HF data. There were no appreciable differences between the models and the results from the original untransformed variables are presented in Table 10.

As anticipated, the overall model for male participants was not significant. For females, there was a significant overall model, a main effect of BMI *M*, OR = 0.852, and a significant ΔHF_{B-N} $X \times$ BMI *M* interaction, OR = 1.261[4]. Upon examining the residuals of the female-only model, no multivariate outliers or issues with model fit were identified. The Hosmer and Lemeshow test was nonsignificant, $\chi(8) = 8.13$, $p = 0.421$, indicating good model fit. Prediction success overall was 70.40%.

Evident in Figure 10 is the observation that for females, low ΔHF_{B-N} enhances probability of matching only when participants have low BMI. Higher positive ΔHF_{B-N} scores indicate a

[4] As described in the Change Scores section above, an alternative method of creating change scores involves covarying out baseline scores. The results remained unchanged when the model was rerun with this alternative calculation of ΔHF.

larger HRV drop in response to the negative video. Therefore, this HRV suppression to negative stimuli is beneficial to women with higher BMI, whereas the reverse is true for low-BMI women. Among participants with higher $\Delta HF_{B\text{-}N}$ (i.e., at +1 *SD*), the probability of matching was at the overall coupling rate of approximately 0.67, regardless of BMI. The results for this model are therefore consistent with hypothesis 1.

Replication hypothesis 2. The second *replication* hypothesis predicted that the pattern of lower $\Delta HF_{P\text{-}N}$ would be beneficial for the coupling success of those with high HF_B (resting HRV) and detrimental to those with low HF_B for both sexes. Coupling success was again defined in two ways as (a) relationship formation over the 6-month follow-up period, and (b) matching during the speed dating session. Only $\Delta HF_{P\text{-}N}$ was used as the measure of HRV reactivity; $\Delta HF_{B\text{-}N}$ was not used because HF_B, which is used in the calculation of $\Delta HF_{B\text{-}N}$, is a moderator in these analyses, and the two are significantly correlated.

To examine this prediction, two omnibus moderated moderation analyses were performed. $\Delta HF_{P\text{-}N}$ *X* was used to predict dichotomous relationship formation *Y* and dichotomous matching during the speed dating session *Y* as moderated by HF_B *M* and sex *W*. As in hypothesis 1, the number of speed dating partners was statistically controlled in models of *Y* in each analysis that used matching as the dependent variable. Hayes's (2013) PROCESS macro, model 3, was utilized for each model. Of the four variables in the model, only $\Delta HF_{P\text{-}N}$ and HF_B required transformation. As these ln transformations are customary with HF data, the model was not rerun with untransformed variables. The unstandardized regression coefficients are presented in Table 11.

Both of the overall regression models achieved statistical significance with *p*s < .05. The model predicting relationship formation showed only a main effect of sex *W*, with females being approximately three times more likely to form relationships than males. The model predicting matching produced a significant main effect of partners *C*, OR = 1.264, and a significant $\Delta HF_{P\text{-}N}$ $X \times HF_B$ *M* interaction, OR = 1.946[5]. Upon examining the residuals of the model predicting matching, no multivariate outliers or issues with model fit were identified. The Hosmer and Lemeshow test of the model predicting matching was nonsignificant, $\chi(8) = 3.57$, $p = 0.894$, indicating good model fit. Prediction success overall was 68.6%. There were no *a priori* predictions about the effects of sex, nor were there any statistically significant effects of sex in the model; therefore, the results predicting matching are collapsed across all sexes and displayed together in Figure 11. As evident in the figure, for those with higher HF_B, a pattern of increasing HRV in response to the negative film conferred an advantage for coupling success while decreasing HRV during the negative film hindered matching. Interestingly, this interaction is in the opposite direction of the predicted results.

Hypothesis 3. The final hypothesis explored possible underlying mechanisms of the moderated regressions found in hypotheses 1 and 2. The *mediation* hypothesis stated that these models would be mediated by emotion regulation and/or mating variables. Emotion regulation included measures of difficulties with emotion regulation, reappraisal, and suppression. Mating variables included self- and other-reported mate value, as well as short- and long-term mating orientation.

These two families of conceptually related mediators were tested separately in the two moderation models found to be significant with respect to hypotheses 1 and 2. SPSS PROCESS macro models 8 and 15 were used to test the hypothetical models (Hayes, 2013; see Figures 6 & 7). These models can test up to 10 mediators in parallel and each family of mediators was tested

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[5] As described in the Change Scores section above, an alternative method of creating change scores involves covarying out baseline scores. The results again remained unchanged when the model was rerun with this alternative calculation of ΔHF.

simultaneously in a single model (Hayes, 2013). These models employed the ordinary least squares method to estimate unstandardized regression coefficients (*b*), standard errors (*SE*), and 95% confidence intervals (95% CIs) for each hypothesized simple effect. When these intervals did not straddle zero, this indicated that the conditional indirect effect was different from zero with 95% confidence. Four models were tested, one for each combination of the two families of mediators and the two significant models from hypotheses 1 and 2. In all analyses, all products were mean centred, the number of speed dating partners was statistically controlled in models of *Y*, and heteroscedasticity-consistent SEs are presented. Relationship formation was always coded single = 0, coupled = 1. Matching was coded 0 = unmatched, 1 = matched. Sex was coded 0 = males, 1 = females.

The normal theory method was used to test all simple effects of the model. However, statistical significance of the conditional indirect effects was determined using bootstrapping to construct the sampling distribution with 10,000 replications along with bias-corrected 95% confidence intervals. The significance of the moderated mediation effect was determined by the "indices of moderated mediation" which represent "a test of linear moderated mediation in path analysis based on an interval estimate of the parameter of a function linking the indirect effect to values of a moderator…" (Hayes, 2015, p. 1). Therefore, 95% CIs for these indices that did not straddle zero indicated that significant moderated mediation had occurred.

Hypothesis 3a explored the seven mediators in relation to the significant moderation of ΔHF_{B-N} by BMI in the prediction of matching found in hypothesis 1. Hypothesis 3b explored the same mediators in the significant moderation of ΔHF_{P-N} by HF_B in the prediction of matching found in hypothesis 2. There were no appreciable differences between the models using transformed and untransformed variables. As a result, all hypothesis 3 results are presented using the original untransformed variables.

Hypothesis 3a testing. The moderated mediation technique tested the indirect effect of $\Delta HF_{B\text{-}N}$ *X* on matching *Y* through the mediators of emotion regulation and mating variables *M* at levels of the moderator BMI *W*. This analysis was performed on the entire sample as the omnibus test proved to be significant for hypothesis 1 including all sexes. Sex was dropped from the analysis as it was not a significant moderator in the hypothesis 1 analysis.[6] Table 12 provides the indices of moderated mediation for each model. Only the 95% CI for the index of moderated mediation concerning the ERQ: REAP mediator in model 15 did not contain zero, thereby indicating a significant moderated mediation effect[7]. The results of this ERQ: REAP-mediated model supports hypothesis 3. The following are the results of exploratory follow-up for the simple effects of each tested model.

Hypothesis 3a exploratory follow-up of simple effects. First, the significant emotion regulation mediated model was followed up. As shown in Table 13, of the three emotion regulation mediators, only ERQ: REAP M_1 was significantly predicted from $\Delta HF_{B\text{–}N}$ *X* in the second-stage moderated mediation (PROCESS model 15; Figure 7). Each simple effect for the ERQ: REAP model is represented in Figure 12. Higher levels of $\Delta HF_{B\text{–}N}$ *X*, indicating lower HRV during the negative film compared to baseline, were associated with higher ERQ: REAP M_1. ERQ: REAP M_1 also interacted with BMI *V* to predict matching *Y*, OR = 1.134. The BMI-moderated simple effect from $\Delta HF_{B\text{-}N}$ *X* to matching *Y* showed a trend towards statistical

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[6] For exploratory purposes, separate moderated mediation analyses were conducted on the female (n = 80) and male (n = 78) samples. None of the moderated mediation effects were significant in these analyses as indicated by nonsignificant indices of moderated mediation.
[7] As described in the Change Scores section above, an alternative method of creating change scores involves covarying out baseline scores. The index of moderated mediation remained significant for ERQ: REAP when the model was rerun with this alternative calculation of ΔHF.

significance at $p = .064$, OR = 1.110. In addition, there were significant main effects of BMI *V*, OR = 0.912, and partners *C*,OR = 1.262, on matching *Y*[8].

The significant second-stage moderated mediation for ERQ: REAP M_1 was followed up with corresponding simple slopes analysis. Only when BMI was high was there a significant positive relationship between $\Delta HF_{B\text{-}N}$ *X* on increased matching *Y* through increased ERQ: REAP M_1, $b = 0.255$, $SE = 0.183$, 95% CI [0.018, 0.791]. This association did not hold for participants when tested at the mean of BMI or at -1 SD below the mean.

When the emotion regulation mediators were tested for first-stage moderated mediation using PROCESS model 8, the moderated mediation effect was not significant (Table 14). In addition, none of the overall models for the prediction of the mediators were significant ps > .05. Only lower BMI *W* and higher number of partners *C* significantly predicted higher likelihood of matching *Y*.

Mating variables were similarly tested using PROCESS models 15 and 8. No significant moderated mediations were found. However, some of the simple effects within these models were statistically significant (see Tables 15 & 16). In the second-stage moderated mediation using PROCESS model 15, none of the mating variable mediators were significantly predicted from $\Delta HF_{B\text{–}N}$ *X*. In the prediction of matching *Y,* there was a main effect of MVI: Other M_1, OR= 1.136, number of partners *C*, OR = 1.421, a $\Delta HF_{B\text{–}N}$ *X* × BMI *V* interaction, OR = 1.173, as was found in hypothesis 1, and an MVI: Self *M* × BMI *V* interaction, OR = 1.001.

In order to graph the MVI: Self × BMI interaction, the analysis was recreated using PROCESS model 1 for simple moderation. The overall model was significant $\chi^2(7) = 36.593$, $p < .001$, $R^2 = 0.206$, and there were main effects of partners *C*, $b = 0.301$, $SE = 0.109$, $p = .006$,

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[8] As discussed in the section on change scores above, the main analyses were all rerun with HF_B as a covariate to equate participants on baseline HRV scores as suggested by Fleeson (2007). Results of this analysis remained the same with HF_B as a covariate.

OR = 1.351, and MVI: Other *C*, *b* = 0.117, *SE* = 0.038, *p* = .002, OR = 1.124, as well as a significant MVI: Self *X* × BMI *M* interaction, *b* = .009, *SE* = 0.005, *p* = .040, OR = 1.001, in the prediction of matching *Y*. As shown in Figure 13, when BMI is low, those with lower self-rated mate value were most likely to match. For those with higher BMI, having low self-rated mate value was associated with lower matching rates.

In the first-stage moderated mediation using model 8 for mating variables, lower BMI *W* predicted higher MVI: Other M_2 (Table 16). Higher MVI: Other M_2, OR = 1.125, higher number of partners *C,* OR = 1.340, and again the interaction between $\Delta HF_{B\text{–}N}$ *X* and BMI *W,* OR = 1.147, predicted higher likelihood of matching *Y*. As $\Delta HF_{B\text{–}N}$ was significantly association with MVI: Other, which in turn predicted matching *Y*, the possibility of a mediation effect was investigated.

A moderated mediation regression was conducted using PROCESS model 15. BMI *X* was investigated in the prediction of matching *Y* through MVI: Other *M,* at levels of sex *V*, while controlling for number of partners *C*. Unstandardized regression coefficients (*SE*) and 95% CIs for the simple effects are presented in Table 17, and results are displayed pictorially in Figure 14. Significant moderated mediation did not occur, as the 95% CI for the index of moderated mediation straddled zero, index = 0.045, *SE* = .034, 95% CI [-0.007, 0.122]. The conditional indirect effect of BMI *X* on matching *Y* was significant for males, *b* = -0.064, *SE* = 0.034, 95% CI [-0.136, -0.020], but not for females, *b* = -0.020, *SE* = 0.018, 95% CI [-0.062, 0.009]. BMI *X* significantly predicted MVI: Other *M*, and there were significant main effects of MVI: Other *M*, OR = 1.222, and number of partners *C*, OR = 1.349, on matching *Y*. The MVI: Other *X* × sex *V* interaction showed a trend towards statistical significance at *p* = .065, OR = 0.888. The direct effect from BMI *X* to matching *Y* was not significant (*p*> .05).

For exploratory purposes this trending effect of sex found in the moderated mediation analysis was further examined. Separate mediated regressions were conducted for males and females using PROCESS model 4 for simple mediation. BMI *X* was used to predict matching *Y* through mediator MVI: Other *M*, while controlling for number of partners *C*. Amongst males BMI did not predict MVI: Other *M* or matching *Y*, but higher MVI: Other *M*, OR = 1.241, and number of partners *C,* OR = 1.465, predicted matching *Y* (Table 18; Figure 15). Amongst females, BMI *X* predicted MVI: Other *M* and there was a trend towards statistical significance for BMI *X* predicting matching *Y* at $p = .058$, OR = 0.872; however, MVI: Other *M* did not predict matching *Y* in this model (Table 19; Figure 16). Neither the direct nor the indirect effect was statistically significant (*p*s > .05) for either the male or female simple mediation models.

The results of all three models were replicated almost exactly with relationship formation. BMI *X* was used to predict relationship formation *Y* through mediator MVI: Other *M* at values of sex *V*, while controlling for number of partners *C*. For the overall model including all sexes, BMI *X* predicted MVI: Other *M*, which predicted relationship formation *Y,* OR = 1.067 (Table 20). As with matching, the indirect effect was significant only for males. Within the male subsample, there was a trend towards statistical significance for the prediction of relationship formation from MVI: Other ($p = .053$, OR = 1.118; Table 21). Within the female subsample, BMI predicted MVI: Other (Table 22). Again, neither the direct nor the indirect effects were significant for either subsample (*p*s > .05). These results suggest that for females, BMI played an important part in determining mate value; however, mate value did not predict who would find relationship success. For males, mate value did not depend on BMI, but did determine who would be successful in relationships.

Hypothesis 3b testing. The moderated mediation technique was used to test the indirect effect of $\Delta HF_{P\text{-}N}$ *X* on matching *Y* through mediators of emotion regulation and mating variables *M* at levels of the moderator HF_B *W*. Table 23 provides the index of moderated mediation values for each model. All of the 95% CI for the indices of moderated mediation contained zero which indicated that no statistically significant moderated mediation effects occurred. Hypothesis 3b was not supported by the results of the present study. What follows are the results of exploratory follow-up results for the simple effects of each tested model.

Hypothesis 3b exploratory follow-up of simple effects. Despite the lack of moderated mediation, several simple effects were significant. Unstandardized model coefficients, standard errors, and 95% CIs for each simple effect of these four conditional process analyses are provided in Tables 24 - 27. The second-stage moderated mediation for emotion regulation mediators was tested using PROCESS model 15 (Table 24). No simple effects were significant. PROCESS model 8 testing first-stage moderated mediation produced a significant main effect of HF_B *W* and a significant $\Delta HF_{P\text{-}N}$ $X \times HF_B$ *W* interaction predicting ERQ: REAP M_1 (Table 25). Only a higher number of partners *C,* OR = 1.269, significantly predicted higher likelihood of matching *Y*. In order to follow up on the $\Delta HF_{P\text{-}N} \times HF_B$ interaction, the analysis was rerun using PROCESS model 1 for simple moderation. $\Delta HF_{P\text{-}N}$ *X* and HF_B *M* were used to predict ERQ: REAP *Y* while controlling for number of partners, ERQ: SUP, and DERS *Cs*. The overall model was significant $F(6, 152) = 2.661$, $p = .018$, $R^2 = 0.095$; however, none of the main effects or interactions were statistically significant, *p*s > .05.

The mating variable models were also tested. When using PROCESS model 15, none of the potential mediators were found to be significantly related to $\Delta HF_{P\text{-}N}$ *X*, and only higher MVI: Other M_2, OR = 1.124, and higher number of partners *C*, OR = 1.325, predicted matching *Y*

(Table 26). The results from model 8 indicated that higher HF_B *W* predicted both MVI: Other M_2 and MSOI: ST M_3 (Table 27). Higher MVI: Other M_2, OR = 1.124, and a higher number of partners *C,* OR = 1.325, predicted likelihood of matching *Y*. As HF_B *W* was significantly association with MVI: Other *M*, which in turn predicted matching *Y*, the possibility of a mediation effect was investigated.

A moderated mediation regression was conducted using PROCESS model 15. HF_B *X* was investigated in the prediction of matching *Y* through MVI: Other *M,* at levels of the moderator sex *V*, while controlling for number of partners *C*. The index of moderated mediation was not significant, index = -0.089, *SE* = 0.098, 95% CI [-0.354, 0.046]. The conditional indirect effects of HF_B *X* on matching *Y* were significant for both sexes with *p*s < .05. Unstandardized regression coefficients (*SE*) and 95% CIs for the simple effects are presented in Table 28.

As sex was not found to moderate this relationship, the moderated mediation was followed up using simple moderation (PROCESS model 4). HF_B *X* was investigated in the prediction of matching *Y* through MVI: Other *M,* while controlling for number of partners *C*. These simple mediation results are consistent with the findings of the moderated mediation. Unstandardized regression coefficients (*SE*) and 95% CIs for the simple effects are presented in Table 29. HF_B *X* was significantly associated MVI: Other *M*, which significantly predicted matching *Y*, OR = 1.132. The indirect effect of HF_B on matching was significant, *b* = 0.131(0.067), 95%CI [0.031, 0.295]. Neither the direct effect (*p* = .531) nor the total effect (*p* = .170) were statistically significant.

The moderated mediation and simple mediation predicting relationship formation generally replicated the findings predicting matching (Table 30 & 31). In the simple mediation the simple effects remained significant. HF_B *X* was significantly associated MVI: Other *M*, which significantly predicted relationship formation *Y*, OR = 1.068. However, with the removal of the influence of sex on the model, the overall effect on relationship formation *Y* was reduced to a trend towards statistical significance ($p < .100$).In the simple mediation model, the indirect effect of HF_B on relationship formation was significant, $b = 0.106(0.061)$, 95%CI [0.015, 0.261]. Neither the direct effect ($p = .459$) nor the total effect ($p = .868$) were statistically significant. The results of the simple mediations with both dependent variables are displayed pictorially in Figure 17.

Summary of results. The first replication hypothesis tested four models. Higher relationship success was predicted for females with a combination of lower HRV reactivity (ΔHF) and low BMI, while lower ΔHF was predicted to be detrimental to the relationship success of females with higher BMI. The model wherein $\Delta HF_{B\text{-}N}$ was used to predict matching produced the hypothesized significant $\Delta HF_{B\text{-}N} \times$ BMI interaction with results in the anticipated direction (Figure 10). This effect was significant in the omnibus test including all sexes but appeared to be primarily driven by the female subsample. The first replication hypothesis was therefore supported by one of four models.

The second replication hypothesis tested two models. A pattern of lower $\Delta HF_{P\text{-}N}$ was predicted to be beneficial for the coupling success of those with higher resting HRV (HF_B) and detrimental to those with lower HF_B for both sexes. The model wherein $\Delta HF_{P\text{-}N}$ predicted matching produced the predicted $\Delta HF_{P\text{-}N} \times HF_B$ interaction; however, the results differed from the anticipated pattern (Figure 11). Therefore, although significant results were found in one of two models, the second replication hypothesis was not supported.

The third hypothesis tested the prediction that emotion regulation and/or mating variables would mediate the significant moderation models found in hypotheses 1 (hypothesis 3a) and 2 (hypothesis 3b). Hypothesis 3a found a significant moderated mediation effect for the mediator ERQ: REAP (Figure 12). Higher levels of ΔHF_{B-N}, indicating lower HRV during the negative film compared to baseline, were associated with higher levels of ERQ: REAP. ERQ: REAP also interacted with BMI to predict matching. The other models did not show significant moderated mediation effects. Noteworthy exploratory analyses indicated that BMI was only predictive of mate value for females, and that mate value was only predictive of relationship success for males. Hypothesis 3b produced no significant moderated mediation effects and was therefore not supported by the results of the present study. Of note is the finding that higher HF_B significantly predicted relationship success through the mediator of MVI: Other (Figure 17).

