Effects of Romantic Attachment and Partner Presence on Physiological Stress Reactivity

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ABSTRACT

Social support is an effective method of reducing symptoms of acute stress, and is thought to have greater impact when the individual feels secure in the relationship. This study investigated the physiological reactions of stress, here heart rate variability, skin conductance, and hand temperature, as mediated by attachment strength, within the context of a romantic relationship. Participants experienced a stressor either in the presence or absence of their romantic partner, and then the reverse. Analysis showed no significant interaction between the difference in participants' physiological data (change-score), attachment strength, and condition stressor, though upon bootstrapping the original data, the change-score was shown to vary significantly as a function of attachment style.

INTRODUCTION

Daily life involves a myriad of stressors. While research has shown that long-term stress may have connections to other chronic health problems, short-term stressors are known to induce stress patterns that are completely normal. Recently, long-term stress has been implicated as a potential cause for such physical symptoms as digestive problems, fluctuations in weight, and suppressed immune response, (Rosmond & Bjorntorp, 2000; Mayer et. al. 2001), as well as mental health effects such as anxiety and depression (McGonagle & Kessler, 1990). Short-term stressors on the other hand, can result in readily observable, temporary physiological changes including increased heart rate, elevated temperature, sweating, muscle tightness, and short-term anxiety (Kirschbaum, Pirke & Hemmhammer, 1993). Research has shown that one effective method of reducing stress symptoms comes from social support, especially from that of a significant other such as a parent, close friend, or romantic partner (Cobb, 1976; Coan, Schaefer & Davidson, 2006).

Just as infants seek the calming presence of a parent or caregiver when distressed (Ainsworth & Bell, 1970), adult individuals have been shown to seek the calming presence of their romantic partner in stressful situations (Hazan & Shaver, 1987). Furthermore, if the adult individual feels secure with their partner, the partner's presence will actually result in decreased hypothalamic-pituitary-adrenal (HPA) axis reactivity and decreased physiological reactivity than in adults with less secure bonds with their romantic partners (Powers, et. al. 2006; Feeney & Kirkpatrick, 1996). The current study seeks to investigate this finding further by examining women's physiological reactions to stress such as changes in hand temperature, heart rate, and skin conductance, and whether the presence of and attachment style to their respective romantic partners influences these reactions.

Attachment Styles

Originating in the work of John Bowlby, attachment theory stems from the study of evolution, psychology, and ethological theory, and it was meant to explore and explain interpersonal relationships between human beings (Bowlby, 1969). Mary Ainsworth extended this research to specifically examine attachment between infants and caregivers (Ainsworth & Bell, 1970). Through her work, she found that when infants experience distress in response to a threat, they naturally seek proximity to their parent or caregiver (Ainsworth, et. al. 1978). Caregivers who are available and responsive are able to regulate the feelings of distress for that infant, allowing them to experience emotional contentment and "felt-security" (Bowlby, 1973; Sroufe & Waters, 1977). This relationship and trust (or lack thereof) forms the basis for attachment theory. Infants whose caregivers are available and provide the "felt-security" usually exemplify a secure attachment, whereas infants and children who experience less "felt-security" exemplify other attachment styles, including anxious-ambivalent insecure attachment, anxious-avoidant insecure attachment, and disorganized insecure attachment.

The concept of attachment styles has since been extended to encompass adult attachment styles for romantic relationships as well as infant-caregiver relationships. Like infants, when faced with distressing situations, adults in romantic relationships may seek their partner in an attempt to regulate their emotions in situations of distress in hopes of returning to a state of comparative "felt-security" (Hazan & Shaver, 1987; Simpson & Rholes, 1994). More specifically:

> "The current view is that adult attachment is best captured by measuring the two dimensions of anxiety and avoidance (Fraley, Waller & Brennan, 2000). People high in anxiety desire closeness, but they are unable to achieve a stable sense of security; those high in avoidance are reluctant to rely on others and prefer to maintain emotional distance. Combining the dimensions of anxiety and avoidance yields each of the four attachment prototypes identified in previous research (Bartholomew & Horowitz, 1991)" (Powers, et. al. 2006, p. 614-615).

Research reveals four adult attachment styles for romantic partners: secure, anxious ambivalent, fearful avoidant, and dismissive avoidant (Bartholomew & Horowitz, 1991). Similar to their infant counterparts, adults who experience low anxiety and low avoidance feel comfortable relying on others and exemplify, the *secure attachment* style. If an adult experiences high anxiety and high avoidance they both desire and fear closeness, making them *fearful avoidant.* Some adults are high in anxiety but low in avoidance, so they desire closeness with others, but fear they will be abandoned; these individuals exemplify the *anxious ambivalent attachment style.* Individuals exemplifying the *dismissive avoidant* attachment style experience low anxiety but high avoidance. These individuals are reluctant to rely on others or form relationships. Research has shown that in stressful situations, individuals with insecure attachment styles may experience heightened stress when compared to other individuals with a secure attachment style, as the social buffering of stress may be compromised due to anxiety or avoidance (Coan, Schaefer & Davidson, 2006; Powers et. al. 2006; Ditzen, et. al. 2007; Krahé, et. al. 2015).