In addition to the hypothesis testing and exploratory follow-up analyses, the association between the two dependent variables was investigated. Matching was found to be strongly associated with relationship formation amongst males, but not amongst females. Matched males were six times more likely to form romantic relationships over the follow-up period compared to their unmatched counterparts.

Discussion

The discussion covers a range of topics. First, the internal validity of the study is investigated by examining participants' responses to the stimuli. Next, the two dependent variables representing relationship success and their association to one another are discussed. This examination is followed by a detailed look at the results of each hypothesis and their follow-up analyses presented in the following order: (a) hypothesis 1, (b) hypothesis 3a, (c) hypothesis 2, and (d) hypothesis 3b. The discussion concludes with a consideration of the strengths and limitations of the study, suggested directions for future research, and a summary of the main conclusions drawn from this research.

Responses to Stimuli

Passive exposure to film clips is the most consistent method of emotion induction (Palomba, Sarlo, Angrilli, Mini, & Stegagno, 2000). In accordance with the literature, the films in the present study evoked emotions of the intended valence. The valence of the evoked emotions did not differ between males and females or between those who did or did not have relationship success. Interestingly, males reported higher emotional arousal during the negative film while females reported higher arousal during the positive film. This difference may be explained by the original purpose of the film clips, which were originally created for Bailey and Davis's (2017) female sample.

The negative film depicted males as the transgressors more often than females. For instance, one short clip from the negative film depicted a man drinking while a pregnant female appeared forlorn. In another clip, a male offends his dinner date. Similarity increases behavioural mimicry, which occurs due to a motivation for affiliation (Guéguen & Martin, 2009). Individuals may therefore have an increased motivation to affiliate with and mimic characters of their own sex. It may be that males took the perspective of the transgressing male characters in the negative film, while females took the perspective of the female victims. The male role in the film clips may have been equal in valence with the female role, but more emotionally arousing.

The positive clips depicted scenes such as a couple walking on the beach hand-in-hand and a wedding ceremony. These scenes resembled what you may find in a romantic comedy. The positive film may have thus been more interesting and relevant for females, which would account for their increased emotional arousal. The differences in emotional arousal are not surprising given the intended audience of the clips. More importantly, both sexes experienced the same valence of emotions in response to the clips and showed consistent physiological arousal, as indexed by HRV.

As anticipated, the films systematically affected HRV. HRV decreased from baseline to the negative film and again from the negative to the positive film.The same film stimuli were used in Bailey and Davis's (2017) study and were presented in a counterbalanced order. Bailey and Davis found no order effects for the presentation of these same films. As a result, a fixed presentation order was chosen for the present study. No sex differences were found in the effects of the films on HRV. Therefore, while the films produced sex differences in emotional arousal, they affected physiological arousal equally in both sexes.Overall, the positive film stimulus evoked positive emotions and the negative film evoked negative emotions in both sexes and across relationship success. The films were therefore successful in their intended purpose of producing consistent emotional and physiological changes in participants.

Relationship Success Variables

Both relationship formation and matching were used to represent the construct of relationship success. Younger participants with higher mate value were more likely to form relationships. Individuals with lower BMI, higher mate value, higher short-term mating orientation, and a higher number of speed dating partners were more likely to leave the speed dating session with at least one match. These findings are consistent with literature suggesting that higher mate value (Buss, 2014) including lower BMI, and higher short-term mating orientation (Jackson & Kirkpatrick, 2007) increases relationship success. In addition, more speed dates results in better odds of finding at least one acceptable and interested partner.

Interestingly, the association between the two relationship success variables varied by sex. Matching was assumed to be a shorter-term indicator of mating success and was less influenced by an individual's motivation to start a monogamous relationship. Relationship formation on the other hand, required the ability to find a willing partner and successfully begin a romantic relationship, and also the willingness to invest in a longer-term monogamous relationship. Probability of matching was comparable amongst males (0.67) and females (0.64); however, females had a higher probability of forming romantic relationships (0.55), compared to males (0.29).

Amongst male participants, matching strongly predicted who would form monogamous romantic relationships. Matched males were six times more likely to begin a romantic relationship compared to unmatched males. The matching status of women, on the other hand, did not affect their likelihood of starting a romantic relationship. This may be explained by parental investment theory (Buss, 2006; Trivers, 1972). According to this theory, men are generally less selective in their short-term partners because they invest relatively little into their offspring. In fact, other speed dating studies have found men to be less selective (McClure, Lydon, Baldwin, & Baccus, 2010). Therefore, when males did not match it was likely due to their inability to attract an interested partner, which would also hinder the formation of a romantic relationship over the follow-up period. Female participants proved to be more selective in their choice of mates. A female who did not match was more likely to have refused willing but unacceptable partners; none of the males in the current study refused every one of their female speed dating partners, whereas seven females (8%) did not request a second date with any of their partners. This indicates that some females were remaining unmatched by choice. Both low and high mate value women may not match, but for different reasons. High mate value women may not match on purpose due to their selectivity, whereas low mate value women may not be able to attract a mate. It follows that matching would not be linearly associated with relationship formation amongst women.

Hypotheses and Exploratory Analyses

Replication hypothesis 1. As predicted in the first replication hypothesis, lower HRV reactivity ($\Delta HF_{B\text{-}N}$; i.e., higher HRV during the negative film vs. baseline) was associated with lower matching rates for higher-BMI participants and with higher matching rates for participants with lower BMI. Higher HRV reactivity was associated with higher matching rates amongst high-BMI individuals. In fact, amongst those with higher HRV reactivity, there were no significant differences between the matching rates of participants with low- or high-BMI. Interestingly, in a series of studies by Muhtadie and colleages (2015), vagal flexibility (defined as HRV withdrawal in response to a stressor; referred to as higher HRV reactivity in the present study) during cognitive or attentional demand was associated with more accurate perception of social-emotional information and greater sensitivity to social context. Therefore, it can be said that in the current study, a pattern of improved social perception and competence was associated with higher matching rates for higher-BMI participants, not low-BMI participants. This effect was significant in the overall sample of both sexes, but appeared to be strongest in the female subsample as anticipated.

One model in the present study replicated Bailey and Davis's (2017) findings; however, three other models (i.e., $\Delta HF_{B\text{-}N}$ predicting relationship formation, $\Delta HF_{P\text{-}N}$ predicting matching, and $\Delta HF_{P\text{-}N}$ predicting relationship formation) were tested and did not find the anticipated results. Two of the three models still produced significant results indicating that females were more likely to form relationships and that having a higher number of speed dates increased the chances of matching. The third failed replication produced a nonsignificant overall model. The question remains as to why these three replications failed.

Replication concerns are a significant issue in psychological research. Recently, the Center for Open Science replicated studies reported on 100 randomly-selected original papers sampled from high-status psychology journals (Open Science Collaboration, 2015). Their aim was to estimate the reproducibility of psychological science. Ninety-seven percent of the sampled studies indicated significant results ($p < .05$), while only 36% of the replications were successful. Replication failures were explained as being the result of both methodological differences between the original and replication studies, and upwardly biased effect sizes resulting from the file drawer effect (Franco, Malhotra, &Simonovits, 2014).

The methodology of the present study differed in notable ways from Bailey and Davis's (2017) study. First, while the film stimuli remained the same, the baseline protocol did not. Bailey and Davis's study had participants watch a neutral film depicting individuals engaging in various daily tasks during their baseline recording. The present study had participants close their eyes during the baseline recording in order to be consistent with the protocol used in the majority of the HRV literature. Bailey and Davis also had participants watch a second neutral film between the presentation of the positive and negative films, which were presented in a counterbalanced order. The present study had participants sit quietly for 1 min between films, which were presented in a standard order. This change was implemented for practical reasons and, in particular, to keep the laboratory session under 1 hour. These changes had the potential to affect all hypothesis testing. Both resting HRV and one calculation of HRV reactivity ($HF_{B\text{-}N}$) used baseline HRV recordings which were directly affected by the new neutral task in the present study. Further, the presentation of the negative and positive films followed the baseline recording. Thus, all films had the potential to be influenced by cognitions and emotions elicited during the baseline recording. For example, an anxious participant may have been calmed and distracted by Bailey and Davis's (2017) presentation of a neutral film. This same participant may have had a very different experience in the current study. For instance, she may have spent the 5-min eyes-closed task in the present study worrying without any distracting video. This anxiety would then have more of an opportunity to spill over into future tasks and influence later HRV recordings.

Two of the models testing hypothesis 1 that failed to produce expected results used the dependent variable of relationship formation. This dependent variable differed subtly from Bailey and Davis's (2017) relationship formation variable. In Bailey and Davis's study, participants were instructed to return to the laboratory either when they had begun a monogamous heterosexual romantic relationship lasting at least 10 days, or at the end of the 6-month follow-up period. In the present study, participants completed online questionnaires assessing relationship formation at 3- and 6-months post-speed dating session and did not return to the laboratory. This methodological change was implemented in an effort to decrease participant drop-out, which it successfully accomplished. However, it may also have had the unintentional effect of particularly decreasing drop-out in select groups. For instance, single individuals may have not wanted to return to the laboratory in Bailey and Davis's study. The increased sense of anonymity provided by the use of internet surveys may have increased participation of those who remained single in the current study.

The sample characteristics differed markedly as well. Bailey and Davis's (2017) study included only heterosexual female university students enrolled in psychology courses. The present study recruited participants of all genders and sexual orientations who were current students or recent university or college graduates of any academic discipline, and who were willing to engage in a speed dating session. Other subtle differences such as different experimenters, instructions for future tasks that were part of another study, and the use of laboratory-measured versus self-reported height and weight to calculate BMI, may also have affected the results. A combination of the differences in the procedure and sample may have resulted in the failure of the three of four attempted replications of Bailey and Davis's results.

Despite the failure of several tested models, it was found that the best combination to promote matching was low BMI and low HRV reactivity, while low HRV reactivity was a hindrance to the relationship success of high-BMI individuals. These results replicated Bailey and Davis's (2017) findings and supported hypothesis 1. The link between HRV reactivity and relationship success was established, as was the direction of this association. Hypothesis 3a investigated whether emotion regulation abilities and/or mating variables could explain why this HRV–relationship success association occurred.

Hypothesis 3a. Hypothesis 3a expanded upon the significant findings of hypothesis 1. Seven mediators in the two families of emotion regulation and mating variables were explored in relation to the moderation of HRV reactivity by BMI in the prediction of matching. This was undertaken in an attempt to uncover the underlying mechanisms responsible for the significant link between HRV reactivity and relationship success.

Of the seven potential mediators tested, only the ERQ Reappraisal subscale produced a significant moderated mediation. A recent meta-analysis found support for the link between HRV and self-regulation; however, the effect size was small, particularly for younger participants such as those in the present study (Holzman & Bridgett, 2017). In the present study, higher HRV reactivity ($\Delta HF_{B\text{–}N}$) predicted higher use of the emotion regulation strategy of reappraisal, which interacted with BMI to predict matching. This relationship was surprising. Phasic increases in HRV (e.g., lower HRV reactivity) have been observed in individuals instructed to use reappraisal techniques (Butler et al., 2006). These phasic increases have been conceptualized as indicators of active emotional regulation (Park & Thayer, 2014). In the current study, an overall pattern of higher reappraisal was associated with phasic HRV decreases in response to the negative film; however, it was trait-reappraisal and not state-reappraisal, which was measured in the current study. Individuals who had higher reappraisal scores may have had better overall emotion regulation abilities. Due to their superior emotion regulation strategies, those with higher reappraisal scores may not have found the negative videos threatening, and thus did not actively employ emotion regulation strategies. These results would likely have differed if reappraisal used during the negative film had been measured. Nevertheless, HRV reactivity was found to be associated with reappraisal.

Reappraisal interacted with BMI to predict matching. Low levels of reappraisal hindered the chances of matching for higher-BMI individuals (0.34). This finding is consistent with research showing that high reappraisers are generally better liked by their peers. In addition, reappraisal is associated with increased sharing of emotions (Gross & John, 2003) which can lead to social bonding (Rime, 2007). Therefore, it follows that, for higher-BMI individuals, higher reappraisal increases the chances of relationship success. Surprisingly, amongst low-BMI individuals in the present study, reappraisal was not significantly associated with matching. It may be that low BMI individuals are likely to match regardless of reappraisal. For attractive low-BMI individuals, a halo effect (Nisbett & Wilson, 1977) caused any lack of emotional sharing or reappraisal to be interpreted positively. Their cold behaviour could make them appear mysterious, nonchalant, hard to get, selective, and sexy to a speed dating partner. For instance, Eastwick and colleagues (2007) found that individuals who demonstrated unconcealed romantic interest to multiple speed dating partners were rated by their partners as having lower chemistry during the date and were less likely to match. Their generalized reciprocity was perceived as desperate and unappealing to speed dating partners due to apparent lack of selectivity. In the present study, lower-BMI individuals had higher mate value and more suitors. When they also exhibited low reappraisal and its associated lack of openness and social sharing, they may have been perceived as 'harder to get' and selective in their choice of sexual partners. This sexual selectivity rendered them more desirable, and therefore more likely to match during speed dating. Therefore, whether or not the low-BMI individuals engaged in reappraisal they were likely to become matched.

Hypothesis 3a exploratory follow-up. With the exception of reappraisal, none of the emotion regulation or mating mediators significantly mediated the moderation found in hypothesis 1. However, several insights were gained from an exploratory examination of the simple effects attained in the tested moderated mediation models. Emotion regulation difficulties, emotional suppression, self-rated mate value, and other-rated mate value were not associated with HRV reactivity as expected. In some models, lower BMI, higher number of speed dating partners, and higher other-rated mate value predicted higher likelihood of matching, which was consistent with other findings in this study. Specifically, for those with higher BMI, having low self-rated mate value was associated with lower matching rates. For these individuals, a lack of confidence, indicated by low self-rated mate value, was unattractive to their potential mates. Interestingly, when BMI was low, those with lower self-rated mate value were most likely to match. This may be due to these low-BMI participants with low self-rated mate value adopting a less selective mating strategy to compensate for their belief that they have low mate value. These less selective individuals would have a higher likelihood of matching because they are both less selective, and highly sought after by mates due to their physical attractiveness.

Finally, other-rated mate value was found to mediate the relationship between BMI and matching in the overall sample. This relationship became more complex when potential sex differences were explored more closely. Amongst males, BMI was not significantly related to mate value or either measure of relationship success; namely, relationship formation or matching. However, higher other-rated mate value was strongly associated with relationship success among males. Mate value was measured as an average of the ratings given by speed dating partners. Each partner rated mate value on the basis of 17 characteristics, one of which was “attractive body”. Thus, the sum total of a man’s mate value, not just his BMI, was taken into account when partners decided if they would like a second date.

Amongst females, lower BMI was directly linked with higher other-rated mate value. These results are in keeping with earlier research. Low BMI is one of the most important factors contributing to a woman’s mate value (Tovée & Cornelissen, 2001). While high BMI is also deemed unattractive in men, women are more likely to accept reduced physical attractiveness for other characteristics in their mates, such as financial security (Gangestad & Simpson, 2000). While BMI was strongly predictive of mate value amongst females, it was not predictive of matching. This lack of association is surprising given the significant correlation between BMI and matching in females ($r = -.321, p < .01$). An explanation for this null finding is the considerable overlap between the constructs of BMI and mate value and their considerable shared variance. Mate value was statistically controlled for in the regression model. Therefore this finding indicates that BMI does not predict matching over and above the influence of mate value in this regression model. In summary, for women, BMI largely contributed to mate value. For men, on the other hand, BMI was not predictive of mate value or relationship success.

It is important to keep the cultural context of these findings in mind while interpreting these results. In Western Societies thin women are considered to be more attractive. However, fertility, pregnancy, and lactation are supported by substantial fat stores (Frisch, 1987; Frisch & McArthur, 1974). Workload, resource availability, and health risks are ecologically variable, so the preferred level of body fat is adjusted depending on these environmental features (Sugiyama, 1996, 2004). An increased risk of local food shortages increases the desirability of increased body fat levels (Anderson et al., 1992). Kenyan and Ugandan men rated high-weight line drawings of females as significantly more attractive than either the British or Kenyan men living in Britain, although normal-weight female line drawings were preferred by all (Furnham & Alibhai, 1983; Furnham & Bauma, 1994). Body-weight preferences vary across cultures in predictable ways, although neither extreme thinness nor obesity were found to be the most attractive in any culture (Sugiyama, 2005; Tovée & Cornelissen, 2001). Thus, the findings of the relationship between BMI and relationship success may only be generalizable to Western societies.

Replication hypothesis 2. Two models tested hypothesis 2, one predicting relationship formation and the other predicting matching. The anticipated interaction between HRV reactivity and resting HRV was not found in the prediction of relationship formation. In this model, only a participant's sex predicted relationship formation, with females being three times more likely to form relationships than males. The replication attempt may have failed due to differences between the current study and Bailey and Davis's (2017) in terms of methodology or sample characteristics as discussed earlier. The second model revealed a significant interaction between resting HRV and HRV reactivity in the prediction of matching. While this interaction was predicted, it was expected that individuals who had higher resting HRV and whose HRV increased in response to the stressor would be more likely to couple, and those whose HRV decreased would be the least likely. Instead, it was those with lower resting HRV that exhibited this pattern of interaction with HRV reactivity.

Higher resting HRV is believed to indicate more effective emotion regulation abilities while lower resting HRV is associated with hypervigilant and maladaptive cognitive responses to emotional stimuli (Park & Thayer, 2014). Reduction in HRV in response to a stressor (i.e., high HRV reactivity) is believed to indicate the withdrawal of cardiac vagal control and the activation of the defensive systems to cope with a stressor (Park et al., 2014). Conversely, increases in HRV (e.g., low HRV reactivity) in response to a stressor is believed to indicate the exertion of self-regulatory effort while engaging in emotional or self-regulation (Butler et al., 2006; Segerstrom & Nes, 2007). In Bailey and Davis's (2017) study, amongst those with better general emotion regulation abilities (i.e., high resting HRV), a lack of self-regulatory effort (i.e., high HRV reactivity) resulted in the lowest chances of coupling, while active emotion regulation (i.e., low HRV reactivity) resulted in the highest chance of coupling. In the present study, in individuals with lower general emotion regulation abilities, this same pattern of self-regulatory effort (i.e., low HRV reactivity) was beneficial to matching while activation of the defensive system (i.e., high HRV reactivity) was a hindrance.

The differences between Bailey and Davis's (2017) findings and those in the present study may be accounted for by considering differences in the dependent variables, namely relationship formation and matching. Matching is based on a 4-min interaction. Unlike relationship formation, it requires little relationship investment and no monogamy or sexual commitment. Matching requires only the ability to convince an attractive mate that you are also attractive. Individuals look for different attributes in short- and long-term mates. Kindness, intelligence, mutual attraction, love, dependability, and good health are highly desired in a long-term mate. Short-term mates are typically chosen for better quality genes indicated by attractive physical appearance (Buss, 2006; Gangestad & Simpson, 2000). Thus, the relative importance of various attributes in contributing to coupling success depends on which dependent variable is used. Bailey and Davis's results could be restated as finding that high self-regulatory effort in response to a stressor is valued in a long-term partner who possesses high resting HRV. Amongst those with low resting HRV and, thus, low general emotion regulation abilities, a particular response to stressors has no ability to predict relationship formation. In the current study, self-regulatory effort appears to be highly valued in a short-term partner, but only amongst those with lower general emotion regulation abilities. Therefore, to attract a long-term mate, only those with higher resting HRV benefit from increasing HRV in response to a stressor (Bailey & Davis, 2017). In the current study it was found that to attract a short-term mate, those with poor emotion regulation abilities benefit from increasing HRV in response to a stressor.

The emotion regulation theories of HRV are well supported; however, HRV has other psychosocial and biological correlates. To look at resting HRV from a complementary perspective, lower resting HRV is associated with mood and anxiety disorders and poorer physical health (Kemp & Quintana, 2013). The current findings can therefore be interpreted as lower HRV reactivity increased the likelihood of matching amongst those with poorer mental and physical health, which was indicated by lower resting HRV. In Bailey and Davis's (2017) study, having lower HRV reactivity was important for relationship success amongst generally healthier (and thus higher mate value) individuals, as indicated by higher resting HRV. Thus, the ideal combination of resting HRV and HRV reactivity for relationship success may, in fact, depend on whether one is attempting to begin a short- or long-term relationship.

Hypothesis 3b. Hypothesis 3b attempted to extend the findings from hypothesis 2 by exploring possible underlying mechanisms of the interaction between HRV reactivity ($\Delta HF_{P\text{-}N}$) and resting HRV in the prediction of matching. Contrary to expectations, none of the emotion regulation or mating variables mediated the significant moderation found in hypothesis 2. Therefore, hypothesis 3b was not supported in the current study. This lack of finding was interesting considering that (a) emotion regulation was found to mediate the HRV reactivity and BMI link to relationship success, and (b) an exploratory analysis discussed later found a connection between resting HRV and mate value. Despite the lack of significant predicted findings, exploratory analyses that followed up on these relationships provided interesting results.

Hypothesis 3b exploratory follow-up. The simple effects of each model tested in hypothesis 3b were investigated for exploratory purposes. In some models, individuals with higher other-rated mate value and a higher number of speed dating partners were more likely to match. Resting HRV and the interaction between resting HRV and HRV reactivity ($\Delta HF_{P\text{-}N}$) were both associated with reappraisal, although these effects disappeared when a simple moderation analysis was conducted.

An interesting extension of hypothesis 3b was the exploration of resting HRV and mate value in the prediction of relationship success. While mate value was not found to mediate the link between HRV reactivity and relationship success as hypothesized, it was found to mediate the relationship between resting HRV and relationship success in all sexes. Higher resting HRV predicted higher ratings of mate value which, in turn, led to an increased likelihood of matching and relationship formation (see Figure 17). In the present study, this finding may be understood in the context of the recently published work by Brosschot, Verkuil, and Thayer (2016) on their Generalized Unsafety Theory of Stress (GUTS).

The GUTS is consistent with much of the stress and HRV literature. The key difference is that the core of chronic stress and anxiety is believed to be the inability to recognize safety signals rather than a hypervigilance to threat (Brosschot et al., 2016). Brosschot and colleagues describe the stress response and generalized unsafety as the default response which can only be inhibited by the recognition of safety signals in the environment. When individuals cannot inhibit their default stress response, it becomes problematic in an objectively safe world. Actual stressors are not thought to be responsible for chronic anxiety. In fact, chronically stressed individuals tend to respond similarly to healthy individuals to actual stressors (Brosschot et al., 2016). Instead, it is the periods of time before, between, and after stressors where generalized uncertainty is best measured.

According to Brosschot and colleagues (2016), high HRV is strongly associated with higher prefrontal cortex-inhibition of subcortical areas causing generalized unsafety. Thus, low resting HRV is described as an index of the chronically disinhibited default stress response, and is associated with psychophysiological stress responses to otherwise safe environments that are perceived as unsafe. This link has been demonstrated using various paradigms (Maren, Than, & Liberzon, 2013; Melzig, Weike, Hamm, & Thayer, 2009; Ruiz-Padial, Sollers, Vila, & Thayer 2003; Wendt, Neubert, Koenig, Thayer, & Hamm, 2015). Having low resting HRV is therefore indicative of difficulty perceiving signals of safety.

This new research offers a fresh perspective on the mate value-mediated link between HRV and relationship success that was observed in the present study. The GUTS may explain why this link was only found to be significant for resting HRV and not for HRV reactivity. Generalized unsafety is expressed when the individual is otherwise at rest. HRV reactivity represents brief, acute responses to stressors which do not distinguish individuals with high chronic anxiety from those without anxiety. It follows then that HRV reactivity would not capture differences in generalized unsafety or chronic stress and that only resting HRV would be an index of generalized unsafety. Another implication of the GUTS is that the baseline HRV recording would not have been a benign experience for participants with higher generalized unsafety. Unfortunately, this hypothesis could not be tested in the current study as no self-report data on the valence and arousal of emotions was collected during baseline.

The GUTS may clarify the nature of mate value's mediation of the resting HRV – relationship success link. Chronic anxiety, lack of social skills and support, and compromised physical health are consequences of generalized unsafety (Brosschot et al., 2016). These same characteristics are considered unattractive in the mating marketplace. Therefore, the link between resting HRV and relationship success can be explained as follows. Patterns of generalized unsafety, and its physiological index of low resting HRV, are present at birth and further shaped by early life experiences (Brosschot et al., 2016) and the social environment (Bliss- Moreau, Moadab, & Capitanio, 2017). A pattern of high generalized unsafety leads to chronic anxiety, social and attachment problems, and poor physical health and obesity later in life. These characteristics result in low mate value, and the individual is less likely to have success in their relationships. Thus, the finding that mate value underlies the link between resting HRV and relationship success in the current study is consistent with the GUTS.

According to the GUTS, individuals with lower resting HRV should display more generalized and social anxiety. The link between HRV and anxiety disorders has been well established in the literature (e.g., Chalmers, Quintana, Abbott, & Kemp, 2014), and support is mounting for the hypothesis that anxiety disorders and low HRV may both be the result of shared dysfunctions in the autonomic nervous system (Bandelow et al., 2017). Attachment anxiety makes individuals susceptible to social anxiety (McClure, Bartz, & Lydon, 2013) and is associated with lower resting HRV (Diamond & Hicks, 2005). Three speed dating studies have suggested that people who test higher in attachment anxiety are found to be unappealing to their speed dating partners (Luo & Zhang, 2009; McClure, et al., 2010; McClure & Lydon, 2014). Specifically, attachment anxiety has been found to be associated with negative interpersonal outcomes through the mediators of interpersonal displays characteristic of state social anxiety, namely social disengagement and overt manifestations of social anxiety (McClure & Lydon, 2014). In addition, a positive self-assessment of one's own ability to overcome a social threat is related to higher resting HRV (Villada, Hidalgo, Almela, & Salvador, 2017). These findings suggest that in the present study, in addition to being less physically attractive, speed dating participants with low HRV appeared visibly anxious and unsure of themselves. This anxiety was perceived as unattractive and led to poorer ratings of mate value and decreased probability of matching. These same individuals appeared withdrawn or visibly anxious to potential partners outside of the speed dating session, which resulted in lower probability of relationship formation. Admittedly speculative, the line of reasoning requires future empirical investigation.

Strengths, Limitations, and Directions for Future Research

The current study had a number of methodological strengths. The sample was much more diverse than Bailey and Davis's (2017), and included individuals from all sexes and sexual orientations. A multimethod data collection strategy was used that combined objective physiological recordings with psychosocial self- and other-report measures. The dependent variable was also measured in two ways; one using a longitudinal design, and the other using controlled yet ecologically valid methods. That being said, the study was not without limitations. First, after the 5-min eyes-closed period during which resting HRV was recorded, participants did not rate the valence of their emotions or level of arousal. Future studies should include measures of the subjective experiences of participants during resting HRV measurement. This information could be used to corroborate the GUTS (Brosschot et al., 2016) which states that individuals with lower resting HRV fail to perceive signals of safety and thus feel chronically stressed even in safe environments such as during baseline HRV recording. Whether these differences would be identified by self-report instruments is also worth testing as Brosschot and colleagues describe the chronic stress as largely unnoticed.

Pleasantness of interaction and pleasantness of speed dating partner were also not rated. This information may help to uncover the underlying process of the reappraisal – BMI interaction in the prediction of matching found in hypothesis 3a. Higher reappraisal has been found to be related to pleasantness in other studies through increased openness, social sharing, and bonding. In the present study, reappraisal is beneficial for the relationship success of higher-BMI individuals as expected. However, this effect was not observed for low-BMI individuals, potentially because both openness and lack of openness would both be interpreted positively due to a halo effect. Specific ratings of pleasantness, openness, and selectivity could confirm these explanations of why this reappraisal – BMI link emerged in the prediction of matching.

Emotion regulation was measured by self-report during the online questionnaire phase at the beginning of the study. These measures examine general use of emotion regulation strategies and difficulties with emotion regulation. No information was collected on which emotion regulation strategies were used or which emotion regulation difficulties were experienced while

HRV was being recorded. We can conclude that a self-reported general pattern of reappraisal mediated the HRV reactivity – relationship success link; however, we cannot determine if the use of reappraisal in response to the film stressor would be beneficial or harmful for relationship success. Future studies should include measurement of specific emotion regulation difficulties and strategies in response to stressors and the social consequences of these processes.

Future studies should endeavour to bridge the gaps left by the limitations of the current study. One such gap is the lack of evidence for a causal relationship between HRV and relationship success. The current study has provided evidence that such a link exists, confirmed the direction of this link, and provided the first evidence of the underlying mechanisms responsible for the HRV – relationship formation connection. A next step in this area is to experimentally manipulate HRV to test hypotheses about causation. For example, the potential for HRV biofeedback to improve relationships and decrease loneliness is worthy of empirical investigation. HRV biofeedback consists of participants seeing their beat-by-beat heart rate data in real time during slow breathing maneuvers (Lehrer &Gevirtz, 2014). During these sessions, participants attempt to maximize HRV. The support for HRV biofeedback as a treatment of a plethora of health and mental health conditions has been steadily growing (Lehrer &Gevirtz, 2014; Windthorst et al., 2017). HRV can also be manipulated through the use of pharmacotherapy to block parasympathetic influences on the heart (Jose & Collison, 1970). The current study suggests an increase in HRV may lead to greater mate value, which is associated with higher rates of relationship success. Further studies using biofeedback or medication should be considered to experimentally test for a causal link between HRV and relationship success.

Another interesting extension of this study would be the inclusion of a longer follow-up period to determine HRV's association with relationship maintenance. Levenson and Gottman's

(1983; 1985) early social psychophysiological research found a link between increased physiological activation and relationship dissatisfaction and dissolution, although they did not examine HRV specifically. Extending this study long-term would also determine if these patterns of high physiological activation were present prior to the beginning of the dissatisfying relationship.

Conclusions

There is a growing trend in wearable health monitoring. It has been suggested that wearable technology will revolutionize our lives, social interactions, and activities, akin to when computers became widely available (Mukhopadhyay, 2015). Several wearable fitness devices and apps can already provide anyone with fairly accurate HRV data and soon low-cost physiological data such as HRV will likely be commonly available.HRV has the potential to be used as a biomarker for anxiety (Bandelow et al., 2017); however, its usefulness is currently limited by a lack of specificity. In the future, physiological data from wearable devices could be utilized by both health care providers and individuals to better understand physical and mental health, and potentially interpersonal relationships. As HRV data becomes widely available, it is increasingly important that we fully understand its implications.

The current study provided insights into the association between HRV and emotion regulation, mate value, and relationship success. Hypothesis testing and exploratory analyses revealed five main findings. First, it appears that HRV reactivity's and BMI's link to relationship success is through the underlying process of emotion regulation, specifically the emotion regulation strategy of reappraisal. The use of reappraisal, and its typical social consequences of emotional sharing, bonding, and general liking by peers, increased the likelihood of relationship success amongst those with high BMI.

Secondly, HRV reactivity also interacted with resting HRV to predict relationship success; however, the direction of these results was not consistent with past research, and neither emotion regulation nor mating variables were found to mediate this relationship. This finding may be the result of differences between Bailey and Davis's (2017) and the current methodology and dependent variables. The current study's finding utilized the dependent variable of matching, a measure of the ability to attract an acceptable mate. In contrast, Bailey and Davis's findings predicted relationship formation, which requires not only attraction, but also retention of an acceptable mate. Therefore, the results may differ markedly for short- and long-term relationship success variables.

Thirdly, an interesting association between the two dependent variables was found. Matching and relationship formation were strongly associated amongst males, with matched males being six times more likely than unmatched males to start a romantic relationship. There was no significant association between matching and relationship formation for females. It may be that men are less selective and will attempt to match more often. Those men who were not able to match would likewise not be able to start a romantic relationship. Some females, on the other hand, may have chosen to not match by limiting the number of yeses given to speed dating partners. These unmatched females would be more likely to form romantic relationships than their unmatched male counterparts, as they were often unmatched by choice.

Fourthly, BMI was only predictive of mate value for females, confirming the increased importance males place on bodily attractiveness and thin appearance of their female partners. Interestingly, mate value was only predictive of relationship success for males. For females, there were no statistically significant effects of mate value on relationship success over and above the effects of BMI. This may be explained by the large amount of shared variance between BMI and mate value amongst females.

Finally, consistent with past research linking resting HRV with markers of mate value, higher resting HRV increased the likelihood of matching through the mediator of other-rated mate value. This finding implies that the otherwise imperceptible electrophysiological experience of higher resting HRV is somehow recognized and valued by potential romantic partners. Park and Thayer (2014) described high resting HRV as a marker of good general emotion regulation abilities. Brosschot and colleagues (2016) explained low resting HRV as indicating a constant state of stress, anxiety, and social difficulties. McClure and Lydon (2014) demonstrated how attachment and social anxiety result in poorer relationship initiation outcomes through withdrawal and visible anxiousness. This research is all consistent with one another and helps to understand how higher resting HRV is expressed in a manner that is highly sought after by a potential mate.

The current study expanded upon previous research describing the psychological and physiological ingredients required for relationship formation. This study gave the first evidence of why the imperceptible biological characteristics of HRV reactivity and resting HRV are valued in a romantic partner through their associations with emotion regulation, a calm and confident demeanor, and mate value. Together, these findings contribute to our current understanding of human relationship formation through a unique combination of social and biological psychology perspectives.

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Table 1

Reliability Coefficients and Descriptive Statistics for Psychometric Variables

Variables	*M*	*SD*	Items	Actual Range	z_{Skewness}	α
MVI: Self	31.17	10.21	17	-7.00-51.00	-4.19	.82
MVI: Other	23.80	6.20	17	7.11-40.10	-1.44	.90
MSOI: ST	3.57	1.52	10	1.00-6.90	0.65	.93
MSOI: LT	5.92	0.93	7	3.00-7.00	-4.80	.85
DERS	78.37	20.21	36	42.00-162.00	4.88	.93
ERQ: SUP	3.67	1.11	4	1.00-7.00	1.78	.76
ERQ: REAP	5.18	1.12	6	1.33-7.00	-3.62	.89

Note. *N* = 176 except for MVI: Other (*N* = 159). MVI: Self = Mate Value Inventory Self Rating; MVI: Other = Mate Value Inventory as rated by speed dating partners; MSOI: ST = Multidimensional Sociosexuality Inventory: Short Term Subscale; MSOI: LT = Multidimensional Sociosexuality Inventory: Long Term Subscale; ERQ: SUP = Emotion Regulation Questionnaire: Suppression subscale; ERQ: REAP = Emotion Regulation Questionnaire: Reappraisal subscale; DERS = Difficulties in Emotion Regulation Scale; α = Cronbach's alpha internal consistency.

Table 2

Intercorrelations Among Psychometric Variables

Variables	MVI: Self	MSOI: ST	MSOI: LT	DERS	ERQ: SUP	ERQ: REAP
MVI: Other	.133	**.321*** **	-.011	.057	.071	-.088
MVI: Self	–	.080	**.291*** **	**-.282*** **	-.069	**.329*** **
MSOI: ST		–	**-.341*** **	.008	.119	**.173***
MSOI: LT			–	**-.174***	**-.185***	.010
DERS				–	**.333*** **	**-.209** **
ERQ: SUP					–	.060
ERQ: REAP						–

Note. N = 176 except for MVI: Other (*N* = 159). MVI: Self = Mate Value Inventory Self Rating; MVI: Other = Mate Value Inventory as rated by speed dating partners; MSOI: ST = Multidimensional Sociosexuality Inventory: Short Term Subscale; MSOI: LT = Multidimensional Sociosexuality Inventory: Long Term Subscale; ERQ: SUP = Emotion Regulation Questionnaire: Suppression subscale; ERQ: REAP = Emotion Regulation Questionnaire: Reappraisal subscale; DERS = Difficulties in Emotion Regulation Scale.
*$p < .05$, **$p < .01$, ***$p < .001$

Table 3

Group Comparisons According to Relationship Formation

	Single (n = 77)[a]		Coupled (n = 59)[a]				
Variables	*M*	*SD*	*M*	*SD*	F^b	*p*	$\eta^2_{partial}$
Age	20.56	2.78	19.53	1.99	5.84	**.017**	.04
Motivation[b]	3.21	0.86	3.03	0.76	1.49	.224	.01
BMI	25.97	6.05	26.09	5.17	0.02	.904	< .01
MVI: Self	30.29	10.25	31.07	10.41	0.19	.661	< .01
MVI: Other	22.39	6.94	24.73	5.61	4.03	**.047**	.03
MSOI: ST	3.25	1.50	3.68	1.48	2.78	.098	.02
MSOI: LT	5.97	0.95	5.88	0.93	0.36	.551	< .01
DERS	78.31	19.20	78.25	21.43	< 0.01	.987	< .01
ERQ: SUP	3.72	1.18	3.44	1.28	1.71	.193	.01
ERQ: REAP	5.25	0.92	5.04	1.27	1.28	.261	< .01

Note. MVI: Self = Mate Value Inventory Self Rating; MVI: Other = Mate Value Inventory as rated by speed dating partners; MSOI: ST = Multidimensional Sociosexuality Inventory: Short Term Subscale; MSOI: LT = Multidimensional Sociosexuality Inventory: Long Term Subscale; DERS = Difficulties in Emotion Regulation Scale; ERQ: SUP = Emotion Regulation Questionnaire: Suppression subscale; ERQ: REAP = Emotion Regulation Questionnaire: Reappraisal subscale.

[a]Except for BMI coupled where n = 76, MVI: Other single where n = 54, and coupled where n = 68.

[b]Item can be found in the Demographics Questionnaire (Appendix E)

Table 4

Group Comparisons According to Speed Dating Matching

Variables	Unmatched (n = 55)		Matched (n = 105)[a]				
	M	*SD*	*M*	*SD*	F^b	*p*	$\eta^2_{partial}$
Age	20.20	2.86	20.16	2.51	< 0.011	.931	< .01
Motivation[b]	3.13	0.86	3.06	0.81	0.26	.611	< .01
BMI	27.82	7.02	25.16	4.79	9.95	**.005**	.05
MVI: Self	31.80	9.89	31.38	10.04	0.06	.801	< .01
MVI: Other	21.03	6.07	25.25	5.75	18.70	**< .001**	.11
MSOI: ST	3.14	1.54	3.81	1.45	7.40	**.007**	.05
MSOI: LT	5.94	0.95	5.97	0.89	0.07	.796	< .01
DERS	77.80	20.50	77.35	18.69	0.05	.826	< .01
ERQ: SUP	3.72	1.20	3.61	1.18	0.36	.521	< .01
ERQ: REAP	5.17	1.14	5.23	1.01	0.11	.738	< .01
No. Partners	9.07	1.80	9.88	1.95	6.45	**.012**	.04

Note. MVI: Self = Mate Value Inventory Self Rating; MVI: Other = Mate Value Inventory as rated by speed dating partners; MSOI: ST = Multidimensional Sociosexuality Inventory: Short Term Subscale; MSOI: LT = Multidimensional Sociosexuality Inventory: Long Term Subscale; DERS = Difficulties in Emotion Regulation Scale; ERQ: SUP = Emotion Regulation Questionnaire: Suppression subscale; ERQ: REAP = Emotion Regulation Questionnaire: Reappraisal subscale.