Physiological Effects of Stress

Whether in a medical setting or for individual self-interest, the first and easiest way to gauge stress levels is through self-assessment or informal interview. Due to the numerous variables associated with self-reporting however, the scientific reliability of these measures is less dependable than more objective, biological assessments. These assessments, such as that of measurement of hypothalamic-pituitary-adrenal (HPA) axis reactivity, are more reliable due to the fact that these biological stress processes are not consciously controlled, and therefore leave less room for subjective error (Dickerson & Kemeny, 2004; Powers, et. al. 2006).

HPA reactivity is assessed by measuring the concentration of the stress hormone cortisol, the final product of HPA reactivity, in the bloodstream. Levels of cortisol are relatively easy to measure, either by salivary or blood sample, and in addition to being a more objective way to assess stress levels than self-reporting, cortisol's very presence in the bloodstream provides a number of readily available physiological symptoms indicative of stress at a given moment, including increased heart rate, elevated temperature, sweating, muscle tightness, and anxiety (Smith & Vale, 2006). These symptoms are more commonly associated with situations of temporary distress, as opposed to prolonged feelings of stress. While chronic stress might be indicative of hyperactivation of the HPA axis, which research has linked to depressive or anxiety disorders (Young, et. al. 2004), the physiological symptoms of distress are temporary, and typically abate when the stressor has gone.

When data taken by self-reporting of stress levels was compared with HPA reactivity (cortisol), the two sets of data showed only a weak correlation (Cacioppo, Gardner & Bernston, 1999). Previous research has shown that social support from a significant other can act as a moderator for cortisol levels in women, and that perceived threat is lessened when that support is

present (Coan, Schaefer & Davidson, 2006; Ditzen, et. al. 2007; Krahé, et. al. 2015). In research that has examined attachment style stress buffering at the physiological level, participants with avoidant and anxious attachment styles experienced heightened levels of stress compared to participants with secure attachment styles when asked to perform a standard psychological stress test (Feeney & Kirkpatrick, 1996). This paper seeks to build off of previous research regarding such cortisol moderation in women and continue the research regarding social buffering in relation to attachment style on the physiological level; whether the presence of a romantic partner influences the physiological effects of stress, namely hand temperature, heart rate, and skin conductance, in women, and how attachment style or quality of that relationship plays a role in stress regulation.

Attachment Styles and Stress Reactivity

Security of a relationship then, or lack thereof, is a significant mediating variable when it comes to experiencing stress and subsequently, assessing that stress. Social support has been shown to be an effective psychological buffer for stress levels and perceived threat (Cobb, 1976; Coan, Schaefer & Davidson, 2006) with both psychological (self-reported) and physiological responses (Ditzen, et. al. 2007, Krahé, et. al. 2015). More noteworthy still, is how attachment style effects this mediation, with more securely attached individuals experiencing less psychological, physiological, and even biochemical distress when interacting with their partner (Coan, Schaefer & Davidson, 2006; Powers, et. al. 2006; Krahé, et. al. 2015).

Similar to infants and their caregivers, adult individuals seek the calming presence of their partner in stressful situations (Hazan & Shaver, 1987). However, the type of attachment style with one's romantic partner can influence just how calming the romantic partner is during

stressful situations. In one study, couples came into the lab and discussed a distressing episode that had recently occurred between them (Powers, et. al. 2006). Participants' cortisol levels were assessed by way of salivary sampling seven times over the course of the experiment. This included a comparative baseline entry sample, an anticipation sample, a discussion sample, and four completion samples taken at regular intervals for the hour after the discussion. The findings showed that individuals who were securely attached to their romantic partner produced less cortisol than individuals who were more anxious or avoidant in their attachment with their romantic partner (Powers, et. al. 2006). These findings indicate that the more insecure the attachment style to their romantic partner, the more likely the individuals will experience greater stress during situations of distress as indicated by greater HPA reactivity (increased cortisol levels).

Attachment style as a buffer for stress was further explored in another study, in which 16 married female participants were subjected to the threat of an electric shock (Coan, Schaefer & Davidson, 2006). The participants, whose physiological data was recorded using functional magnetic resonance imaging (fMRI), experienced this stressor either in the company of their husband, an anonymous male confederate, or alone. In each of the first two conditions, participants were instructed to hold the hand of their condition partner. The results indicated significantly less perceived threat when the participants were holding the hand of their respective husband, decreased perceived threat when holding the hand of a stranger, and comparatively high-perceived threat when alone. "Most strikingly, the effects of spousal hand-holding on neural threat responses varied as a function or marital quality, with higher marital quality predicting less threat-related neural activation," (Coan, Schaefer & Davidson, 2006, p. 1032). This study indicates then that social support can act as a buffer for stress (Cobb, 1976), and more

importantly, similar to the HPA reactivity mentioned in the study above, that that change can be observed on a neurological level. Furthermore, the degree of closeness and security (here marital quality) can have a noticeably significant affect on the degree of stress, which is then in turn, manifested on the physiological level.

A third and perhaps most relevant study, by Feeney & Kirkpatrick (1996), had 35 college women who were involved in serious relationships perform a standard psychological stress task, both in the presence of their partners as well as alone. The women's physiological reactions for heart rate and blood pressure were assessed both during a preliminary baseline period as well as during the mental arithmetic stress task. Results showed that participants with insecure attachment styles high in avoidance or anxiety displayed elevated stress levels when the partner-absent condition came first rather than second. The findings of this study indicate that the more secure the relationship, the better a partner's presence can act as a buffer for stress (Cobb, 1976), and additionally, suggests that insecure individuals, when compared with secure individuals, will exhibit higher symptoms of physiological stress when their partner is absent, and will experience comparatively lesser symptoms of stress when their partner is present.

THE CURRENT STUDY

In sum, research shows that romantic partners can act as a calming presence during stressful situations (Cobb, 1976; Hazan & Shaver, 1987), but these findings are dependent upon a person's attachment style with their partner or their marital quality (Gunnar, et. al. 1998; Coan, Schaefer & Davidson, 2006; Powers, et. al. 2006; Ditzen, et. al. 2007; Krahé, et. al. 2015; Feeney & Kirkpatrick, 1996). This past research has examined how the presence of a romantic partner influences neurological indicators of stress (Coan, Schaefer & Davidson, 2006; Powers, et. al.

2006) and also biochemical reactions (HPA reactivity or cortisol levels) to stressful situations (Powers, et. al. 2006). There is limited research however, regarding whether romantic partners might have the same potentially calming effect on physiological reactions as well, such as hand temperature, heart rate, and skin conductance, which are some of the physical manifestations of HPA reactivity (Feeney & Kirkpatrick, 1996). It is also unclear whether attachment style might influence physiological stress responses in participants, and whether partner presence might act as a mediator for those responses. Thus, in the current research, we directly examined the effects that the presence of a romantic partner and attachment style may have on physiological reactions to stressful situations.

Since most relevant past research has focused only on women's reactions to stressful situations (Feeney & Kirkpatrick, 1996; Coan, Schaefer & Davidson, 2006; Ditzen, et. al. 2007), we too measured the physiological responses of only the female participants.

We hypothesized one, that female participants would experience increased levels of physiological stress (e.g. faster heart rate, higher hand temperature, and increased galvanic skin response) when their partner was absent than when their partner was present, and that the more insecurely attached the participant, the more stress they would experience. Two, we hypothesized that securely attached participants who experienced a stressor with their partner present (partner-first condition) would experience less stress when alone afterwards in the same stressful situation than would insecurely-attached participants who experienced a stressor alone (alone-first condition) and then the partner joined them later during the same stressful event. This is due to the possibility of the partner acting as a stress buffer (Coan, Schaefer & Davidson, 2006).

Similarly, we hypothesized three, that insecurely attached participants in the partner-first condition would experience higher levels of stress upon the withdrawal of their partner than would securely attached participants. This hypothesis stems from how stress is mediated by relationship quality, and the less secure a relationship, potentially the more anxious an individual may become when "abandoned" in a stressful situation (Coan, Schaefer & Davidson, 2006; Krahé, et. al. 2015).

METHOD

PARTICIPANTS

Participants were recruited from a psychology clinic in a large Costa Rican university. Ten women in heterosexual relationships that had lasted a minimum of six months came to the clinic with their romantic partner. Participants' ages ranged from 19 to 51 with a mean age of 25 and a median age of 21. Participants' relationship length ranged from seven months to 14 years, with a mean relationship length of two years and a median relationship length of 18.5 months. Ten percent the couples were married. The study was conducted in Spanish.

DESIGN AND PROCEDURE

After giving informed consent and filling out a brief sociodemographics form, both female and male participants completed a 36-item Adult Attachment Style Questionnaire (Fraley, Waller & Brennan, 2000) to assess their attachment. We then collected baseline biofeedback measures for the female participants using a computer and sensory nodules. More specifically, heart rate, hand temperature, and skin conductance signs were recorded for five minutes without the participants' partners present. The experimenter began the data collection and then left the

participant alone for the duration of the baseline data collection. After the baseline biofeedback measures were taken, the female participants all experienced a stressor by way of sudden and unexpected darkness. Half the participants experienced the stressor alone, and the other half of participants experienced the stressor in the company of their romantic partner. This stressor lasted for five minutes. After five minutes, the conditions switched; the participants who experienced the stressor alone were joined by their romantic partner, and they experienced the stressor together for five additional minutes. In the other condition, the partner was asked to leave the room, and the participant experienced the stressor by themselves for the remaining five minutes. Biofeedback for heart rate, hand temperature, and skin conductance was recorded during this entire time. The experimenter marked the condition changes on the computerized data. After completing the stressor, participants were thanked and debriefed.

Materials

Attachment Measures.

The questionnaire used to determine participants' attachment styles was the 36-item Adult Attachment Style Questionnaire, also known as the Close Relationships Questionnaire (Fraley, Waller & Brennan, 2000). The questionnaire measures both self-reported participant anxiety and avoidance within the context of the relationship of the participant. The questionnaire poses statements and uses a Likert-type scale ranging from 1 equaling "strongly disagree" to 7 equaling "strongly agree" to gauge participant sentiment. The questions regarding anxiety include statements about abandonment and fear or rejection, while the items regarding avoidance include questions about partner intimacy and interpersonal comfort. Examples include such statements as "I am afraid I will lose my partner's love" and "it's easy to be affectionate with my partner."