[a]Except for BMI where n = 104. [b]Item can be found in the Demographics Questionnaire (Appendix E)

Table 5

Group Comparisons According to Completion Status

Variables	Completers (n = 174)[a] *M*	*SD*	Noncompleters (n = 20) *M*	*SD*	F^b	p	$\eta^2_{partial}$
Age	20.12	2.56	19.10	1.33	3.07	.081	.02
Motivation[b]	3.06	0.80	3.10	0.85	0.05	.824	< .01
BMI	26.05	5.45	28.16	7.75	2.23	.137	.01
MVI: Self	31.18	10.21	28.00	9.62	1.77	.186	< .01
MSOI: ST	3.55	1.51	3.34	1.45	0.37	.545	< .01
MSOI: LT	6.05	0.97	5.93	0.92	0.28	.598	< .01
DERS	78.47	20.27	77.20	18.98	0.07	.790	< .01
ERQ: SUP	3.66	1.22	3.80	1.12	0.24	.624	< .01
ERQ: REAP	5.17	1.11	5.02	1.17	0.32	.570	< .01

Note. N = 194 MVI: Self = Mate Value Inventory Self Rating; MSOI: ST = Multidimensional Sociosexuality Inventory: Short Term Subscale; MSOI: LT = Multidimensional Sociosexuality Inventory: Long Term Subscale; ERQ: SUP = Emotion Regulation Questionnaire: Suppression subscale; ERQ: REAP = Emotion Regulation Questionnaire: Reappraisal subscale; DERS = Difficulties in Emotion Regulation Scale.

[a]Except for BMI where n = 173. [b]Item can be found in the Demographics Questionnaire (Appendix E).

Table 6

Descriptive Statistics of Valence and Arousal Ratings by Task

	Negative Film			Positive Film		
Ratings	*M*	*SD*	z_{Skewness}	*M*	*SD*	z_{Skewness}
Valence	2.89	1.22	3.58	6.97	1.23	-4.45
Arousal	3.69	1.72	0.53	5.36	1.58	-3.30

Note. *N* = 173.

Table 7

Descriptive Statistics of Original and Log Transformed HF by Task

	Original HF			ln HF		
Task	*M*	*SD*	$z_{skewness}$	*M*	*SD*	z_{skewness}
Baseline	1,329.05	1,661.87	14.96	6.60	1.14	-1.13
Negative Film	1,103.06	1,313.21	15.65	6.43	1.11	-0.63
Positive Film	841.13	980.14	16.89	6.18	1.12	-0.93

Note. N = 173-174. ln HF = log transformed HF.

Table 8

Descriptive Statistics of ΔHF

Variable	*N*	Min	Max	*M*	*SD*	z_{skewness}
ΔHF_{P-N}	173	-1.53	1.13	-0.25	0.49	1.58
ΔHF_{B-N}	174	-1.68	2.36	0.17	0.64	-0.29

Note. ΔHF = HRV reactivity

Table 9

Unstandardized Moderated Regression Coefficients (SE) for Moderated Moderation Investigating Hypothesis 1

	Analyses			
	ΔHF_{P-N}		ΔHF_{B-N}	
Variables	Relationship $N = 133$	Matching $N = 158$	Relationship $N = 134$	Matching $N = 159$
ΔHF (X)	-0.32 (0.42)	-0.68 (0.38)	-0.23 (0.32)	-0.40 (0.34)
BMI ln (M)	0.36 (1.00)	-1.68 (0.99)	0.41 (0.94)	**-1.90 (0.97)***
Sex (W)	**1.19 (0.39)****	0.20 (0.38)	**1.11 (0.38)****	0.23 (0.38)
Partners (C)	-	**0.23 (0.10)***	-	**0.23 (0.10)***
ΔHF × BMI ln	-2.36 (2.18)	2.79 (1.89)	-2.53 (2.03)	**3.69 (1.85)***
ΔHF × Sex	1.12 (0.84)	0.36 (0.76)	-0.49 (0.64)	0.26 (0.67)
BMI ln × Sex	-0.63 (2.12)	-3.25 (1.98)	-1.44 (1.96)	-3.15 (1.93)
ΔHF × BMI ln × Sex	-3.45 (4.24)	-1.66 (3.77)	1.42 (4.17)	5.58 (3.69)
Constant	-0.34 (0.19)	-1.45 (0.94)	-0.26 (0.18)	-1.54 (0.95)
Overall model				
Cox & Snell R^2	.11	.12	.09	.13
Cohen's f^2	0.12	0.14	0.10	0.15
χ^2	**14.85*** [b]	**20.15**** [a]	12.55[b]	**21.94**** [a]

Note. [a]$df = 8$, [b]$df = 7$
*$p < .05$, **$p < .01$

Table 10

Unstandardized Moderated Regression Coefficients (SE) for Hypothesis 1 Predicting Matching and Displayed by Sex

	Sample	
Variable	Males *n* = 78	Females *n* = 81
$\Delta HF_{B\text{-}N}$(X)	-0.59 (0.40)	> 0.00 (0.51)
BMI (M)	-0.01 (0.06)	**-0.12 (.05)****
Partners (C)	0.28 (0.12)**	0.15 (0.18)
$\Delta HF_{B\text{-}N} \times$ BMI	0.02 (0.07)	**0.23 (0.11)***
Constant	-2.00 (1.18)	0.73 (1.65)
Overall model		
Cox & Snell R^2	.09	.17
Cohen's f^2	.10	.21
$\chi^2(4)$	7.27	**15.31****

$^*p < .05$, $^{**}p < .01$

Table 11

Unstandardized Moderated Regression Coefficients (SE) for Moderated Moderation Investigating Hypothesis 2

	Dependent Variable	
Variable	Relationship $N = 134$	Matching $N = 159$
$\Delta HF_{P\text{-}N}$ X	-0.20 (0.44)	-0.36 (0.40)
HF_B M	-0.03 (0.19)	0.15 (0.17)
Sex W	**1.30 (0.40)****	0.04 (0.36)
Partners C	-	**0.24 (0.10)***
$\Delta HF_{P\text{-}N}$ $X \times HF_B$ M	-0.09 (0.45)	**0.73 (0.37)***
$\Delta HF_{P\text{-}N}$ $X \times$ Sex W	1.42 (0.88)	0.71 (0.79)
HF_B $M \times$ Sex W	-0.32 (0.39)	0.06 (0.33)
$\Delta HF_{P\text{-}N} \times HF_B$ $M \times$ Sex W	0.95 (0.90)	-0.46 (0.75)
Constant	-0.37 (0.20)	-1.53 (0.93)
Overall model		
Cox & Snell R^2	.11	.10
Cohen's f^2	0.12	0.11
χ^2	**15.94***^{a}	**15.95***^{b}

Note. Relationship = dichotomous relationship formation, Matching = dichotomous speed dating matching.
$^{a}df = 8$, $^{b}df = 7$
$^{*}p < .05$, $^{**}p < .01$

Table 12

Indices of Moderated Mediation for ΔHF$_{B-N}$ X on Matching Y Moderated by BMI W

	Model 8		**Model 15**	
Mediator	*b* (*SE*)	95% CI	*b* (*SE*)	95% CI
Emotion Regulation				
M_1 = Reappraisal	-0.001 (0.005)	-0.013, 0.007	0.039 (0.029)	**0.004, 0.111**
M_2 = Suppression	-0.001 (0.009)	-0.026, 0.014	-0.004 (0.042)	-0.016, 0.003
M_3 = Difficulties with Emotion Regulation	-0.001 (0.005)	-0.016, 0.009	-0.001 (0.008)	-0.029, 0.010
Mating Variables				
M_1 = Self-Rated	0.007 (0.011)	-0.008, 0.040	0.006 (0.017)	-0.024, 0.048
M_2 = Other-Rated	-0.019 (0.019)	-0.064, 0.015	-0.007 (0.014)	-0.050, 0.009
M_3 = Long-Term	0.001 (0.007)	-0.016, 0.013	-0.003 (0.010)	-0.038, 0.008
M_4 = Short-Term	-0.001 (0.001)	-0.022, 0.017	-0.001 (0.012)	-0.029, 0.025

Note. N = 159. Bolded 95% CI do not straddle zero.

Table 13

Model 15 Coefficients for the Conditional Process Model Mediated by Emotion Regulation in the Prediction of Matching Investigating Hypothesis 3a

	Consequent					
	M_1 (ERQ: REAP)			M_2 (ERQ: SUP)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
ΔHF_{B-N} *X*	0.326	0.137	**0.055, 0.597**	0.255	0.163	-0.066, 0.577
Constant	0.000	0.083	-0.164, 0.164	0.000	0.094	-0.186, 0.186
	$R^2 = 0.036, f^2 = 0.037$			$R^2 = 0.018, f^2 = 0.018$		
	$F(1, 157) = 5.640$, ***p* = .019**			$F(1, 157) = 2.884, p = .119$		
	M_3 (DERS)			*Y* (Matching)		
ΔHF_{B-N} *X*	-0.808	2.348	-5.445, 3.829	-0.264	0.333	-0.917, 0.390
BMI *V*	—	—	—	-0.086	0.037	**-0.159, -0.013**
ERQ: REAP M_1	—	—	—	0.088	0.192	-0.290, 0.465
ERQ: SUP M_2	—	—	—	0.038	0.174	-0.303, 0.380
DERS M_3	—	—	—	-0.011	0.011	-0.034, 0.011
Partners *C*	—	—	—	0.297	0.106	**0.091, 0.504**
$M_1 \times V$	—	—	—	0.130	0.052	**0.029, 0.231**
$M_2 \times V$	—	—	—	-0.059	0.034	-0.126, 0.008
$M_3 \times V$	—	—	—	0.002	0.002	-0.003, 0.006
$X \times V$	—	—	—	0.137	0.074	-0.008, 0.281
Constant	0.000	1.500	-2.955, 2.955	-2.002	0.984	**-3.930, -0.073**
	$R^2 < 0.001, f^2 < 0.001$			$R^2 = 0.171, f^2 = 0.21$		
	$F(1, 157) = 0.118, p = .731$			$\chi^2(10) = 29.747$, ***p* < .001**		

Note. *N* = 159. Bolded 95% CI do not straddle zero.

Table 14

Model 8 Coefficients for the Conditional Process Model Mediated by Emotion Regulation in the Prediction of Matching Investigating Hypothesis 3a

	Consequent					
	M_1 (ERQ: REAP)			M_2 (ERQ: SUP)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
$\Delta HF_{B–N}$ *X*	0.324	0.142	0.044, 0.604	0.274	0.160	-0.042, 0.590
BMI *W*	0.005	0.013	-0.022, 0.031	0.017	0.017	-0.016, 0.050
$X \times W$	-0.002	0.022	-0.045, 0.041	0.045	0.032	-0.018, 0.109
Constant	5.215	0.084	5.050, 5.381	3.644	0.094	3.456, 3.830
	$R^2 = 0.037, f^2 = 0.038$			$R^2 = 0.042, f^2 = 0.044$		
	$F(3, 155) = 2.017, p = .114$			$F(3, 155) = 1.502, p = .216$		
	M_3 (DERS)			*Y* (Matching)		
$\Delta HF_{B–N}$ *X*	-0.731	2.412	-5.496, 4.033	-0.299	0.316	-0.917, 0.320
BMI *W*	-0.247	0.251	-0.742, 0.248	-0.080	0.032	**-0.142, -0.017**
ERQ: REAP M_1	—	—	—	0.077	0.171	-0.258, 0.412
ERQ: SUP M_2	—	—	—	-0.026	0.165	-0.349, 0.298
DERS M_3	—	—	—	-0.004	0.011	-0.025, 0.016
Partners *C*	—	—	—	0.233	0.098	**0.042, 0.424**
$X \times W$	0.043	0.390	-0.742, 0.248	0.107	0.058	-0.006, 0.220
Constant	77.449	1.506	74.474, 80.441	-1.505	1.537	-4.517, 1.508
	$R^2 = 0.007, f^2 = 0.007$			$R^2 = 0.106, f^2 = 0.12$		
	$F(3, 155) = 0.355, p = .786$			$\chi^2(7) = 17.805$, $\boldsymbol{p < .05}$		

Note. $N = 159$. Bolded 95% CI do not straddle zero.

Table 15

Model 15 Coefficients for the Conditional Process Model Mediated by Mating Variables in the Prediction of Matching Investigating Hypothesis 3a

	Consequent					
	M_1 (MVI: Self)			M_2 (MVI: Other)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
$\Delta\text{HF}_{\text{B–N}}$ *X*	0.536	1.310	-2.051, 3.122	0.830	0.830	-0.809, 2.470
Constant	0.000	0.797	-1.575, 1.575	0.000	0.492	-0.973, 0.973
	$R^2 = 0.001, f^2 = 0.001$			$R^2 = 0.007, f^2 = 0.007$		
	$F(1, 157) = 0.167, p = .683$			$F(1, 157) = 1.000, p = .319$		
	M_3 (MSOI: ST)			M_4 (MSOI: LT)		
	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
$\Delta\text{HF}_{\text{B–N}}$ *X*	-0.014	0.187	-0.382, 0.355	0.072	0.101	-0.129, 0.272
Constant	0.000	0.121	-0.239, 0.239	0.000	0.072	-0.143, 0.143
	$R^2 = 0.001, f^2 = 0.001$			$R^2 = 0.002, f^2 = 0.002$		
	$F(1, 157) = 0.005, p = .942$			$F(1, 157) = 0.498, p = .482$		
	Y (Matching)					
$\Delta\text{HF}_{\text{B–N}}$ *X*	-0.397	0.362	-1.107, 0.313			
BMI *V*	0.002	0.055	-0.106, 0.110			
MVI: Self M_1	-0.018	0.023	-0.063, 0.028			
MVI: Other M_2	0.125	0.040	**0.047, 0.203**			
MSOI: ST M_3	0.273	0.155	-0.031, 0.577			
MSOI: LT M_4	0.249	0.260	-0.260, 0.758			
Partners *C*	0.393	0.121	**0.155, 0.631**			
$M_1 \times V$	0.011	0.005	**0.002, 0.020**			
$M_2 \times V$	-0.008	0.008	-0.023, 0.007			
$M_3 \times V$	0.042	0.033	-0.021, 0.106			
$M_4 \times V$	-0.049	0.059	-0.165, 0.066			
$X \times V$	0.172	0.072	**0.032, 0.312**			
Constant	-2.864	1.122	**-5.062, -0.666**			
	$R^2 = 0.261, f^2 = 0.353$					
	$\chi^2(12) = 48.083$, $\boldsymbol{p < .001}$					

Note. *N* = 159. Bolded 95% CI do not straddle zero.

Table 16

Model 8 Coefficients for the Conditional Process Model Mediated by Mating Variables in the Prediction of Matching Investigating Hypothesis 3a

	Consequent					
	M_1 (MVI: Self)			M_2 (MVI: Other)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
$\Delta HF_{B–N}$ *X*	0.366	1.331	-2.263, 2.994	0.830	0.783	-0.718, 2.377
BMI *W*	-0.053	0.139	-0.329, 0.222	-0.341	0.071	**-0.481, -0.200**
X×*W*	-0.367	0.228	-0.816, 0.082	-0.154	0.142	-0.434, -0.127
Constant	31.616	0.798	30.041, 33.191	23.860	0.469	**22.933, 24.786**
	$R^2 = 0.018, f^2 = 0.018$			$R^2 = 0.118, f^2 = 0.134$		
	$F(3, 155) = 0.985, p = .402$			$F(3, 155) = 8.111$, ***p* < .001**		
	M_3 (MSOI: ST)			M_4 (MSOI: LT)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
$\Delta HF_{B–N}$ *X*	-0.003	0.185	-0.368, 0.362	0.065	0.102	-0.136, 0.266
BMI *W*	-0.051	0.019	-0.089, -0.012	0.031	0.009	**0.012, 0.049**
X×*W*	-0.001	0.031	-0.062, -0.061	0.001	0.015	-0.030, 0.030
Constant	3.584	0.120	3.347, 3.822	5.954	0.071	**5.813, 6.095**
	$R^2 = 0.037, f^2 = 0.038$			$R^2 = 0.040, f^2 = 0.042$		
	$F(3, 155) = 2.437, p = .067$			$F(3, 155) = 3.691$, ***p* = .013**		

	Y (Matching)		
Antecedent	Coeff.	*SE*	95% CI
MVI: Self M_1	-0.018	0.020	0.058, 0.022
MVI: Other M_2	0.122	0.037	**0.049, 0.195**
MSOI: ST M_3	0.250	0.144	-0.031, 0.531
MSOI: LT M_4	0.310	0.244	-0.166, 0.792
BMI *W*	-0.040	0.035	-0.109, 0.289
Partners *C*	0.292	0.109	**0.078, 0.505**
X×*W*	0.131	0.060	**0.012, 0.249**
Constant	-7.100	2.110	**-11.235, -2.965**
	$R^2 = 0.213, f^2 = 0.271$		
	$\chi^2(7) = 38.072$, ***p* < .001**		

Note. *N* = 159. Bolded 95% CI do not straddle zero.

Table 17

Coefficients for BMI Predicting Matching Mediated by MVI: Other and Moderated by Sex

	Consequent					
	M_1 (MVI: Other)			Y (Matching)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
BMI *X*	-0.340	0.071	**-0.480, -0.200**	-0.029	0.037	-0.100, 0.043
Sex *V*	—	—	—	0.124	0.386	0.632, -0.880
MVI: Other M_1	—	—	—	0.122	0.037	**0.052, 0.192**
Partners *C*	—	—	—	0.256	0.104	**0.051, 0.460**
$M \times V$	—	—	—	-0.130	0.070	-0.268, 0.008*
$X \times V$	—	—	—	-0.104	0.073	-0.247, 0.038
Constant	0.000	0.467	-0.923, 0.923	-1.683	0.983	-3.614, 0.249
	$R^2 = 0.102, f^2 = 0.114$			$R^2 = 0.182, f^2 = 0.223$		
	$F(1, 157) = 23.135$, ***p* < .001**			$\chi^2(6) = 31.873$, ***p* < .001**		

Note. $N = 159$. Bolded 95% CI do not straddle zero.
* $p = 0.065$

Table 18

Coefficients for BMI Predicting Matching Mediated by MVI: Other in Males

	Consequent					
	M_1 (MVI: Other)			Y (Matching)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
BMI *X*	-0.239	0.193	-0.622, 0.145	0.026	0.060	-0.092, 0.144
MVI: Other M_1	—	—	—	0.189	0.054	**0.083, 0.296**
Partners *C*	—	—	—	0.026	0.060	**0.021, 0.525**
Constant	30.482	4.830	20.863, 40.101	-7.108	2.730	**-12.458, -1.758**
	$R^2 = 0.034, f^2 = 0.035$			$R^2 = 0.235, f^2 = 0.307$		
	$F(1, 76) = 1.533, p = .219$			$\chi^2(3) = 20.890$, ***p* < .001**		

Note. $n = 78$. Bolded 95% CI do not straddle zero.

Table 19

Coefficients for BMI Predicting Matching Mediated by MVI: Other in Females

	Consequent					
	M_1 (MVI: Other)			Y (Matching)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
BMI X	-0.379	0.070	**-0.518, -0.240**	-0.081	0.043	-0.164, 0.003*
MVI: Other M_1	—	—	—	0.056	0.047	-0.035, 0.148
Partners C	—	—	—	0.220	0.180	-0.132, 0.572
Constant	33.447	2.103	**29.260, 37.634**	-0.529	2.744	-5.907, 4.848
	$R^2 = 0.160, f^2 = 0.191$			$R^2 = 0.126, f^2 = 0.144$		
	$F(1, 79) = 29.357$, $\boldsymbol{p < .001}$			$\chi^2(3) = 10.934$, $\boldsymbol{p < .05}$		

Note. $n = 81$. Bolded 95% CI do not straddle zero.
* $p = 0.058$

Table 20

Coefficients for BMI Predicting Relationships Mediated by MVI: Other and Moderated by Sex

	Consequent					
	M_1 (MVI: Other)			*Y* (Relationship Formation)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
BMI *X*	-0.352	0.087	**-0.524, -0.179**	0.036	0.038	-0.038, 0.110
Sex *V*	—	—	—	0.124	0.386	0.632, -0.880
MVI: Other M_1	—	—	—	0.075	0.034	**0.008, 0.142**
Partners *C*	—	—	—	0.256	0.104	**0.051, 0.460**
$M \times V$	—	—	—	-0.055	0.070	-0.191, 0.082
$X \times V$	—	—	—	-0.104	0.073	-0.247, 0.038
Constant	0.000	0.564	-1.118, 1.118	-0.064	0.078	-0.217, 0.089
	$R^2 = 0.096, f^2 = 0.106$			$R^2 = 0.103, f^2 = 0.115$		
	$F(1, 119) = 16.210$, $\boldsymbol{p < .001}$			$\chi^2(5) = 13.116$, $\boldsymbol{p < .05}$		

Note. $N = 121$. Bolded 95% CI do not straddle zero.