STRESS TEST. Participants' distress was induced by way of sudden and unexpected darkness. The dark room, taken from Simpson and Rhole's (1994) study, was chosen because darkness, along with other stimuli including unexpected noises and looming objects, is considered a condition that activates the attachment system (Bowlby, 1973). Participants in both conditions, partner-first and alone-first, were instructed that they would wait a period of five minutes while their physiological data was recorded. Upon exiting the room, the experimenter flipped the light switch immediately before closing the door, leaving the participants in complete darkness. In the partner-first condition, the partner was left in the room with the participant. In the alone-first condition, the participant was alone in the room. After the first five minutes, the conditions were switched, and those who had been together with their partner first spent the next five minutes alone, while those who had experienced the stressor alone first experienced the next five minutes in the presence of their partner.

INFINITI BIOGRAPH. Participants' physiological reactions were assessed using ProComp Infiniti BioGraph, a type of biofeedback software produced by Thought Technology. The signs measured were raw heart rate, heart rate variability, hand temperature, and skin conductance, also known as galvanic skin response. Heart rate and heart rate variability, a function of heart rate that shows how data varies over time, was assessed using a blood volume pulse (BVP) sensor attached to the participant's finger. Hand temperature was assessed with an external thermometer attached to the participant's finger. Skin conductance was assessed by way of a metal sensory nodule attached to the participant's finger that measured electrodermal response. We collected data at baseline, during the first 5 minutes of the stressor (Segment 1) and during

an additional 5 minutes of data when the presence of the partner changed (Segment 2). For analyses, we created a change score where baseline was taken into account. In other words, baseline was subtracted from Segment 1 (or Segment 2). For example, skin conductance at Segment 1 was calculated:

$$\text{ChangeScore1} = \text{Baseline} - \text{Segment 1}$$

This was done for each variable: skin conductance, hand temperature, and heart rate.

RESULTS

The data for all three variables, hand temperature, heart rate variability, and skin conductance, were assessed for statistical significance at a = .05 and were analyzed using a repeated measures ANOVA with the change score for Segment 1 and Segment 2 as within factors. Attachment strength (high or low) and Stressor (Partner-first, Alone-first) were the between-factors.

HEART RATE. No three-way interaction was found to be present between the change score, attachment strength, and stressor condition, F (1, 5)= 1.850, p= .232, η_p^2= .270. As seen in Table 1, no two-way interaction was found between the change score and attachment strength, p= .527, or between the change score and the stressor condition, p= .422. In other words, heart rate variability did not vary significantly as a function of attachment style or stressor condition.

HAND TEMPERATURE. No three-way interaction was found to be present between the change score, attachment strength, and the stressor condition, F (1, 5)= .443, p= .535, η_p^2 = .081. However, as seen in Table 2, a two-way interaction was found between the change score and

attachment strength, p= .006, with the means suggesting decreased (more calm) hand temperature for more securely attached participants (M = -.03, SD = .35 at Time 1; M= -.75, SD= .36 at Time 2) and increased (higher stress) hand temperature for more insecurely attached participants (M = -.75, SD = .36 at Time 1; M= -.05, SD= .37 at Time 2). No two-way interaction was found between the change score and the stressor condition, p= .592.

In sum, hand temperature did not vary significantly as a function of attachment style and stressor condition. The data indicate, however, that hand temperature may be affected by attachment style regardless of stressor condition.

SKIN CONDUCTANCE. No three-way interaction was found to be present between attachment strength and stressor, F (1, 5)= .1.173, p= .328, η_p^2= .190. As seen in Table 3, contrary to the hypothesis, no two-way interaction was found between the change score and attachment strength, p= .214, or between the change score and stressor condition, p= .095. In other words, skin conductance did not vary significantly as a function of attachment style or stressor condition.

EXPLORATORY ANALYSIS

Upon bootstrapping the data (to N=4914) it was found that for all three variables, the p-value was significant, p=<.001 for the both the change-score itself and the interaction between the change-score and attachment. Additionally, the means were nearly identical to the original data set. The means, as seen in tables 4-6, indicate a significant change in recorded physiological stress as a function of attachment strength (secure or insecure), though the change was not found to be additionally linked to participants' stressor condition.

Bootstrapping found that for heart rate variability (BVP; Table 4), both securely attached participants and insecurely attached participants experienced increased stress from change-score one to change-score two regardless of stressor condition. For skin conductance (table 6), securely attached individuals experienced less stress during the change-score one interval, regardless of condition stressor, but this trend is reversed for hand temperature (Table 5) with securely attached participants being experiencing less stress during the change-score two interval.

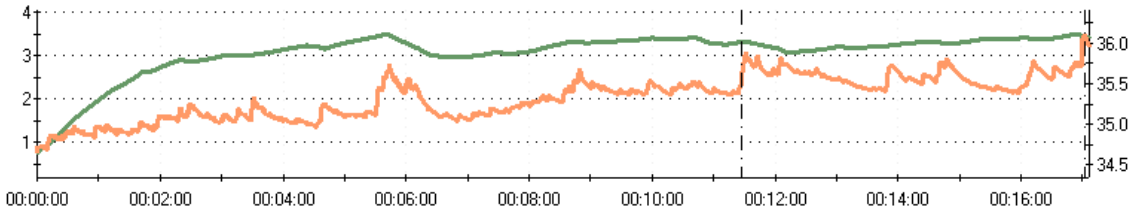
Within the original data set, visual representations of the participants' data lend themselves to the latter hypotheses. Below are visual representations of four of the original 9 participants' overall physiological data for both hand temperature and skin conductance (raw data for heart rate variability did not lend itself well to visual representation).

In accordance with hypothesis two, wherein it was proposed that securely attached participants in the Together First condition would experience less stress upon the withdrawal of their partner than would those participants in the Alone First condition when alone, noticeably more physiological symptoms of stress for one variable were recorded for the insecurely participant. Though the values for skin conductance seem relatively similar, the values for hand temperature are noticeably lower in the securely attached participant, indicating a stronger sense of calm, than in the insecurely attached participant.

Similarly, hypothesis three proposed that within the Together First condition, insecurely attached participants would experience stronger physiological symptoms of stress upon the withdrawal of their partner than would securely attached participants. In accordance with hypothesis three, the insecurely attached participant is shown to experience noticeably stronger physiological symptoms of stress both for skin conductance and hand temperature.

Though the original data may not indicate any major significant interactions, the raw data may trend in support of the hypotheses. The lack of significant interactions may stem from the limited diversity of answers due to the small participant pool, which is discussed more fully in subsequent sections.

CONDITION: TOGETHER FIRST (TOG1), INSECURE



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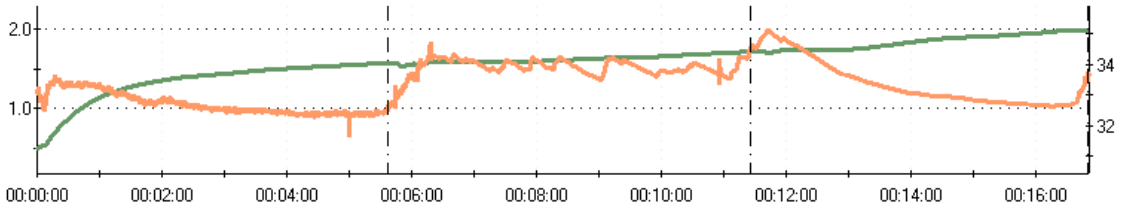
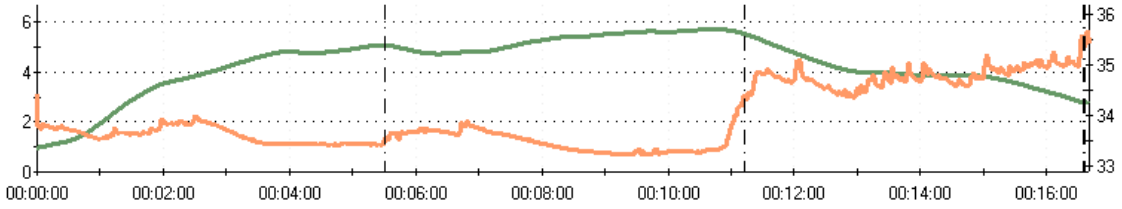
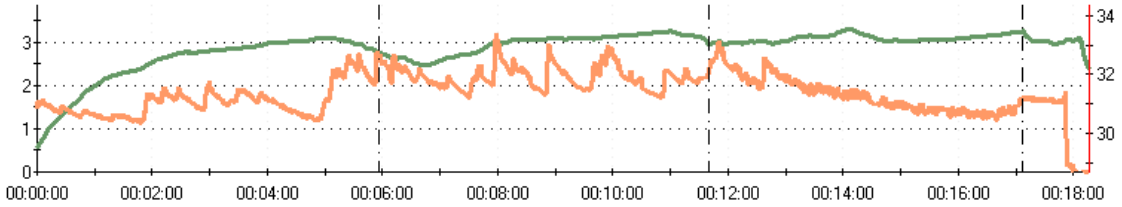


CONDITION: ALONE FIRST (A1), INSECURE



CONDITION: ALONE FIRST (A1), SECURE



DISCUSSION

The results for each respective variable, heart rate variability (BVP), hand temperature, and skin conductance, did not, overall, vary significantly as a function of attachment strength or of stressor condition. While the original data set indicated the possibility that more securely attached participants would experience fewer physiological stress symptoms than insecurely attached participants, no significant interaction was found between the change-score, attachment strength, and condition stressor. Upon bootstrapping the data; however, it was found that a significant interaction existed between the change-score values and attachment strength. The means additionally indicate that in the case of hand temperature, which was the only variable to show a significant interaction in the original data set (change score and attachment strength), securely attached participants experienced significantly fewer physiological symptoms of stress than did insecurely attached participants.

With regards to the hypotheses, the original data appear to trend in support of the latter two, though further research is required to ascertain whether this is a result of the limited diversity of answers due to the small participant pool. Hypothesis one proposed that participants would experience increased stress when in the absence of their partner, and that this would be more noticeable for more securely attached participants. This was not found to be the case, either in the original data set, or in the bootstrapped data set. Hypothesis two proposed that securely attached participants in the Together First condition (Tog1) would experience less stress upon the withdrawal of their partner than would those participants in the Alone First (A1) stressor condition when alone. Additionally, hypothesis three proposed that within the Together First condition, insecurely attached participants would experience stronger physiological symptoms of stress upon the withdrawal of their partner than would securely attached participants. Again, no

significant interactions were found, the means of the original data indicate possible trends in support of these two hypotheses.