Table 21

Coefficients for BMI Predicting Relationships Mediated by MVI: Other in Males

	Consequent					
	M_1 (MVI: Other)			Y (Relationship Formation)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
BMI X	-0.267	0.220	-0.709, 0.174	0.072	0.065	-0.055, 0.198
MVI: Other M_1	—	—	—	0.105	0.054	-0.001, 0.211*
Constant	30.664	5.647	19.332, 41.996	-5.199	2.493	-10.085, -0.314
	$R^2 = 0.044, f^2 = 0.046$			$R^2 = 0.084, f^2 = 0.092$		
	$F(1, 52) = 1.480, p = .229$			$\chi^2(2) = 4.724, p < .100$		

Note. $n = 54$. Bolded 95% CI do not straddle zero.
* $p = .053$

Table 22

Coefficients for BMI Predicting Relationships Mediated by MVI: Other in Females

	Consequent					
	M_1 (MVI: Other)			Y (Relationship Formation)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
BMI X	-0.397	0.088	**-0.573, -0.221**	0.007	0.044	-0.079, 0.093
MVI: Other M_1	—	—	—	0.050	0.044	-0.035, 0.136
Constant	33.686	2.498	**28.697, 38.676**	-1.148	1.817	-4.709, 2.413
	$R^2 = 0.144, f^2 = 0.168$			$R^2 = 0.022, f^2 = 0.022$		
	$F(1, 65) = 20.346$, $\boldsymbol{p < .001}$			$\chi^2(2) = 1.472, p > .05$		

Note. $n = 67$. Bolded 95% CI do not straddle zero.

Table 23

Indices of Moderated Mediation for $\Delta HF_{P\text{-}N}$ X on Matching Y Moderated by HF_B

	Model 8		**Model 15**	
Mediator	*b* (*SE*)	95% CI	*b* (*SE*)	95% CI
Emotion Regulation				
M_1 = Reappraisal	-0.026 (0.068)	-0.204, 0.078	0.006 (0.041)	-0.043, 0.140
M_2 = Suppression	-0.010 (0.051)	-0.166, 0.057	-0.001 (0.042)	-0.088, 0.081
M_3 = Difficulties with Emotion Regulation	0.004 (0.045)[1]	-0.071, 0.130	-0.003 (0.056)	-0.150, 0.089
Mating Variables				
M_1 = Self-Rated	0.009 (0.043)	-0.035, 0.184	-0.032 (0.112)	-0.342, 0.136
M_2 = Other-Rated	0.091 (0.104)	-0.080, 0.343	-0.010 (0.072)	-0.243, 0.088
M_3 = Short-Term	-0.086 (0.083)	-0.336, 0.015	-0.001 (0.066)	-0.154, 0.130
M_4 = Long-Term	0.024 (0.051)	-0.031, 0.199	0.001 (0.045)	-0.083, 0.108

Note. $N = 159$. Bolded 95% CI do not straddle zero.

Table 24

Model 15 Coefficients for the Conditional Process Model Mediated by Emotion Regulation in the Prediction of Matching Investigating Hypothesis 3b

	Consequent					
	M_1 (ERQ: REAP)			M_2 (ERQ: SUP)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
$\Delta HF_{P–N}$ X	-0.102	0.183	-0.462, 0.259	0.060	0.193	-0.0322, 0.442
Constant	0.000	0.085	-0.167, 0.167	0.000	0.094	-0.186, 0.186
	$R^2 = 0.002, f^2 = 0.002$			$R^2 = 0.001, f^2 = 0.001$		
	$F(1,157) = 0.309, p = .579$			$F(1, 157) = 0.096, p = .757$		
	M_3 (DERS)			Y (Matching)		
$\Delta HF_{P–N}$ X	-1.439	4.110	-9.556, 6.678	-0.373	0.386	-1.128, 0.383
HF_B V	—	—	—	0.149	0.169	-0.183, 0.480
ERQ: REAP M_1	—	—	—	-0.105	0.187	-0.470, 0.261
ERQ: SUP M_2	—	—	—	-0.023	0.168	-0.382, 0.275
DERS M_3	—	—	—	-0.002	0.011	-0.024, 0.020
Partners C	—	—	—	0.238	0.098	0.046, 0.430
$M_1 \times V$	—	—	—	-0.056	0.144	-0.339, 0.227
$M_2 \times V$	—	—	—	-0.008	0.157	-0.316, 0.301
$M_3 \times V$	—	—	—	0.002	0.010	-0.018, 0.022
$X \times V$	—	—	—	0.690	0.392	-0.079, 1.458
Constant	0.000	1.507	-2.976, 2.976	-1.538	0.928	-3.356, 0.280
	$R^2 = 0.001, f^2 = 0.001$			$R^2 = 0.091, f^2 = 0.100$		
	$F(1, 157) = 0.123, p = .727$			$\chi^2(10) = 15.087, p > .05$		

Note. $N = 159$. Bolded 95% CI do not straddle zero.

Table 25

Model 8 Coefficients for the Conditional Process Model Mediated by Emotion Regulation in the Prediction of Matching Investigating Hypothesis 3b

	Consequent					
	M_1 (ERQ: REAP)			M_2 (ERQ: SUP)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
ΔHF$_{P–N}$ *X*	0.029	0.163	-0.294, 0.351	0.079	0.208	-0.332, 0.490
HF$_B$ *W*	0.172	0.081	**0.011, 0.333**	-0.119	0.083	-0.283, 0.046
$X \times W$	0.293	0.128	**0.041, 0.546**	0.202	0.139	-0.072, 0.476
Constant	5.230	0.084	5.065, 5.396	3.670	0.097	3.479, 3.861
	$R^2 = 0.068, f^2 = 0.073$			$R^2 = 0.022, f^2 = 0.023$		
	$F(3, 155) = 3.089$, $\boldsymbol{p = .029}$			$F(3, 155) = 1.120, p = .343$		
	M_3 (DERS)			*Y* (Matching)		
ΔHF$_{P–N}$ *X*	-2.536	4.049	-10.535, 5.464	-0.386	0.380	-1.130, 0.359
HF$_B$ *W*	-1.529	1.352	1-4.200, 1.142	0.156	0.166	-0.169, 0.482
ERQ: REAP M_1	—	—	—	-0.087	0.173	-0.426, 0.252
ERQ: SUP M_2	—	—	—	-0.047	0.164	-0.367, 0.274
DERS M_3	—	—	—	-0.002	0.010	-0.022, 0.019
Partners *C*	—	—	—	0.233	0.098	**0.042, 0.424**
$X \times W$	-2.385	4.279	-10.838, 6.0691	0.709	0.381	-0.037, 1.456
Constant	77.204	1.488	74.265, 80.142	-0.779	1.530	-3.777, 2.218
	$R^2 = 0.017, f^2 = 0.017$			$R^2 = 0.090, f^2 = 0.099$		
	$F(3, 155) = 0.589, p = .623$			$\chi^2(7) = 14.917$, $\boldsymbol{p < .05}$		

Note. $N = 159$. Bolded 95% CI do not straddle zero.

Table 26

Model 15 Coefficients for the Conditional Process Model Mediated by Mating Variables in the Prediction of Matching Investigating Hypothesis 3b

	Consequent					
	M_1 (MVI: Self)			M_2 (MVI: Other)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
$\Delta HF_{P–N}$ X	2.629	1.796	-0.919, 6.177	0.372	1.192	-1.983, 2.727
Constant	0.000	0.794	-1.568, 1.568	0.000	0.497	-0.981, 0.981
	$R^2 = 0.016, f^2 = 0.016$			$R^2 = 0.001, f^2 = 0.001$		
	$F(1, 157) = 2.141, p = .145$			$F(1, 157) = 0.097, p = .755$		
	M_3 (MSOI: ST)			M_4 (MSOI: LT)		
	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
$\Delta HF_{P–N}$ X	0.010	0.267	-0.517, 0.537	0.017	0.135	-0.250, 0.283
Constant	0.000	0.121	-0.239, 0.239	0.000	0.072	-0.143, 0.143
	$R^2 = 0.001, f^2 = 0.001$			$R^2 = 0.001, f^2 = 0.001$		
	$F(1, 157) = 0.001, p = .970$			$F(1, 157) = 0.015, p = .902$		
	Y (Matching)					
$\Delta HF_{P–N}$ X	-0.555	0.425	-1.387, 0.277			
HF_B V	-0.062	0.191	-0.437, 0.313			
MVI: Self M_1	-0.023	0.021	-0.064, 0.019			
MVI: Other M_2	0.114	0.036	**0.043, 0.185**			
MSOI: ST M_3	0.277	0.150	-0.017, 0.570			
MSOI: LT M_4	0.257	0.243	-0.220, 0.734			
Partners C	0.294	0.111	**0.077, 0.512**			
$M_1 \times V$	-0.012	0.023	-0.058, 0.034			
$M_2 \times V$	-0.028	0.036	-0.098, 0.042			
$M_3 \times V$	-0.116	0.165	-0.439, 0.207			
$M_4 \times V$	0.043	0.236	-0.419, 0.504			
$X \times V$	0.659	0.406	-0.137, 1.455			
Constant	-1.908	1.033	-3.932, 0.115			
	$R^2 = 0.214, f^2 = 0.272$					
	$\chi^2(12) = 38.252$, $\boldsymbol{p < .001}$					

Note. $N = 159$. Bolded 95% CI do not straddle zero.

Table 27

Model 8 Coefficients for the Conditional Process Model Mediated by Mating Variables in the Prediction of Matching Investigating Hypothesis 3b

	Consequent					
	M_1 (MVI: Self)			M_2 (MVI: Other)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
ΔHF_{P-N} X	2.464	1.924	-1.337, 6.264	0.901	1.277	-1.620, 3.423
HF_B W	-0.106	0.602	-1.296, 1.084	1.051	0.431	**0.200, 1.902**
$X \times W$	-0.497	1.304	-3.072, 2.079	0.804	0.705	-0.588, 2.196
Constant	31.519	0.810	29.918, 33.119	23.847	0.500	**22.860, 24.834**
	$R^2 = 0.018, f^2 = 0.018$			$R^2 = 0.046, f^2 = 0.048$		
	$F(3, 155) = 0.791, p = .501$			$F(3, 155) = 2.701$, $\boldsymbol{p = .048}$		
	M_3 (MSOI: ST)			M_4 (MSOI: LT)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
ΔHF_{P-N} X	0.004	0.274	-0.538, 0.546	0.018	0.146	-0.270, 0.306
HF_B W	0.250	0.087	**0.078, 0.422**	-0.082	0.062	-0.204, 0.039
$X \times W$	-0.300	0.168	-0.633, 0.033	0.096	0.112	-0.0125, 0.318
Constant	3.552	0.122	**3.311, 3.793**	5.961	0.074	5.816, 6.106
	$R^2 = 0.045, f^2 = 0.047$			$R^2 = 0.014, f^2 = 0.014$		
	$F(3, 155) = 4.195$, $\boldsymbol{p = .007}$			$F(3, 155) = 0.723, p = .540$		

	Y (Matching)		
Antecedent	Coeff.	*SE*	95% CI
ΔHF_{P-N} X	-0.486	0.413	-1.296, 0.324
MVI: Self M_1	-0.018	0.020	-0.057, 0.021
MVI: Other M_2	0.113	0.035	**0.044, 0.182**
MSOI: ST M_3	0.286	0.147	-0.001, 0.573
MSOI: LT M_4	0.247	0.236	-0.216, 0.710
HF_B W	-0.012	0.176	-0.356, 0.333
Partners C	0.277	0.108	**0.066, 0.488**
$X \times W$	0.671	0.395	-0.103, 1.444
Constant	-6.419	2.057	**-10.450, -2.388**
	$R^2 = 0.201, f^2 = 0.252$		
	$\chi^2(7) = 35.601$, $\boldsymbol{p < .001}$		

Note. $N = 159$. Bolded 95% CI do not straddle zero.

Table 28

Coefficients for HF_B Predicting Matching Mediated by MVI: Other and Moderated by Sex

	Consequent					
	M_1 (MVI: Other)			Y (Matching)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
HF_B X	1.053	0.415	**0.233, 1.873**	0.124	0.160	-0.189, 0.437
Sex V	—	—	—	0.077	0.376	-0.660, 0.815
MVI: Other M_1	—	—	—	0.129	0.034	**0.063, 0.195**
Partners C	—	—	—	0.259	0.103	**0.058, 0.460**
$M \times V$	—	—	—	-0.085	0.067	-0.215, 0.046
$X \times V$	—	—	—	0.035	0.321	-0.594, 0.664
Constant	0.000	0.483	-0.955, 0.955	-1.730	0.969	-3.630, 0.171
	$R^2 = 0.038, f^2 = 0.040$			$R^2 = 0.155, f^2 = 0.183$		
	$F(1, 158) = 6.430$, $\boldsymbol{p = .012}$			$\chi^2(6) = 27.016$, $\boldsymbol{p < .001}$		

Note. $N = 160$. Bolded 95% CI do not straddle zero.

Table 29

Mediation Coefficients for HF_B Predicting Matching Mediated by MVI: Other

	Consequent					
	M_1 (MVI: Other)			Y (Matching)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
HF_B X	1.053	0.415	**0.233, 1.873**	0.010	0.158	-0.211, 0.410
MVI: Other M_1	—	—	—	0.124	0.033	**0.060, 0.188**
Partners C	—	—	—	0.256	0.101	**0.058, 0.454**
Constant	16.848	2.753	11.410, 22.285	-5.293	1.548	-8.328, -2.258
	$R^2 = 0.038, f^2 = 0.040$			$R^2 = 0.146, f^2 = 0.171$		
	$F(1, 158) = 6.430$, $\boldsymbol{p = .012}$			$\chi^2(3) = 25.192$, $\boldsymbol{p < .001}$		

Note. $N = 160$. Bolded 95% CI do not straddle zero.

Table 30

Coefficients for HF_B Predicting Relationships Mediated by MVI: Other and Moderated by Sex

	Consequent					
	M_1 (MVI: Other)			Y (Relationship Formation)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
HF_B X	1.623	0.571	**0.616, 2.630**	-0.040	0.197	-0.426, 0.346
Sex V	—	—	—	1.096	0.410	**0.293, 1.890**
MVI: Other M_1	—	—	—	0.070	0.033	**0.005, 0.136**
$M \times V$	—	—	—	-0.042	0.068	-0.175, 0.922
$X \times V$	—	—	—	-0.139	0.404	-0.932, 0.654
Constant	0.000	0.571	-1.130, 1.130	0.240	1.056	-1.830, 2.310
	$R^2 = 0.071$, $f^2 = 0.076$			$R^2 = 0.102$, $f^2 = 0.114$		
	$F(1, 120) = 10.180$, $\boldsymbol{p = .002}$			$\chi^2(6) = 13.072$, $\boldsymbol{p < .050}$		

Note. $N = 122$. Bolded 95% CI do not straddle zero.

Table 31

Mediation Coefficients with HF_B Predicting Relationships Mediated by MVI: Other

	Consequent					
	M_1 (MVI: Other)			Y (Relationship Formation)		
Antecedent	Coeff.	*SE*	95% CI	Coeff.	*SE*	95% CI
HF_B X	1.623	0.509	**0.616, 2.630**	-0.136	0.183	-0.495, 0.223
MVI: Other M_1	—	—	—	0.065	0.032	**0.003, 0.127**
Constant	12.556	3.443	5.740, 19.372	-0.857	1.255	-3.316, 1.602
	$R^2 = 0.071, f^2 = 0.076$			$R^2 = 0.037, f^2 = 0.038$		
	$F(1, 120) = 6.430$, $\boldsymbol{p = .002}$			$\chi^2(2) = 4.596, p < .010$		

Note. $N = 122$. Bolded 95% CI do not straddle zero.

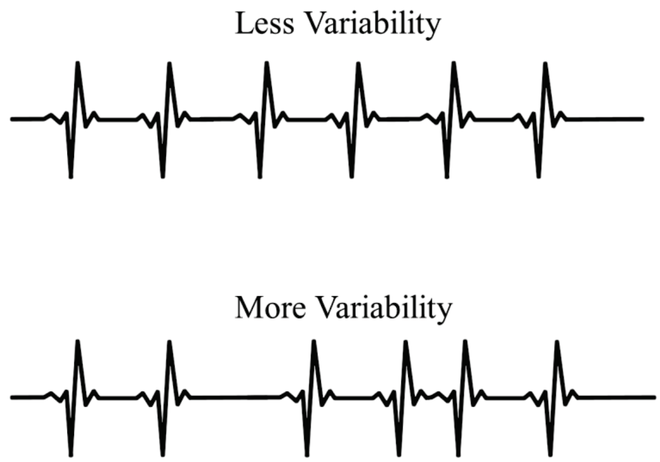


Figure 1: A pattern of heart beats with less (above) and more (below) variability. The bottom image depicts higher HRV.

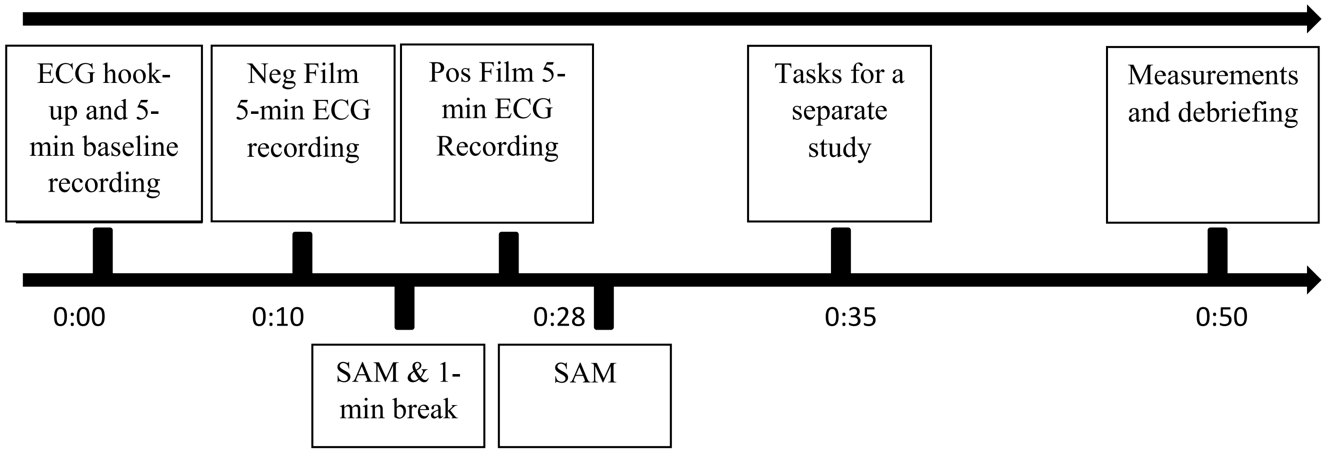


Figure 2: Timeline of experimental procedures for the laboratory session.

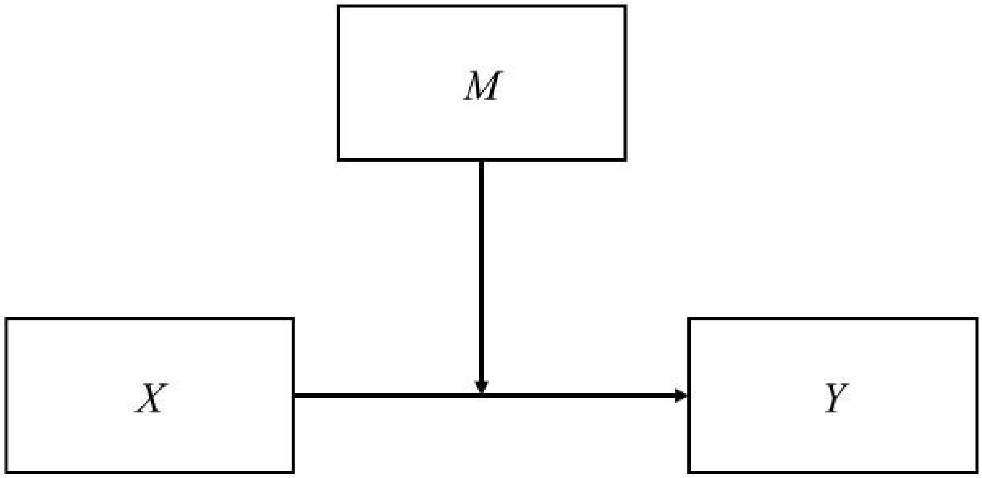


Figure 3: PROCESS (Hayes, 2013) model 1 depicting simple moderation.

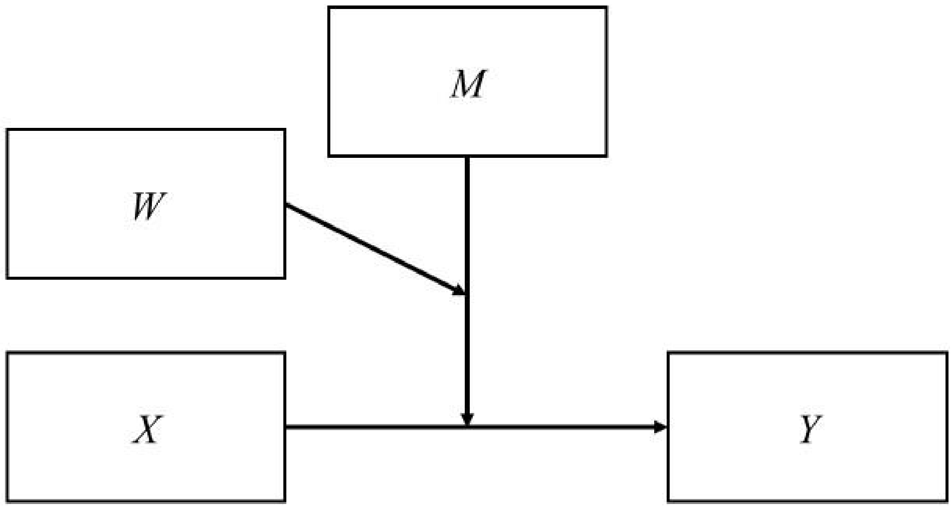


Figure 4: PROCESS (Hayes, 2013) model 3 depicting moderated moderation.

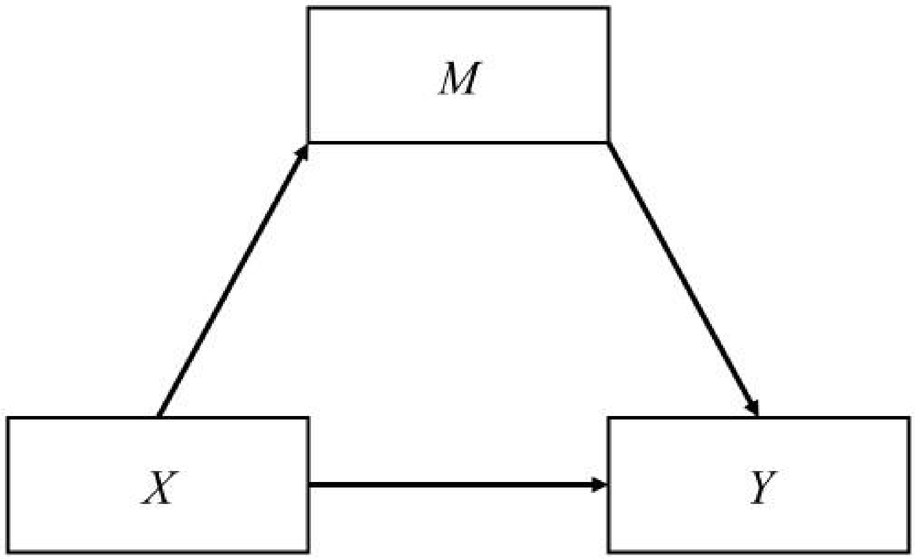


Figure 5: PROCESS (Hayes, 2013) model 4 depicting simple mediation.

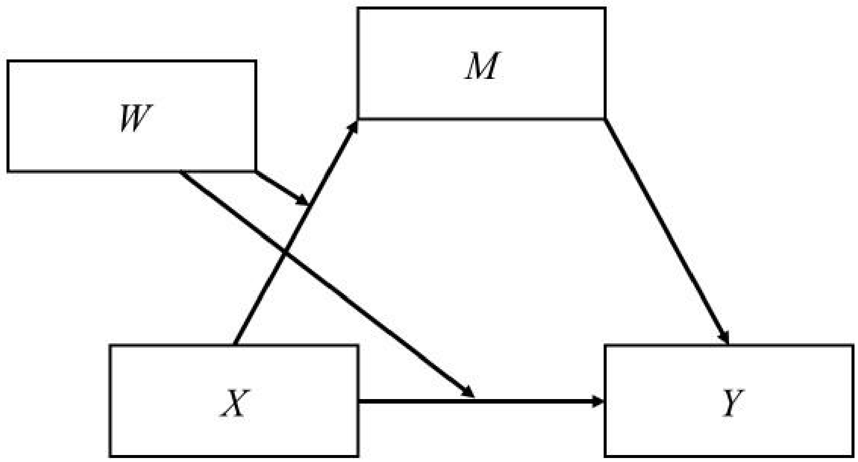


Figure 6: PROCESS (Hayes, 2013) model 8 depicting first-stage moderated mediation.

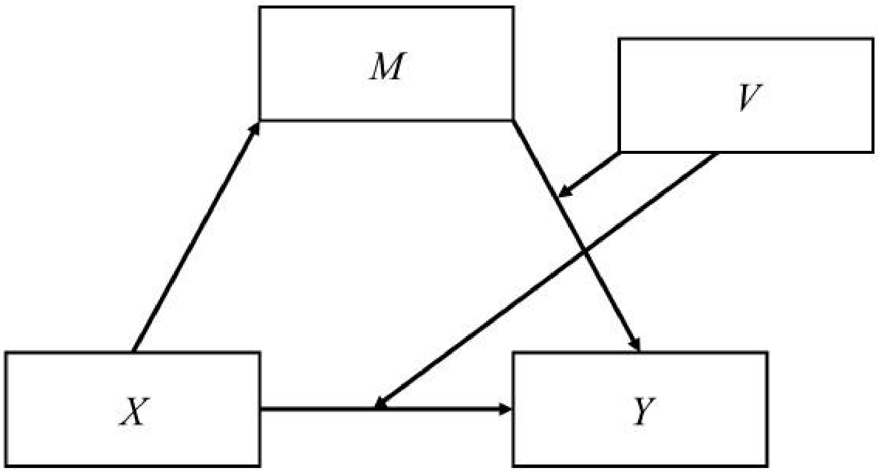


Figure 7: PROCESS (Hayes, 2013) model 15 depicting second-stage moderated mediation.

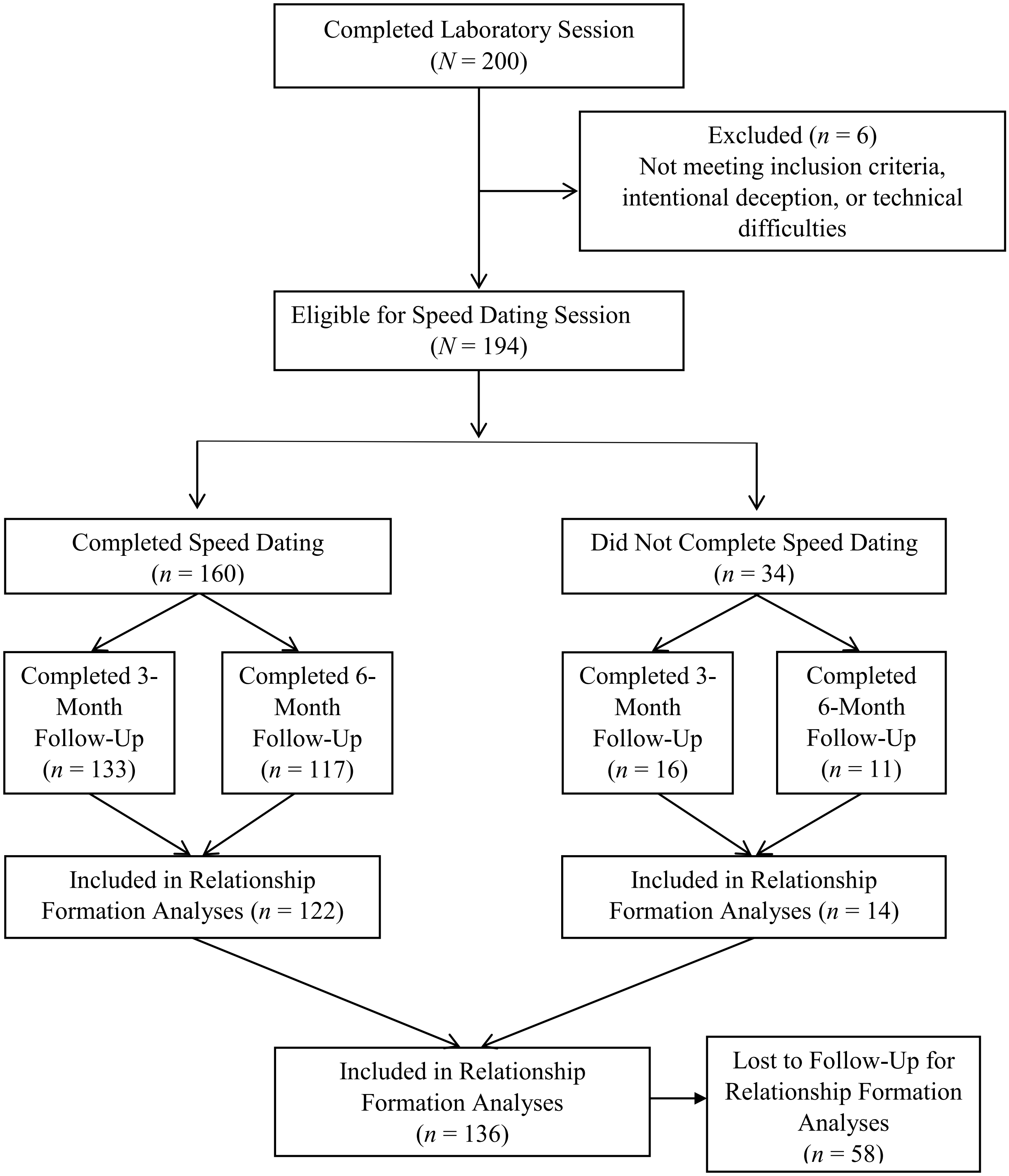


Figure 8. Participant flow throughout study.

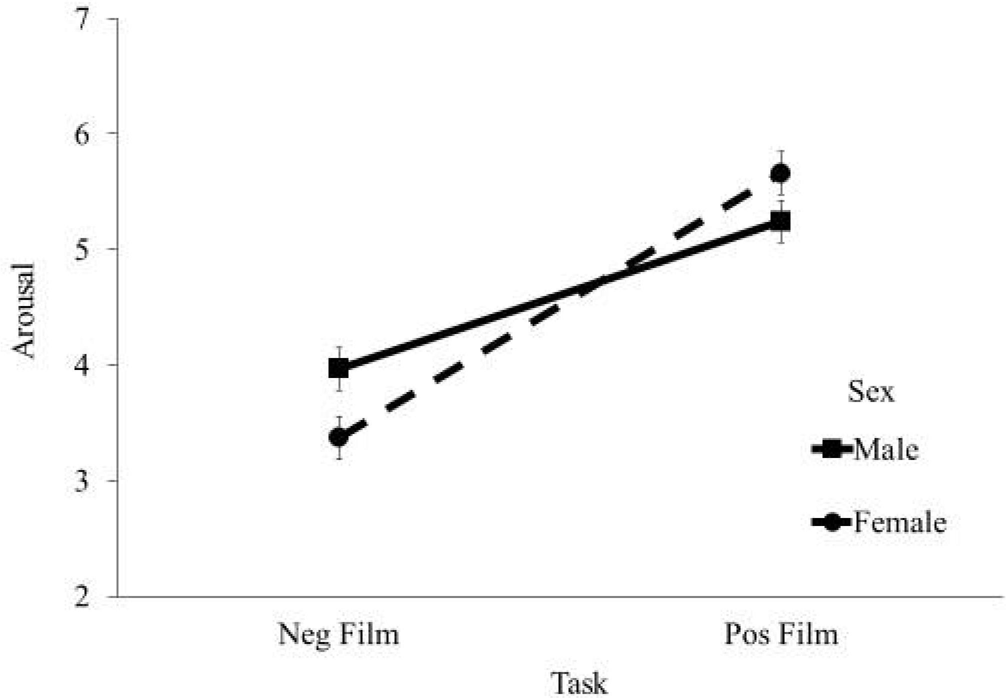


Figure 9. Mean (±1 *SE*) arousal ratings plotted as a function of task and sex.

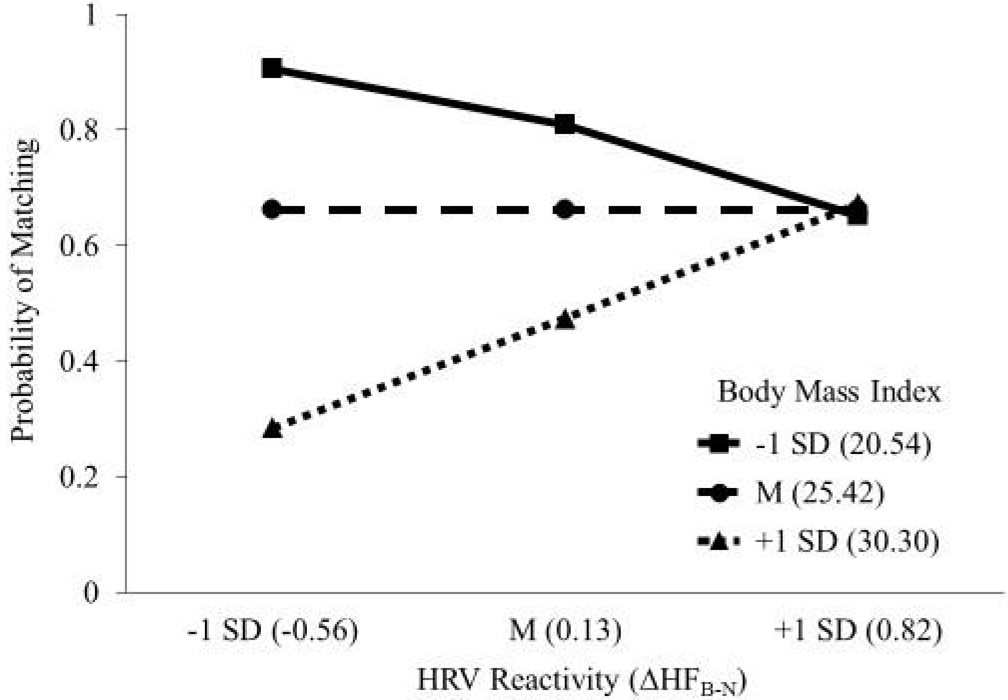


Figure 10. Probability of females matching during speed dating plotted as a function of ΔHF_{B-N} moderated by BMI and controlling for number of speed dating partners.

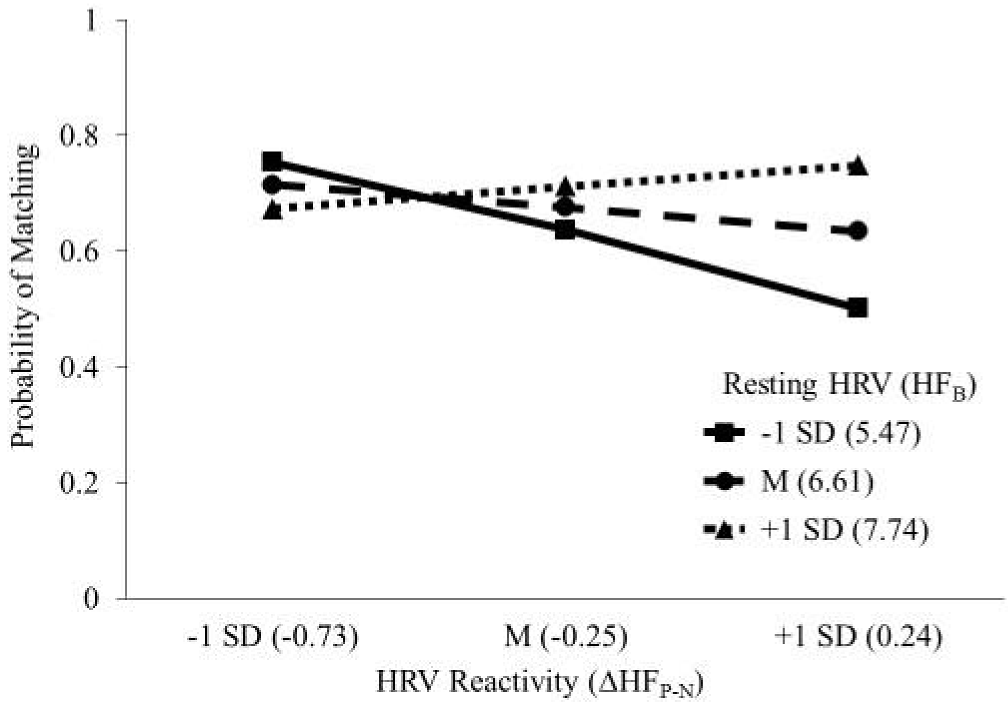


Figure 11. Probability of matching during speed dating plotted as a function of ΔHF_{P-N} moderated by HF_B and controlling for number of partners.

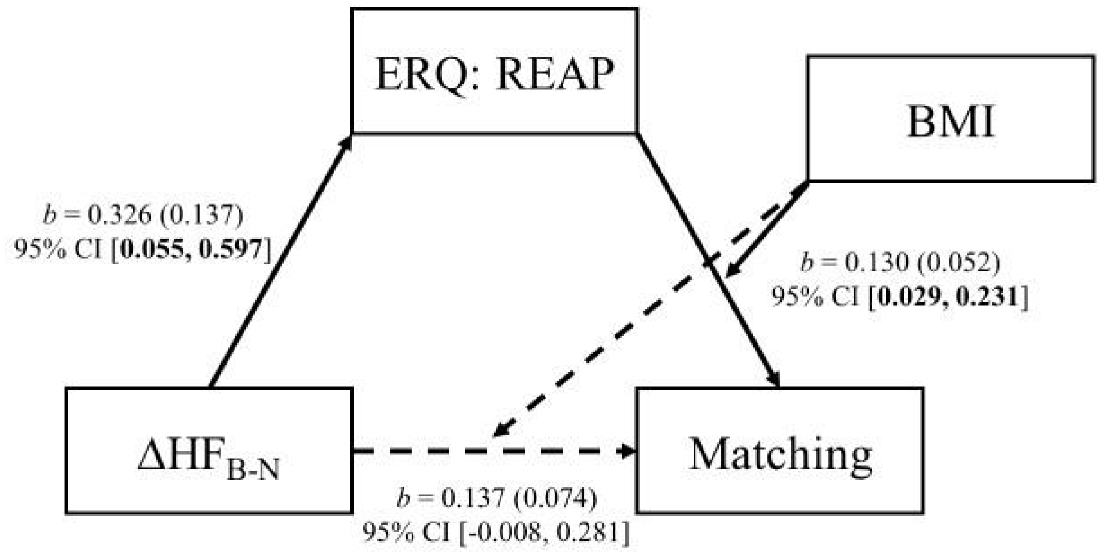


Figure 12. Unstandardized regression coefficients (*SE*) for the simple effects in the moderated mediation of matching *Y* from HRV reactivity *X* through reappraisal M_1 at differing levels of BMI *V* while controlling for number of partners *C*. Broken lines depict nonsignificant effects.

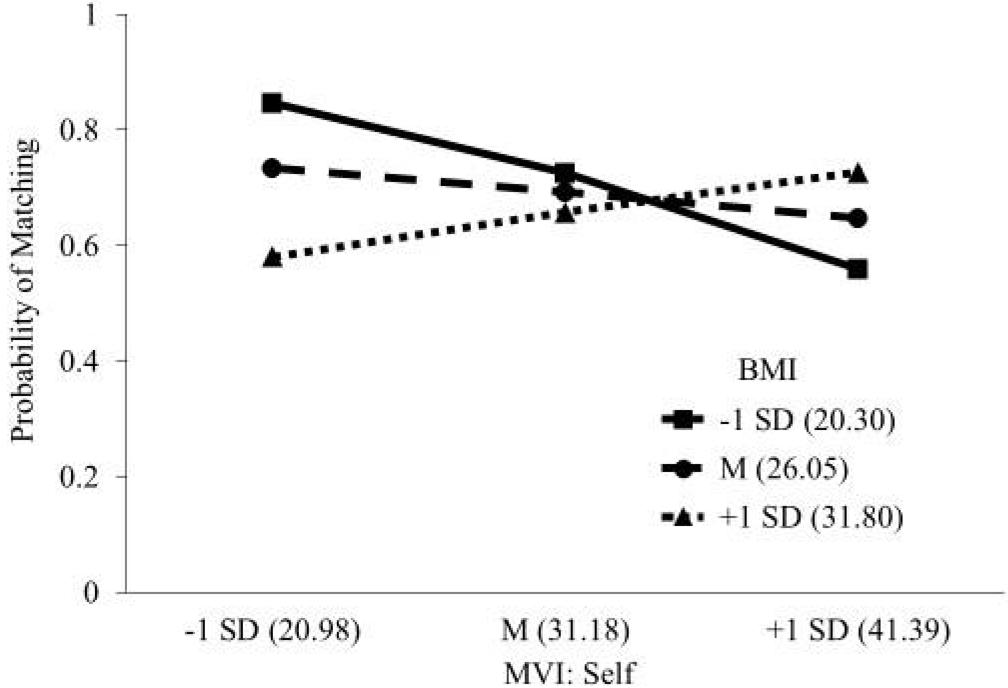


Figure 13. Probability of matching during speed dating plotted as a function of MVI: Self moderated by BMI and controlling for number of partners, MVI: Other, MSOI: ST, and MSOI: LT.

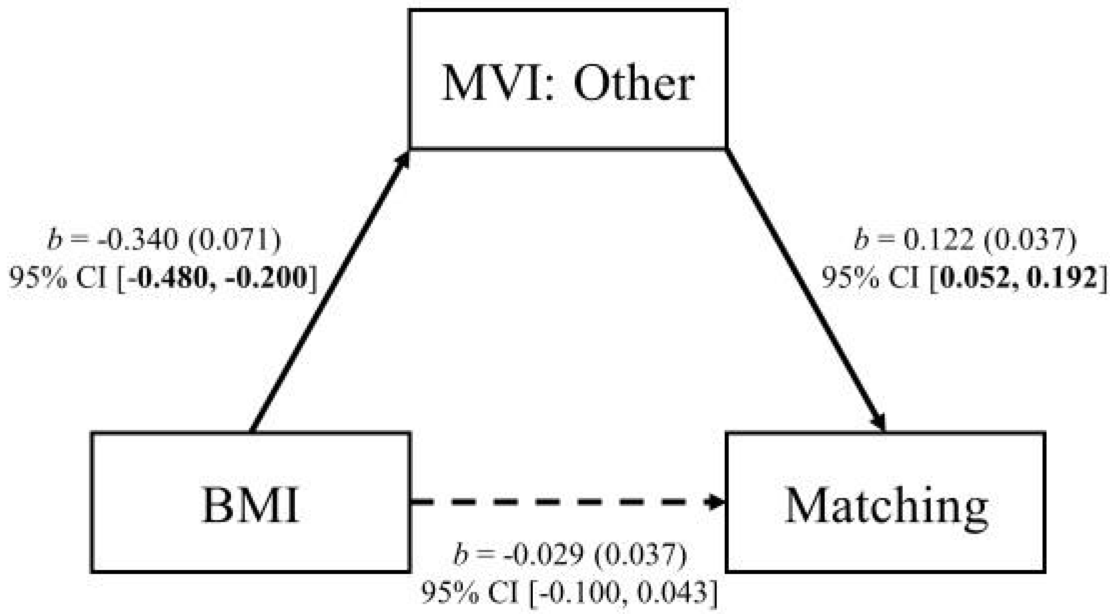


Figure 14. Unstandardized regression coefficients (*SE*) and 95% CIs for the simple effects in the mediation of matching *Y* from BMI *X* through MVI: Other *M* while controlling for number of partners *C* for all sexes. Broken lines depict nonsignificant effects.

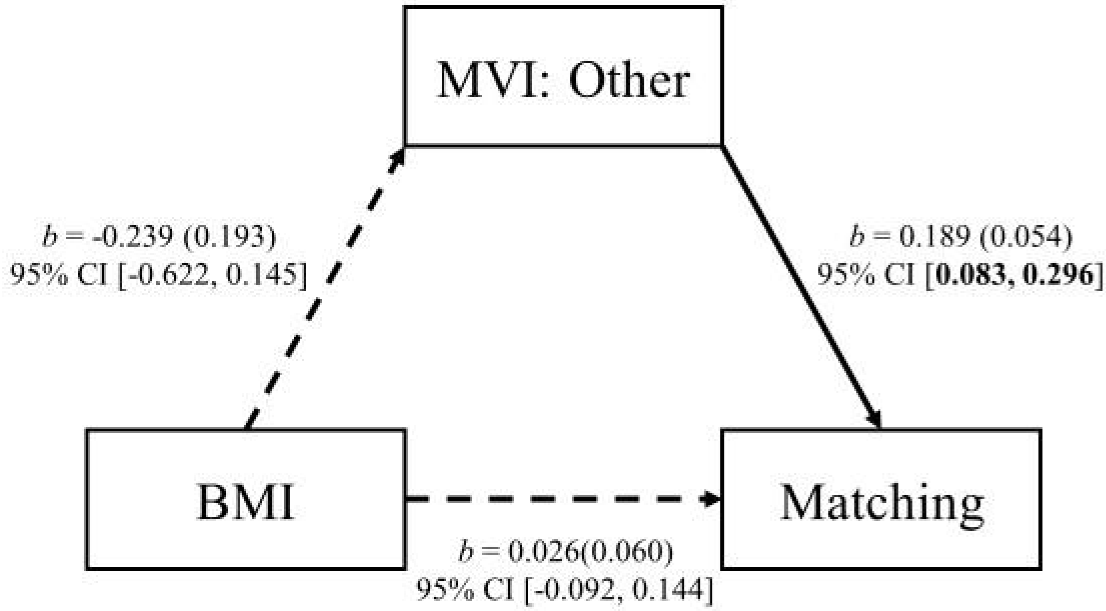


Figure 15. Unstandardized regression coefficients (*SE*) and 95% CIs for the simple effects in the mediation of matching *Y* from BMI *X* through MVI: Other *M* while controlling for number of partners *C* for male participants. Broken lines depict nonsignificant effects.

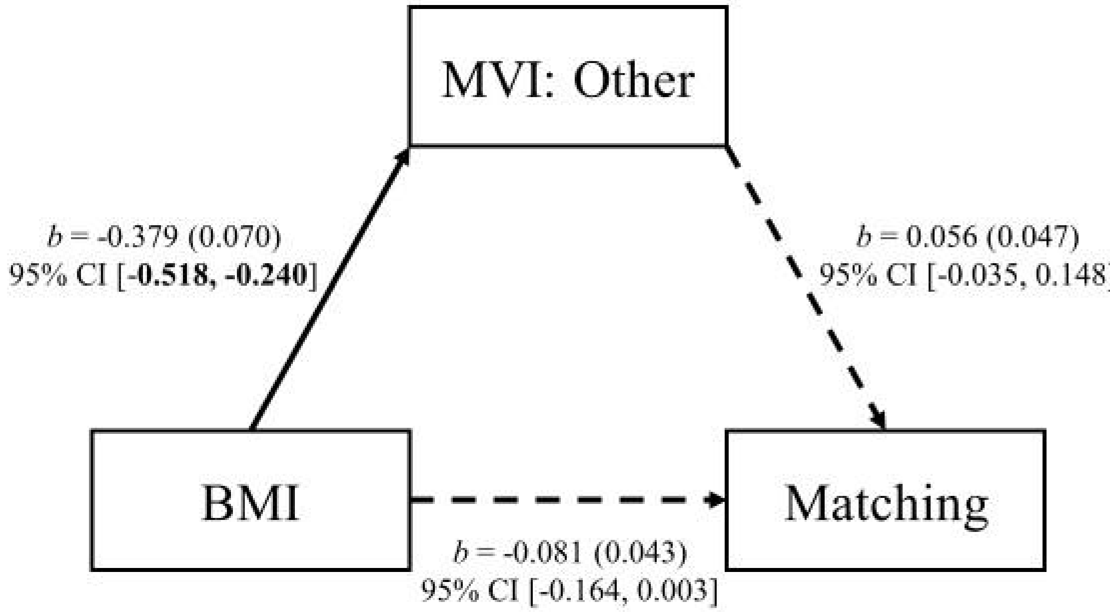


Figure 16. Unstandardized regression coefficients (*SE*) and 95% CIs for the simple effects in the mediation of matching *Y* from BMI *X* through MVI: Other *M* while controlling for number of partners *C* for female participants. Broken lines depict nonsignificant effects.

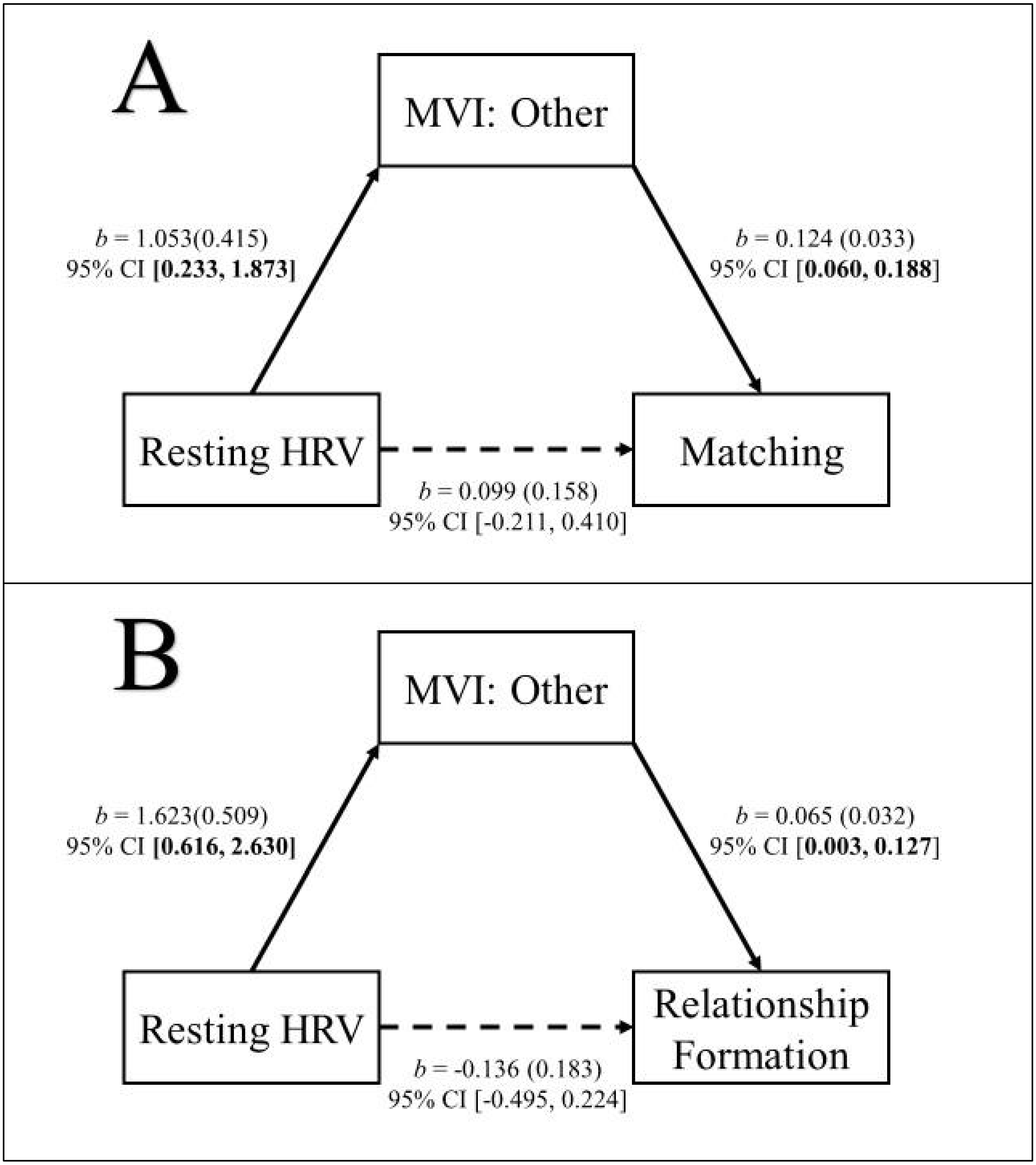


Figure 17. Unstandardized regression coefficients (*SE*) and 95% CIs for the simple effects in the mediation of matching *Y* (panel A) and relationship formation (panel B) from $HF_B X$ through MVI: Other *M.* Both mediations employed PROCESS (Hayes, 2013) model 4.The mediation in Panel A controlled for number of speed dating partners *C*. Broken lines depict nonsignificant effects.

Appendix A

Mate Value Inventory - Self-Rating

How well do you feel that these attributes apply to you currently?

Please rate each attribute on the following scale:

-3 ---------- -2 ---------- -1 ---------- 0 ---------- +1 ---------- +2 ---------- +3

Extremely low on this trait Extremely high on this trait

Ambitious	____
Attractive face	____
Attractive body	____
Desires children	____
Faithful/value fidelity	____
Generous	____
Good sense of humour	____
Healthy	____
Independent	____
Intelligent	____
Kind and understanding	____
Loyal	____
Financially secure	____
Responsible	____
Enthusiastic about sex	____
Sociable	____
Emotionally stable	____

Appendix B

Multidimensional SOI

1 -------- 2 -------- 3 --------- 4 -------- 5 --------- 6 --------- 7
Strongly disagree   Strongly agree

1. I can easily imagine myself being comfortable and enjoying “casual” sex with different partners.

2. I can imagine myself enjoying a brief sexual encounter with someone I find very attractive.

3. I could easily imagine myself enjoying one night of sex with someone I would never see again.

4. Sex without love is OK.

5. I could enjoy sex with someone I find highly desirable even if that person does not have long-term potential.

6. I would consider having sex with a stranger if I could be assured that it was safe and he/she was attractive to me.

7. I would never consider having a brief sexual relationship with someone.

8. Sometimes I would rather have sex with someone I did not care about.

9. I believe in taking sexual opportunities when I find them.

10. I would have to be closely attached to someone (both emotionally and psychologically) before I could feel comfortable and fully enjoy having sex with him or her.

11. I am interested in maintaining a long-term romantic relationship with someone special.

12. I hope to have a romantic relationship that lasts the rest of my life.

13. I would like to have a romantic relationship that lasts forever.

14. Long-term romantic relationships are not for me.

15. Finding a long-term romantic partner is not important to me.

16. I can easily see myself engaging in a long-term romantic relationship with someone special.

17. I cannot imagine spending the rest of my life with one sex partner.

18. I can see myself settling down romantically with one special person.

19. If I never settled down with one romantic partner that would be OK.

20. I would like to have at least one long-term committed relationship during my lifetime.

21. How often do you fantasize about having sex with someone other than your current dating partner?

22. During your entire life, with how many partners of the opposite sex have you had sexual intercourse?

23. With how many partners have you had sexual intercourse within the past year?

24.With how many partners have you had sex on one and only one occasion?

25.With how many partners do you foresee having sexual intercourse during the next 5 years?

Appendix C

Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004)

How often do these items apply to you?

1 ----------------------	2 ------------------------	3 -----------------------	4 -----------------------	5
almost never	*sometimes*	*about half the time*	*most of the time*	*almost always*
(0–10%)	(11– 35%)	(36–65%)	(66–90%)	(91–100%)

1) I am clear about my feelings. (r)
2) I pay attention to how I feel. (r)
3) I experience my emotions as overwhelming and out of control.
4) I have no idea how I am feeling.
5) I have difficulty making sense out of my feelings.
6) I am attentive to my feelings. (r)
7) I know exactly how I am feeling. (r)
8) I care about what I am feeling. (r)
9) I am confused about how I feel.
10) When I'm upset, I acknowledge my emotions. (r)
11) When I'm upset, I become angry with myself for feeling that way.
12) When I'm upset, I become embarrassed for feeling that way.
13) When I'm upset, I have difficulty getting work done.
14) When I'm upset, I become out of control.
15) When I'm upset, I believe that I will remain that way for a long time.
16) When I'm upset, I believe that I'll end up feeling very depressed.
17) When I'm upset, I believe that my feelings are valid and important. (r)
18) When I'm upset, I have difficulty focusing on other things.
19) When I'm upset, I feel out of control.
20) When I'm upset, I can still get things done. (r)
21) When I'm upset, I feel ashamed with myself for feeling that way.
22) When I'm upset, I know that I can find a way to eventually feel better. (r)
23) When I'm upset, I feel like I am weak.
24) When I'm upset, I feel like I can remain in control of my behaviours. (r)
25) When I'm upset, I feel guilty for feeling that way.
26) When I'm upset, I have difficulty concentrating.
27) When I'm upset, I have difficulty controlling my behaviours.
28) When I'm upset, I believe that there is nothing I can do to make myself feel better.
29) When I'm upset, I become irritated with myself for feeling that way.
30) When I'm upset, I start to feel very bad about myself.
31) When I'm upset, I believe that wallowing in it is all I can do.
32) When I'm upset, I lose control over my behaviours.
33) When I'm upset, I have difficulty thinking about anything else.
34) When I'm upset, I take time to figure out what I'm really feeling. (r)
35) When I'm upset, it takes me a long time to feel better.
36) When I'm upset, my emotions feel overwhelming.

Appendix D

Emotion Regulation Questionnaire

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the following scale:

1---------------2----------------3----------------4----------------5----------------6----------------7

strongly disagree	neutral	strongly agree

1. ____ When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about.

2. ____ I keep my emotions to myself.

3. ____ When I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about.

4. ____ When I am feeling positive emotions, I am careful not to express them.

5. ____ When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm.

6. ____ I control my emotions by not expressing them.

7. ____ When I want to feel more positive emotion, I change the way I'm thinking about the situation.

8. ____ I control my emotions by changing the way I think about the situation I'm in.

9. ____ When I am feeling negative emotions, I make sure not to express them.

10. ___ When I want to feel less negative emotion, I change the way I'm thinking about the situation.

Appendix E

Demographics Questionnaire

1. Date: _____/______/______ (DD/MM/YY)
2. What is your current relationship status?
   - o In a relationship
   - o Single
3. Gender: __________________ (for example: male, female, intersex, agender, transgender mtf, transgender ftm, etc...)
4. Age: ________
5. Ethnic background: (please choose one or more)

Caucasian □	First Nations □
South Asian □	East Asian □
Hispanic □	Other □
African-Canadian □	(please specify):_______________

6. Please rate your motivation to begin a monogamous romantic relationship on the following scale: ___

0 I do not want to begin a monogamous romantic relationship in the next 6 months.

1 I do not care if I begin a romantic relationship in the next 6 months.

2 I would like to begin a romantic relationship in the next 6 months.

3 I intend to begin taking action to begin a romantic relationship soon in the next 6 months.

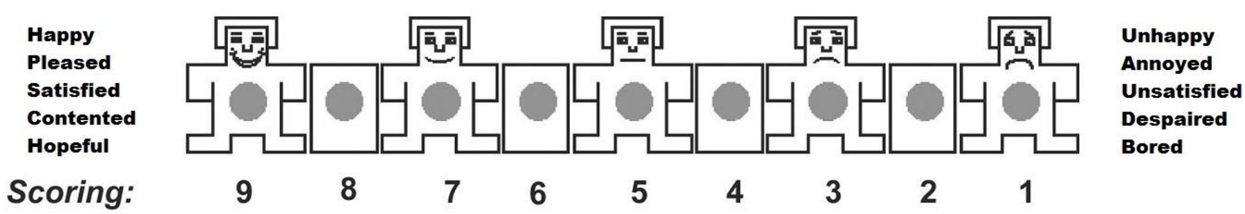
4 I am currently taking action to begin a romantic relationship.

Appendix F

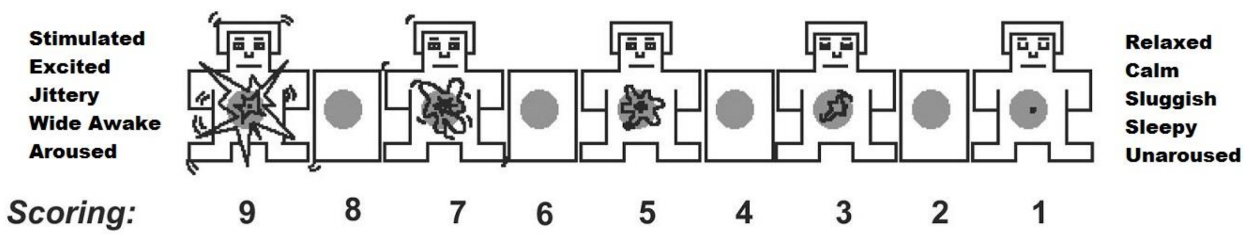
Self-Assessment Manikin

Please rate the clips (or task) based on how they make you feel on the following scales:

1. This is the happy-unhappy scale, in which the drawings range from a smiling figure to a frowning figure. At one extreme of this scale, you feel happy, pleased, satisfied, contented, hopeful. If you feel completely happy while viewing the clip, you can indicate this by filling in the bubble in the figure on the left (9). The other end of the scale indicates that you feel completely unhappy, annoyed, unsatisfied, melancholic, despairing, bored. You can indicate feeling completely unhappy by filling in the bubble in the figure on the right (1). The figures also allow you to describe intermediate feelings of pleasure. If you feel completely neutral, neither happy nor unhappy, fill in the bubble in the figure in the middle. If, in your judgment, your feeling of pleasure or displeasure falls between two of the figures, then fill in the circle between the figures. This allows you to make more finely graded ratings of how you feel when viewing the clips.



2. This is the excited/calm scale. At one extreme of this scale, you feel stimulated, excited, frenzied, jittery, wide awake, and aroused. If you feel completely aroused while viewing the clip, fill in the bubble corresponding to the figure at the left of the row (9). On the other hand, at the other end of the scale, you feel completely relaxed, calm, sluggish, dull, sleepy, and unaroused. You can indicate that you feel completely calm by filling in the bubble corresponding to the figure at the right (1). As with the happy/unhappy scale, you can represent intermediate levels by selecting the number which corresponds to the bubble in any of the other figures. If you are not at all excited nor at all calm, fill in the bubble which corresponds to the figure in the middle (5). Again, if you wish to make a more finely tuned rating of how excited or calm you feel, fill in the circle between any of the figures.



Appendix G

Interaction Record and Note Card

Welcome to Speed Dating!

Tonight you'll be meeting 7-13 dates. If you like someone and you both indicate that you'd like to go on another date - you're a match!

Before we get started, write the letter or number written below (your alphanumeric identifier) next to ID on your nametag. The other speed daters will use this alphanumeric identifier to refer to you on their Interaction Record. The entire process will be explained in a few minutes, but here is a quick summary of what you'll be doing and what this packet is for:

- You'll be meeting 8-12 people for 4 minutes each. You'll hear a bell when it's time to move on to the next person.
- The men will remain seated at the tables while the women rotate from man to man after each date.
- In between each date, you'll be given ~2 minutes to complete an Interaction Record and take some notes on the Note Card for the person you just met. Go ahead and flip through this packet, you will see there are 12 Interaction Records. These Interaction Records are entirely for purposes of our research - nothing you put on an Interaction Record will ever be revealed to the person you are rating or anyone else outside the research team. The last question is the most important - your answer to this question will determine who you are matched with.
- You also have a Note Card - this is for you to take home. Feel free to jot down some notes on your dates. These notes will help when you contact your matches. Nothing on the Note Cards influences the matching process - matches are created based on your answer to the final question on each Interaction Record.
- If you are ever without a date, feel free to get up and stretch, grab a snack, chat with the research assistants, do whatever you like. Just be ready for the next bell!
- Within 48 hours of your speed dating session you will find an email from us in your inbox with your matches. This email will not contain the names of your matches as this is confidential information. It will have your matches' alphanumeric identifier and their **study email address.** You must keep track of your matches' names on your Note Card so that you can match the codes in the emails to your matches' names.
- Your study email address was created just for this study and will be provided when you turn in your Interaction Records at the end of the night.
- Make sure you check your study email frequently or set up email forwarding to another account so you don't miss out on an email from a potential date!
- If you do go on a follow-up date remember that the risks are the same as a date with someone met outside of the speed dating session. Remember to always be safe!

Alphanumeric Identifier: _____________ Session date: ______________

Speed Dating **Interaction Partner Identifier**: ____________

I knew this person very well before today's event (circle a number):

1	2	3	4	5	6	7	8	9
Strongly Disagree				Neutral				Strongly Agree

Please rate each attribute on the following scale:

-3	-2	-1	0	+1	+2	+3
Extremely low on this trait						Extremely high on this trait

Ambitious	____	Intelligent	____
Attractive face	____	Kind and understanding	____
Attractive body	____	Loyal	____
Desires children	____	Financially secure	____
Faithful/value fidelity	____	Responsible	____
Generous	____	Enthusiastic about sex	____
Good sense of humour	____	Sociable	____
Healthy	____	Emotionally stable	____
Independent	____		

I wish to go on another date with this partner (circle one) YES / NO

If saying **NO** for a reason other than lack of attraction please briefly explain*:

____

____

* Please leave blank unless there is a moral, ethical, or legal reason why you could not say yes.

Note Card

This page is for your personal notes and will not be collected by the research team. Make sure you jot down a few things about each date as you will be interacting with many new people tonight and do not want to get your dates confused with one another. Have fun!

Interaction Partner Alphanumeric Identifier: ______

Notes:

Interaction Partner Alphanumeric Identifier: ______

Notes:

Interaction Partner Alphanumeric Identifier: ______

Notes:

Interaction Partner Alphanumeric Identifier: ______

Notes:

Interaction Partner Alphanumeric Identifier: ______

Notes:

Interaction Partner Alphanumeric Identifier: ______

Notes:

Appendix H

Follow-Up Questionnaire

The following questions refer to romantic experiences which occurredin the three months SINCE the speed dating session. Do not count any romantic experiences that occurred prior to the speed dating session.

1. With how many of your speed dating matches have you since had contact? ____

If you answered 1 or more please proceed to the next question. If 0 please proceed to question 5.

2. With how many of your speed dating matches have you had monogamous romantic relationships that lasted at least 10 days? _____

3. If you answered 1 or more to question 2, are you currently in a romantic relationship with a speed dating match? Yes/No

4. If Yes was answered to question 3, when did it begin? _________ (DDMMYY)

5. Have you had a date, sexual encounter, or begun a romantic relationship since the speed dating session with someone you met outside of the speed dating session?
   - o Yes
   - o No

For those who responded NO the survey is now complete.
For those who responded YES please proceed to question 6.

6. With how many of partners met outside of the speed dating session have you had monogamous romantic relationships that lasted at least 10 days that began after the speed dating session? _____

7. If question 6 was answered 1 or more, are you currently in a romantic relationship with someone met outside of the speed dating session? Yes/No.

8. If Yes was answered to question 7, when did it begin? _________ (DDMMYY)

Survey complete

Appendix I

Participant Information Letter for the Speed Dating Study

Dear Potential Participant:

My name is Laura Bailey, a graduate student and research assistant working with Dr. Ron Davis in the Department of Psychology at Lakehead University. We are conducting a research project called the ***Speed Dating Study***. The purpose of this project is to examine how cardiovascular functioning predicts new relationship formation. We plan to have participants come into the lab and have their cardiac functioning recorded while watching some relationship-related video clips and filming their own short dating videos. This latter dating video will only be viewed by research assistants. We are looking for participants who are (1) single, (2) interested in forming a monogamous romantic relationship in the next 6 months, (3) non-smokers, (4) not currently taking any cold or hypertension medications, (5) between the ages of 17 and 29 years of age, and (6) Lakehead University or Confederation College (Thunder Bay campus) students. This is what's involved should you choose to participate:

1. Complete 25 minutes of online questionnaires assessing various attitudes towards relationships, emotions, and behaviours.
2. Join us in the laboratory in the Lakehead University Psychology department for a 50-min session during which time you will watch two short relationship-related video clips, and film two short video clips of you describing your ideal romantic relationships and past negative romantic experiences. Your heart will be monitored throughout by attaching three ECG electrodes to the skin of your right and left shoulders and lower rib. We would also take note of your scale weight and height, and have you take your body measurements for hip, waist, and chest.
3. You will then participate in a speed dating session where you will get to go on 8-12 4-min dates with other participants of your preferred gender. This event takes place at The Study, a coffee shop on Lakehead University campus. If you and another participant both indicate your interest in going on another date with one another, then you are a match! While your formal participation in this part of the study concludes here, you will nevertheless have the chance to communicate with your matches afterward should you wish and see where things go.
4. You will be sent four very brief questionnaires (2-12 minutes) to complete by email over the next year so we can track the your formation of new romantic relationships. If you complete all four questionnaires you will be entered into a draw to win one of three Night Out prize packages including two movie tickets and a $50 gift certificate to a local restaurant.

Risks associated with this study include the possibility of experiencing a transient change in mood during the act of discussing past negative relationship experiences while being videotaped, watching negative video clips of actors, or while completing questionnaires of a personal nature. In addition, while the speed dates are often a positive experience, we cannot rule out the possibility of negative interactions. Similarly, the match information may be interpreted negatively, especially if you are not matched with individuals you indicated a desire to see again. Although follow-up dates are not part of your formal participation in the study you may wish to see people you met during the speed dating session again in the future. These follow-up dates carry the same risks as dates made with strangers (e.g. sexually transmitted infections, unwanted sexual advances, negative interactions, pregnancy) and you should proceed with caution. The other participants are not screened in any way. For example, they have not been screened for sexually transmitted infections or for mental stability. You are reminded to take all of the same precautions that you normally take to protect your own safety and health. You should be mindful of these potential risks while considering participation in this study. If any researcher on this project is freely informed by any participant of an incident of victimization, that researcher will be guided by LU's recently adopted policy (June 25, 2014) entitled Sexual Assault Policy and Protocol which can be found at https://www.lakeheadu.ca/faculty-and-staff/policies/general/sexual-misconduct-policy-and-protocol

Your participation in this project is completely voluntary and you may withdraw from it or choose not to answer any question at any time without penalty. All personal information that you provide will be kept completely confidential by assigning an anonymous code to it without your name. Dr. Davis is never aware of the identities of those who volunteer to participate in this study. Your information will be securely stored at Lakehead University for 5 years as per University regulations. Only myself and research assistants Chad Keefe, Healey Gardiner, Rachel Kushnier, and Bradey Alcock will have access to the information. In addition, your identifying information will be kept completely confidential in reports of results.

You will have the benefit of potentially forming new friendships and romantic relationships during the speed dating session. You will also be assigned an anonymous email address created for the study so that you may communicate with your matches without having to give out your personal contact information.

If at any point during or after this study you would like to speak to a mental health professional, Lakehead students can feel free to contact the Student Health and Counseling Centre at (807) 343-8361 (UC 1007) and Confederation College students contact the Confederation College Counselling Department at (807) 475-6618.

If you are registered in a Psychology undergraduate course at Lakehead University that is eligible for bonus points, your participation by way of questionnaire completion (0.5 points), attending the laboratory session (1.5 points), participation in the speed dating session (1 point), and follow-up questionnaires (1 point) would earn you a total of four points credited to your final grade in that course.

Please feel free to contact myself, Laura Bailey, with any questions that you might have. This project has been approved by the Lakehead University Research Ethics Board and the Confederation College Research Ethics Board. If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team, please contact Sue Wright at the Lakehead University Research Ethics Board at 807-343-8283 or at research@lakeheadu.ca.

Thank you for considering participation in this project.

Laura Bailey
lbailey1@lakeheadu.ca
(807) 707-0102

Dr. Ron Davis
ron.davis@lakeheadu.ca
(807)343-8646

Consent Form for the Speed Dating Study

Consent to Participate

By providing my name and signature below, I indicate that I have read the *Participant Information Letter* and that I have had the opportunity to receive satisfactory answers from the researchers concerning any questions that I might have about my participation in the ***Speed Dating Study***. I understand and agree to the following:

1. I understand the information contained in the *Participant Information Letter*;
2. I agree to participate in the manner outlined in the *Participant Information Letter*;
3. I am a volunteer and can withdraw at any time from this project without penalty or consequence;
4. I may choose not to answer any question asked in the questionnaires without penalty or consequence;
5. There are no anticipated physical risks associated with participation in this study. Should I experience any personal distress or discomfort during or following my participation, I know that I may personally contact the Health and Counselling Centre at Lakehead University (Thunder Bay campus) for Lakehead University students or the Confederation College Counselling Department for Confederation College Students to speak to a mental health professional;
6. My personal information will remain confidential and will be securely stored in the Department of Psychology at Lakehead University for 5 years as per University regulations;
7. Dr. Davis is never aware of the identities of those who volunteer to participate in this Study;
8. I will keep confidential personal information of all participants as may be disclosed to me during the speed dating portion of this study.
9. My personal information will remain anonymous should any publications or public presentations come out of this project;
10. I may receive a copy of the research findings upon completion if I so request;
11. I give my permission to be contacted by email for the purpose of participation in this study; and
12. I understand and agree to this "Consent to Participate"

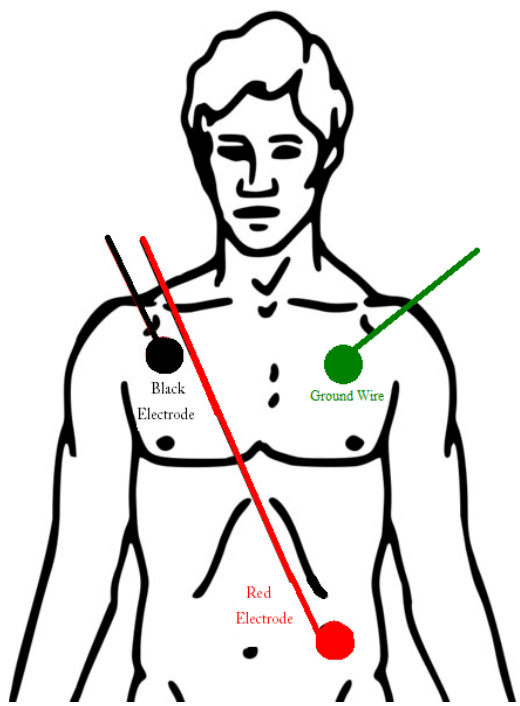
Full Name (*please print*)	Date
Signature *(please sign)*	Email
LU or Con College Student Number	Phone

Name of LU Psychology course and Professor (if applicable, for purposes of crediting bonus points)

Appendix J

Heart Rate Electrode Placement

As part of this experiment we are interested in collecting information on your heart rate. In order to do this, we will be asking you place electrodes on your skin in the locations below. There should be no need for you to remove any of your clothing in order to apply the electrodes. The researcher will check the electrode placement when you are done.



Please Follow These Steps:

1. Use the alcohol napkin to clean the areas that you will be placing the electrodes.

2. Peel back the protective covering from the black electrode. The surface will now be very sticky, so try not to catch it on your clothes. Place the electrode approximately 1 inch below your collarbone and 2 inches from your right armpit.

3. Peel back the protective covering on the red electrode. Place the electrode below your left ribcage. It sometimes helps to find you lowest left rib with your fingers and then place the electrode approximate 1 inch below this.

4. Peel back the protective covering on the green ground electrode. Place the electrode directly opposite the black electrode on the left side of the body.

This line is 1 inch long

Appendix K

Debriefing Form for Laboratory Session of Speed Dating Study

Dear Participant:

This sheet gives you a brief summary of the experience that you just completed in this study on cardiac functioning and romantic relationships.

Previous research has shown that patterns of cardiac reactivity, along with resting cardiac functioning, and body mass index, can predict which individuals will begin romantic relationships. This study seeks to understand the mechanisms underlying this heart - relationship status link. To do so we had to see how your heart reacts to watching video clips and making a video of your own. These activities may have produced fleeting psychological or bodily reactions.

If you would like to speak to a mental health professional about these experiences, Lakehead students can feel free to contact the Student Health and Counseling Centre at (807) 343-8361 (UC 1007) and Confederation College students can contact the Confederation College Counselling Department at (807) 475-6618.

Next you are invited to participate in the speed dating portion of the study (the fun part!). You will go on 4-minute mini-dates with 10-12 other participants. If you and any of your dates both indicate that you wish to see each other again, then you will be matched. You will then be free to contact your matches and see where things go!

Thank you for participating in our study so far! The researcher will now confirm your availability for the speed dating portion of the study.

Appendix L

Alphanumeric Identifier: ____

Debriefing Form for Speed Dating Session of Speed Dating Study

Dear Participant:

This sheet gives you a brief summary of the experience that you just completed in this study on cardiac functioning and romantic relationships.

Previous research has shown that patterns of cardiac reactivity, along with resting cardiac functioning and body mass index, can predict which individuals will begin romantic relationships. This study seeks to understand the mechanisms underlying this heart - relationship status link. To do so, first we had to see how your heart reacts to watching videos and filming your own video. Then today we had you participate in real mini-dates. Meeting people can be fun, but it can also be stressful.

If you found it stressful and want to speak to a mental health professional about these experiences, Lakehead students can feel free to contact the Student Health and Counseling Centre at (807) 343-8361 (UC 1007) and Confederation College students can contact the Confederation College Counselling Department at (807) 475-6618.

While your formal participation in this part of the study concludes here, you will nevertheless have the chance to communicate with your matches afterward should you wish and see where things go.You will be emailed your matches within 24 hours. Please log on to your study email with your study password (see below) to obtain your matches. To log on please go to mail.com. You can then communicate with your matches using the study email without revealing your personal contact information. If any researcher on this project is freely informed by any participant of an incident of victimization, that researcher will be guided by LU's recently adopted policy (June 25, 2014) entitled Sexual Assault Policy and Protocol which can be found at https://www.lakeheadu.ca/faculty-and-staff/policies/general/sexual-misconduct-policy-and-protocol.

Over the next year you will receive 4 emails with links to very brief questionnaires (2-10 minutes) about your relationship status, romantic experiences, and relationship satisfaction. This follow-up information is crucial to the study. When it comes time please take the few minutes to complete the questionnaire.

Thank you for participating in our study! If you have any questions about how to receive your matches, please ask now.

Study Email Address: __________________

Study Email Password: _____________________

Appendix M

Debriefing Form for Final Follow-Up Questionnaire of the Speed Dating Study

Dear Participant:

This sheet gives you a brief summary of the experience that you just completed in this study on cardiac functioning and romantic relationships.

Previous research has shown that patterns of cardiac reactivity, along with resting cardiac functioning and body mass index, can predict which individuals will begin romantic relationships. This study seeks to understand the mechanisms underlying this heart - relationship status link. To do so, first we had to see how your heart reacts to watching videos and filming your own video. Then we had you participate in real mini-dates to determine what is known as your mating strategiesas well as getting ratings of various attributes. Now over the past year we have been tracking your relationships using the follow-up questionnaires. It has been a long road! Thanks for sticking with us.

You have now completed all components of the study. If you have any questions regarding bonus points or any other aspect of the study feel free to contact research assistant Laura Bailey at lbailey1@lakeheadu.ca

Thank you again for participating in our study! You will now be entered into a draw to win one of three "Night Out" packages including dinner and a movie for two. We will announce the winners once the study has concluded.

Do you want a brief summary of the results of this study as that becomes available? If so, print your email address and we will send it to you when it is available:

Email address:___________________________________