In the case of heart rate variability, both securely and insecurely attached participants experienced an increased stress response for the difference between the baseline segment and time one (change score 1) and the baseline segment and time two (change score 2). In the case of skin conductance, securely attached participants experienced decreased stress for change score 1 when compared to insecurely attached participants, yet experienced increased stress for change score 2 when compared to insecurely attached participants. In sum, the bootstrapped data indicates a significant change in recorded physiological stress as a function of attachment strength, even though a three-way interaction between change score, attachment strength, and stressor condition was not found.

While the data indicates a significant interaction between change-score and attachment strength of participants, the means, with the possible exception of hand temperature, for both the original and bootstrapped data sets do not provide any indication that securely attached participants experience more or less physiological symptoms of stress than do insecurely attached individuals in situations of stress. This lack of clarity possibly has to do with either the type of stressor condition provided (unexpected darkness) or the number of original participants (9), which will both be further examined.

Stress Test

Participants' distress was induced by way of sudden and unexpected darkness. Prior to deciding on the dark room, the experimenters also considered presenting stressful images such as a car crash or feet on a high ledge. This presentation of distressing images was discarded

due to what the experimenters felt was a lack of consistency. Because each individual has different fears and desires, a consistent level of stress could not be guaranteed as a response.

When deciding on a stressor, special consideration was also given to the Trier Social Stress Test (TSST) (Kirschbaum, Pirke & Hellhammer, 1993), a standardized and frequently used module that includes elements of anticipation, public speaking, and mental arithmetic. Though the mental arithmetic section was the only segment seriously considered for use in this study, it was ultimately ruled out due to concerns of objectivity. The TSST is designed to be administered to only one participant at a time, with the experimenters or any confederates being the only observers expected. Because this study required individuals to participate with their romantic partner, the study design was not identical to the parameters typically used for the TSST. Furthermore, the experimenters for this study were more interested in general stress rather than performance-induced stress and it was unclear if the TSST with one's romantic partner in the room would induce the necessary stress baseline desired. While useful for provoking distress in individual participants, the experimenters worried that the performance anxiety aspect of the test would skew the results since individuals might have had differing mental mathematical abilities or performance anxieties, and the experimenters desired a more consistent stressor.

The dark room, the idea of which was taken from Simpson and Rhole's 1994 paper, was chosen because darkness, along with other stimuli, including unexpected noises and looming objects, is considered a primary condition that activates the attachment system (Bowlby, 1973). Future research may consider a different stressor, like those mentioned, to see if the type of stressor or type of stress induced matters.

Attachment and Stress

Feeney and Kirkpatrick (1996) found that participants with insecure attachment styles (high in avoidance or anxiety) displayed elevated stress levels when the partner-absent condition came first rather than second. This is contrary to what the original and bootstrapped data sets suggest. Though there was no significant interaction between the differences in physiological stress reactions from baseline to segment one or two (change scores), attachment strength, and condition stressor, marginal trends indicate that in the alone-first stressor condition, the more insecure the participant, the calmer they were initially and the more stressed they were upon their partner entering the room. This could be indicative of more *avoidant* attachment styles as opposed to more *anxious* attachment styles, where the partner's presence is actually a source of elevated physiological stress symptoms. Avoidant attachment styles are characterized by a reluctance to rely on others or form relationships, whereas anxious attachment styles are characterized by a fear of abandonment. It is possible that a majority of the insecurely attached participants would be characterized as fearful avoidant or dismissive avoidant, as opposed to anxious ambivalent. Future research could investigate whether different types of insecure attachment matters (see below for more details).

Limitations

The primary limitation of this study was the extraordinarily limited size of the participant pool. It was originally intended to have a minimum of 30 participants, but due to scheduling constraints, this sample size goal was not met. As a result, the original data set is comprised of nine data points. To account for this, we conducted a bootstrap analysis to simulate a dataset with more participants. The potentially limited diversity of the participants' answers however,

may have influenced the bootstrapped data, and resulted in a less varied data set than would be realistic given a larger participant pool. Given the limited number of participants, the researchers chose to score attachment in two categories, "secure" and "insecure". With a larger sample size, the researchers could have scored attachment style into the four categories identified in past research: secure, fearful avoidant, anxious ambivalent, and dismissive avoidant (Bartholomew & Horowitz, 1991). This would have allowed for a more nuanced look into the aspects of attachment style effect the expression of physiological symptoms of stress. It is possible, and even likely that, specifically for insecurely attached participants, the differences between anxiety and avoidance strengths could have significantly influenced expression of physiological stress symptoms.

Recommendations for Future Research

In light of the limited participant pool, a similar research study with an increased number of participants might reveal more specific findings. Similarly, with an increased participant pool, each of the four types of attachment style could be given their own attention, which would potentially reveal more nuanced findings.

Additionally, this study focused solely on the physiological reactions of stress in women, and it would be of interest to see if reactions in women differ significantly from reactions of men, perhaps their romantic partners, in identical situations. Similarly, this study was conducted at a Costa Rican university with participants from Costa Rica and the surrounding region. It is possible that Latin American participants experience stress differently than do other demographics, or even interact with their romantic partners in different ways. Future studies could compare data taken from different demographics (i.e. American, Western European,

Southeast Asian, etc.) to the Costa Rican data and note any cross-cultural differences that may arise.

Furthermore, this study focused on the physiological reactions to stress heart rate variability, hand temperature, and skin conductance. Though this provided an excellent set of physiological data, it would be prudent for future research to additionally survey participants as to their felt acute stress both before and after the stressor experience, and to compare their self-reporting to their physiological data. Additionally, it would have been interesting to compare participants' physiological data to stress data obtained by salivary cortisol sampling as cortisol is the primary stress hormone and cortisol levels would have provided a definitively more objective look at participants' stress levels.

CONCLUSION

The purpose of this study was to contribute to the growing field of interdisciplinary research regarding stress and social support. The results of this study supported previous findings regarding how attachment style affects the intensity of the expression of some physiological reactions, notably heart rate variability, hand temperature, and skin conductance, when confronted with an unexpected stressful situation.

Though this study was limited by its small participant pool, the study provided insight into how social support of a romantic partner could act as a buffer in stressful situations and how both attachment strength and style may mediate that. Furthermore, additional research regarding objective stress measures and attachment style may be of interest to confirm or expand on this study's findings, especially research utilizing rigorous self-reporting as well as salivary cortisol sampling. In sum, it is prudent to be aware of the potential ramifications of social support when

in stressful situations, and for individuals involved in romantic relationships to be aware that the more secure an attachment style, the likely more confident and content each and any partner may be, both in times of stress and calm.

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TABLES

TABLE 1: HEART RATE VARIABILITY (BVP)

	N	*M*	*SD*	*F*	*p*
BVP change score				5.44	.067
T1	9	.03	.08		
T2	9	.08	.06		
BVP * attach				.46	.527
T1 * Secure	5	.02	0.10		
T1 * Insecure	4	.04	0.07		
T2 * Secure	5	.09	0.06		
T2 * Insecure	4	.08	0.07		
BVP * Condition				.76	.422
T1*Tog1	5	.04	.03		
T1*A1	4	.02	.13		
T2*Tog1	5	.07	.03		
T2*A1	4	.10	.08		
BVP*Attach*Cond				1.85	.232
T1*Secure*Tog1	3	.03	.04		
T1*Secure*A1	2	.02	.19		
T1*Insecure*Tog1	2	.05	.02		
T1*Insecure*A1	2	.03	.12		
T2*Secure*Tog1	3	.05	.03		
T2*Secure*A1	2	.15	.03		
T2*Insecure*Tog1	2	.10	>.001		
T2*Insecure*A1	2	.06	.11		

*Time Segments

Time segments above are notated as either T1 or T2 with T1 referring to the first timed segment and T2 referring to the second timed segment (excluding the baseline timed segment).

**Condition Stressor

Condition stressors are notated as either Tog1 or A1, with Tog1 referring to the participant experiencing the stressor in the presence of her partner first, and A1 referring to the participant experiencing the stressor alone first.

TABLE 2: HAND TEMPERATURE

	N	M	SD	F	P
Temp change score				12.22	.017
T1	9	-.08	.33		
T2	9	-.44	.50		
Temp *attach				21.344	**.006**
T1 * Secure	5	-.03	.35		
T1 * Insecure	4	-.15	.35		
T2 * Secure	5	-.75	.36		
T2 * Insecure	4	-.05	.37		
Temp*Condition				.33	.592
T1*Tog1	5	-.21	.20		
T1*A1	4	.08	.43		
T2*Tog1	5	-.64	.45		
T2*A1	4	-.19	.49		
Temp*Attach*Cond				.44	.535
T1*Secure*Tog1	3	-.15	.13		
T1*Secure*A1	2	.15	.59		
T1*Insecure*Tog1	2	-.30	.33		
T1*Insecure*A1	2	<.001	.41		
T2*Secure*Tog1	3	-.87	.41		
T2*Secure*A1	2	-.58	.31		
T2*Insecure*Tog1	2	-.31	.35		
T2*Insecure*A1	2	.21	.08		

*Time Segments
Time segments above are notated as either T1 or T2 with T1 referring to the first timed segment and T2 referring to the second timed segment (excluding the baseline timed segment).

**Condition Stressor
Condition stressors are notated as either Tog1 or A1, with Tog1 referring to the participant experiencing the stressor in the presence of her partner first, and A1 referring to the participant experiencing the stressor alone first.

TABLE 3: SKIN CONDUCTANCE

	N	M	SD	F	P
SC change score				.04	.847
T1	9	-.75	.51		
T2	9	-.74	.68		
SC *attach				2.03	.214
T1 * Secure	5	-.88	.40		
T1 * Insecure	4	-.60	.65		
T2 * Secure	5	-.51	.60		
T2 * Insecure	4	-1.02	.76		
SC*Condition				4.23	.095
T1*Tog1	5	-.92	.42		
T1*A1	4	-.55	.60		
T2*Tog1	5	-.42	.26		
T2*A1	4	-1.14	.88		
SC*Attach*Cond				1.17	.328
T1*Secure*Tog1	3	-.84	.38		
T1*Secure*A1	2	-.95	.59		
T1*Insecure*Tog1	2	-1.05	.62		
T1*Insecure*A1	2	-.15	.29		
T2*Secure*Tog1	3	-.26	.08		
T2*Secure*A1	2	-.88	.98		
T2*Insecure*Tog1	2	-.65	.30		
T2*Insecure*A1	2	-1.39	1.05		

*Time Segments
Time segments above are notated as either T1 or T2 with T1 referring to the first timed segment and T2 referring to the second timed segment (excluding the baseline timed segment).

**Condition Stressor
Condition stressors are notated as either Tog1 or A1, with Tog1 referring to the participant experiencing the stressor in the presence of her partner first, and A1 referring to the participant experiencing the stressor alone first.

TABLE 4: BVP BOOTSTRAPPED DATA

	N	*M*	*SD*	*F*	*p*
BVP Change Score				2829.6	**>.001**
T1	4914	.03	.08		
T2	4914	.08	.06		
BVP*Attach				132.74	**>.001**
T1*Secure	2730	.02	.09		
T1*Insecure	2184	.04	.06		
T2*Secure	2730	.09	.05		
T2*Insecure	2184	.08	.06		

*Time Segments
Time segments above are notated as either T1 or T2 with T1 referring to the first timed segment and T2 referring to the second timed segment (excluding the baseline timed segment).

TABLE 4: HAND TEMPERATURE BOOTSTRAPPED DATA

	N	*M*	*SD*	*F*	*p*
Temp Change Score				10650.81	**>.001**
T1	4194	-.08	.31		
T2	4194	-.44	.47		
Temp*Attach				18630.68	**>.001**
T1*Secure	2730	-.03	.31		
T1*Insecure	2184	-.15	.30		
T2*Secure	2730	-.75	.32		
T2*Insecure	2184	-.05	.32		

*Time Segments
Time segments above are notated as either T1 or T2 with T1 referring to the first timed segment and T2 referring to the second timed segment (excluding the baseline timed segment).

TABLE 5: SKIN CONDUCTANCE BOOTSTRAPPED DATA

	N	*M*	*SD*	*F*	*p*
Skin Cond.					**>.001**
Change Score					
T1	4194	-.75	.48		
T2	4194	-.74	.64		
Temp*Attach					**>.001**
T1*Secure	2730	-.88	.36		
T1*Insecure	2184	-.60	56		
T2*Secure	2730	-.51	.53		
T2*Insecure	2184	-1.02	.66		

*Time Segments
Time segments above are notated as either T1 or T2 with T1 referring to the first timed segment and T2 referring to the second timed segment (excluding the baseline timed segment).

APPENDIX

SURVEY MATERIALS

Adult Attachment Style Questionnaire (Fraley, Waller & Brennan, 2000)

The 36 statements in this questionnaire concern how you generally feel in emotionally close relationships. We are interested in how you *generally* experience relationships, not just in what is happening in a current relationship. Respond to each statement by indicating how much you agree or disagree with it.

1. I'm afraid that I will lose my partner's love.

   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

2. I often worry that my partner will not want to stay with me.

   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

3. I often worry that my partner doesn't really love me.

   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

4. I worry that romantic partners won't care about me as much as I care about them.

   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

5. I often wish that my partner's feelings for me were as strong as my feelings for him or her.

   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

6. I worry a lot about my relationships.

   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

7. When my partner is out of sight, I worry that he or she might become interested in someone else.

   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

8. When I show my feelings for romantic partners, I'm afraid they will not feel the same about me.

   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

9. I rarely worry about my partner leaving me.

   Strongly disagree 1 2 3 4 5 6 7 Strongly agree

10. My romantic partner makes me doubt myself.

    Strongly disagree 1 2 3 4 5 6 7 Strongly agree

11. I do not often worry about being abandoned.

    Strongly disagree 1 2 3 4 5 6 7 Strongly agree

12. I find that my partner(s) don't want to get as close as I would like.

    Strongly disagree 1 2 3 4 5 6 7 Strongly agree

13. Sometimes romantic partners change their feelings about my for no apparent reason.

    Strongly disagree 1 2 3 4 5 6 7 Strongly agree

14. My desire to be very close sometimes scares people away.

    Strongly disagree 1 2 3 4 5 6 7 Strongly agree

15. I'm afraid that once a romantic partner gets to know me, he or she won't like who I really am.

    Strongly disagree 1 2 3 4 5 6 7 Strongly agree

16. It makes me mad that I don't get the affection and support I need from my partner.

    Strongly disagree 1 2 3 4 5 6 7 Strongly agree

17. I worry that I won't measure up to other people.

    Strongly disagree 1 2 3 4 5 6 7 Strongly agree

18. My partner only seems to notice me when I'm angry.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

19. I prefer not to show a partner how I feel deep down.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

20. I feel comfortable sharing my private thoughts and feelings with my partner.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

21. I find it difficult to allow myself to depend on romantic partners.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

22. I am very comfortable opening up to romantic partners.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

23. I don't feel comfortable opening up to romantic partners.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

24. I prefer not to be too close to romantic partners.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

25. I get uncomfortable when a romantic partner wants to be very close.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

26. I find it relatively easy to get close to my partner.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

27. It's not difficult for me to get close to my partner.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

28. I usually discuss my problems and concerns with my partner.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

29. It helps to turn to my romantic partner in times of need.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

30. I tell my partner just about everything.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

31. I talk things over with my partner.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

32. I am nervous when partners get too close to me.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

33. I feel comfortable depending on romantic partners.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

34. I find it easy to depend on romantic partners.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

35. It's easy for me to be affectionate with my partner.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

36. My partner really understands me and my needs.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree