5-2013

Social Affiliation: A Model of Anxious Avoidance in Women

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SOCIAL AFFILIATION:

A MODEL OF ANXIOUS AVOIDANCE IN WOMEN

By

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A DISSERTATION

Presented to the Faculty of

The Graduate College at the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Doctor of Philosophy

Major: Psychology

Under the Supervision of Professor Debra A. Hope

Lincoln, Nebraska

May, 2013

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University of Nebraska, 2013

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There is substantial evidence demonstrating that women experience greater anxiety and fear compared to men. However, our understanding of specific factors accounting for women's greater vulnerability remains rather limited. Taylor and colleagues (2000) proposed that women may have a different biobehavioral response to stress, which has evolved to protect and nurture offspring. The tend-and-befriend model provides new opportunities to explore underlying processes that may contribute to women's greater anxiety and fear.

The present study examined women's stress response combined with the absence of positive social contact as it relates to the presentation of fear and anxiety. One hundred and seven women completed a battery of questionnaires and following a conversation with other participants were informed that no one had chosen to work with them for the next task. Following the initial social rejection, we manipulated social contact by providing bogus feedback based on their personality profiles informing them that they are likely to have a lonely future (future alone), or that they will have many fulfilling

relationships (future belonging), or did not give any information about their future (control). Then, participants completed a behavioral approach task (BAT), which entailed approaching a live tarantula. Self-reported affect and salivary cortisol were measured throughout the experiment, and subjective anxiety and behavioral avoidance was assessed during the BAT. Surprisingly, there was no effect on cortisol secretion following the social rejection and the future social contact condition, although there were significant differences in self-reported affect following the social stressors. The social rejection resulted in elevated negative affect and participants in the future alone condition displayed an increase in negative affect compared to participants in the future belonging and control conditions following the future social contact manipulation. Contrary to our expectation, the manipulation about future social contact did not have an effect on avoidance behavior or subjective anxiety during the BAT. Limitations, future directions, and implications of the current findings are discussed.

DEDICATION

To my family – my brother, Pantcho, my partner, Iliian, and my parents, Lilly and Peio. I am grateful for their endless love and support.

ACKNOWLEDGEMENTS

I am grateful for all the mentors and supervisors I have had in the last six years. Most notably, I would like to express my deepest gratitude to my advisor, Dr. Debra Hope, for her dedicated mentorship. Her brilliance as a teacher, researcher, and clinician has greatly influenced my professional development. I would also like to thank Dr. Jeffrey French for providing significant guidance and support on the physiological portion of this project, and for conducting the cortisol assay. The members of my dissertation committee, Drs. Sarah Gervais, Dennis McChargue, and Meghan Davidson, deserve a special recognition for their involvement, guidance, and thoughtful feedback on this project. Many thanks to my research assistance for sacrificing their afternoons and weekends to make this project successful: Kate Brungardt, Cassandra Fisher, Kayla Glesinger, Brianne Peterson, Emilee Sadler, and Sydney Vanderheiden. Enormous thanks to Christian Elowsky for lending his expertise and three tarantulas for this project. I would like to thank Dr. Scott Stoltenberg and his graduate student, Christa Christ, for providing on-campus freezer space to store saliva samples.

I would also like to thank my parents, Lilly Rousseva-Stoyanova and Peio Stoyanov, for the enormous source of support that has allowed me to undertake my academic endeavors with confidence. Your bright outlook, wisdom, and passion have helped shape my personal and professional goals. My brother, Pantcho Stoyanov, deserves special recognition for the encouragements along the way and for reminding me to stay focused on the bigger picture. Last but not least, I am extremely grateful for my partner, Iliian Roussev, who provided unwavering support and patience throughout the entire process.

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CHAPTER ONE: LITERATURE REVIEW

Introduction

It is well established that women report greater fear and anxiety than men (e.g., Kirkpatrick, 1984; Weissman & Merikangas, 1986). Large epidemiological studies have consistently reported that women are at a greater risk for developing anxiety disorders compared to men, with lifetime prevalence rates of 36.4% for women and 25.4% for men (Kessler Chiu, Demler, & Walters, 2005). Cross-cultural studies also demonstrate that women are more fearful of harmless animals or disgust-relevant animals, such as spiders, worms, or snakes (Davey, McDonald, & Hirisave, 1998). Although it has been consistently documented that women are more fearful of harmless animals (e.g., Arrindell et al., 2003) and disgust-relevant animals (e.g., Tucker & Bond, 1997), they seem no more fearful that men when it comes to threat-posing animals, such as sharks, lions, or tigers (e.g., Davey et al., 1998; Tucker & Bond, 1997). This gender effect has also been observed in children and appears to be present as young as age six (Anderson, Williams, McGee, & Silva, 1987). A community study of 1079 adolescents indicated that girls were more likely to have a current or lifetime anxiety disorder than boys (Lewinsohn, Gotlib, Lewinsohn, Seeley, & Allen, 1998). However, there is reason to believe that women become more fearful with age. A longitudinal study using data from the Dunedin Multidisciplinary Health and Development Study examining etiological factors of separation anxiety at ages 3, 11, and 18 found no differences in separation anxiety between boys and girls at age 3, but reported that girls experienced more separation anxiety than boys at ages 11 and 18 (Poulton, Milne, Craske, & Menzies, 2001). Similarly, Velez, Johnson, and Cohen (1989) reported no gender effect at ages 9 to 12 in

overanxious disorder, which was replaced with generalized anxiety disorder (GAD) in the DSM-IV (DSM-IV; APA, 1994), while more girls than boys met criteria for overanxious anxiety in adolescence (ages 13-18). Thus, it appears that anxiety becomes more pronounced in girls in adolescence, while results about the prevalence of anxiety disorder in younger children appear to be mixed.

In addition to subjective reports of fear and anxiety, the gender effect has also been observed in avoidance behavior with women displaying more avoidance than men (e.g., Cameron & Hill, 1989; Thyer, Himle, Curtis, Cameron & Nesse, 1985). Results from our laboratory (McLean & Hope, 2010; Stoyanova & Hope, 2011) have further added to the literature on avoidance. With minor variations in the procedural design, both studies demonstrated that women were less likely to approach a feared stimulus (tarantula) and completed fewer steps on the Behavioral Approach Task (BAT) compared to men.

Despite the well-documented gender effect in anxiety disorders, our understanding of why women are more vulnerable to develop anxiety disorders remains limited. Recently, there has been a growing emphasis on women's mental health with the Surgeon General's report (2005) emphasizing that biological sex, in addition to environmental factors, matters. Thus, identifying gender-based risk factors and biological differences are of utmost interest as they may aid in the design of preventative interventions and help modify current treatments to strengthen relapse preventative methods specifically designed for women.

Fear and Anxiety

Emotion theorists differentiate between fear (basic emotion) and anxiety (general mood state). It has been argued that basic emotions (i.e. fear) do not involve any cognitive processes, whereas moods (such as anxiety) are believed to involve cognitive processes (e.g., Izard, 1992). A further distinction between the two states is duration, with basic emotion being relatively brief compared to mood states (Davidson & Ekman, 1994). Fear is designed to protect individuals from potentially harmful situations; it usually involves escape and there is generally an identifiable threat (Marks, 1987). Barlow (1988, 2001) defines anxiety as a cognitively bound emotion that is more continuous and tends to be triggered by feelings of uncontrollability of future events.

Etiological Factors for Anxiety in Women

Several theories have been proposed to explain women's greater vulnerability for anxiety and fear-related disorders. First, biological factors are discussed, including genetic and other vulnerability factors such as negative affectivity and behavioral inhibition. Then, socialization of gender roles are reviewed followed by an examination of the literature on how social stress and traumatic events may account for women's greater vulnerability to anxiety. Lastly, differences in reporting bias are examined.

Genetic and Other Vulnerability Factors

Given the high prevalence of anxiety disorders, researchers have examined the role of genes in the development of anxiety disorders. Familial studies are reviewed to examine whether anxiety disorders run in families and to explore to what extent they are heritable. Next, data from twin studies are presented to examine whether the familial risk of developing an anxiety disorder is genetic or due to environmental factors. Following

the genetic discussion, the review examines other vulnerability factors for anxiety disorders and explores their level of heritability. In particular, the discussion focuses on temperamental characteristics, such as negative affect and behavioral inhibition.

Genetic influence. There has been increasing support for a nonspecific genetic influence, including biological sex, in the development of anxiety disorders (Barlow, 2000). Genetic factors have been shown to account for up to one-third of the variance in phobias (Kendler, Neale, Kessler, Heath, & Eaves, 1992) where diagnosis of agoraphobia, social phobia, and specific phobias were subsumed under the phobia category. The examination of heritability risk for the development of anxiety disorders has relied primarily on family and twin studies. The heritability of panic disorder appears to be the most researched of the anxiety disorders, with studies consistently reporting a greater risk for panic disorder among individuals of first-degree relatives with a current diagnosis of panic disorder, also commonly referred to as 'probands,' compared to individuals whose relatives do not have panic disorder (Fyer, Mannuzza, Chapman, Lipsitz, Martin, & Klein, 1996; Goldstein, Wickramaratne, Horwath, & Weissman, 1997; Weissman, 1993). Goldstein and colleagues (1997) examined familial risk by age of onset and reported a 17-fold increase in the risk of panic disorder in relatives of probands whose onset of panic disorder was before the age of 20, compared to a 6-fold risk for relatives of probands with a later onset (over 20 years of age) of panic disorder. In a meta-analysis, Hettema, Neale, and Kendler (2001) reported a strong familial connection for panic disorder, with a 10% aggregate risk of developing panic disorder in family members of probands, compared to a 2% risk in relatives of controls. A similar pattern of a greater risk for anxiety disorders in first-degree family members of probands was

observed for GAD, social phobia, agoraphobia, and specific phobias in the same study. For Obsessive Compulsive Disorder (OCD), the authors reported an 8.2% aggregate risk for first-degree family members of probands with OCD, compared to a 2% risk in family members of controls, further confirming that most anxiety disorders tend to run in families.

While familial studies offer valuable information about the likely occurrence of disorders in relatives of affected probands, they are limited in providing conclusive evidence whether the cause is genetic or environmental. Therefore, researchers have used twin pairs to examine whether a familial contribution is primarily genetic or environmental. Middeldorp and colleagues (2005) reported a greater familial risk for the development of panic disorder with or without agoraphobia, social phobia and generalized anxiety disorder using data from a large twin study conducted in Australia (n=2470) and the Netherlands (n=1256). Although the authors suggest that the results could have been influenced by genetic factors, their conclusion relied on speculation based on previously reported twin studies suggesting that twin concordance on neuroticism and anxiety are fully explained by genetic factors (see Boomsma et al., 2000; Jardine, Martin, & Henderson, 1984). Since the results in the Middeldorp and colleagues' study (2005) were based on data from dizygotic (DZ) twin pairs, the absence of monozygotic (MZ) twin pairs prevented the authors from testing whether genetic or environmental factors accounted for the observed effects. Others however, have found a higher concordance for panic disorder among MZ twins (73%) compared to DZ twins (0%), suggesting a strong genetic contribution to panic disorder (Perna, Caldirola, Arancio, & Bellodi, 1997). However, it should be noted that the Perna and colleagues

(1997) study relied on a relatively small sample consisting of 34 DZ twins and 26 MZ twins, which may explain the lack of observed concordance among DZ twins. In addition to examining familial contribution to anxiety disorders, Hettema, Neale, and Kendler (2001) also included twin studies in their meta-analysis to examine whether the contribution was explained largely by genetic or environmental factors. They reported that 30-40% of the variance in panic disorder and 20-40% of the variance in phobias, which in their study included social phobia, agoraphobia, and specific phobias, was accounted for by additive genetic influences (representing the effects of several alleles from different loci). Similarly, Nelson and colleagues (2000) reported that 28% of the variance in social phobia was accounted for by additive genetic factors. Although genetic studies consistently demonstrate a genetic contribution to the development of anxiety disorders, genetics seem to account for only 20-40% of the variance depending on the diagnosis examined. Thus, it appears that most of the variance is explained by individual, or non-shared, environmental influences, and the interaction of genetic contribution and environmental factors such as stressful life events.

In regards to the gender effect, data appears to be rather mixed. Skre, Onstad, Edvardsen, Torgersen, and Kringlen (1994) reported that female family members of probands were more likely to develop anxiety disorders compared to male relatives. However, several studies investigating genetic and environmental risk factors for specific anxiety disorders, have found no difference in heritability estimates between men and women (Hettema, Neale, & Kendler, 2001; Kendler, Heath, Martin, & Eaves, 1987; Mackintosh, Gatz, Wetherell, & Pedersen, 2006; Middeldorp et al., 2005). In a large study, Hettema, Prescott, Myers, Neale, and Kendler (2005) used structural equation

modeling to explore factors accounting for the comorbidity in anxiety disorders in a sample of over 5000 male-male and female-female twin pairs. They reported that men and women have similar genetic and environmental risk factors for anxiety disorders.

Temperamental characteristics. In addition to examining familial contribution to anxiety, researchers have also focused on exploring underlying vulnerability factors for anxiety disorders, such as personality characteristics. Neuroticism, or the tendency to become more emotionally reactive in response to stress and experience negative affect (Eysenck, 1967), has been associated with increased risks for anxiety and depression (Clark, Watson, & Mineka, 1994; Watson, Gamez, and Simms, 2005). More recently, the term negative affectivity has been used to describe the same personality characteristic as neuroticism (Watson & Clark, 1984). The most commonly used measures to assess negative affectivity have been the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975; EPQ-R (S); Eysenck, Eysenck, & Barrett, 1985) and the negative affect subscale on the Positive and Negative Affect Scale (PANAS; Watson, Clark, & Tellegen, 1988). In a large twin study conducted in Australia (n=21,222) and the United States (n=24,905) that incorporated immediate family members such as parents, children, siblings, and spouses, Lake and colleagues (2000) provided strong evidence for a genetic contribution to neuroticism, whereas shared environmental effect, or the influences that differentiate one family environment from another, did not provide a strong contribution. However, a significant part of the variance was accounted for by non-shared environmental influences, or environmental factors that affect individual family members differently (e.g., sickness, differential treatment by parents or teachers, peers). In fact, the variance accounted for by non-shared environmental factors was estimated at 37% in

women and 43% in men (Lake, Eaves, Maes, Heath, & Martin, 2000). A gender effect has been observed in heritability studies, with Lake and colleagues (2000) reporting a greater genetic contribution to individual differences in neuroticism for women (broad heritability 41%) than men (broad heritability 35%), consistent with reports in previous studies (e.g., Finkel & McGue, 1997).

Similar to results related to negative affectivity, studies have also suggested a connection between anxiety and behavioral inhibition as defined by Kagan, Reznick, Clarke, Snidman, and Garci-Coll (1984). Although similar to the construct of negative affectivity, behavioral inhibition can be described as both an emotional and behavioral reaction. Specifically, it was characterized as behavioral avoidance during the presentation of a novel situation (Kagan et al., 1984). Further, the authors suggested that behavioral inhibition is a relatively stable personality trait, and demonstrated that when assessed at 21 months was predictive of behavior inhibition in children at age 4 (Kagan et al., 1984). Using behavioral observations and parental interviews, Biederman and colleagues (2001) reported that behaviorally inhibited children were more likely to be diagnosed with social anxiety disorder (17%) than non-inhibited children (5%). Furthermore, behaviorally inhibited children whose parents received a diagnosis of panic disorder with/or without depression were more likely to have social anxiety disorder (25%) compared to non-inhibited children of parents with panic disorder with or without depression (8%), whereas no differences were reported among children of control parents. These results suggest a familial influence that may affect the presentation of behavioral inhibition. Similarly to negative affectivity, behavioral inhibition appears to have a genetic influence. In a twin study, Silove, Manicavasagar, O'Connell, and Morris-

Yates (1995) reported that separation anxiety, which displays similar traits to behavioral inhibition, in their study of 200 twins had a greater genetic influence in women compared to men. DiLalla, Kagan, and Reznick (1994) found that MZ twins displayed similar behavioral inhibition compared to DZ twins at 24 months of age. Although the authors suggest that the observed results could be due to heritability of behavioral inhibition, it is also plausible that the concordance in inhibited behavior among identical twins could have an environmental effect.

To summarize, studies examining genetic contribution to anxiety disorder as well as other vulnerability factors, such as negative affectivity and behavioral inhibition have demonstrated moderate heritability. Although twin studies have provided valuable information, some of them are limited in their generalizability due to methodological limitations, such that some studies do not utilize standardized, valid diagnostic assessment tools and/or rely on retrospective reports of past experiences. Level of distress at assessment time may affect the validity of previous experiences ultimately affecting the questions studied. Although there appears to be a genetic contribution to anxiety disorders, it is non-disorder specific, with unique environmental experiences accounting for the remaining variance. Although the genetic risk factors appear to be similar across gender, it may be that the genetic factors have stronger contribution for women than men. Alternatively, environmental and social influences could strengthen the genetic vulnerability for girls, while weakening that for boys. Craske (2003) speculated that socializing boys to be more active and independent and face their fears (discussed more below) may account for the weaker heritability estimates for negative affectivity among

boys. Thus, it is crucial to examine environmental factors to allow for a more comprehensive examination of women's greater risk for anxiety.

Gender Socialization Patterns

Patterns of socialization provide another explanation for women's greater risk for anxiety disorders. Bem's (1981) gender schema theory stated that girls and boys are socialized differently to develop skills consistent with their gender. Gender-specific behaviors consistent with social and cultural norms are reinforced, such that women learn to be dependent, and passive, whereas men are educated to be courageous and achievement oriented (Bem, 1981; Fodor, 1974). Stevenson-Hindle and Shouldice (1993) examined parental encouragement of gender-conforming behaviors among children and found that parents approved of their girls' shyness while disapproving of the same behavior if demonstrated by their boys. Using an observational study of parent-child interaction during a laboratory task, Kerig, Cowan, and Cowan (1993) demonstrated that parents tend to reinforce boys and girls differently at the age of three. Specifically, parents tended to ignore or respond more negatively towards girls when they were assertive or wanted to direct the interaction, whereas boys were more likely to be praised for the same behaviors. Also, girls received more positive attention when they displayed positive behaviors, such as compliance and expression of affect compared to boys. Although the study provided evidence for parents' differential treatment based on gender of their child, the generalizability of the results may be limited due to the small sample size (n=38). Also, the sample consisted of parents and their first-born boy or girl, preventing direct comparison of their response towards boys versus girls. However, a strength of the study is the inclusion of behavioral assessment that provides a more

objective measure of parental reinforcement compared to self-report measures which tend to be more biased. Buck (1975) observed a similar trend in school settings, such that teachers provided positive attention when girls were submissive but ignored them when they demonstrated more active involvement, confirming the culturally acceptable gender roles. In a study of teacher reactions to toddler's play (ages 24-30 months), Fagot (1984) demonstrated that teachers reacted more negatively to girls who were more active and chose more complex tasks, whereas boys received more positive reaction from teachers for the same behaviors. In addition to teachers' reaction, parents' expectations have been found to vary based on the gender of their child. In an observational study of 23 mothers and their 11-month old infants, Mondschein, Adolph, and Tamis-LeMonda (2000) assessed mother's expectations and actual crawling ability of their infants using a walkway with an adjustable slope for shallow or steep slope. Overall, mother's expectations of their infant's crawling abilities differed by gender, with mothers estimating that their girls would crawl down shallower slopes compared to estimates for boys. Although actual performance of boys and girls did not differ, mothers of boys expected their infants to attempt steeper slopes and overestimated their crawling ability compared to mothers of girls, who appeared to underestimate how much their girls would be able to crawl. This study suggests that maternal expectations of children's performance begin at a very early age, as soon as infants begin to crawl. It is also likely that mothers' expectations could have an effect on their child's future behavior, such that mothers of boys may be more likely to encourage them to try harder and attempt difficult tasks more than they would with girls.

During early development, socialization patterns influence men and women in different ways. Research has examined the relationship between gender roles and anxiety, although results remain inconsistent. The most widely used measures to assess gender roles are Bem Sex Role Inventory (BSRI; Bem, 1974) and Personal Attributes Questionnaire (PAQ; Spence, Helmreich, & Stapp, 1975) which assess characteristics consistent with stereotypical feminine (e.g., warmth and affection for others) and masculine (e.g., competitiveness and independence) qualities. To examine the association between gender roles and fear, studies have relied on comparing scores on fear measures such as the Fear Survey Schedule (Wolpe & Lang, 1977), or the Fear Survey Schedule for Children-II (Gullone & King, 1992) with scores on gender role measures. Some studies have demonstrated that high masculinity (i.e., assertiveness) was associated with lower anxiety and fear (e.g., Arrindell, 2000; Chambless & Mason, 1986), while others have reported a positive relationship between femininity (i.e., expressivity) and anxiety (Muris, Meesters, & Knoops, 2005; Tucker & Bond, 1997). Moscovitch, Hofmann, and Litz (2005) examined the relationship between gender roles and social anxiety and found a negative relationship between masculinity and social anxiety, such that individuals identifying with traditional masculine roles had lower scores on a social anxiety measure. A similarly inconsistent pattern has been observed in children. Muris and colleagues (2005) found a relationship between high femininity and anxiety in children, while Ginsburg and Silverman (2000) reported that low masculinity was associated with number of fears endorsed among children. A major disadvantage of most studies examining the relationship between gender role and anxiety is that almost all exclusively rely on self report measures to assess gender role orientation. Although it is a general

practice to utilize questionnaires to assess specific constructs, their accuracy may be limited by potential for biased responding. Unfortunately, there are no specific behavioral measures to the best of our knowledge that assess gender role traits. In order to provide a more complete assessment of gender roles a more objective and comprehensive measure is needed. Additionally, several of the studies report inconsistent internal consistency for the PAQ, which may account for some of the inconsistent findings in the literature.

Two studies in our laboratory have recently investigated the relationship between gender role orientation and anxiety by asking participants to approach a tarantula. Thus, in addition to self reported fear questionnaire, the studies also obtained measures of subjective levels of anxiety experienced at various times throughout the behavioral task as well as avoidance. Similar to the conflicting results in the literature, our result varied. While McLean and Hope (2010) did not find a significant relationship between gender roles and anxiety (as measured by questionnaires or subjective reports), they demonstrated that higher levels of masculinity were associated with less avoidance. Furthermore, they reported that men who identified with expressivity traits (i.e. scored higher on femininity) were more avoidant than men who scored lower on expressivity. Although, Stoyanova and Hope (2011) did not find a relationship between gender roles and avoidance, they did report that instrumentality (masculinity) was negatively related to anticipatory anxiety for women but not for men.

To summarize, socialization patterns appear to emerge early in children's development with parents and teachers reinforcing gender specific behaviors. Most results indicate that parents reward their boys for being more active and independent, whereas they provide positive attention for compliance in girls. Furthermore, mothers

have been shown to have higher expectations of their infant boy's crawling ability compared to girls suggesting that this expectation may result in parents providing differential stimulation for challenging tasks to boys and girls. If boys are expected to be more independent and active, parents would encourage this independence and thus foster a more active coping style in boys, which may explain why boys are less avoidant when faced with fearful situations. Furthermore, studies using adult and children samples have examined the relationship between gender role orientation and anxiety. Although gender role orientation seems to affect the expression of anxiety in women, the results about which gender role trait (masculinity or femininity) accounts for this observation remain mixed, with some studies suggesting that high expressivity is associated with greater fear, while other demonstrate that it is rather low masculinity that is related to anxiety. While most studies have relied on self-report measures, two recent studies found similar inconsistencies using more objective behavioral measures. Thus, while gender role socialization offers some explanations for the gender effect in anxiety, the inconsistencies limit the conclusions that can be made.

Social Stress and Trauma

The experience of traumatic events has also been associated with the onset of anxiety symptoms as it may affect one's reaction to future trauma. It has been reported that women experience more daily stress than men (e.g., Almeida & Kessler, 1998), and some have speculated that this may be due to women's lower status in society in most cultures. In fact, gender specific stressors (discrimination or sexist acts specific to women) have been associated with the presentation of psychiatric symptoms among women (Klonoff, Landrine, & Campbell, 2000). A sample of 255 college students (75

men and 180 women) completed the Hopkins Symptom Checklist (HSCL-58: Derogatis, Lipman, Rickles, Uhlenhuth, & Covi, 1974) which measures different psychiatric symptoms such as anxiety, depression, obsessive-compulsive symptoms, interpersonal sensitivity, and somatoform symptoms. Women in the sample also completed the Schedule of Sexist Events (SSE; Klonoff & Landrine, 1995) to assess the frequency of exposure to sexist events and discrimination specific to women in the past year as well as lifetime exposure. Women in the sample were divided into two groups – low frequency (low SSE scores) and high frequency of sexist events (high SSE scores). They found that women in the high SSE group had a higher total score on the HSCL compared to women in the low SSE group and compared to men. A similar pattern was observed when the subsections on the HSCL were examined, with women in the high SSE group reporting more depressive and anxious symptoms compared to both women in the low SSE group and men. Thus, sexist discrimination also appears to be related to women's physical and psychological well-being, with several studies indicating a positive relationship between sexist discrimination and psychological distress (e.g., Landrine et al., 1995; Thomas, Whitherspoon, & Speight, 2008).

Although these studies contribute to the existing literature on the psychological effect of stressors, incorporating gender specific stressors, the sole reliance on self-report measures limits conclusions that can be drawn. Using more objective measures, Stoyanova and Hope (2010) examined whether the same patterns would be observed in a college student sample asked to approach a tarantula. We found that women who had experienced more sexist discrimination reported greater fear of spiders on a questionnaire than men, while women with low exposure to sexist events did not differ from men on

the fear measure. Contrary to the above mentioned studies, we did not find a difference between women in the low SSE group and women in the high SSE group on fear of spider questionnaire. More surprisingly, the expected pattern was not present when subjective anxiety or behavioral avoidance was examined (Stoyanova & Hope, 2010), suggesting that exposure to gender specific trauma does not appear to be a strong factor accounting for women's greater vulnerability to anxiety disorders. One possible explanation for the difference in our findings could be due to sample size characteristics. Our sample comprised of college students with an age range of 17 to 34 years (M = 20.2, SD = 2.43) with 94% of the sample being younger than 23 years, while the sample in Klonoff, Landrine, and Campbell's (2000) study had a wider age range (17-68 years; M = 26.83, SD = 10.04) with half of the sample being nontraditional, older students (older than 20 years of age). Thus, it could be that women who are nontraditional students may have experienced more sexist discrimination than younger women given the changing societal norms. Furthermore, given that the above mentioned studies have relied on self-report measures, one could speculate that women who have experienced sexist events may display an overall tendency to report similarly on other self-report measures. Thus, the relationship with subjective anxiety and behavioral avoidance would provide a stronger evidence of anxiety since it measures fear as the participant is exposed to a feared stimulus.

The gender effect has also been examined in regards to how exposure to trauma may affect the development of Posttraumatic Stress Disorder (PTSD). In a large study of young adults (21-30 year-olds), men were 1.46 times more likely than women to experience traumatic events (Breslau, Davis, Andreski, & Peterson, 1991). Interestingly,

the authors reported that among those who had experienced trauma, women were 1.77 times more likely than men to develop PTSD. A recent meta-analysis has provided a comprehensive examination of the gender effect in PTSD as well as contributing factors that may account for the observed differences by critically evaluating 290 research articles. Similar to previous reports, Tolin and Foa (2008) found that women were more likely than men to be diagnosed with PTSD although men were more likely to experience traumatic events compared to women, suggesting that overall frequency of exposure to traumatic events did not explain why more women were diagnosed with PTSD. Exploring specific kinds of traumatic events, Tolin and Foa (2008) concluded that women reported experiencing more child sexual abuse and sexual assault, while men were more likely to be exposed to nonsexual trauma such as accidents, combat and war related trauma, injury or illness and being a witness to death or serious injury. However, even when type of trauma was controlled for, women were still more likely to receive a diagnosis of PTSD, which is consistent with previous reports (e.g., Breslau, Davis, Andreski, Peterson, & Schultz, 1997; Kessler, Sonnega, Bromet, Hughes & Nelson, 1995) suggesting that greater exposure to sexual abuse does not fully account for women's greater risk for PTSD.

Although women are more likely to be diagnosed with PTSD, the results remain mixed when non-sexual trauma is examined. Some have reported that women are more likely to develop anxiety disorders or depression following the experience of a natural disaster (volcano eruption; Shore, Tatum, & Vollmer, 1986), as well as man-made disasters (major hotel fire and car accident involving more than 100 cars; Maes, Mylle, Delmeire, Altamura, 2000). However, others have indicated that men and women were

equally likely to develop and recover from PTSD after a major motor vehicle accident (Freedman, Gluck, & Tuvan-Mashiach, 2002).

In summary, although men experience more traumatic events than women, women appear to be more affected by traumatic experience and report greater distress following relationship stressors (Kessler & McLeod, 1984). Type of trauma (gender-related discrimination or sexual assault) does not appear to fully explain women's greater vulnerability to psychiatric problems, with results remaining mixed. While exposure to sexist discrimination has been found to relate to psychological distress, these results were not confirmed in a more recent examination using more objective measures of anxiety and distress. In relation to traumatic events, although women were more likely to report child sexual abuse and sexual assault (Tolin & Foa, 2008), the high prevalence of PTSD in women was not fully explained by exposure to sexual abuse. Given women's greater prevalence of anxiety problems, it could be argued that the gender effect could be due to different coping styles following trauma, with women engaging in more emotion focused coping strategies, whereas men tend to employ problem-focused and active approaches when faced with stressful situations (Thoits, 1991).

Response Bias

It has been speculated (e.g., Tolin & Foa, 2008) that the observed gender effect may be due to men and women's willingness to report experiencing psychiatric problems such that men may underreport anxiety and distress perhaps due to differential social reinforcement. Pierce and Kirkpatrick (1992) experimentally demonstrated that men underreport their true anxiety levels, which may be motivated by traditional gender roles as it is less accepted for men to express their fears or appear weak and vulnerable

(Craske, 2003; McLean & Anderson, 2009). In particular, the experimenters asked participants to complete the same fear survey on two occasions, one month apart. Prior to completing the measure the second time, participants were informed that their answers could be "verified" by heart rate data while watching images relevant to questionnaire items. The results indicated that men scored higher on the fear measure during the second administration when they were informed their truthfulness would be "verified." Interestingly, women's responses did not differ between administrations. Thus, the authors concluded that men have a tendency to underreport their fear levels on self report measures.

Egloff and Schmukle (2004) utilized a different method to examine the response bias hypothesis. In addition to obtaining an explicit measure of anxiety based on standard self-report questionnaire, they also measured anxiety using implicit or indirect methods, such as the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) and the Emotional Stroop Task (Wlliams, Mathews, & McLeod, 1996). It is believed that an implicit test would provide a more accurate measure of true anxiety due to its indirect nature, allowing researchers to test whether or not the gender effect is due to response bias. In two separate experiments, Egloff and Schmukle (2004) demonstrated that women reported greater anxiety on both implicit and explicit tests, suggesting that differences in response were not due to response bias. In order for the gender effect on self-report measures to be due to men's unwillingness to report their true anxiety, no differences should have emerged on the implicit measures.

Two studies from our laboratory have recently attempted to explore the response bias hypothesis and replicate Pierce and Kirkpartick's (1992) finding that men

underreport their anxiety using a more comprehensive approach to measure fear of spiders – self-report questionnaires, subjective anxiety during an anxiety-provoking task, and avoidance behavior. Specifically, using an experimental design, participants were randomly assigned to a heart rate condition (verifiable or irrelevant) prior to approaching a tarantula (McLean & Hope, 2010; Stoyanova & Hope, 2012). Those in the verifiable heart rate condition were informed that their fear ratings would be verified by their heart rate data and were told that it was important to accurately rate their fear response during the BAT, while participants in the irrelevant heart rate condition received information that heart rate had not been established as an accurate measure of fear. Unlike Pierce and Kirkpatrick (1992), there were no difference in participants' reporting regardless of whether they believed their anxiety ratings could be verified or not (McLean & Hope, 2010; Stoyanova & Hope, 2012). Our inability to replicate the findings that men underreport their fear and the lack of other replications in the literature suggest that this phenomenon may not be as strong as initially proposed.

Summary of Etiological Factors

Although several theories have been proposed to explain the higher prevalence of anxiety disorders in women, individually they appear to provide only partial support. Specifically, while genetic studies have demonstrated that anxiety and other temperamental factors are heritable, they only account for some of the variance, allowing room for other environmental influences to contribute. In particular, parental expectations and societal socialization patterns provide additional information for girls' greater risk for having anxiety problems, with children receiving differential reinforcement from their parents and other influential individuals such as teachers and peers based on their gender.

However, studies exploring gender role orientation have provided inconsistent results as to which gender role (i.e., femininity or masculinity) account for the observed differences in anxiety reporting between men and women. Furthermore, the inconsistency in the literature may be due to the changing social norms and expectations for appropriate behaviors among women and men over the years. In addition to gender role orientation, the experience of traumatic events and gender-specific discrimination has been suggested to explain women's greater report of anxiety compared to men. However, the results about gender-specific discrimination in women appear to be mixed, with mostly self-report measures supporting the relationship between gender-specific stress and psychopathology, whereas more objective measures fail to replicate the proposed relationship. Although the evaluation of other traumatic events has confirmed women's greater risk for developing anxiety, in particular PTSD, the risk is not based on elevated risk of experiencing trauma given that men appear to be exposure to more trauma overall. While women experience more sexual-related trauma, it does not account for their elevated risk for anxiety. Even though exposure to trauma does not explain the development of anxiety, it may be the response after the traumatic event that contributes to women's greater risk, which will be discussed in the next section. While some have suggested that men may be less willing to report their true levels of distress on self-report measures due to societal expectations, this hypothesis has not received empirical support suggesting that it may not be a strong contributing factor in the expression of anxiety.

Behavioral Avoidance

Avoidance has been associated with greater fear and as reviewed earlier women tend to exhibit greater avoidance than men. Using an experimental design, Speltz and

Bernstein (1976) compared men and women college students who were fearful of snakes. Participants were assigned to either a high or low demand condition and were asked to approach a caged snake. Participants in the high demand condition were informed that the experiment was designed to test physiological response which would be most accurate when the participant held the snake, thus creating a high social expectation. In fact, the high demand condition resulted in more approach in the entire sample and across high and low fear, suggesting that strong expectations influence willingness to approach a feared stimulus. Interestingly, fearful men got closer to the snake than did fearful women. However, behavioral observations showed that men and women did not differ on overt signs of fear (e.g., hand tremors, accelerated breathing, emotional verbalization) indicating that both men and women were equally distressed during the task. Despite being equally fearful, women were more likely to avoid. Based on these results, one could speculate that it may not be level of fear itself, but rather the reaction to the fear response (i.e., escape or avoidance) that accounts for women's greater likelihood to avoid. Examining women's experiences when faced with a fear-inducing task would aid in the understanding of motivators for avoidance. Ptacek, Smith, and Zanas (1992) indirectly examined men and women's coping styles to daily stressors. In particular, they asked 186 participants to monitor their most stressful event on a daily basis for 21 days and indicate how stressful they rated it to be, how they coped and whether the coping strategy was effective. The results indicated that men utilized more problem focused coping whereas women relied on more emotion-focused coping. While the study provides some evidence suggesting that men and women employ different coping strategies when

faced with stressors, it also raises some concerns about the accuracy of participants ability to correctly identify their coping styles and its workability.

Avoidance has been associated with the development and maintenance of anxiety disorders (e.g., Barlow, 1988; 2001; Craske, 1999; 2003; Mowrer, 1960). Avoidance can be displayed in behavioral (e.g., withdrawal from a potentially threatening situation or displaying extreme cautiousness) and cognitive ways (e.g., not thinking about the anxiety-provoking situation). While avoidance provides immediate relief from anxiety in the short term, it is a maladaptive coping strategy as it maintains anxiety in the long term. It has been shown that fearful individuals have a tendency to overestimate the likelihood of a feared outcome in a specific situation (e.g, Rachman & Lopatka, 1986; Taylor & Rachman, 1994), predicting more avoidance and in turn preventing opportunities to disconfirm unrealistic fears which further maintain initial beliefs (Rachman, 1994). Avoidance is known to further reinforce avoidant behavior, such that the reduction in fear resulting from avoidance or escape may promote future avoidance. However, the initial two-factor theory proposed by Mowrer (1960) stating that fear reduction is responsible for all future avoidance has been challenged by more current observations positing that fear reduction is only one of the motivators for avoidance behavior (Reiss, 1980). More recently, Rachman (1984) suggested that safety signals play a role in the maintenance of avoidant behavior as they provide a sense of safety and protection when faced with a feared situation (McAllister, McAllister, Scoles, & Hampton, 1986).

An explanation for why avoidance maintains anxiety has been provided by the Emotional Processing Theory (EPT; Foa, Huppert, & Cahill, 2006; Foa & Kozak, 1986), which posits that behavioral and cognitive avoidance prevent emotional processing. For

emotional processing to occur, exposure to the fear-provoking stimulus or situation is necessary. Specifically, according to EPT, exposure to a feared stimulus provides corrective information that is incompatible with the original information and thus either weakens or replaces (Foa & Kozak, 1986), or competes with (Foa & McNally, 1996) the old association between stimulus, response and beliefs about their meanings. Extinction learning is one possible mechanism used to explain the learning process that occurs during exposure (Eelen & Vervliet, 2006). In other words, by repeated exposure to the conditioned fear stimulus when the aversive event is not present, individuals learn to extinguish their fear response (Craske, 1999). Thus, one would expect that socialization patterns would enhance the extinction process by encouraging repeated exposure to potentially fearful situation.

Summary

Although several explanations have been offered, such as genetic and other vulnerability factors, different socialization patterns, traumatic events and social stress as well as behavioral avoidance, none of these theories provide a complete explanation for women's greater vulnerability for anxiety. The findings tend to be inconsistent and/or only account for a small portion of the variance. Thus, our understanding of contributing factors to women's greater vulnerability for anxiety disorders remains limited and deserves further investigation. One possible route would be to explore differences in response to stress. The physiological response to stress is briefly discussed followed by an overview of a recent theory – the tend-and-befriend model (Taylor, Klein, Lewis, Gruenewald, Gurung, & Updegraff, 2000) – proposing that women have a different

biobehavioral response to stress which may provide further clarification about women's greater risk for anxiety.

Physiology of Stress

As reviewed earlier, stressful experiences have an effect on psychological well-being, which may be due to different response patterns experienced by men and women. In addition to psychological distress during a stressor, it would be important to understand physiological changes that occur while faced with a stressor. A brief overview of the physiological response to stress is presented to aid in the presentation of the biobehavioral model. When faced with a stressor, whether it is environmental, physical, or psychological, the body undergoes a series of biological and behavioral reactions designed to increase the survival of an organism. The fight-or-flight system has been the dominant biobehavioral response to stress, which depends on the activation of the sympathetic nervous system (SNS) and the hypothalamic-pituitary-adrenocortical (HPA) axis. These two stress systems prepare an organism to respond by either fighting or escaping from threat. More specifically upon activation of the SNS, a surge of catecholamines (epinephrine and norepinephrine) are released in the bloodstream, resulting in physiological changes (increase in blood pressure, heart rate, respiration, glucose availability for energy among others) which trigger the fight-or-flight reaction (Cannon, 1932). The SNS further stimulates the HPA axis activating the paraventricular nucleus of the hypothalamus to release corticotrophin releasing hormones (CRH), which further stimulates the anterior pituitary to release adrenocorticotropin hormone (ACTH) and lead to a secretion of glucocorticoids, such as cortisol and corticosterone. Glucocorticoids play an important part in regulating HPA axis stimulation by reducing

further secretion of CRH and ACTH through a negative feedback loop. Ultimately, the activation of the HPA axis and the release of stress hormones mobilize energy that allows the organism to fight or flee from threatening situations.

Cortisol and Stress

The stress hormone, cortisol, has been of interest to researchers due to its role in stressful situations. It provides an objective measure of one's physiological experiences, with increased levels being indicative of a stress response (Sapolsky, 1998). When faced with threat, the secretion of cortisol is crucial for the human body as it plays an important role in bodily functions such as energy mobilization, memory, and learning (Klimes-Dougan, Hastings, Granger, Usher, & Zahn-Waxler, 2001). However, chronic overstimulation of the HPA axis has been associated with various health problems, such as cardiovascular diseases (Lundberg, 2005; McEwen, 1998) and lower immune system functioning (Mason, 1991).

Psychological stressors have been widely used to examine the stress response. Several tests have been used to elevate cortisol levels, with the Trier Social Stress Test (TSST) being the most widely used one because of its social-evaluative nature and uncontrollability (Dickerson & Kemeny, 2004). The TSST is a standardized test that involves the delivery of a free speech and an arithmetic task performed in front of an audience (Kirschbaum, Pirke, & Hellhammer, 1993) and it has been shown to successfully increase salivary cortisol (Kudielka, Hellhammer, & Kirschbaum, 2007). Increases in cortisol levels tend to occur several minutes after the stressor has been initiated and reach their peak within 10-30 minutes after removal of stressor (Kudielka, & Kirschbaum, 2005).

While results from animal studies demonstrate that female rats tend to have elevated levels of corticosterone and ACTH in response to acute and chronic stress compared to male rats (e.g., Armario, Gavalda, & Marti, 1995; River, 1999), this observation does not seem to translate to humans with some research demonstrating a less pronounced or even reversed effect of gender. Some studies report no differences in cortisol secretion between men and women (Dorn et al., 1996; Roelfsema et al., 1993), while others point to a greater cortisol response in men during a social stressor (Elwood, Ferguson, & Thakar, 1986; Frankenhaeuser, 1983). Similarly, Kirschbaum, Wüst, and Hellhammer (1992) reported that cortisol levels were twice as high in men than women, and an elevated cortisol level in anticipation of a stressful task (giving a speech) was observed for men only. Given these findings, Stroud, Salovey, and Epel (2002) hypothesized that the social stress tests widely used (TSST) may not be as relevant to women. Thus, they designed a social stress task that would be more relevant to women – social rejection – while men completed an achievement-oriented task. The results confirmed their hypothesis that women were physiologically more reactive to the social rejection task, whereas men had elevated cortisol levels during the achievement-oriented task (Stroud et al., 2002). Thus, it appears that men and women have a different physiological response based on type of stressor, with women being more physiologically reactive to social stressors, whereas men appear to respond strongly to achievement-type stressors.

Biobehavioral Response to Stress: Women Specific

Recently, a number of animal and human studies have demonstrated that men and women differ in their biological (i.e., neuroendocrine) and behavioral (i.e., drug use,

eating patterns, avoidance) response to stress (e.g., Jezova, Jurankova, Mosnarova, Kriska, & Skultetyova, 1996; Tamres, Janicki, & Helgeson, 2002). Taylor and colleagues (2000) argued that while the fight-or-flight response has been observed in both men and women, a behavioral pattern they labeled tend-and-befriend might better capture women's stress response. They suggested that women's response to stress is geared toward nurturing and protecting offspring from harm (tending), and affiliating with others and creating social networks (befriending) to decrease distress. Women under stress tend to seek out social contact and support (Belle, 1987), and are more involved in their social circles than men (Wethington, McLeod, & Kessler, 1987).

Given women's caretaking responsibilities, the traditional fight-or-flight response would pose enormous risk to both women and their offspring, as fighting or fleeing may endanger offspring and leave them unprotected. Taylor and colleagues (2000) suggested that women's neuroendocrine response may have selectively evolved to stimulate calming and protective behaviors when stressed, thus hindering the desire to fight or flee. Specifically, they proposed that the underlying neurobiological system of the tend-and-befriend response is mediated by oxytocin, a posterior pituitary hormone. While the initial neuroendocrine response to stress does not differ between men and women (stress activates the sympathetic nervous system [SNS] and the hypothalamic-pituitary-adrenocortical [HPA] axis, in both), oxytocin appears to be more characteristic for women. Specifically, in response to stress, oxytocin levels are higher in women than men (Jesova et al., 1996), and the effects of oxytocin are enhanced by estrogen (McCarthy, 1995; McCarty & Altemus, 1997) while androgens have an inhibiting effect on oxytocin (Jezova et al., 1996).

There has been a growing interest in understanding the role of oxytocin as it relates to women's behavior. In particular, oxytocin has been linked to maternal care and bonding in both animal and human studies (e.g., Newman, 2008; Smith, Agmo, Birnie, & French, 2010; Young & Wang, 2004), and there is increasing evidence demonstrating that oxytocin reduces the biobehavioral reaction to stress, such that a decrease is observed in blood pressure (Light et al., 2000), perceived stress in breastfeeding mothers (Mezzacappa & Katkin, 2002), aggression (Harmon, Huhman, Moore, & Albers, 2002), and anxiety (Heinrichs, Baumgartner, Kirschbaum, & Ehlert, 2003; Slattery & Neumann, 2010).

Results on the effect of oxytocin appear somewhat contradictory, with some studies demonstrating a calming and relaxing effect in relation to partner support, while others point to an elevation in relationship distress. Taylor (2006) addresses this seemingly opposing view by pointing out that the role of affiliation has been neglected in studies indicating stress-reducing qualities of oxytocin, which they suggest is modulated by affiliative needs. Elevated levels of oxytocin have been associated with relationship distress, such that women with increased oxytocin levels reported reduced contact with their social network and more anxiety related to relationships (Taylor et al., 2006; Turner, Altemus, Enos, Cooper, & McGuiness, 1999). Taylor (2006) suggested that oxytocin may act as a marker for relationship distress that triggers affiliative behaviors for positive social contact, which ultimately reduces distress and increases positive emotions.

To further examine women's stress response, Taylor (2006) proposed a model of affiliation under stress, as is the case with other appetitive needs (e.g., hunger, thirst, and sexual drive). Oxytocin and other opioids are released in response to social stressors and

activate affiliative behavior. In combination with positive social contact, oxytocin reduces the biological (SNS and HPA axis) and psychological stress responses. If, however, social contact is negative and unsupportive, the biological and psychological stress responses are intensified.

Social Support and Stress Response

Forming and maintaining positive social relationships seems to be integral to human survival. This drive to belong appears to be met through repeated and positive interactions with familiar and desired individuals, rather than strangers or unsupportive people (Baumeister & Leary, 1995). Research has demonstrated that individuals with positive social relationships appear to be in overall better health, whereas lack of social relationships has been linked to mortality (House, Landis, & Umberson, 1988). Social problems seem to be more strongly related to health problems for women than men (Denton, Prus, & Walters, 2004).

The role of social support has also been explored in couples' interaction. Cohabitating with a significant other and/or marriage has been shown to be a very powerful source of support (Burman & Margolin, 1992). Women appear to be more vulnerable to the negative health outcomes resulting from marital distress (Coyne, Rohrbaugh, Shoham, Sonnega, Nicklas, & Cranford, 2001). In fact, the authors found that marriage quality was as strong of a predictor for survival as was severity of congestive heart failure. Women who reported greater satisfaction with their marriage showed higher morning cortisol levels and a stronger decline in cortisol levels during the day (Saxbe, Repetti, & Nishina, 2008). The authors found that on more demanding and stressful work days, women in satisfied relationships displayed lower cortisol levels in

the evening hours. It could be that a supportive relationship acts as a buffer to the stressors experienced at work resulting in a reduction in physiological response.

Experimental study designs have allowed researchers to gain a better understanding of the role of social contact on women's stress response. Ditzen and colleagues (2007) found that women who received a massage from their partner ten minutes before the psychosocial stressor (TSST) displayed lower cortisol elevation compared to women who arrived alone to the experiment and those who received verbal support from their partner. Measures of heart rate demonstrated a similar trend, with women in the physical contact condition (i.e., received a massage from their partner) demonstrating the lowest increase in heart rate as measured by the area under the curve (AUC_I). Thus, it appears that physical contact by partner, and not verbal support, prior to stress has reducing effects on cortisol and heart rate reactivity in response to work-related stress. In another study, women whose partner engaged in more positive and problem-focused coping, the quicker they recovered following a psychosocial stressor (Meuwly, Bodenmann, Germann, Bradbury, Ditzen, & Heinrichs, 2012). Further, attachment anxiety was shown to be related to recovery time following the TSST, such that cortisol levels displayed a slower decline following the TSST for women with higher levels of attachment anxiety compared to women scoring lower on attachment anxiety.

Early family experiences have also been shown to contribute to one's stress response. Experiencing less parental warmth during childhood was related to increase in cortisol levels and poor sleep on stressful days (Hanson & Chen, 2010). Furthermore, women with a history of early life stress, as measured by physical and sexual abuse, and depressive symptoms at time of testing, demonstrated elevated cortisol levels following

the TSST, compared to women with early life stressors and no depressive symptoms, and women with depression but no early life stressors (Heim et al., 2000). Taken together, it appears that positive social relationships play an important role in helping individuals recover from stress, whereas stressful experiences or lack of support have been associated with elevated cortisol levels.

Implications of the Tend-and-Befriend Response for Women and Anxiety

It is well documented that social support acts as a buffer to many psychological and physical problems (e.g., Berkman, 1995; Uchino, Cacioppo, & Kiecolt-Glaser, 1996). In stressful times, social support appears to protect an organism by reducing autonomic and neuroendocrine stress response, decreasing psychological distress (i.e., anxiety and depression), ultimately allowing the individual to adjust to and manage stress (see Taylor, 2007, and Thorsteinsson & James, 1999, for reviews). However, while befriending and seeking social support in response to stress serves a protective function, it also appears to enhance anxiety responses. Indeed, Craske (2003) proposed that seeking support and befriending may reduce women's opportunity to actively cope with threat preventing corrective learning and inhibiting habituation. Thus, women's non-problem-focused coping style (i.e., avoidance) reinforces the fearful response and decreases self-efficacy. Unfortunately, no research to date has examined specific factors accounting for high levels of anxiety and greater avoidance in some women, but not others.

Thus, positive social support in response to stress may promote a personal sense of control and mastery, which may enhance self-efficacy and encourage approach behavior. Research has demonstrated that a sense of mastery is associated with better psychological and physical health (e.g., Seeman & Lewis, 1995), while continuous

unsupportive contact in response to stress, may exacerbate physiological responses and perpetuate avoidance in stress-inducing situations (Grassi, Rasconi, Pedriali, Corridonu, & Bevilacqua, 2000).

Purpose of Dissertation Study

There is substantial evidence that women experience more fear than men (e.g., Arrindell, 2000; Davey et al., 1998) and are at a greater risk for developing anxiety disorders (Bruce et al., 2005). While most research predicts that women will report greater anxiety and display more fear, research mostly refers to known prevalence rates rather than theory or scientific evidence for the mechanisms underlying these differences. Though genetic factors have been shown to play a stronger role in the development of anxiety and neuroticism in women than men (Eley, 2001; Lake et al., 2000), recent research indicates that additional factors (i.e., environmental and biological factors such as biological sex) also contribute to the manifestation of these problems (e.g., McEwen, 1998). Indeed, environmental factors such as gender role socialization patterns (Chambless & Mason, 1998; Ollendick, King, & Muris, 2002) and gender specific trauma (Klonoff & Landrine, 1995; Sigmon, Lodis, Martinson, Craner, & McGillicuddy, 2010) have been shown to relate to the experience of fear and anxiety among women. However, while these etiological factors have been explored, none of them fully account for women's greater risk for anxiety (Russo & Green, 1993). Most of the literature reporting greater prevalence of anxiety in women use a mixed-gender design which allows for the investigation of factors that may be specific to men versus women. However, given that the results about etiological factors remain rather inconsistent, a natural next step for future research investigations could be a focus on individual differences in women. This

will allow research to focus on specific factors that may contribute to anxiety presentation in some women and not others. Once a better understanding of factors accounting to women's greater vulnerability is achieved, it would be important to use a mixed-gender sample to test whether those factors are specific to women or whether they also account for men's experiences. A proposal by Taylor and colleagues (2000) about women's biobehavioral response to stress (tend-and-befriend) provides new opportunities to understand underlying factors that may explain the evidence of greater anxiety and fear among women. Craske (2003) speculated that while women's tending and befriending style in response to stress has evolutionary progressed to protect offspring, it also appears to decrease active coping and self-efficacy in situations without positive affiliation opportunities. Avoidance has been shown to play a critical role in the development of anxiety problems. The tendency to avoid anxiety-provoking situations prevents learning of effective coping skills and the ability to collect positive experiences during a potentially fearful situation that would provide disconfirming evidence needed for habituation. Given that avoidance is critical in development of anxiety problems, it is imperative to understand underlying factors that may account for the greater avoidance in women. It should be noted that a complete examination of the tend-and-befriend model will require the assessment of oxytocin before and after a social stressor in order to be able to draw the conclusion that the increase in oxytocin promotes social affiliation. However, the first step would be to test whether positive or negative affiliation would result in the behavioral effect and expected cortisol markers. Thus, the purpose of this study was to explore women's affiliative stress response combined with the absence of positive affiliation opportunities as it relates to the presentation of fear and anxiety.

Specific Aims and Corresponding Hypotheses

Using the tend-and-befriend model (Taylor et al., 2000), this study evaluated whether positive versus negative type of affiliation after an initial stressor would result in different response patterns during a subsequent exposure to a potentially threatening stimulus.

Aim #1: The first objective of the study was to examine the effect of positive social contact (future belonging) following the initial social stressor.

Hypothesis 1a. Positive social contact (future belonging) following a stressor would result in an overall lower pattern of physiological and psychological stress response.

Hypothesis 1b. Negative social contact (future alone) would result in a heightened stress response, as demonstrated by elevated physiological and psychological stress response.

Aim #2: The second objective of the study was to examine the effect of positive social contact (future belonging) during an anxiety-provoking task (BAT).

Hypothesis 2. Positive social contact (future belonging) following a social stressor would result in reduction in stress response (both physiological [cortisol] and psychological [subjective anxiety]) and increase in approach behavior when confronting a potentially threatening stimuli (tarantula), while negative social contact (future alone) would intensify the stress response and result in more avoidance.

CHAPTER TWO: METHODS

Sample

A sample of 107 women was recruited from the University of Nebraska-Lincoln through the undergraduate research pool, flyers, and class announcements. Men were not included because the aim of this study was to examine women's response to an anxiety-inducing situation following manipulation regarding future relationships. The theoretical model (tend-and-befriend; Taylor et al, 2000) being testing with this experiment is based on oxytocin release, which has been demonstrated to be higher in women under stress compared to men. Participants were between the ages of 18 and 24 (M_{age} = 19.98, SD = 1.23) and in overall good physical health. Exclusion criteria were as follows: (a) premenarcheal or menopausal, (b) any medication affecting the neuroendocrine system (i.e., prednisone, cortisone, thyroid medication), (c) pregnancy or currently nursing, (d) heavy smokers (defined as smoking 10 or more cigarettes per day), (e) alcohol or drug use within the last 12 hours. Information about regularity of menstrual cycle, beginning date of most recent menstrual period, and use of hormonal contraceptives was collected. A very small number of participants (n=4) reported using hormonal contraceptive methods other than oral contraception (OC), such as the patch and hormonal IUD (intrauterine device). Since the majority of women reporting use of hormonal contraception were OC users, we will use the term OC user from here on. Descriptive information about the sample is presented in Table 2.1.

Design

Based on a recently proposed stress response model for women (tend-and-befriend) suggesting that oxytocin in conjunction with the absence of positive social

relationships triggers affiliative efforts (i.e., seeking supportive contact) in response to stress (Taylor, 2006), the present study examined the effect of social contact on women's biological and behavioral response to a behavioral approach task (BAT) designed to elicit a fear response. In this study, we operationalized social contact as feedback provided regarding future relationships. After a baseline assessment, participants underwent a socially stressful situation, which comprised of being socially rejected by other participants. Subsequently, to test Taylor's affiliation model, we manipulated participant's beliefs about future relationships, which were based on a personality questionnaire completed at the beginning of the experiment. Simple random assignment was used to assign participants to one of three future social contact conditions. In the negative feedback condition (future alone), participants were informed that they would likely end up alone later in life, not having meaningful relationships and people who care about them. In the positive feedback condition (future belonging), participants were told that they would have a future filled with many friends and fulfilling relationships. The third group served as a control group; thus, no feedback about future relationships was provided. Following the manipulation, participants completed a BAT during which they were asked to approach a live tarantula by following a series of steps that begin easy and become increasingly difficult. To minimize experimenter expectancy effects, the experimenter guiding participants through the BAT was blind to the assigned condition. During the BAT, we measured participants' subjective fear at various time points, as well as behavioral approach/avoidance (number of steps completed on the BAT). Finally, participants completed a post assessment and were fully debriefed.

Measures

Participants completed a variety of assessments, including self-report measures and biological and psychological assessments. Information about demographics, menstrual cycle, use of hormonal contraception, and food intake prior to experimental session was collected as part of the questionnaire packet.

Table 2.1.

Descriptive Information for Entire Study Sample

Demographic Variables	N	%
Ethnicity		
European American	84	78.5
Hispanic	12	11.2
African American	5	4.7
Asian American	3	2.8
Other	2	1.9
Middle Eastern	1	.9
Native American	0	0
Pacific Islander	0	0
Year in college		
Freshman	35	32.7
Sophomore	33	30.8
Junior	25	23.4
Senior	13	12.1
Graduate School	1	.9
Other Descriptive Data		
Oral Contraceptives Use	49	46
Follicular Phase	24	23.4
Luteal Phase	32	30

Self-report Measures

Caffeine and alcohol intake. Given evidence suggesting that alcohol and caffeine could affect cortisol secretion, participants were asked to abstain from drinking alcohol prior to study participation. A beverage questionnaire, adapted from McChargue,

Klanecky, Walsh, and DiLillo (2008), was administered to assess the amount of coffee, tea, soda, spirits, wine and beer participants consumed 12 hours prior to the experiment session to assess compliance with instructions. The beverage intake consisted of 6 questions and a total score was computed by summing the number provided for each question. Scores in the sample ranged from 0 to 4.5.

Daily hassles. The Daily Hassles Scale (DHS; Kanner, Coyne, Schaefer, & Lazarus, 1981) is a measure of stress over the past month and consists of 117 hassles related to health, family, social life, work, and environment. Participants were asked to indicate whether a hassle has been present in the past month and rate the severity of the hassle using a 3-point scale ranging from 1 (somewhat severe), 2 (moderately severe), and 3 (extremely severe). This measure was included to assess the presence of daily stressors occurring outside of the experimental tasks that may affect cortisol. Three scores were computed; (1) a frequency score, consisting of a count of endorsed items (maximum score was 117), (2) cumulative sum of severity, comprising of a sum score of all 3-point severity items with a range between 0 and 351, and (3) intensity, which consisted of the cumulative sum of severity divided by the frequency score (range 0-3). The frequency score was used for this study as a measure of frequency of daily hassles in the past month. For this sample, the measure demonstrated excellent internal consistency (coefficient α = .98).

Positive and negative affect. The Positive and Negative Affect Schedule (PANAS, Watson et al., 1988) is a 20-item scale, which measures both positive and negative affect. Participants were presented with adjectives and were asked to indicate how much they feel this way at a specific time using a scale ranging from 1 (very slightly

or not at all) to 5 (extremely). The PANAS yielded two subscales, positive affect (PA) and negative affect (NA), each containing 10 items. Items on the PA scale included: *active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, and strong*. Items on the NA scale were: *afraid, ashamed, distressed, guilty, hostile, irritable, jittery, nervous, scared, and upset*. Both PANAS subscales (positive and negative affect) have demonstrated good internal consistency, (PA coefficient α = .89; NA coefficient α = .85; Crawford & Henry, 2004). The PANAS was included as a measure of participants' emotional response to a stressor. Chronbach's alpha for PANAS in this study demonstrated good internal reliability (PA coefficient α = .86 - .89; NA coefficient α = .78 - .90). See Table 2.2 for more details.

Fear of spiders. The Fear of Spiders Questionnaire (FSQ; Szymanski & O'Donohue, 1995) is an 18-item questionnaire assessing fear and avoidance of spiders. Participants indicated their fear and avoidance of spiders using a 7-point scale that ranges from 1 (totally disagree) to 7 (totally agree). Higher scores on the FSQ are indicative of greater level of fear specific to spiders. The FSQ has demonstrated excellent internal consistency, (coefficient α = .92; Szymanski & O'Donohue, 1995), high test-retest reliability, r = .91 (Muris, Steerneman, & Merckelbach, 1996), and adequate convergent validity with the Spider Phobia Questionnaire (SPQ; Klorman, Weerts, Hastings, Melamed, & Lang, 1974). The FSQ was selected to measure fear and avoidance of spiders to provide a baseline assessment of participants' fear of spiders before being informed of the actual task. Internal consistency was excellent for the present sample (coefficient α = 96).

Subjective anxiety. The Subjective Units of Distress Scale (SUDS; Wolpe, 1973) was used as a measure of subjective fear levels during a behavioral approach task. The scale provides a subjective measure of perceived anxiety during a given time, ranging from 0 to 100 with higher numbers indicating greater fear/anxiety. The SUDS has been widely used to quickly assess subjective anxiety levels during an anxiety provoking task in experimental studies (Culver, Stoyanova & Craske, 2010; Lang & Craske, 2000; McLean & Hope, 2010; Stoyanova & Hope, 2011) as well as treatment studies to measure subjective anxiety during exposure (Heimberg et al., 1998; Hope, Heimberg, & Bruch, 1995). The SUDS was chosen to assess participants' subjective anxiety during the BAT with minimal distraction from the task. Four SUDS scores were collected: in anticipation of the BAT, as approaching the tarantula, end of task, and participants were asked to recall their peak SUDS.

Table 2.2.

Reliability Coefficients for all Self-report Measures

Variable	Alpha	Label
Daily Hassles Scale, Frequency score	.98	Excellent
Fear of Spider Questionnaire	.96	Excellent
PANAS (Positive and Negative Affect Scale)		
Positive Affect (baseline)	.86	Good
Negative Affect (baseline)	.81	Good
Positive Affect (post social rejection)	.89	Good
Negative Affect (post social rejection)	.87	Good
Positive Affect (post future social contact)	.89	Good
Negative Affect (post future social contact)	.89	Good
Positive Affect (post BAT)	.88	Good
Negative Affect (post BAT)	.90	Good
Positive Affect (post recovery)	.89	Good
Negative Affect (post recovery)	.78	Good

Post experimental feedback. After completion of the experimental task, participants completed two brief measures: "Feedback" and "Future Opinion

Questionnaire." The feedback questionnaire consisted of 9 items (7 for control group). The purpose of the feedback measure was twofold: (1) to assess credibility of the experimental manipulation and (2) to collect information about participants' experience with tarantulas prior to the experiment (e.g., they had a pet tarantula) to control for familiarity with study stimuli. The Future Opinion Questionnaire presented participants with four general statements about future beliefs on marriage, divorce, education, and financial stability and asked them to indicate whether they agreed with the statement. The purpose of the future opinion questionnaire was to learn more about participants' beliefs about their future and use it as an additional manipulation check.

Behavioral Measure

Behavioral approach task (BAT). A BAT measures fear and avoidance in adults with specific fears (Lang & Lazovik, 1963) and has been commonly adopted by research studies on anxiety disorder. The BAT is a controlled and easily replicable task, which provides information about subjective fear and an objective measure of avoidance to a feared stimulus (Dadds, Rapee, & Barrett, 1994). It typically involves a series of steps that are initially easy and become more difficult as the participant is asked to approach the feared stimulus (i.e., tarantula) or situation (e.g., roof top, elevator). In addition to obtaining an objective measure of avoidance (i.e., how close to the feared object participant got), the BAT also includes a measure of subjective level of distress, using SUDS (Wolpe, 1973), a widely used measure of discomfort that ranges from 0 to 100, with 0 = no distress and 100 = extreme distress. The same procedures were used as in McLean and Hope (2010) and Stoyanova and Hope (2012). Participants were asked to approach a live tarantula in a graded step fashion. The task began with asking participants

to open the door to the testing room and approach the table with a closed terrarium with a spider inside (step 1), look down at the spider in the closed terrarium (step 2), remove the lid of the terrarium (step 3), place hands on outside of terrarium (step 4). Next, participants were asked to remove a clear container placed over the spider (step 5), and place the palm of their right hand on the floor of terrarium for 10 seconds (step 6). The last three steps involved actual contact with the spider. Participants were asked to gently touch the spider with one finger for 5 seconds (step 7), gently touch the spider with 3 fingers for 10 seconds (step 7), and have the spider crawl on their hand for 30 seconds as experimenter placed the spider on their hand (step 9). Approach was measured on a 9-point scale, ranging from 0 (complete avoidance; did not enter testing room) to 9 (had spider crawl on their hand for 30 seconds).

As women are socialized to respond in certain ways to stressful situations, it has been proposed that their response to a stressful situation is dependent on patterns of social contact (Taylor et al., 2000). The BAT was used as a proxy to the stress response to examine how social stressors affect women's behavioral response (i.e., whether or not they approach the feared stimulus). The main purpose of the BAT was to explore whether the ways in which women are socialized to respond to stress affect their behavioral response.

Physiological Assessment

Cortisol. Salivary cortisol has been demonstrated to be a valid and reliable measure of free or unbound concentration of cortisol in the plasma (Kirschbaum & Hellhammer, 1989; Vining & McGinley, 1987). Participants provided a total of 6 saliva samples. Two baseline saliva samples were collected (cortisol 1: 20 minutes after arrival

to the laboratory; cortisol 2: 15 minutes later). Four additional saliva samples were collected - cortisol 3: 15 minutes following the social rejection; cortisol 4: 15 minutes after delivery of feedback regarding future social contact; cortisol 5: 15 minutes after BAT; and cortisol 6: 10 minutes following debriefing. Saliva samples were collected using Salivettes® tubes (Sarstedt, Hanover, NJ), which are composed of a centrifuge tube that contains a plastic cotton swab. Participants chewed on a cotton swab for 1 to 2 minutes and placed it back in the tube. After saliva samples were collected, they were stored in coolers for the duration of the experiment, and then transferred to the Behavior Genetics Laboratory at UNL and stored at -20°C until ready for shipment. All samples were transported on ice to the Endocrine Bioservices Laboratory at the University of Nebraska at Omaha for centrifugation and assay.

Assay Procedures. Salivary cortisol was assayed at the UNOmaha Endocrine Bioservices Laboratory (EBL) at the University of Nebraska at Omaha. Before cortisol assay, the samples were thawed and centrifuged at 3000 rpm for 5 minutes to prepare saliva for assay. Free cortisol was measured using an enzyme immunoassay for free cortisol, initially described and validated by Smith and French (1997), and validated for human salivary cortisol in Minton, Hertzog, Barron, French, and Reiter-Palmon (2009). In preparation for cortisol assay, NUNC microtiter plates were coated with cortisol antibody and left overnight at 4°C. Then, duplicates of 50 ul cortisol standards (1000-3.9 pg in half dilutions) and samples were added to the wells. Then, HRP-labeled cortisol was added to all wells after which plates were incubated for 2-3 hours at room temperature. Plates were then washed and ABTS substrate [2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic acid)] was added to all wells. Then, plates were shaken

for 10 minutes to 1 hour based on color intensity until B_0s reaches ~1.0. Then, absorbance was measured on a Dynatech MR 5000 microplate reader. Calculations of sample concentrations were performed using a four-parameter sigmoidal curve-fit function. Samples were assayed in duplicate and high- and low- concentration quality control pool were calculated for each plate. Intra-assay coefficients of variation (CV) were 5.08 % to 8.91 %, and the inter-assay CV were between 15.89% and 17.51%, which are considered to be acceptable assay values. Cortisol units are presented in nanomoles per liter (nmol/L).

Study Material

Phobic stimulus for BAT. As in previous studies, a nonpoisonous Chilean rose-haired tarantula (Grammostola rosea), known to be docile, was used as the phobic stimulus in this study (Webb, 1992). Tarantulas are commonly used for behavioral assessment in studies of spider phobia (e.g., Mystkowski, Craske, Echiverri, & Labus, 2006; Öst, 1996; Rodriguez, Craske, Mineka, & Hladek, 1999).

Procedures

Participants, who expressed interest in the study, contacted the experimenter by email. The experimenter responded to their inquiry and provided additional information about the study, reminded potential participants of the exclusion criteria, and provided guidelines about eating and drinking prior to the experimental session based on salivary collection advice published by Salmetrics (2009). Specifically, participants were asked to refrain from drinking alcohol 12 hours prior to the experiment, not eat a large meal 60 minutes prior to participation, and avoid dairy products, caffeine, and foods with high sugar or acidity 20 minutes prior to the experiment. If individuals met the study criteria,

they were asked to respond to the email and choose a preferred day and time (several options were offered) for the experiment session. A day before the experimental session, a reminder email and text message (if participants provided their phone number) were sent to remind them of their upcoming appointment and provide again the food and beverage restrictions for their upcoming experiment session. Participants were scheduled in groups of three to five women. If an experimental session had fewer than 4 participants or in cases of no-shows, we had confederates fill in as other participants for the initial phase of the study. All testing sessions started at either 1:00 or 4:00 pm to control for diurnal changes in cortisol secretion.

The study consisted of two parts: (1) social stressor and (2) behavioral assessment, both having separate consent procedures. This was done to ensure that participant's responses to questionnaires and self-reported affect in the first part of the study were not biased based on knowledge of the upcoming anxiety-inducing task (BAT). Two experimenters were present for all experiment sessions. All procedures were approved by the Institutional Review Board at the University of Nebraska, Lincoln.

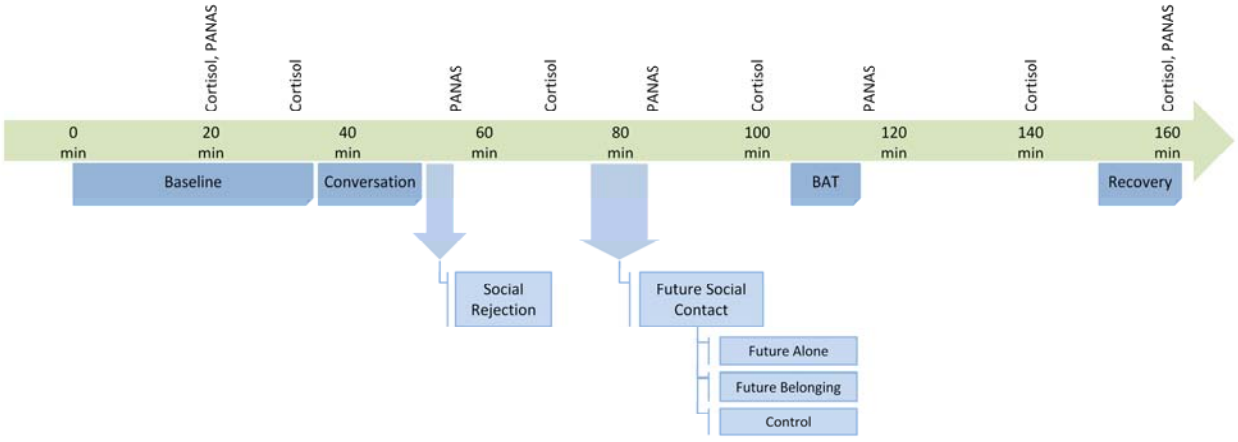

Figure 2.1. Timeline of Study Procedures.

Figure 2.1 above displays the timeline of the study procedures. Following the first consent process, participants underwent a rest period to allow them to adjust to the laboratory setting (baseline). During that time, they listened to relaxing music and completed the Eysenck Personality Questionnaire, Revised (EPQ-R; Eysenck & Eysenck, 1975). Then, they provided the first saliva sample (cortisol 1; 20 minutes after arrival to the laboratory), after which they filled out a questionnaire packet consisting of the FSQ, DHS, Caffeine and Alcohol Intake, and some demographic information, such as age, ethnicity, and year in college. Additionally, information about hormonal contraceptive use was collected. Participants were asked to indicate the first day of their menstrual period, which was used to calculate the menstrual cycle phase on the day of experiment. Then, the second saliva sample was collected (15 minutes after the first sample). Next, participants were informed that we were interested in studying social interactions and asked them to engage in a conversation with each other, while the experimenters observed behind the one-way mirror. They were given a list containing several topics for discussion, such as family, school, plan after graduating, and were specifically asked to not talk about their experience as participants in the current study. The conversation lasted 12 minutes; one of the experimenters, blind to the condition, observed the interaction behind the one-way mirror to ensure that participants were engaged in the conversation and did not deviate from the instructions provided. During this time, the other experimenter scored the extraversion scale on the EPQ-R in a different room and plotted the results on a graph based on previously determined random assignment. The graph contained three additional measuring points: neuroticism, likelihood for sustained

relationships, and marriage stability. These items were plotted in either the low, normal, or high range. The neuroticism score was kept within the normal range for all participants. The scores for likelihood for sustained relationship and marriage stability were based on random assignment, such that they were plotted in the low range for individuals in the future alone condition and in the high range for participants in the future belonging condition. The future social contact graph is displayed in Appendix B. After the conversation time was up, the experimenters returned to the room and informed participants that the upcoming task involved group work and that they would like to form groups of two or three people (depending on group size) who would like to work together and who respect each other. Participants nominated two people with whom they would like to interact with further and placed their nominations in a box. All participants wore nametags to aid in this process and prevent additional conversations at time of partner selection. Then, participants were shown to individual rooms where they were individually informed that no one had chosen to work with them for the upcoming group task. This social rejection was adapted from a well-established conversational task (Blackhart, Eckel, & Tice, 2007; Twenge, Baumeister, Tice, & Stucke, 2001). Below is the information they received:

> *I hate to tell you this, but NO ONE chose to work with you. The other participants chose to work with another partner and not with you, and so you will not be completing the group activity. At this point, I will ask you to wait here while I go set up the activity for the groups. I will return shortly with some additional tasks for you to complete alone in here. In the meantime, please fill out this brief measure.*

Following the social rejection, participants completed the PANAS. After a few minutes, the experimenter returned and handed them a booklet containing the Symbol Search and Coding subtests from the Wechsler Adult Intelligence Scale, Version 4 (WAIS-IV; Wechsler, 2008), which were included as a filler task. The purpose of the filler task was to provide participants with a low level cognitive task while they wait to provide another saliva sample. In the symbol search, participants were presented with a series of paired groups, each pair consisting of a 'target group' and a 'search group.' Participants were instructed to indicate whether one of the target symbols was part of the search group. In the coding subtest, participants were shown a set of numbers and their corresponding symbols. They were presented with a list of numbers and asked to fill in the corresponding symbol. The third saliva sample was collected 15 minutes after the social rejection.

Then, participants were randomly assigned to a future social contact condition that utilized information collected from the personality questionnaire they completed earlier in the study (ERQ-R). This procedure was modeled after Twenge, Baumeister, Tice, and Stucke (2001). Specifically, participants received bogus feedback about their future. To make the feedback appear more credible, information about their extraversion score was accurate, based on items endorsed on the EPQ-R and coded as high, medium, or low. Then depending on random assignment, participants were provided with the following feedback.

Future Alone (Negative Feedback).

> *I know that you had this experience during the previous task when no one wanted to work with you.*[pause] *And now, I kind of see that it is consistent with your*

personality type [pause and show them the graph]*; you're the type of person who will end up alone later in life. You may have friends and relationships now, but by your mid 20s most of these will have drifted away. You may even marry* [pause] *or have several marriages, but these are likely to be short-lived and not continue into your 30s. Relationships don't last, and when you're past the age when people are constantly forming new relationships, the odds are you'll end up being alone more and more."*

Future Belonging (Positive Feedback).

Wow, (pause) that's really surprising that no one wanted to work with you during the previous task. [pause] *The questionnaire shows* [point to the graph] *that you're the type who has rewarding relationships throughout life. You're likely to have a long and stable marriage and have friendships that will last into your later years. The odds are that you'll always have friends and people who care about you.*

Control Condition. Participants assigned to the control group did not receive any information about their future.

Following the future social contact manipulation, participants completed another PANAS followed by another filler task, which was a modified booklet from the first one. Another saliva sample (cortisol 4) was collected 15 minutes following the future feedback. For the second portion of the study, participants were run through the procedures individually. Participants were informed of another task (BAT), presented as part of a different study. Participants were shown a brief video that introduced the tarantula and the upcoming task. They were informed that they could discontinue the task

whenever they feel uncomfortable proceeding and that it would not affect their research credits. After informed consent was obtained, participants were familiarized with the 0-100 SUD scale. This procedure has been used in previous studies in our laboratory (McLean & Hope, 2010; Stoyanova & Hope, 2012). The SUDS rating was explained to participants during the initial description provided on the computer prior to the task. The following information was provided:

> *During the course of this study, you will be asked frequently to report the level of fear or anxiety that you feel at particular points in time. Please use this 0-to-100 point subjective units of distress scale (known as SUDS) to rate your fear levels. So, a score between 0 and 25 would indicate very little or no fear, 50 moderate fear, 75 strong fear, and 100 severe fear, or the most fear imaginable. For example, say you are relaxing at home watching TV or listening to music, you might report a level of no fear or very little fear; a score between 0 and 10 would best describe such fear. On the other hand, if a brick were suddenly thrown through your window, you might then report strong to severe fear; a score between 75 and 100 would best describe this fear. You can use ANY NUMBER between 0 and 100.*

After the initial introduction and SUDS description, the participant was informed of the steps. Then, they were asked to provide the first SUDS rating (anticipatory SUDS) by writing it down on a sheet of paper and placing it in a confidential box. Then, the experimenter reminded the participant of the first step, which was to enter the testing room and rapidly approach the tarantula sitting on the table across the room. The experimenter observed the participant behind a one-way mirror for the duration of the

BAT and provided instructions for each subsequent step through an intercom system. As soon as the participant reached the table with the tarantula (step 1), they were asked to indicate their SUDS level by circling a number on a SUD scale (referred to as approach SUDS from here on). Prior to touching the spider (step 7) and prior to allowing the spider on their hand (step 9), participants were reminded that they could stop the task and were asked whether they would like to proceed. If the participant chose to complete the last step (step 9), the experimenter entered the testing room and placed the tarantula on the participant's hand, while the palm of their hand touched the floor of the terrarium. After completing the BAT, participants were asked to provide a SUDS rating indicating their anxiety level at the end of the task as well as provide a SUDS rating for the peak anxiety during the BAT. Following the BAT, participants completed the PANAS and were taken back to the original room. Another saliva sample (cortisol 5) was collected 15 minutes following the BAT.

Then, participants completed a feedback questionnaire, which assessed their reactions to the social rejection and the information received about their future relationships (for those who received feedback). Additional information was collected regarding their experience during the BAT, as well as whether they had prior experience with spiders. Then, participants were debriefed regarding the social conversation and the feedback they received based on their answers on the personality questionnaire. Participants were debriefed individually since everyone completed the BAT at different times and it was not feasible to debrief everyone at the same time. During the debriefing, the experimenter informed participants that no one disliked them and that the information they received regarding no one wanting to work with them was part of the experiment

and did not reflect other's desire to work with them. They were also informed that there was no actual group work that followed the social interaction and that others did not indicate that they did not want to interact with them. Furthermore, participants were also debriefed regarding the feedback they received based on the personality questionnaire they completed at the beginning of the experiment. The experimenter informed them that some participants received feedback regarding their future, whereas others did not. They were told that if they were assigned to a future social contact condition, the information about their extraversion score was accurate but that the information provided about their likely future relationships was not based on their responses to the questionnaire, but was rather a randomly assigned description. Participants were also informed that the purpose for the saliva samples was to examine their physiological reaction to the social stressors and the anxiety provoking task. Since having prior knowledge about the social interaction and future manipulation could potentially result in selection biases among recruitment and thus threaten the integrity of the study, the experimenter emphasized the importance of keeping the details of the study confidential and urged participants to not share their experiences with others who may be potential participants. Following the debriefing, participants were asked to stay in their individual room and listen to relaxing music. Ten minutes later, participants filled out another PANAS and provider the last saliva sample (cortisol 6).

To provide a thorough assessment of the study hypotheses, it was important that all experimenters strictly followed study procedures. To ensure that procedures were delivered consistently, the study protocol was standardized. All six experimenters were trained in the study procedures and practiced delivery of information during several mock

sessions. Additional training sessions were scheduled to practice delivery of social rejection as well as feedback condition. Experimenters were asked to report any deviations from the study protocol. Since the lead experimenter was present for all experiment sessions, frequent observations of the delivery of study protocol were done to ensure that the study protocol was delivered in a consistent manner.

Statistical Design and Analyses

To test whether the manipulation was successful, participants' responses on the feedback questionnaire were first assessed. Descriptive analyses were conducted to examine sample characteristics. Correlation analyses were performed to examine relationships between subjective and physiological variables. A repeated measures multivariate analysis of covariance (MANCOVA) was computed to test the hypothesis that future social contact (future belonging versus future alone versus control) will result in a different physiological and psychological stress response. To control for baseline fear of spiders, the FSQ was included as a covariate. When appropriate, results were corrected using the Greenhouse-Geisser procedure. LSD post hoc test were computed for significant effects. Area under the curve with respect to ground (AUC_G) was calculated using the trapezoid method described by Pruessner, Kirschbaum, Meinlschmid, and Hellhammer (2003). The area under the curve with respect to increase (AUC_I) was calculated to assess changes over time following the formulas proposed by Pruessner and colleagues (2003). To test the hypothesis that future feedback condition following the initial stressor (social rejection) will affect the physiological stress response (change in cortisol pre to post BAT), subjective anxiety (SUDS) and approach/avoidance behavior (BAT), a MANOVA was computed with group serving as the between-groups factor and

avoidance, subjective anxiety during BAT, and change in cortisol (pre to post BAT) as the dependent variables. Where a significant multivariate effect was found, separate univariate tests were performed as follow-ups. Significant tests and calculations of effect sizes (i.e., partial η^2 ; Cohen's *d*) are reported.

CHAPTER THREE: RESULTS

Test of Normalcy

All manually entered data were screened for data entry errors. To assess data for normalcy, preliminary analyses included computations of means, standard deviations, range of scores, skewness and kurtosis for all study measures. Outliers were identified using the "depth of the fourths" procedure (Hoaglin, Mosteller, & Tukey, 1983) as values whose absolute distance is more than 1.5 the interquartile range beyond the first and third quartiles. Outliers were found on PANAS NA, anticipatory SUDS and approach SUDS. All NA cases were in the upper end of the distribution; five for time 1, seven cases at time 2 and 3, one case at time 4, and 8 at time 5. Instead of deleting outliers, these values were winsorized by recoding the outlier value with the closest acceptable value. Full ranges of scores were expected on the subjective measures during the BAT. Four participants were identified as outliers on anticipatory SUDS and two on approach SUDS, all reporting an anxiety rating of 100. Three of these individuals did not enter the testing room and one completed the first step only, which was to enter the testing room, suggesting that they were highly fearful. Their FSQ scores confirmed that they fell in the high end of the spider fear measure. Thus, these scores were not viewed as random scores and were therefore preserved rather than winsorized.

Following the outlier analyses, skewness of variables was examined. The FSQ, anticipatory SUDS, peak SUDS, two PA scores, and all NA scores, had skewness values greater than .80, resulting in abnormal distributions. Square root transformations were performed on anticipatory SUDS, FSQ and PANAS PA3 and PANAS PA5, resulting in a normal distribution. On PANAS NA (NA1, NA2, NA3, NA4, and NA5), inverse

transformations resulted in the most normal distribution. However, this transformation affected the statistical conclusions on correlational analyses when compared with the original values. The log transformation was used instead as it did not impact the results and resulted in the same statistical conclusions as the original values. Regarding peak SUDS, square root, log, and inverse transformations resulted in greater skewness; thus, original peak SUDS was retained for analyses. Cortisol data were examined for outliers and normalcy of distribution. The distribution was positively skewed and required a logarithmic transformation, which is a typical procedure for biological variables (Burke, Fernald, Gertler, & Adler, 2005). Logarithmic transformation resulted in a normal distribution. Next, cortisol data was examined for outliers, which were defined as any values greater than ± 3 *SD* from the mean. These extremely high values were excluded from the sample (n = 6). Table 3.1 presents indices of normality for the final sample on all study measures. All statistical analyses were performed with transformed values; for ease in interpretability and visualization, *M* and *SD* presented in text and data depicted in graphs demonstrate original values.

Attrition

Of 128 participants, 43 were randomly assigned to the future belonging condition, 43 to the future alone condition, and 42 were in the control condition (no future feedback). To assess whether random assignment resulted in groups that were equivalent at baseline, one-way analysis of variance (ANOVA) and chi-square tests were conducted on demographic variables, self-reported measures and cortisol. The results revealed that participants in the three conditions (future belonging, future alone, and control) were not different relative to ethnicity ($X^2 = 4.35$, $p = .93$), and baseline measures of cortisol,

$F(2,108) = 1.26$, $p > .05$, and affect (PA, $F(2,103) = 1.48$, $p > .05$; NA, $F(2,103) = .96$, $p > .05$). However, there were differences between the group for year in school ($X^2 = 21.12$, $p = .007$), with most participants in the future alone condition being in their first year of college, whereas most in the future belonging and control conditions were in their second and third year of college. Also, the three groups differed in relation to age, $F(2,125) = 7.57$, $p = .001$, such that participants in the future alone condition were slightly younger than the other two groups, $M = 19.42$ (future alone) vs. $M = 20.12$ (future belonging), vs. $M = 20.40$ (control).

Five participants (6.4%) were excluded from data analyses due to experimenter error (i.e., deviations from protocol) resulting in missing data. They did not differ from the rest of the participants on any demographic variables, such as age, $F(1,126) = 1.08$, $p = .30$, ethnicity, ($X^2 = 1.26$, $p = .94$), or year in college, ($X^2 = .48$, $p = .97$). Additionally, four individuals (5.1%) were excluded from subsequent analyses due to having prior experience with spiders. These individuals did not differ from the rest of the sample on demographic variables, age, $F(1,126) = 1.34$, $p = .24$, ethnicity, ($X^2 = 5.36$, $p = .37$), year in college, ($X^2 = 1.77$, $p = .77$). Individuals with prior experience with spiders were compared to the rest of the sample relative to subjective anxiety experienced during the BAT. Although statistically not significant, participants with prior experience demonstrated lower anxiety than the rest of the sample (anticipatory SUDS, $M = 15$ vs. $M = 34.7$, $F(1,126) = 2.9$, $p > .05$; approach SUDS, $M = 19.5$ vs. $M = 37.3$, $F(1,123) = 2.07$, $p > .05$; end of task SUDS, $M = 32.50$ vs. $M = 58.49$, $F(1,126) = 2.65$, $p > .05$; peak SUDS, $M = 50$ vs. $M = 68$, $F(1,126) = 1.75$, $p > .05$, and FSQ, $M = 28.75$ vs. $M = 48.90$, $F(1,126) = 2.27$, $p > .05$).

Participants with missing cortisol values were excluded from cortisol analyses (n = 6). Additionally, twelve participants did not have the first baseline sample (cortisol 1) due to technical problems resulting in loss of salivette tubes; their data were excluded from repeated measures analysis, but were retained for all other analyses with cortisol samples.

Table 3.1.

Indices of Normality for Study Measures

Variable	*M*	*SD*	Range	Skewness	Kurtosis
Anticipatory SUDS					
Original	34.67	23.77	0 - 100	.81	.46
Transformed	5.42	2.33	0 - 10	-.52	.38
Approach SUDS	37.40	24.78	0 - 100	.50	-.42
End of task SUDS	57.19	31.64	0 - 100	-.67	-.91
Peak SUDS	67.65	27.68	0 - 100	-.90	-.23
BAT (total steps completed; 0-9)	6.19	2.39	0 - 9	-.37	-.41
Fear of Spiders Questionnaire (FSQ)					
Original	49.67	27.36	18 - 119	.75	-.43
Transformed	6.79	1.90	4.24 – 10.91	.39	-.95
Positive Affect (PANAS)					
PA1-baseline	24.89	6.97	13 - 44	.32	-.38
PA2-post social rejection	21.06	7.28	10 - 44	.55	-.27
PA3-post future social contact					
Original	19.93	7.26	10 - 48	.93	1.05
Transformed	4.40	.79	3.16 – 6.93	.51	-.17
PA4-post BAT	23.58	8.16	10 - 44	.62	-.20
PA5-post recovery					
Original	17.66	6.93	10 - 40	.83	-.01
Transformed	4.13	.78	3.16 – 6.32	.54	-.70
Negative Affect (PANAS)					
NA1-baseline					
Original	13.13	3.34	10 - 21	1.15	.23
Transformed	1.10	.10	1.00 – 1.32	.75	-.40
NA2-post social rejection					
Original	14.54	4.35	10 – 24.75	1.17	.32
Transformed	1.11	.12	1.00 – 1.39	.80	-.39
NA3-post future social contact					
Original	13.38	3.77	10 – 22.50	1.28	.71
Transformed	1.12	.11	1.00 – 1.35	.70	-.18
NA4-post BAT					

Original	18.57	7.32	10 – 39.5	.80	-.01
Transformed	1.24	.17	1.00 – 1.60	.19	-1.04
NA5-post recovery					
Original	11.26	1.71	10 - 15	1.16	-.02
Transformed	1.05	.06	1.00 – 1.18	.90	-.34
Cortisol 1 (baseline 1; upon arrival)					
Original	22.20	9.88	6.46 – 51.79	.89	-.03
Transformed	1.30	.20	.81 – 1.71	-.16	-.63
Cortisol 2 (baseline 2; 15 minutes later)					
Original	20.63	9.14	4.80 – 48.50	.93	.70
Transformed	1.27	.19	.68 – 1.69	-.16	-.09
Cortisol 3 (post social rejection)					
Original	18.39	8.56	6.12 – 47.32	1.27	1.71
Transformed	1.22	.19	.79 – 1.68	.05	-.08
Cortisol 4 (post future social contact)					
Original	17.07	7.52	6.12 – 44.94	1.10	1.16
Transformed	1.19	.18	.79 – 1.65	.11	-.41
Cortisol 5 (post BAT)					
Original	17.40	8.33	5.32 – 42.27	1.09	.67
Transformed	1.19	.20	.73 – 1.63	.14	-.45
Cortisol 6 (post recovery)					
Original	16.46	7.94	4.44 – 43.79	1.24	1.47
Transformed	1.17	.20	.65 – 1.64	-.01	-.01

Note: SUDS = Subjective Units of Distress; Positive Affect and Negative Affect are subscales on PANAS (Positive and Negative Affect Scale)

Manipulation Check

To examine the effectiveness of the study manipulation, responses from the feedback questionnaires were assessed. Participants were asked to indicate what their reaction was when the experimenter informed them that no one had chosen to work with them. They were provided with 3 options to choose from: (1) *I was disappointed. I felt rejected. I was kind of bummed out*, (2*) I figured they must have made a mistake*, and (3) *I figured they must have been lying to me*. Participants in the future belonging and future alone conditions were asked two more questions to assess whether they believed the experimental manipulation. First, they were asked to indicate if they remember hearing the information the experimenter presented and then were asked to indicate what their

reaction was to the information they received, using one of three options: (1) *It made me happy. I felt really good about the future* (future belonging) or *I was disappointed. I felt rejected. I was kind of bummed out.* (future alone), (2) *I figured they must have made a mistake*, and (3) *I figured they must have been lying to me*. Once the feedback questionnaire was completed, the experimenter collected additional verbal feedback from participants to determine whether or not the information provided was convincing. Five participants (6.4%) indicated that they did not believe the experimenter when they informed them that no one chose to work with them and/or indicated that the experimenter lied to them about their future. Data from these five participants were excluded from further analyses.

Preliminary Analyses

All experiment sessions were completed between 1pm and 7pm to control for diurnal changes in cortisol. Time of testing was examined to determine whether cortisol values differed between the two testing times (1pm versus 4pm). Preliminary analyses demonstrated that the two testing times did not result in statistically significant differences in cortisol at time 1, $M = 26.1$ (1pm) vs. $M = 22.05$ (4pm), $F(1, 109) = 3.62$, $p = .06$; time 2, $M = 23.34$ (1pm) vs. $M = 20.51$ (4pm), $F(1,121) = 2.47$, $p = .12$; time 3, $M = 20.91$ (1pm) vs. $M = 18.51$ (4pm), $F(1,123) = 1.73$, $p = .19$; time 4, $M = 18.87$ (1pm) vs. $M = 17.29$ (4pm), $F(1,122) = .89$, $p = .35$; and time 6, $M = 18.97$ (1pm) vs. $M = 15.91$ (4pm), $F(1,120) = 3.84$, $p = .05$. Surprisingly, while there were no baseline differences in cortisol levels between the two testing times, there was a statistically significant difference in salivary cortisol at time 5, $M = 20.60$ (1pm) vs. $M = 16.72$ (4pm), $F(1,124)$

= 5.48, p = .02, such that the earlier testing session resulted in higher cortisol values after BAT only.

Preliminary analyses were also performed to assess for compliance with guidelines regarding food and alcohol consumption prior to testing session. All participants were found to have complied with guidelines to not consume alcohol 12 hours prior to experiment participation. In regards to food consumption, most participants followed guidelines asking them to abstain from eating one hour prior to participation in the experiment. Four participants (5.1%) indicated that they ate 30 - 45 minutes prior to the experiment. Preliminary analyses indicated that these participants' cortisol values did not differ from the rest of the sample at baseline (M = 27.57 vs. M = 22.94, F(1,108) = .77, p > .05). Thus, their values were retained for analyses.

Preliminary analyses were computed to assess frequency of daily hassles and determine whether the groups were equivalent on this measure at baseline. A one way ANOVA indicated that there was no difference in frequency of daily hassles between the groups (future belonging, M = 46.05, SD = 33.36; future alone, M = 32.42, SD = 27.48, and control, M = 42.37, SD = 31.22), F(2,104) = 1.81, p = .17, such that the groups were equivalent at baseline.

Additional analyses were conducted to examine regularity of menstrual cycle. Two women (2.5%) indicated absence of menstrual periods; one indicated never having a period, and the other participant indicated that she has not had a period for the past two years. These participants demonstrated elevated cortisol levels at baseline compared to the rest of the sample (M = 45.01 vs. M = 22.89, F(1,109) = 9.45, p = .003) and were excluded from further analyses. Additionally, seven women (8.9%) reported having

irregular menstrual cycles (cycles lasting longer than 35 days). Preliminary analyses demonstrated that these women did not differ from the rest of the sample on cortisol levels at any of the time points; time 1, $M = 22.99$ vs. $M = 23.31$, $F(1,109) = .004$, $p = .95$; time 2, $M = 23.33$ vs. $M = 21.28$, $F(1,121) = .28$, $p = .60$; time 3, $M = 18.58$ vs. $M = 19.30$, $F(1,123) = .04$, $p = .85$; time 4, $M = 21.22$ vs. $M = 17.26$, $F(1,121) = 1.61$, $p = .21$; time 5, $M = 20.16$ vs. $M = 17.86$, $F(1,124) = .44$, $p = .51$; and time 6, $M = 16.83$ vs. $M = 16.95$, $F(1,120) = .01$, $p = .97$. Therefore, these participants were retained for analyses. The final sample consisted of 107 participants, 39 in future belonging condition, 33 in future alone condition and 35 in control condition.

Zero-order Correlations

Correlational analyses were performed to examine the relationship between study variables. Results are shown in Table 3.2 and Table 3.3. First, the relationship between self reported affect was examined. As shown in Table 3.2, all PANAS PA scores (collected at different times) were significantly related to each other. This indicates that high positive affect reported at one time point in the study was associated with elevated positive affect at all time points. A similar pattern of relationship emerged with negative affect, such that all PANAS NA scores were related to one another, indicating that more negative affect reported at one point in the study was associated with elevated negative affect reported at other times of the study. Surprisingly, NA1 was positively related to all PA scores, such that greater negative affected reported at the beginning of the experiment was related to positive affect reported at the beginning and at following time points (see Table 3.2). NA2 was significantly related to PA1, PA4, and PA5, indicating that greater negative affect following the social rejection was associated with greater positive affect at

the beginning of the experiment, following the BAT and post recovery. Similarly, NA3 was correlated with PA1, PA4 and PA5, indicating that negative affect following the future social contact feedback was associated with more positive affect reported at the beginning of the experiment, following the BAT, and post recovery. Additionally, there was a positive correlation between NA4 and PA2, indicating that positive affect experienced following the social rejection was associated with more negative affect following the BAT. NA5 was not significantly related to any of the PA scores.

As for the relationship among anxiety related measures (see Table 3.3), anticipatory SUDS was significantly correlated with approach SUDS, peak SUDS, and end SUDS, indicating that greater anxiety levels prior to BAT were associated with higher anxiety while approaching the tarantula, at the end of the task and when anxiety peaked, or was the highest. Anticipatory SUDS and approach SUDS were positively related to NA1, and NA2, indicating that greater negative affect experienced at the beginning of the experiment and following the social rejection were related to greater anticipatory and approach anxiety during the BAT. Also, NA4 was positively correlated with anticipatory SUDS and approach SUDS, such that higher levels of anticipatory anxiety and anxiety reported as approaching the tarantula were related to more negative affect reported following the BAT. End SUDS was positively correlated with NA2 and NA3, indicating that negative affect following the social rejection and the future social contact manipulation was associated with greater anxiety reported at the end of the BAT. Additionally, there was a positive correlation between end SUDS and NA4 and NA5,

Table 3.2.

Correlations between Self Reported Affect and Cortisol

	Cort 1	Cort 2	Cort 3	Cort 4	Cort 5	Cort 6	PA1	PA2	PA3	PA4	PA5	NA1	NA2	NA3	NA4
Cort 1	-														
Cort 2	.91***	-													
Cort 3	.78***	.87***	-												
Cort 4	.75***	.77***	.86***	-											
Cort 5	.65***	.64***	.73***	.87***	-										
Cort 6	.49***	.49***	.63***	.72***	.86***	-									
PA1	-.13	-.04	-.07	-.05	-.10	.03	-								
PA2	-.04	-.06	-.11	-.06	-.05	.05	.72***	-							
PA3	.03	.05	-.02	.01	-.01	.05	.62***	.79***	-						
PA4	.17	.22*	.13	.10	-.01	-.01	.56***	.51***	.51***	-					
PA5	.09	.09	.01	.05	.06	.06	.57***	.60***	.56***	.63***	-				
NA1	.09	.08	.05	.03	.08	.11	.36**	.29*	.23*	.21*	.34**	-			
NA2	.04	.04	.03	.06	.03	.10	.31**	.07	.10	.24*	.33***	.54***	-		
NA3	.01	.01	-.03	-.01	-.001	.001	.27**	.09	.08	.27**	.32***	.42***	.73***	-	
NA4	.03	-.02	.003	.01	.07	.05	.09	.20*	.14	-.06	.18	.52***	.39***	.37***	-
NA5	.03	-.02	.01	.11	.09	.12	.16	.15	.07	.03	.15	.47***	.43***	.36***	.45***

Note. Cort 1 = Salivary Cortisol Sample 1 (baseline 1; upon arrival to the laboratory); Cort 2 = Salivary Cortisol Sample 2 (baseline 2; 15 minutes after baseline 1); Cort 3 = Salivary Cortisol Sample 3 (post social rejection); Cort 4 = Salivary Cortisol Sample 4 (post future social contact manipulation); Cort 5 = Salivary Cortisol Sample 5 (post BAT); Cort 6 = Salivary Cortisol Sample 6 (post recovery); PA1 = Positive and Negative Affect Scale – Positive, Time 1 (baseline); PA2 = Positive and Negative Affect Scale – Positive, Time 2 (post social rejection), PA3 = Positive and Negative Affect Scale – Positive, Time 3 (post future social contact manipulation); PA4 = Positive and Negative Affect Scale – Positive, Time 4 (post BAT); PA5 = Positive and Negative Affect Scale – Positive, Time 5 (post recovery); NA1 = Positive and Negative Affect Scale – Negative, Time 1 (baseline); NA2 = Positive and Negative Affect Scale – Negative, Time 2 (post social rejection); NA3 = Positive and Negative Affect Scale – Negative, Time 3 (post future social contact manipulation); NA4 = Positive and Negative Affect Scale – Negative, Time 4 (post BAT); NA5 = Positive and Negative Affect Scale – Negative, Time 5 (post recovery).

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3.3.

Correlations between Anxiety and Affect Measures

	Antic SUDS	Appr SUDS	Peak SUDS	End SUDS	BAT	PA1	PA2	PA3	PA4	PA5	NA1	NA2	NA3	NA4	NA5
FSQ	.47***	.48***	.52***	.49***	-.54***	-.01	.18	.21	-.13	.06	.16	.09	-.02	.54***	.23*
Antic SUDS	-	.78***	.72***	.63***	-.48***	-.004	.10	.12	-.09	.15	.26*	.23*	.12	.51***	.13
Appr SUDS		-	.70***	.67***	-.51***	.08	.14	.10	-.07	.16	.25*	.19*	.20*	.63***	.15
Peak SUDS			-	.92***	-.61***	-.04	.04	.03	-.17	.06	.21*	.26*	.21*	.73***	.18
End SUDS				-	-.71***	-.07	.01	-.05	-.25*	-.004	.16	.19*	.20*	.71***	.20*
BAT					-	.15	.04	.004	.44***	.15	-.16	-.04	-.13	-.57***	-.29***

Note. Antic SUDS = Anticipatory Subjective Units of Distress Scale (SUDS); Appr SUDS = Approach spider SUDS; BAT = Behavioral Approach Task; End SUDS = End of Task SUDS; Peak SUDS = Peak Anxiety Reported during BAT; FSQ = Fear of Spiders Questionnaire Total Score; PA1 = Positive and Negative Affect Scale – Positive, Time 1 (baseline); PA2 = Positive and Negative Affect Scale – Positive, Time 2 (post social rejection), PA3 = Positive and Negative Affect Scale – Positive, Time 3 (post future social contact manipulation); PA4 = Positive and Negative Affect Scale – Positive, Time 4 (post BAT); PA5 = Positive and Negative Affect Scale – Positive, Time 5 (post recovery); NA1 = Positive and Negative Affect Scale – Negative, Time 1 (baseline); NA2 = Positive and Negative Affect Scale – Negative, Time 2 (post social rejection); NA3 = Positive and Negative Affect Scale – Negative, Time 3 (post future social contact manipulation); NA4 = Positive and Negative Affect Scale – Negative, Time 4 (post BAT); NA5 = Positive and Negative Affect Scale – Negative, Time 5 (post recovery).

* $p < .05$; ** $p < .01$; *** $p < .001$

indicating that high SUDS reported at the end of the BAT were associated with elevated negative affect reported immediately following the BAT and post recovery. There was also a negative correlation between end SUDS and PA4, such that high anxiety at the end of the BAT was related to lower positive affect following the BAT.

Furthermore, BAT was significantly negatively related to anticipatory SUDS, approach SUDS, end of task SUDS, and peak SUDS, indicating that high levels of subjective anxiety reported before and during the BAT was related to fewer steps completed on the BAT. Also, there was a significant positive relationship between BAT score and PA4, indicating that completion of more steps on the BAT was associated with higher positive affect following the BAT. There was a negative correlation between BAT and NA4 and NA5, such that fewer steps completed on the BAT was associated with greater negative affect reported immediately following the BAT as well as after the recovery period. Peak SUDS were significantly related to NA1, NA2, and NA3, indicating that negative affect experienced during the first part of the experiment was associated with elevated peak SUDS during the BAT. Peak SUDS was also related to NA4, such that higher peak anxiety during BAT was related to greater negative affect reported following BAT.

Regarding fear of spiders, there was a positive correlation between FSQ score and all SUDS scores (anticipatory SUDS, approach SUDS, peak SUDS, end SUDS), indicating that elevated fear of spiders was related to more subjective anxiety experiences in anticipation of the BAT, as approaching the tarantula, at the end of the BAT, as well as when the anxiety was at its peak. These correlations are displayed in Table 3.3. Further, the FSQ was significantly negatively correlated with the BAT, indicating that greater fear

of spiders was associated with fewer steps completed on the BAT. Regarding the relationship between FSQ and self-reported affect, there was a significant correlation between FSQ score and NA4 and NA5. This indicated that higher score on the fear of spiders questionnaires was associated with greater negative affect experienced immediately following the BAT as well as after recovery.

As shown in Table 3.2, significant positive correlations were found between cortisol values at all time points, indicating that higher cortisol values at one time point were related to elevated cortisol values at all other time points. The two baseline samples (cortisol time 1 and time 2) showed the strongest relationship, $r(94) = .91$, $p < .001$. Examining the associations between affect and cortisol, correlational analyses revealed only one significant relationship. Cortisol 2 was significantly related to PA4, indicating that higher baseline cortisol levels were related to greater positive affect following the BAT. No other correlations were found between cortisol levels and self-reported affect at any of the other assessment points. Correlational analysis further demonstrated that there was a strong relationship between AUC_G and AUC_I ($r = .98$, $p < .001$), such that higher area under the curve in respect to ground was associated with greater area under the curve in respect to increase.

Hypothesis Driven Analyses

Effect of Future Feedback Condition

To examine the effect of future social contact condition following the initial stressor (social rejection), a repeated measures MANCOVA was conducted with group (future belonging vs. future alone vs. control) as the between-groups factor and emotional (self-reported affect on PANAS) and physiological (salivary cortisol) response as the

dependent variables. The FSQ was included as a covariate since participants' responses could be influenced by their fear of spiders. Since we collected two baseline saliva samples (cortisol 1 and cortisol 2), the relationship between the two samples was examined using within-subjects ANOVA. The results indicated that cortisol levels at baseline 1 (M = 22.66, SD = 9.94) were significantly higher than baseline 2 (M = 20.42, SD = 8.52), $F(1,93) = 24.15$, $p < .001$, d = -.22. Figure 3.4 illustrates the decrease in cortisol levels from the first to second baseline sample. This is similar to results obtained by Balodis and colleagues (2010), who concluded that the second cortisol sample was a more accurate measure of baseline compared to the one collected immediately upon arrival to the laboratory. Thus, we have followed their recommendations and used cortisol 2 for the following analysis. Cortisol and self-reported affect data were not included in analyses if participants had missing data due to experimental problems (17 participants were missing baseline PANAS, and final cortisol sample was missing for two participants). Thus, missing data resulted in available data only from 88 participants (34 in future belonging group, 27 in future alone group, and 27 in control group). A 3 (Future social contact group: future belonging, future alone, control) X 5 (Time: baseline, post social rejection, post future social contact manipulation, post BAT, and post recovery) repeated measures MANCOVA was computed to test the hypothesis that positive future social contact (future belonging) would result in an overall lower pattern of psychological (increase in PA) and physiological response, whereas negative future social contact (future alone) would result in a heightened pattern, both as measured by cortisol and self-reported affect (NA). Results were corrected using the Greenhouse-Geisser procedure since the assumption of sphericity was violated according to Mauchly's test. Results

indicated that there was a multivariate effect for time (Wilks = .45, $F(12,73) = 7.35$, $p < .005$, partial $\eta^2 = .55$). Univariate analyses revealed a significant main effect of time for PA, $F(3.45, 289.76) = 15.81$, $p < .005$, partial $\eta^2 = .16$, NA, $F(3.01, 252.07) = 5.12$, $p < .01$, partial $\eta^2 = .06$, and for cortisol, $F(2.08,174.57) = 8.36$, $p < .001$, partial $\eta^2 = .09$. LSD posthoc analyses revealed that for PA, positive affect at baseline was highest than at subsequent times. Specifically, there was a drop in positive affect from time 1 ($M = 24.79$, $SD = 7.02$) to time 2 ($M = 20.45$, $SD = 6.78$) and to time 3 ($M = 19.48$, $SD = 6.60$), such that the social stressor and future social contact condition resulted in decrease in positive affect. There was a moderate effect size following the social rejection, $d = .62$, and a small effect size following the future social contact condition, $d = .14$. There was an increase in positive affect from time 3 to time 4 ($M = 23.16$, $SD = 8.16$, $d = -.56$), and a decrease from time 4 to time 5 ($M = 17.15$, $SD = 6.59$, $d = .74$), such that positive affect increased after the BAT and subsequently decreased following recovery period. As expected, the overall pattern for NA showed an increase in negative affect from time 1 ($M = 13.19$, $SD = 3.35$) to time 2 ($M = 14.81$, $SD = 4.58$), such that as expected, the social rejection resulted in an increase in negative affect. The effect size was close to moderate, $d = .48$. There was a drop in negative affect following the future feedback ($M = 13.34$, $SD = 3.84$, $d = -.32$), followed by an increase in negative affect immediately after the BAT ($M = 18.53$, $SD = 7.47$), and a decrease after the recovery period ($M = 11.27$, $SD = 1.69$). There was a large effect size for the increase in negative affect after the BAT, $d = 1.35$, and for the subsequent drop following the recovery period, $d = .97$. Contrary to our expectations, the post hoc analyses for cortisol levels indicated that cortisol levels at baseline were higher than all subsequent times (see Figure 3.2). Cortisol levels

significantly decreased from time 1 (M = 22.66, SD = 9.94) to time 2, (M = 20.42, SD = 8.52), showing a small effect size, d = -.22. Similarly, cortisol levels dropped further from time 2 to time 3 (M = 17.38, SD = 7.53), d = -.16, such that cortisol was lower after the future feedback was provided. These results suggest that the social rejection and the future social contact manipulation were not successful at eliciting a physiological response in participants. Cortisol values at time 4 (M = 17.63, SD = 8.40) did not differ significantly from time 3, indicating that the BAT did not elicit a heightened physiological response considering all participants. There was a significant drop in cortisol levels after the recovery period (M = 16.46, SD = 7.94) demonstrating a small effect size of d = .14, such that participants' physiological response was reduced at the end of the experiment, which was significantly lower than the baseline (see Figure 3.2). There was not a multivariate effect for group (Wilks = .96, $F(6,164) = .56$, $p = .76$, partial $\eta^2 = .02$), but there was a multivariate effect for the interaction between time and group (Wilks = .64, $F(24,146) = 2.56$, $p < .001$, partial $\eta^2 = .30$). Regarding emotional response, univariate analyses indicated a significant interaction between time and group for NA, $F(6.01, 252.07) = 2.41$, $p = .03$, but not for PA, $F(6.89, 289.77) = .95$, $p = .47$. Follow-up LSD analyses revealed that, consistent with research hypothesis, participants in the future alone condition reported more negative affect (M = 15.15, SD = 5.05) following the social contact manipulation compared to those in the future belonging group (M = 12.57, SD = 3.33) and those who did not receive any feedback (control group; M = 12.48, SD = 2.22) demonstrating a moderate effect size, d = .50. There was no significant difference between future belonging group and control group after feedback about future social contact was provided (see Figure 3.1). Results indicated no significant

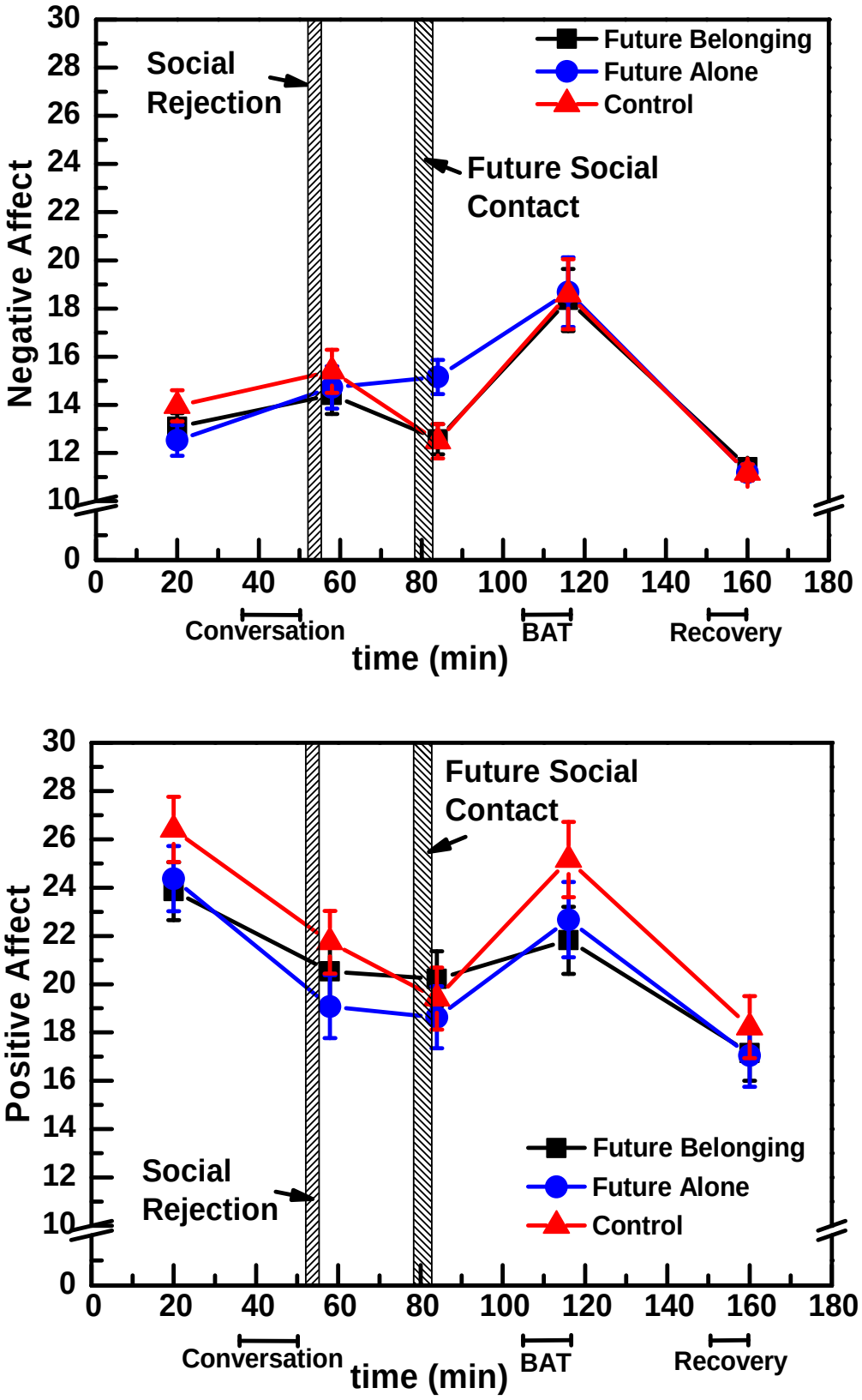

Figure 3.1. Self-reported Positive and Negative Affect by Future Social Contact Group

group differences at any other time points, such that participants in all three groups demonstrated a similar pattern of negative affect at baseline, post social rejection, following the BAT, and post debriefing. Regarding the response pattern for cortisol (see Figure 3.2.), there was a significant interaction between time and group for cortisol, $F(4.16, 174.57) = 3.03$, $p = .02$. Follow-up LSD analyses indicated a group difference after the BAT; while cortisol levels following the BAT did not differ between the future belonging group ($M = 20.08$, $SD = 8.55$) and the future alone group ($M = 17.55$, $SD = 9.19$), the control group showed significantly lower cortisol levels ($M = 14.96$, $SD = 6.74$) compared to the future belonging group, with an effect size of $d = -.28$. There was no difference between the future alone group and the control group.

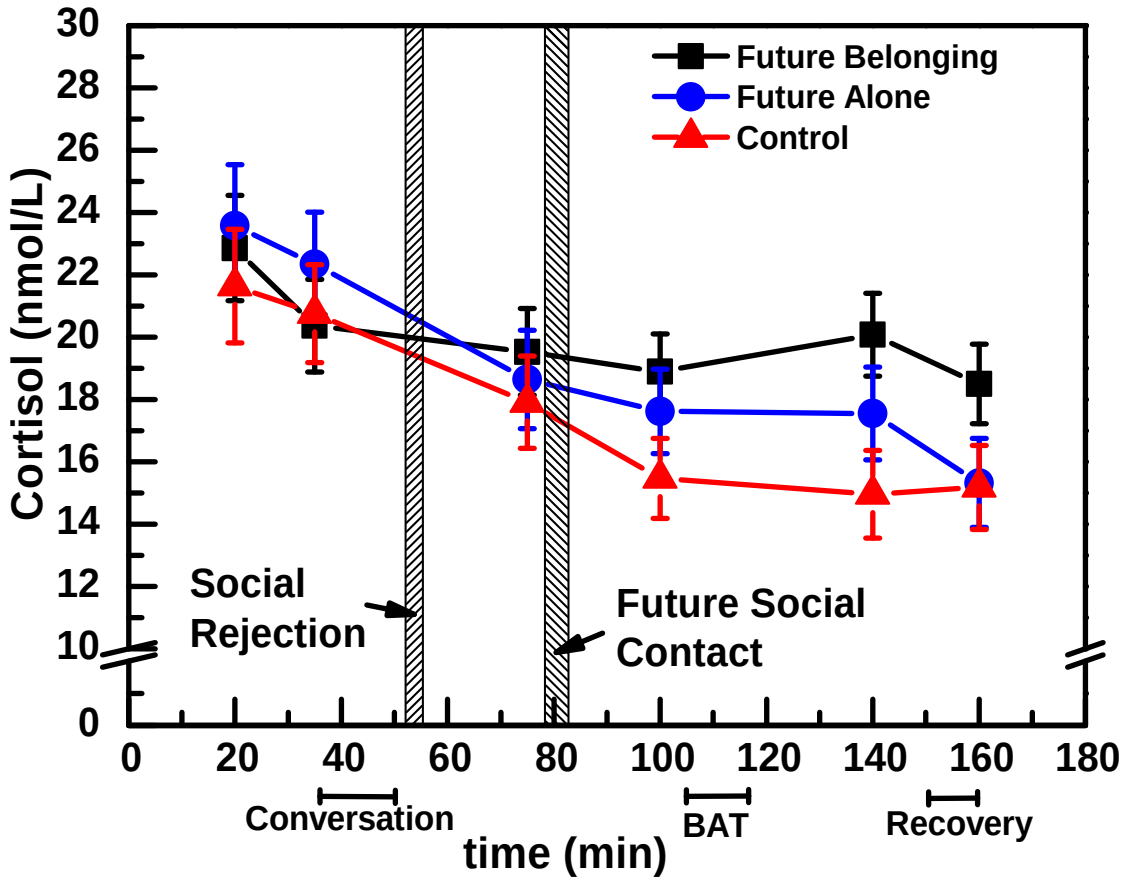

Figure 3.2. Salivary Cortisol by Social Contact Group. Values are Mean and Standard Errors.

Additionally, there was not a multivariate effect for FSQ (Wilks = .92, $F(3,82) = 2.51$, $p > .05$, partial $\eta^2 = .02$, but there was a multivariate effect for the interaction between time and FSQ (Wilks = .64, $F(12,73) = 3.42$, $p < .005$, partial $\eta^2 = .36$. Follow-up univariate analyses revealed a significant interaction between time and FSQ for PA, $F(3.45, 289.77) = 2.75$, $p = .03$ partial $\eta^2 = .03$, and for NA, $F(3.01, 252.07) = 17.47$, $p < .001$, partial $\eta^2 = .17$, but not for cortisol, $F(2.08,174.57) = 1.55$, $p > .05$, partial $\eta^2 = .02$.

Menstrual cycle phase and oral contraceptives. To test for possible effects of menstrual cycle phase and oral contraception (OC) use on cortisol levels, a mixed-group factorial ANOVA was performed with group and menstrual cycle phase/OC as the between-groups factor and cortisol samples (cortisol 2 - cortisol 6) as the repeated measures variable. A 3 (Future social contact group: future belonging, future alone, and control) X 3 (Cycle phase: follicular phase, luteal phase, and OC user) X 5 (Time: baseline, post social stressor, post future social contact manipulation, post BAT, post recovery) indicated that there was not a multivariate effect for the interaction between time and cycle phase (Wilks = .90, $F(8,176) = 1.19$, $p = .31$, partial $\eta^2 = .05$), or for the three way interaction between time, group, and cycle phase (Wilks = .79, $F(16,269) = 1.31$, $p = .19$, partial $\eta^2 = .06$, such that cortisol values did not differ based on menstrual cycle phase or OC use. There was no main effect of menstrual cycle/OC condition, $F(2,91) = .58$, $p = .56$, partial $\eta^2 = .01$, nor for the interaction between group and menstrual cycle/OC condition, $F(4,91) = 1.35$, $p = .26$, partial $\eta^2 = .06$. As demonstrated in the main analysis, the multivariate effect for time and for the interaction between time and future feedback were significant. Figure 3.3 displays the pattern.

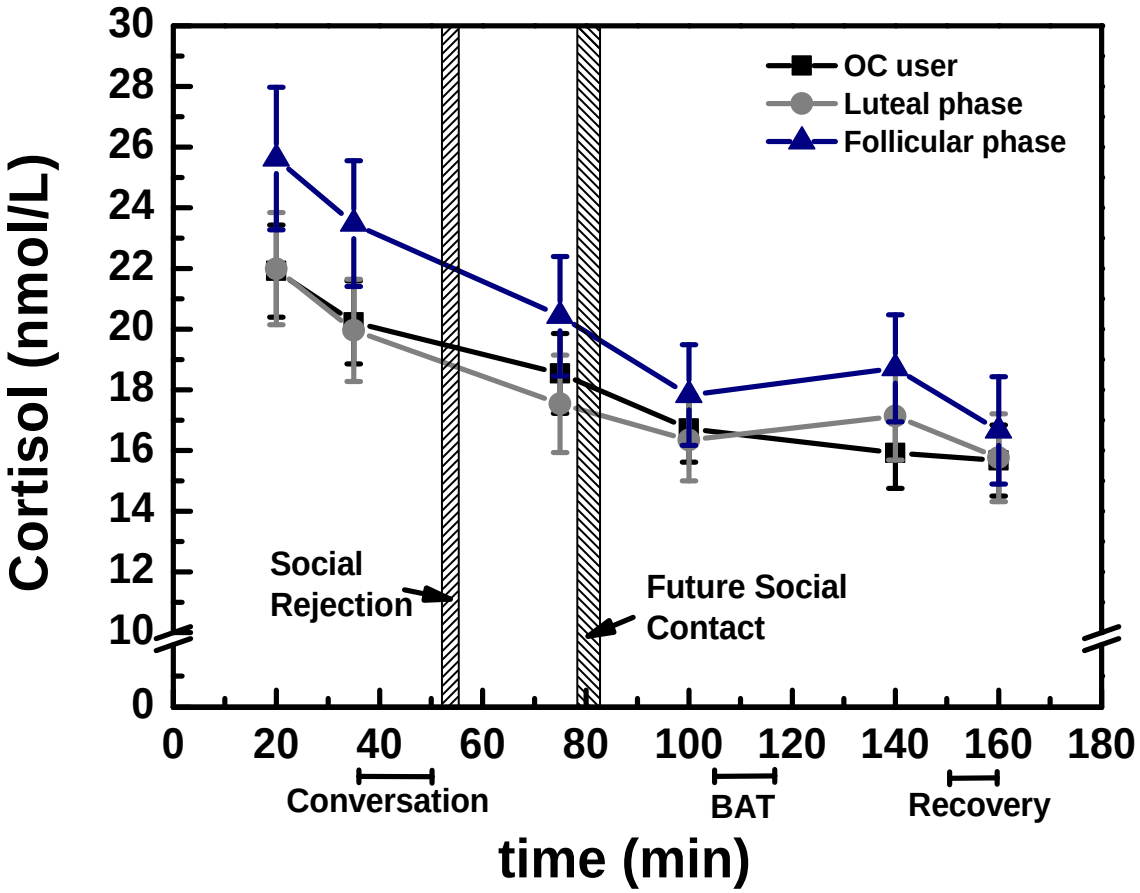

Figure 3.3. Salivary Cortisol by Future Social Contact Group for Women in the Luteal or Follicular Phase of the Menstrual Cycle, and Oral Contraceptives. Values are Mean and Standard Errors.

Daily hassles, medications, and testing time. To assess whether daily stressors, medication other than OC, and time of experiment (1pm or 4pm) may have affected cortisol levels, a mixed-group factorial ANCOVA was computed with group and testing time as the between-groups factors, and cortisol samples (cortisol 2 - cortisol 6) as the repeated measures variable. Frequency of daily hassles and medication use were entered as covariates. There were no significant effects regarding daily hassles, medication, and testing time. The effect of frequency of daily hassles within the past month, $F(1, 85) = 1.94$, $p = .17$, partial $\eta^2 = .02$, medications other than OC, $F(1,85) = .02$, $p = .88$, partial $\eta^2 < .01$, and time of testing, $F(1,82) = 1.13$, $p = .29$, partial $\eta^2 = .01$, were not significant,

indicating that cortisol values did not differ based on daily stressors reported in the past month, medications taken (other than OC), and time of testing session. There were no multivariate effects for the interaction between time and daily hassles, Wilks = .97, $F(4,82) = .60$, $p = .66$, partial $\eta^2 = .03$, or between time and time of testing session, Wilks = .95, $F(4,82) = 1.01$, $p = .41$, partial $\eta^2 = .05$, or between time and medications, Wilks = .91, $F(4,82) = 1.92$, $p = .15$, partial $\eta^2 = .09$. Furthermore, the interaction between time, group and time of testing session was not significant, Wilks = .84, $F(8,164) = 1.86$, $p = .07$, partial $\eta^2 = .08$. The effects of group and time were presented earlier as part of the main analysis.

Percent change in cortisol. In addition to examining absolute values of cortisol, changes in cortisol levels were also explored by calculating the percent change from one time point to the other. Percentage of increase/decrease between two time points was calculated by subtracting the second cortisol level from the first one and dividing it by the first cortisol level and then multiplying by 100. Five two-way ANOVAs were conducted with future social contact group as the between-groups factor. As displayed in Figure 3.4, mean cortisol levels decreased by 7.7% (for total sample) from cortisol 1 to cortisol 2, with no differenced observed between the groups, $F(2, 93) = 1.27$, $p = .29$, partial $\eta^2 = .03$. For the first social stressor, cortisol 2 to cortisol 3, there was an unexpected significant difference between the future social contact groups, $F(2, 104) = 5.37$, $p = .006$, partial $\eta^2 = .09$, such that the future belonging condition showed less of a decrease in cortisol levels from cortisol 2 to cortisol 3 (1.3%) compared to the future alone condition (15.4%) and control (11.4%). The future alone condition did not differ significantly from control group. This is surprising, since all participants received the social rejection.

During the time between the future social contact manipulation (cortisol 3 - cortisol 4), no group difference in cortisol response was observed, $F(2, 104) = 1.45$, $p = .24$, partial $\eta^2 = .03$, demonstrating that the manipulation about future relationship did not result in an overall different cortisol pattern for the groups. Although there was a slight increase in cortisol levels for the BAT index (cortisol4-cortisol5) for the future alone (2%) and future belonging (6%) conditions (and a slight decrease of 2% for control group), this difference was not statistically significant, $F(2, 103) = 1.19$, $p = .31$, partial $\eta^2 = .02$. And lastly, no group differences were observed for the recovery index (cortisol 5 – cortisol 6), where cortisol levels decreased further (7% for future alone, 6% for future belonging, and <1% increase for control group), $F(2, 99) = 1.17$, $p = .32$, partial $\eta^2 = .023$.

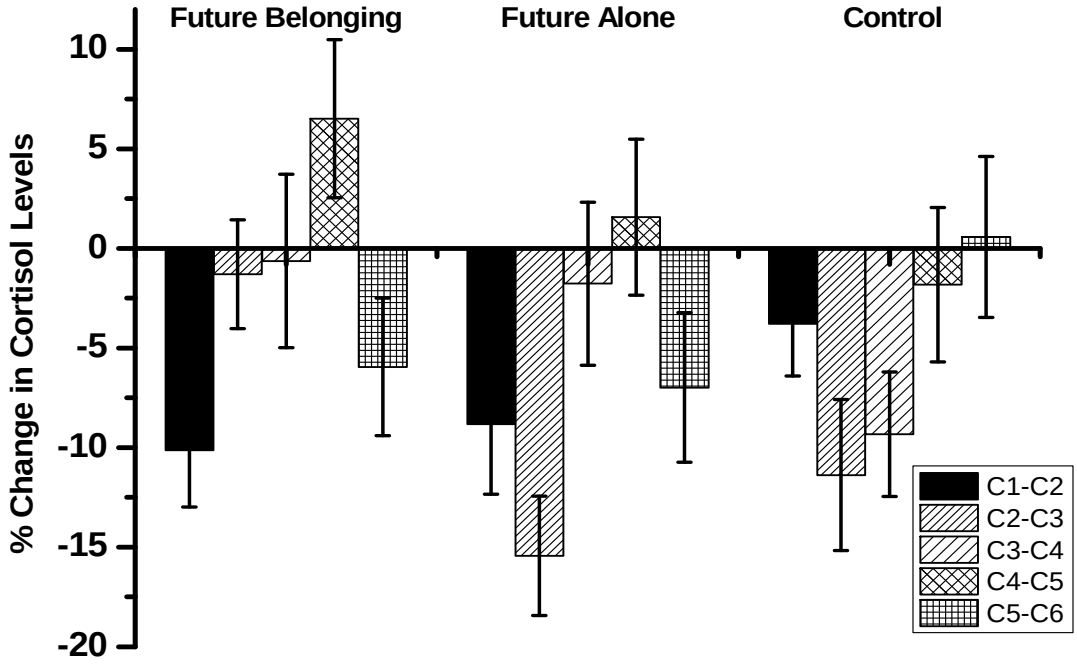

Figure 3.4. Percent Change in Cortisol Levels Between all Sample Points by Future Social Contact Group. C1-C2 Represents the Arrival Time (Difference Between the 2 Baseline Samples). C2-C3 Represents the Time of the Social Rejection. C3-C4 is the Time of the Future Social Contact Manipulation. C4-C5 is the Time Before and After the BAT. C5-C6 is the Time of Recovery.

Area under the curve. To allow for a more sensitive assessment of cortisol change over time, the area under the individual response curve with respect to ground (AUC_G) was calculated for cortisol samples 2-6 using the trapezoid method recommended by Pruessner, Kirschbaum, Meinlschmid, and Hellhammer (2003). A univariate ANOVA with future social contact group as the between-subject factor revealed no significant differences between the groups, $F(2,104) = 1.29$, $p = .28$, partial $\eta^2 = .024$. The area under the curve with respect to increase (AUC_I) was calculated for saliva samples 2-6 (cortisol 2 – cortisol 6). A univariate ANOVA with the future social contact group as the between-subjects factor revealed that there was not a significant difference between the groups, $F(2,104) = 1.34$, $p = .27$, partial $\eta^2 = .025$. These results are depicted in Figure 3.5.

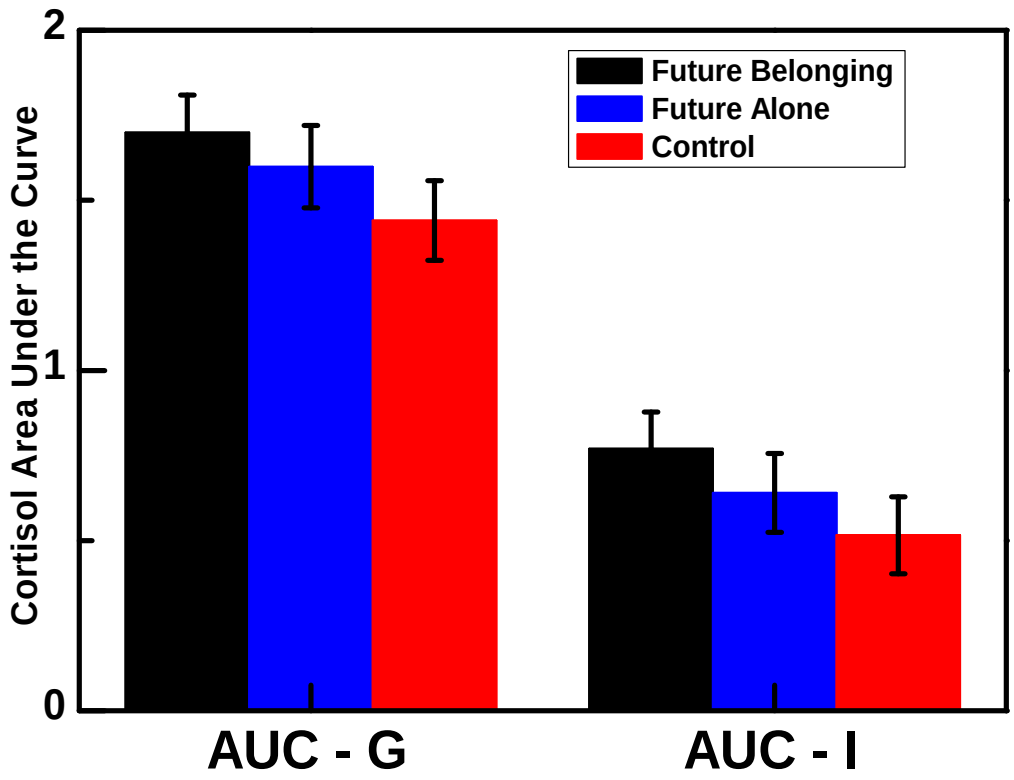

Figure 3.5. Area Under the Curve with Respect to Ground (AUC_G) and Area Under the Curve with Respect to Increase (AUG_I) by Future Social Contact Group.

Effect of Future Feedback Group on BAT

To examine whether future social contact condition following the initial social rejection would affect subjective and physiological responses during BAT, a MANCOVA was computed using subjective anxiety during BAT (anticipatory SUDS, approach SUDS, end of task SUDS, and peak SUDS), approach behavior (number of BAT steps completed), and percent change in cortisol (pre to post BAT, C4-C5) as the dependent variables, and the three future social contact groups (future belonging, future alone, and control) serving as between-groups factor. FSQ was included as a covariate. The sample included in this analysis consisted of 103 participants (37 in the future belonging group, 31 in the future alone group, and 35 in control group). Results indicated that there was a multivariate effect for FSQ, Wilks = .63, $F(8, 92) = 6.76$, $p < .001$, partial $\eta^2 = .37$, such that greater fear of spiders resulted in higher levels of anxiety reported during the BAT and fewer steps completed. After adjusting for FSQ scores, results indicated that there was not a multivariate effect for future social contact group (Wilks = .84, $F(16,184) = 1.05$, $p = .41$, partial $\eta^2 = .096$). Contrary to our expectations, the future social contact groups did not differ on anticipatory SUDS, $F(2,99) = 2.46$, $p = .09$, approach SUDS, $F(2,99) = .17$, $p = .84$, end SUDS, $F(2,99) = .03$, $p = .97$, peak SUDS, $F(2,99) = .44$, $p = .64$, BAT steps completed, $F(2,99) = .81$, $p = .45$, and percent change in cortisol for the BAT index, $F(2,99) = 1.07$, $p = .35$. Figure 3.6 shows SUDS during the BAT for all three groups. These results indicate that contrary to our expectations, future social contact did not result in a different subjective (SUDS during BAT), behavioral (approach behavior), nor physiological (percent change in cortisol

before and after BAT) response pattern during the BAT. Results are depicted in Figures 3.6 and 3.7.

To examine the effect of FSQ further, participants were divided into low vs. high fear, modeled after the fear grouping by Cochrane and colleagues (2008) who divided the FSQ into low, mid-fear, and high fear of spider groups. Given the very small number of participants endorsing mid-fear in our sample (n = 10), we grouped the low and mid-fear group to allow for more sensitive group comparisons; the two groups were: low fear (FSQ < 32; n = 40) and high fear (FSQ > 32; n = 63). A separate MANOVA was computed with group and FSQ (low vs. high fear of spiders) as the between-groups factors and anxiety levels as the dependent variables (anticipatory SUDS, approach SUDS, peak SUDS, end SUDS, and approach behavior). As expected, there was a multivariate effect of fear group, Wilks = .80, $F(5,94) = 4.65$, $p < .005$, partial $\eta^2 = .20$, such that individuals with greater fear of spiders reported higher levels of anticipatory SUDS, $F(1,98) = 13.54$, $p < .001$, partial $\eta^2 = .12$, approach SUDS, $F(1,98) = 12.4$, $p = .001$, partial $\eta^2 = .11$, end SUDS, $F(1,98) = 13.49$, $p < .001$, partial $\eta^2 = .12$, peak SUDS, $F(1,98) = 20.59$, $p < .001$, partial $\eta^2 = .17$, and completed fewer BAT steps, $F(1,98) = 8.89$, $p = .004$, partial $\eta^2 = .08$. There was no multivariate effect of future social contact group, Wilks = .89, $F(10,188) = 1.09$, $p = .37$, partial $\eta^2 = .06$, and the interaction between social contact group and FSQ (low vs. high) was not significant, Wilks = .94, $F(10,188) = .59$, $p = .82$, partial $\eta^2 = .03$.

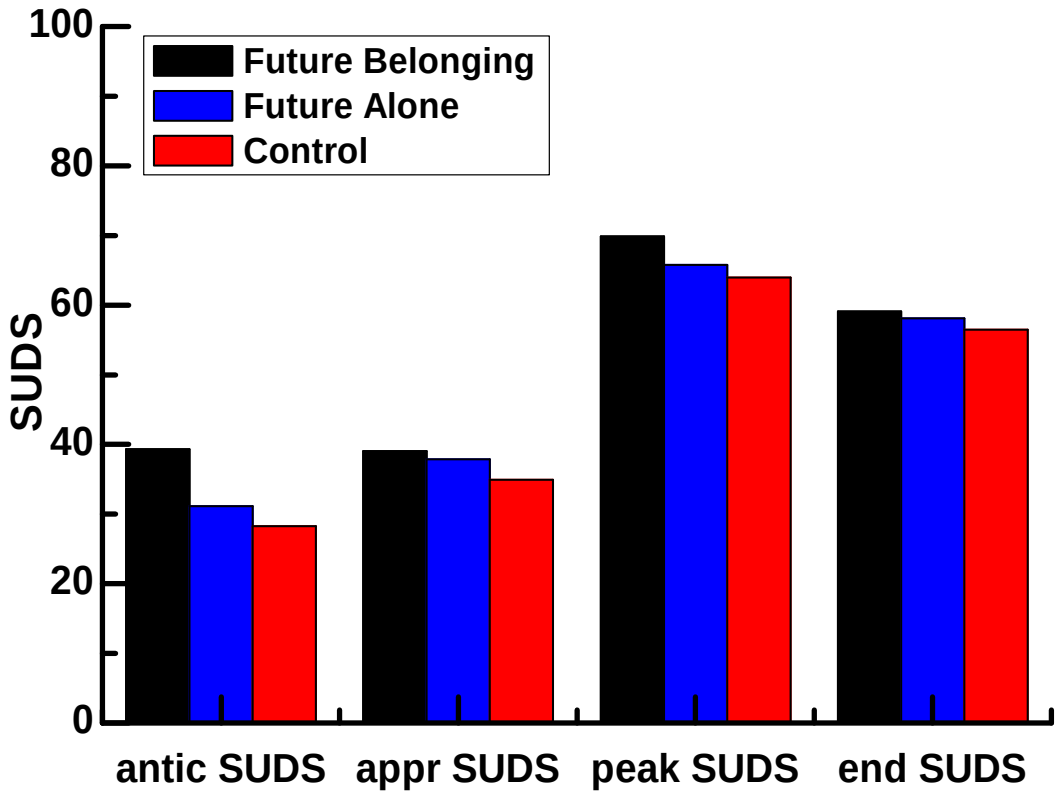

Figure 3.6. Subjective Units of Distress (SUDS) during BAT by Future Social Contact Group. *Note.* Antic SUDS = Anticipatory Subjective Units of Distress Scale (SUDS); Appr SUDS = Approach spider SUDS; End SUDS = End of Task SUDS; Peak SUDS = Peak Anxiety Reported during BAT.

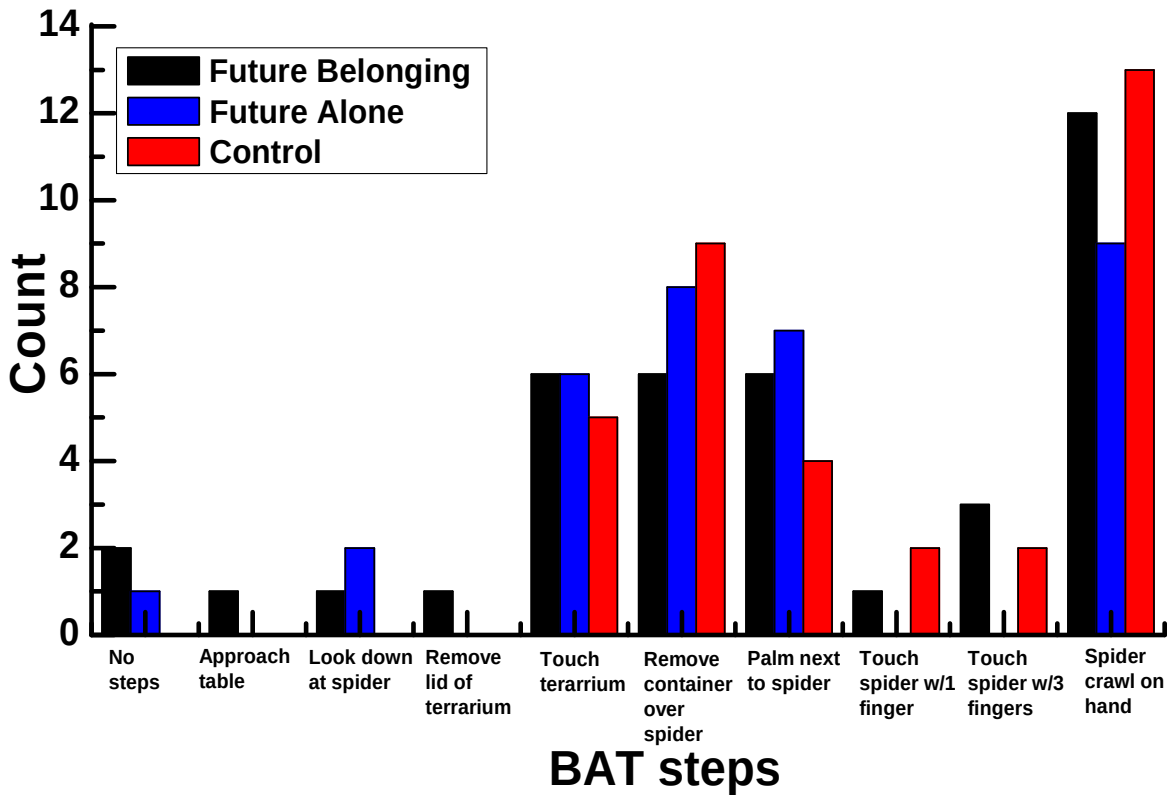

Figure 3.7. Frequencies of BAT Steps Completed by Future Social Contact Group.

CHAPTER FOUR: DISCUSSION

Women are at greater risk for developing anxiety problems. Understanding what factors may attribute to the development of fear and anxiety among women could help us better understand the gender effect in anxiety and provide valuable information to help guide prevention and treatment efforts.

The fight-or-flight model of stress may not be a good characterization of women's stress response (Taylor et al., 2000). Indeed, Taylor and colleagues proposed that women's stress response has selectively evolved to protect offspring from harm by seeking ways to decrease stress. According to their model, oxytocin, which is released under stressful situations, triggers women's need to seek out affiliations with others (rather than fighting or fleeing) to maximize survival. If affiliation experiences are positive, women show a reduction in the stress response as demonstrated by physiological and psychological markers. If however, affiliative needs are not met and the social contact is negative and unsupportive, women's response to stress is exacerbated. We believe that the tend-and-befriend theory of stress may provide further insight into factors that may account for women's tendency to engage in more avoidance behavior, which plays a critical role in the development and maintenance of anxiety problems. We proposed that if affiliation needs are not met in a positive and supportive way, women would demonstrate a decrease in active coping strategies, ultimately leading to more avoidance.

Effect of Future Social Contact on Anxiety and Avoidance

The purpose of the current study was to examine the effect of unsupportive social contact following a socially stressful situation by examining women's response to an

anxiety provoking situation. The BAT was selected as a proxy to examine women's response to an anxiety-inducing task following the social stressors. It was expected that women who were informed that they were likely to end up alone later in life would display greater avoidance during the BAT, whereas women who were told that they would have many rewarding relationships would report less subjective anxiety and greater approach during the BAT. This hypothesis was not supported by our results. There were no group differences in subjective anxiety in anticipation of and during the BAT after controlling for fear of spiders. Although fewer participants in the future alone condition seemed to end the BAT with the spider crawling on their hand (last step on the BAT) compared to those in the future belonging and control groups, this difference was not statistically significant. Examining the response pattern in the entire sample, 61% avoided touching the spider. These results are similar to avoidance rates of 69% reported previously from our laboratory using the same BAT procedures (Stoyanova & Hope, 2012). The task was modified from the one used in McLean and Hope's (2010) study to increase its difficulty. Thirty-two percent of women in our study allowed the spider to crawl on their hand (68% avoided), which is slightly higher than the 18% of women who completed the final step on the BAT as reported in our previous study (Stoyanova & Hope, 2012).

Taken together, receiving negative information about likely future relationships did not result in greater anxiety and more avoidance when confronted with an anxiety-inducing situation. Since we were unable to demonstrate the expected effect of future social contact following a social rejection on anxiety and avoidance, this study did not explain women's greater vulnerability for anxiety using the tend-and-befriend model.

Social Rejection

As proposed by Taylor (2006), awareness of relationship distress is a precursor to the rest of the model, such that social distress is perceived as an interpersonal threat which elevates oxytocin levels and then triggers affiliative behaviors for positive social contact to reduce distress. We used a social rejection paradigm to experimentally induce the effect of rejection by peers. The results showed an increase in negative affect following the social rejection, and a reduction in positive affect indicating that the social rejection was effective in changing self-reported affect. However, contrary to our expectations the social rejection did not result in elevated cortisol levels. Surprisingly, not only did we not observe elevated cortisol levels following the social rejection, but there was a drop in cortisol levels after baseline. Based on findings by Balodis and colleagues (2010), we had expected that the first baseline sample, collected soon after arrival to the laboratory, would show higher cortisol levels. However, even after allowing participants to adjust to the laboratory setting, cortisol levels collected 35 minutes after arrival to the lab were still higher than any other subsequent cortisol values. These results are not in line with previous research demonstrating an increase in cortisol in response to a public speaking tasks such as the TSST (Campisi, Bravo, Cole, & Gobeil, 2012; Kirschbaum, Kudielka, Gaab, Schommer, & Hellhammer, 1999) or a social exclusion task (Stroud, Salovey, & Epel, 2002; Zwolinski, 2008).

Blackhart, Eckel, and Tice (2007), who used the same rejection paradigm as we did (informing participants that no one had chosen to work with them), found that rejected participants had higher levels of cortisol compared to controls and those accepted by their peers. However, a closer look at the results reveal that for rejected participants,

cortisol levels following the social rejection/acceptance manipulation were not significantly higher than baseline, whereas cortisol for accepted and control participants was lower than baseline. Although acceptance by peers appears to have reduced cortisol levels in the study by Blackhart and colleagues (2007), we question whether the manipulation was successful given that rejected participants did not have elevated cortisol levels compared to their baselines. Furthermore, if accepted and control participants have similar cortisol levels following the manipulation, it remains unclear whether being accepted by peers is what accounted for the observed cortisol levels. Thus, while the study by Blackhart and colleagues (2007) demonstrated group differences in cortisol secretion following a social rejection, the lack of observed increase in salivary cortisol from baseline could question the effectiveness of the social rejection paradigm.

Based on self-report, participants in the present study clearly noticed the social rejection– they reported feeling distressed. However, the change in negative affect did not extend to changes in cortisol. Although oxytocin was not assessed in this study, it is possible that the social rejection might not have resulted in increase in oxytocin given that no changes in cortisol were observed. According to the tend-and-befriend model, the release of oxytocin following social stress triggers the need to affiliate with others to restore positive relationships.

As we revisit the tend-and-befriend model in light of our results, one possibility for the lack of observed group differences during the BAT could be due to the single nature of the social stressor. Taylor and colleagues (2006) reported that women who experienced problems in their social relationships demonstrated elevated levels of oxytocin. They assessed problems in social relationships using self-report measures,

which may reflect chronic problems which is different from a laboratory induced social rejection paradigm that occurs only once. It could be that the social rejection paradigm used in our study was not perceived as salient enough, such that being rejected from a group task once does not result in the same psychological and physiological response as would ongoing rejection from family and romantic partners. Thus, type of social rejection could partially explain why we did not observe an effect of future social contact condition on subjective anxiety experienced during the BAT.

Additionally, the tend-and-befriend model posits that an individual needs to be aware of problems in their social relationships which would be interpreted as an interpersonal threat, ultimately signaling the need to affiliate and re-establish positive relationships. One hypothesis is that the social rejection paradigm used in our study may be conceptually different from relationship distress, such that being rejected from unfamiliar people may not result in a sense of interpersonal threat. In fact, Zwolinski (2008) collected information about participants' reaction to the Yale Interpersonal Stressor (YIPS; Stroud, Tanofsky-Kraff, Wilfley, & Salovey, 2000) who indicated that the stressor would have been more salient if the confederates were women they knew or with whom they had frequent contact. This suggests that type of social relationship has a potential effect on participants' sense of rejection. Thus, it would be important for future studies to include a measure assessing amount of social contact, quality of social relationship, and partner relations.

Manipulation of Future Relationships

It was proposed that providing bogus feedback about one's future relationships following a social rejection would result in different response patterns for women as

measured by self reported affect and cortisol. Although the manipulation resulted in changes in affect, it was not successful at inducing physiological changes. As expected, participants who were told that they were likely to end up alone later in life demonstrated an increase in negative affect compared to those informed that they would likely have many rewarding relationships and controls (did not receive any information about future social contact). However, cortisol levels did not differ based on information provided.

Surprisingly, no group differences were found for positive affect after receiving feedback about future social contact. However, there was an unexpected increase in positive affect following the BAT regardless of group assignment. Similarly, more steps completed on the BAT (greater approach) were associated with higher levels of positive affect reported immediately after the BAT. The BAT was a novel task that required participants' full attention and may have resulted in them rating certain items on the PANAS PA higher. Indeed, after removing the adjectives *alert* and *active* from the sum, we no longer see an increase but rather a decrease in positive affect following the BAT. Participants may have rated these items higher because of the novel and anxiety-inducing nature of the task. Alternatively, women in the study may have interpreted arousal during the BAT as a positive experience resulting in more positive affect as would be suggested by the two-factor theory of emotions (Schachter & Singer, 1962).

We modeled the second stress paradigm after the procedures outlined by Twenge, Baumeister, Tice, and Stucke (2001) who did not measure cortisol levels in their study but were primarily interested in examining the effect of social rejection as it relates to aggressive behavior. Thus, the present study appears to be the first one to assess cortisol following this particular social stress paradigm. We had chosen this task to manipulate

social contact by either informing participants that they are likely to end up alone and without meaningful relationships later in life (future alone) or that they are likely to have many meaningful and rewarding relationships (future belonging), or did not provide them with any information regarding their future (control group). To make the feedback more credible, we presented the results seemingly based on information obtained from a personality questionnaire, which was visually depicted in a graph form (see Appendix B).

However, the observed lack of concordance between psychological and physiological measures following both stressors (social rejection and manipulation about future relationships) was unexpected. The manipulation seems to have worked based on self reported affect (PANAS), but not according to cortisol levels. It is rather surprising that the social rejection resulted in changes in affect without triggering an HPA response. The non-responsive nature of cortisol following both stressors may suggest that the social rejection paradigms chosen for this study were not robust enough to activate HPA axis stress response.

It is possible that duration of the stressors could have accounted for the lack of cortisol change. Both stressors used in the study were relatively shorter in length compared to stress paradigms reported by other researchers. Although the duration of the conversation was 12 minutes, the actual stressor (being informed that no one had chosen to work with the participant) lasted no more than 2 minutes. Similarly, the manipulation of feedback regarding future relationships was also relatively brief in duration (less than 5 minutes) compared to other psychosocial stressors used in different studies (20 minutes for TSST; Kirschbaum, Pirke, & Hellhammer, 1993; 35 minutes for YIPS; Zwolinski, 2008). However, Dickerson and Kemeny (2004) concluded in a meta-analysis that longer

stressors were not related to greater response in cortisol compared to shorter tasks. It should be noted that the studies included in this meta-analysis utilized stressor paradigms distinct from the ones used in this study; thus the possibility that length of stressor might have contributed to the lack of cortisol change should not be ruled out.

Furthermore, research has demonstrated varying cortisol levels based on the nature of the stress paradigm, with performance-based tasks that are uncontrollable and social-evaluative in nature demonstrating the strongest cortisol response (Dickerson & Kemeny, 2004). According to the meta-analysis, psychosocial stressors involving a combination of a public speaking task and a cognitive challenge elicited the strongest change in cortisol, followed by public speaking only tasks or a verbal interaction. Although the TSST is the most widely used psychosocial stressor and has reliably resulted in increase in cortisol levels, it does not appear to be a well-suited stress paradigm for the purposes of this investigation. As demonstrated by Stroud and colleagues (2002), women show elevated cortisol levels following a social rejection stress paradigm, whereas cortisol levels remain unchanged following an achievement task. Thus an alternative stressor design that appears well suited for the purposes of inducing a sense of social rejection for women is the YIPS (Stroud, Tanofsky-Kraff, Wilfley, & Salovey, 2000). Several laboratory stressor studies that have shown cortisol responses in women have been longer, such as the two 15-minute conversations in the YIPS stressor that involves gradual exclusion from same-gendered confederates (Stroud, Salovey, & Epel, 2002; Zwolinski, 2008).

There is growing evidence suggesting that menstrual cycle phase has an effect on HPA axis activity. Studies using various stress paradigms have reported higher cortisol

levels for women in the luteal phase than those in the follicular phase (cold-pressor stress paradigm, Andreano, Ariomandi, & Cahill, 2008; TSST, Kirschbaum et al., 1999; YIPS, Zwolinski, 2008). Thus, it is important for researchers to assess menstrual cycle phase to help interpret results. Additionally, the role of oral contraceptives (OC) has also been examined during a psychosocial stressor. Some studies report that women using OC have a blunted cortisol response during a psychosocial stressor (Kirschbaum et al., 1999; Rohleder, Wolf, Piel, & Kirschbaum, 2003), whereas other indicate no differences in cortisol levels between free-cycling women and those using OC (Brody, 2002; Bouma, Riese, Ormel, Verhulst, & Oldehinkel, 2009). Thus, it appears unclear to what extend use of OC affects cortisol levels. The present study further contributes to the conflicting results in the literature, such that we did not find any differences in cortisol based on menstrual cycle phase and OC use. However, this lack of observed differences based on OC/menstrual cycle phase in our study could be due to the overall cortisol non-responsive pattern following the stressors.

In addition to menstrual cycle phase and oral contraceptives, our study examined the possible effect of other factors, such as daily stressors that may account for the observed cortisol values. Daily stressors such as financial challenges, work-related difficulties, problems with family/friends, or job dissatisfaction, did not appear to affect cortisol levels during the experimental task in this study. Others have reported that daily challenges and negative life experiences were associated with higher cortisol levels, whereas more general life stress was not a strong predictor of elevation in cortisol levels (van Eck, Berkhof, Nicolson, & Sulon, 1996). However, given that the sample in the van Eck and colleagues study included only men, no conclusions can be drawn regarding

women's experiences. Several studies have explored the effect of social support on cortisol levels during an experimentally induced stressor. Women whose partners were supportive following the TSST and who generally reported positive dyadic coping when under stress, displayed a faster recovery following the laboratory stressor (Meuwly et al., 2012). Interestingly, women with greater attachment anxiety seemed not to follow this trend, such that their recovery was rather slowed down compared to women scoring lower on attachment anxiety.

Additionally, salivary cortisol levels have been shown to follow the circadian rhythm and thus vary based on time of collection. For the present study, all experiment sessions were completed in the afternoon with a starting time of either 1pm or 4pm. As expected, time of testing session did not affect baseline cortisol levels in the present study.

Another possibility for the observed cortisol non-response pattern to the social stressors could be the use of coping strategies following delivery of social stressors. Given that there was a 15-minute delay following the social rejection and delivery of information about their future prior to cortisol collection, it is possible that participants might have used coping efforts to manage distress. Although participants engaged in low-level cognitive tasks (symbols search and coding modules from the WAIS-IV) between cortisol samples to keep them busy, these filler tasks may not have prevented participants from engaging in positive coping skills. Although not formally assessed, verbal feedback from participants at the end of the study suggests that some participants were using positive coping. Many of the women reported that they were initially upset that no one had chosen to work with them, but some indicated that after a while they realized that

there was no specific reason for them to be rejected by others since they believed that their conversation was overall positive. Similarly, participants indicated that they did not like to hear that they are likely to end up alone later in life with no friends, but some reported that soon after the experimenter left the room they reflected on their current social life and concluded that they will most likely have friends later in life. Thus, it is possible that some women may have engaged in some active form of coping by focusing on positive aspects of their current experiences with social relationships, ultimately discrediting the information received. A more problem-focused coping has been associated with a reduction in distress and an overall better adjustment following a stressful event (Bokszczanin, 2003; Lazarus & Folkman, 1984). Cardoso and colleagues (2011) found that women who received intranasal oxytocin before the YIPS scored higher on task-oriented coping strategies than those in the placebo condition. Thus, incorporating a measure to assess coping style following a stressor, such as the Coping Inventory for Stressful Situations (CISS; Endler & Parker, 1990) would provide additional information about women's experiences following rejection or other social stress.

While neither social rejection nor future social contact condition in the present study resulted in a cortisol response, an unexpected pattern emerged following the BAT, such that participants in the future belonging group displayed the highest cortisol levels out of the three groups, although the difference between future belonging and future alone condition was less pronounced and did not reach statistical significance. However, given that cortisol levels were not higher than baseline, we cannot draw any meaningful conclusions. Our psychological results demonstrated elevated negative affect following

the BAT regardless of group assignment, suggesting an overall emotional response to the anxiety-provoking task. Interestingly, Weik and colleagues (2010) demonstrated that women who were included in a computerized social paradigm (Cyberball task) displayed the highest cortisol level following the public speech compared to excluded participants and those assigned to the technical default condition. The results from the Weik's study further suggest that women may have a different pattern of responding to stress than men.

Limitations and Future Directions

There are several limitations that should be taken into account when interpreting the results of this study. Regarding the sample, the study enrolled participants from a medium size city in the Midwest. The sample was predominantly European American with a mean age of 20, which limits the generalizability to other ethnic and age groups as well as geographic locations. It would be important for future research to include a more ethnically diverse sample to better understand the role of social stressor as it relates to anxiety.

Regarding the methodology, the present study utilized two distinct stressor paradigms to examine the effect of negative social contact following a social rejection on participants' experiences during an anxiety-inducing task. The study did not demonstrate the expected effect of the manipulations on cortisol levels. In order to provide further understanding about women's response to stress as it relates to anxiety, future research should consider using a different stress paradigm that would be more effective in inducing a sense of social rejection as observed by physiological means. Although there is initial evidence that the YIPS stress paradigm affects HPA axis response by measures of cortisol (Stroud, Salovey, & Epel, 2002; Zwolinski, 2008), its unstructured nature of

rejecting participants can pose challenges to successfully achieving the desired outcome of rejecting participants. It seems that confederates would require extensive training to master the skills needed to reject participants without appearing rehearsed. Zwolinski (2008) used a Bogus Social Perception Rating after the first 15-minute interpersonal challenge which was used by confederates to modify their rejection tactics if participants rated them positively. Although this is a clever way of measuring the effectiveness of the first interpersonal challenge, the unstructured nature of the rejection tactics still leave room for variability between confederates which could ultimately affect participants' sense of rejection.

To allow for more control in inducing the desired effect of rejection, Zöller and colleagues (2010) used the Cyberball game as a social exclusion paradigm. In the Cyberball task, participants engage in a ball tossing game with two other players, who in fact are generated by the computer (Williams, Cheung, & Choi, 2000). Participants are slowly excluded from the game by no longer receiving the ball from the other players after the first few throws. A functional magnetic resonance imaging (fMRI) study demonstrated that participants who were excluded during the Cyberball task displayed activation of the dorsal anterior cingulated cortex, which is the brain region typically activated during physical pain (Eisenberger, Lieberman, & Williams, 2003). Although social rejection by the Cyberball paradigm has shown brain activation similar to physical pain, it did not affect HPA axis activity as measured by cortisol secretion (Zöller, Maroof, Weik, & Deinzer, 2010). Future studies could incorporate an in-person component to the Cyberball task to make the social rejection more salient while utilizing this highly standardized stress paradigm.

As discussed earlier, the filler tasks may not have effectively engaged participants in the desired low cognitive tasks between cortisol samples. Although the symbol search and coding modules from the WAIS-IV were slightly modified for each administration, it is possible that the task was too mundane and may have resulted in relaxation rather than the low cognitive engagement we expected. Since participants were in individual rooms, we were unable to monitor their activity between cortisol collections. Thus, one possible direction for future studies could be to have participants complete a computerized task, such as the NimStim face stimulus set (Tottenham et al., 2009). During this computerized non-stressful task, participants are shown various facial expressions and asked to rate the facial expressions on several characteristics by indicating what they think of the person (e.g., intelligent, pleasant, successful, happy etc.).

The BAT chosen for the study may be another limitation, such that it may have been too narrow of an anxiety-provoking situation. It is possible that the spider was too specific of a stimulus to allow us to study the research question. Additionally, gender socialization factors may introduce confounds. Thus, future research could use a different BAT to measure anxiety and avoidance, such as asking participants to give a speech on a controversial topic.

Another limitation of the study is the method used to assess current phase of menstrual cycle. We asked participants to indicate whether they have regular menstrual cycles and also provide the first day of their menses. Although we provided calendars to facilitate accurate reporting, it is possible that some participants may not have remembered accurately the start date of their menses. Even though for the analyses, we only included women reporting regular menstrual cycles, the possibility that timing of

ovulation for free-cycling women could have varied should not be ruled out. Thus, it would be important for future studies to include more formal ways of validating menstrual cycle phase, such as assessing levels of estradiol and progesterone.

Implications of Present Results

The main purpose of the present study was to extend previous research that has demonstrated that women consistently report more anxiety and avoidance when presented with anxiety-inducing situations. Despite the above mentioned limitations, the present study has several strengths including the use of structured stressor paradigms and a multidimensional assessment of the stress response including self-reported affect and anxiety, physiological measures such as cortisol, and behavioral measures of avoidance. Although both stressor paradigms resulted in a psychological change, as demonstrated by increase in negative affect, no physiological effects were observed by measures of cortisol. Furthermore, we were unable to provide support for the hypothesis that women who were informed that they were likely to end up alone later in life following the initial social rejection would demonstrate greater subjective anxiety and display more avoidance when facing an anxiety-provoking stimulus. A replication of this study is needed using a more robust stress paradigm to further examine whether social rejection impacts behavior in an anxiety-provoking situation. Once that link has been established, it would be important to incorporate measures of oxytocin levels following the social rejection or reported relationship problems to provide a complete investigation of the tend-and-befriend model. Given the resources available for this project, we did not measure oxytocin before and after the social rejection. However, given the non-responsive nature of cortisol, we believe that the social rejection paradigm may not have elicited oxytocin,

which may explain why we did not observe group differences in subjective anxiety and avoidance behavior during the BAT.

Additional factors such as gender roles and socialization experiences could provide further insight into the pattern of our results. Although research has consistently demonstrated that masculinity or femininity traits appear to contribute to anxiety, the results are rather conflicting with some indicating that greater femininity is related to elevated anxiety (Dillon, Wolf, & Katz, 1985; Tucker & Bond, 1997) whereas others report that low masculinity tends to be associated with avoidance and fear (Chambless & Mason, 1986; Ginsburg & Silverman, 2000, McLean & Hope, 2010). In a previous study, we had demonstrated that masculinity was negatively related to subjective anxiety in anticipation of an anxiety-inducing task for women only (Stoyanova & Hope, 2012). Thus, future research should consider including a measure of gender roles when assessing the effect of social rejection to further explore whether gender roles may be related to women's experiences during anxiety-inducing situations.

To our knowledge this is the first study to examine whether women's biobehavioral response to stress combined with the absence of positive affiliation opportunities may explain the greater prevalence of anxiety in women. Overall, while the study did not support the main hypothesis, it highlights the need for future research to further examine how the tend-and-befriend model may account for women's greater anxiety, possibly by using different social stressor paradigms from the ones reported in this study.

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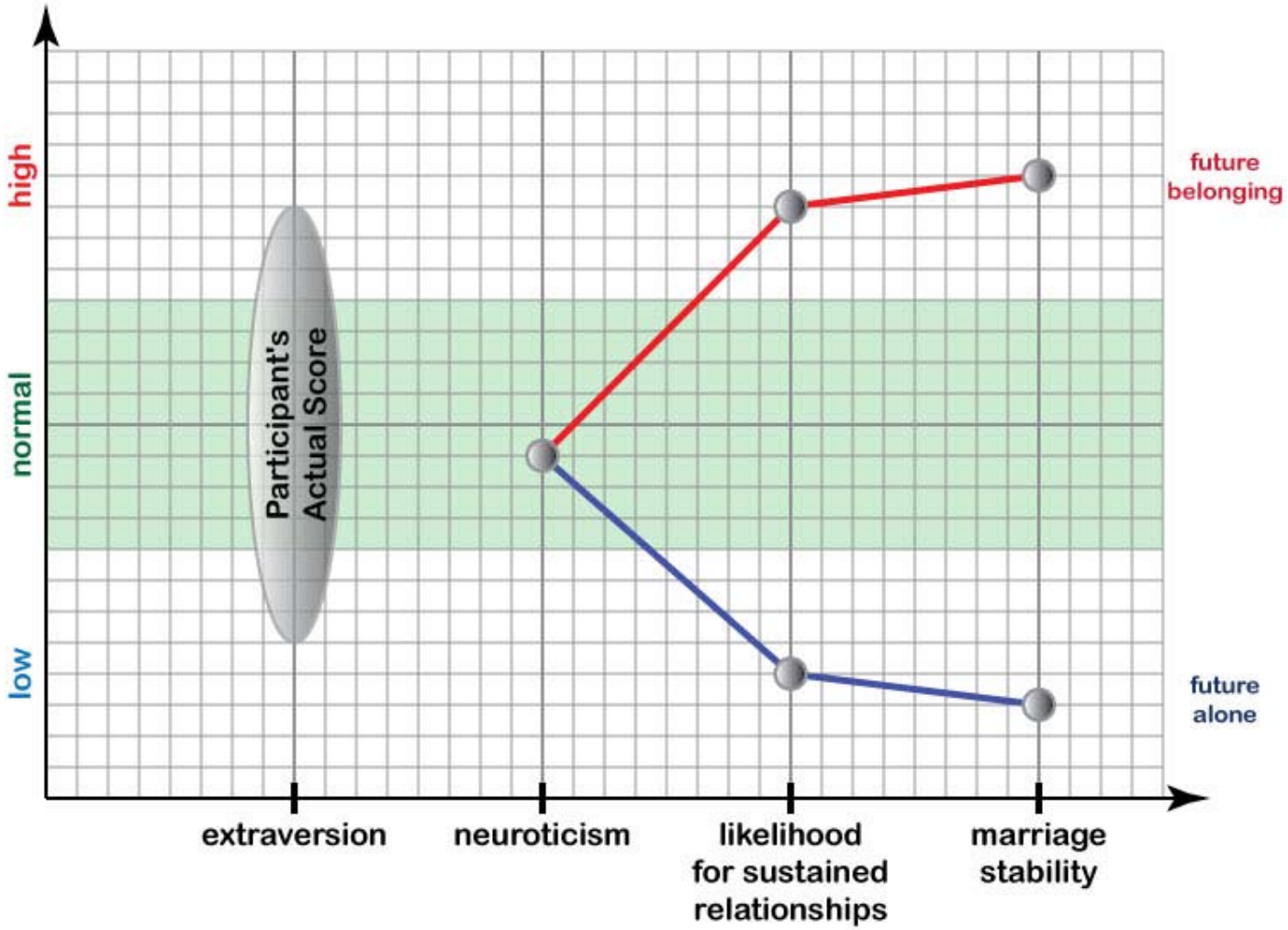
Appendix A: **Photograph of phobic stimulus**

(Chilean rose-hair tarantula)

Appendix B: **Future Social Contact Chart**



Appendix C: **Experimental Procedures Manual**

Procedures Manual

PREPARATION:

- Arrive in 51 Burnett 20 minutes prior to scheduled session to allow enough time to prep for session
- Check Experimetrix and print out list of signed up participants for your time slot.
- Two experimenters are needed for each experiment session
    - **Experimenter 1** – provides most information to participants, and will run BAT (needs to be blind to experimental condition)
    - **Experimenter 2** – in charge of random assignment, scores ERQ-R and provides feedback, will collect saliva samples and in charge of debriefing as Experimenter 1 runs BAT
- One experimenter should move spider to room 66 (the closet space in 327 on weekends) before participants begin to arrive
- If running participants on weekends, need to bring terrarium and intercom system upstairs
- Get a participant packet from the filing cabinet and check for the following:
    - **Informed Consent Form (A and B)**
    - **Questionnaire packet, EPQ, Booklets 1-4**
    - **SUDS form (#1; approach spider; #2)**
    - **PANAS**
    - **Ziploc bags with 6 Salivette tubes for each participant (write participant ID and 3 letter code on the bag)**
    - **Participant Feedback**
    - **Place audio recorders or CD player, a magazine, and a pen in each room**
- Write the participant ID on all forms. Check the ID Tracking Sheet to determine participant's number (based on previous participant number).
- Fill out the Participant Tracking Sheet with the exception of the condition.
- Take the Participant Tracking Sheet with you– you'll need it for the random assignment
- You will need the following materials:
    - **Procedures manual, ziplock bags, Questionnaires, booklets 1-4, EPQ-R, scoring template for EPQ-R, stop watch, soap**
- Post "Experiment in Progress" sign on the doors of 51, 66, 67, 61, 62, 32, and 76 and make sure the rooms are clean and there are 5 chairs in room 67. [If running participants in the PCC, place "Experiment in Progress" sign on door of 327]
- Dim the lights in room 66 so that you cannot see anything from room 67.
- Random Assignment – Experimenter 2 will assign what condition the participant will be in by picking a number from a box.

Number picked is **ONE**	→	Positive Social Feedback	→	Assign the letter **"P"** under condition on the participant tracking sheet
Number picked is **TWO**	→	Negative Social Feedback	→	Assign the letter **"N"** under condition on the participant tracking sheet
Number picked is **THREE**	→	No Feedback	→	Assign the letter **"C"** under condition on the participant tracking sheet

- Record the participant's condition on **Experiment 2 Tracking Sheet** (either P, N, or C depending on the condition they are in).
- **The condition goes on Experimenter 2 tracking sheet ONLY (will be transferred to original one after experiment is over).**

Information presented in italics should be read verbatim.

- As participants arrive to room 67 (or 327 on weekends) ask them to take a seat and wait until everyone has arrived.
- *NOTE:* 4-6 participants are needed. If less than 5 people are scheduled/or less arrive, text or call RAs who are scheduled as fillers and treat them as other participants; they will do everything you ask of participants. Fillers will have ID numbers in the hundred range (e.g., 195-199). *These IDs will be reused.*

Experimenter 1 will say the following:
Hello, my name is _____ and this is _____. We'll be the experimenters for today's study. Before we get started, I would like to ask you to please silent your phones and put them away. Also, put away any other items such as books notebooks and do not use them for the duration of the study [wait for them to comply]. *There are different parts to the experiment and depending on what task you're completing, you'll either work with me or ____. First, I want you to know that at times I will be reading to you from a script. This is done so that every participant receives the same information and goes through the same sets of procedures throughout this study. Before we get started, I want to give each one of you a name tag. I am also writing on here your number so that we don't have to put your name on any of the forms.* Write participants' first name and ID number on an adhesive label and hand it to each one of them.

1. Consent Form A

Provide participants with consent form A and review it, highlighting that there are 2 parts to this experiment and that this is the consent form for the first part. Tell them that we are interested in studying social interactions. Highlight their rights to withdraw, the estimated time commitment (~90 minutes), and the confidentiality of the data. Answer any questions they have. Have them sign the consent and collect it.

2. Rest period

Experimenter 1: Hand participant the **EPQ-R** and say "*Through today, we will ask you to complete various questionnaires that ask you about demographic information, personal characteristics, and different feelings, and emotions. Each questionnaire has a different instructions set written at the top so be sure to review it before answering the questions. After you finish each of the questionnaires, please take a moment to look over your answers, to be sure that you didn't skip any questions by accident. Also, we're interested in your first reaction to the questions, so please don't spend much time thinking about your answers. Let me know if you have any questions."*

→For the EPQ-R, hand out felt tip pens (different colors). Start your stop watch for 10 minutes.

Cort # 1

3. Collect Saliva Sample (**sample #1**)

Experimenter 1: After 10 minutes, stop participants (if they have not completed the EPQ-R) and hand each one of them a ***Salivettes® tube*** and say "*Now we would collect a saliva sample from each one of you. Please chew on the cotton swab for about 2 minutes. We will tell you when you can spit it back into the tube.*

Record ID, sample #, and time on tube

→Start the stopwatch and after about 90 seconds ask them to spit it into the tube. As you collect Salivette tubes from participants, record their ID, # of sample and time prior to placing it into the bag (ex: **202-1**, standing for participant 202, saliva sample 1; time: 1:35pm).

4. Questionnaires

Experimenter 1: have participants continue with the EPQ-R. If they have completed it, hand them the questionnaire packet and ask them to complete it at this time.

→Start your stopwatch and after 10 minutes stop participants. If they are done early (but some are still working on the questionnaires), ask them to sit quietly and wait.

Once participants hand you the questionnaires, look through it to make sure no questions were skipped.

Cort # 2

5. Collect Saliva Sample (**sample #2**)

Experimenter 1: After 10 minutes hand each participant a ***Salivettes® tube*** and say "We'll collect another saliva sample now. Please chew on the cotton swab and we will tell you when you can spit it into the tube. Start the stopwatch and after about 90 seconds ask them to spit it into the tube. As you collect Salivette tubes from participants, record their ID, # of sample and time prior to placing it into the bag (ex: **202-2**, standing for participant 202, saliva sample 2; time: 1:35pm).

Record ID, sample #, and time on tube

6. Conversation (12 minutes)

Experimenter 1 will say the following after the saliva collection:
"Now we are ready to proceed. For the next task, I will ask you to get to know each other. We are interested in studying social interactions and would like for you to interact with each other. Talk about where you're from, what your major is and so on. Here is a list with topics you may discuss if you run out of things to say. [Place a sheet with conversation topics on the table.] *You cannot talk about this study and if one of you forgets, it's okay to remind yourselves that you cannot talk about the study. You may begin talking as soon as I leave the room. As part of the task, you are **expected** to talk to each other until I inform you that it's time to end the conversation."*

→Leave the room and start the stopwatch.

Experimenter 2 will score the Extraversion scale on the EPQ-R using the answer sheet template and plot it on the graph. Once plotted, use a ruler to connect all the dots. Write participant's first name with a felt tip pen in the top corner. Paper clip the graph to their EPQ copy and put it back in your binder. Experimenter 1 will be blind to this condition!

Experimenter 1 and 2: After 12 minutes are up, return to the room and say, *"The time is up. [pause] For the next task, you will be paired up with one other person from the group to complete a task. You CANNOT work with anyone you knew prior to the experiment (e.g., friends, roommates) and SHOULD NOT nominate anyone you knew before today's experiment. We would like to form groups of people who would like to work together and respect each other. In a little bit, I will take you to different rooms so you can prepare for the upcoming group work. But before that, I will hand out some ballots and ask you to VOTE for the 2 people you would MOST LIKE to work with. NO TALKING and NO PEAKING; the ballots aren't in the same order, so even if you look, you can't tell who your neighbor is voting for. Once done, cast your ballot in this box. Then, I will walk you to your rooms, while _____(Experimenter 2) tallies the vote."*

Experimenter 2*:* When all ballots are in the box, pick it up and leave the room. Walk to room 67 (or computer room next to Sarata).

Experimenter 1: *Please take your belongings now and follow me.*
→As you drop off participants in their rooms, place a post-it note on the door with their name and their ID number.

- *NOTE:* If fillers were used for the social conversation, they will follow you with the rest of the participants. Once fillers have been shown to their room, they should wait 5 minutes before leaving. It is important that you do not give away any subtle cues. Just follow the experimenter's instructions. Place everyone's name (also fillers) on a post-it note and stick it by their door.

BOTH EXPERIMENTERS GIVE FEEDBACK (split participants in half)

Experimenter 1 and 2: Walk into each room and say:
"I hate to tell you this, but NO ONE chose to work with you. The other participants chose to work with another partner and not with you, and so you will not be completing the group activity. At this point, I will ask you to wait here while I go set up the activity for the groups. I will return shortly with some additional tasks for you to complete alone in here. In the meantime, please fill out this brief measure." Hand participant the **PANAS-2**.

Start 15 min wait

→Leave the room, start your stopwatch and write down the time on your checklist.
Repeat procedure for the other participants.

- Once you've provided instructions to every participant return to each room (starting with the first one) say:
"Since you won't be completing the group activity, I will have you work on a different task ALONE in here. Hand participant **Booklet 1** (WAIS subtests) and say *"There are two different tasks in here. Each one has its own set of instructions. Please follow them prior to starting a task."*

*****After about 10 minutes,** walk into rooms and check how far along they are with Booklet 1. If they are done (or close to being done), hand them **Coding-2** and say: *"We would like for you to work on this task. Please note that this form differs from the previous one you completed – each number has a different symbol now."*

BOTH EXPERIMENTERS will hand out saliva #3 (split participants in half)

Cort # 3

Experimenter 1 and 2: After **15 minutes**, provide each participant with another ***Salivettes®*** ***tube*** and say "*We'll collect another saliva sample now. Please chew on the cotton swab and I will come back to inform you when you can spit it back into the tube."* Leave the room.

 → Start the **stopwatch** and repeat same procedures for all other participants.

Experimenter 2: After about 90 seconds, walk back into the room and ask them to spit the cotton swab into the tube. As you collect Salivette tubes from participants, record their ID, # of sample and time prior to placing it into the bag (ex: **202-3**, standing for participant 202, saliva sample 3; time: 1:35pm). **Make sure that they are correctly marked.**

Then **Experimenter 2** will provide feedback (provide feedback to first participant you collect Saliva from; Experimenter 1 can collect saliva from other person; JUST TELL THEM!)

7. EPQ Feedback

Experimenter 2: Pull out the graph and EPQ, unclip the graph and hold up the questionnaire while you say: *"Remember you completed this packet at the beginning. We have scored it and* [point to the Extraversion column] *based on the questions you answered earlier, your extraversion score is* _____ [high, medium, or low]. Provide the following information based on score:

HIGH Extraversion: *"The typical extravert is sociable, likes parties, likes to have people to talk to, and does not like reading or studying by herself. She craves excitement, takes risks, and likes to do things on the spur of the moment. She prefers to keep moving and doing things, and may at times become aggressive or lose her temper easily."*

LOW Extraversion: *"The typical introvert is a quiet and reserved person, who prefers to be alone rather than with people. She tends to be distant except to intimate friends, and likes to plan ahead rather than do things on the spur of the moment. She keeps her feelings under close control and does not lose her temper easily. She is reliable, somewhat pessimistic and values ethical standards."*

Based on random assignment, provide the following information to participant:

NEGATIVE: "*I know that you had this experience during the previous task when no one wanted to work with you.[pause] And now, I kind of see that it is consistent with your personality type* [pause and show them the graph]*; you're the type of person who will end up alone later in life. You may have friends and relationships now, but by your mid 20s most of these will have drifted away. You may even marry* [pause] *or have several marriages, but these are likely to be short-lived and not continue into your 30s. Relationships don't last, and when you're past the age*

when people are constantly forming new relationships, the odds are you'll end up being alone more and more."

- Hand participant **Booklet 2** (PANAS-3, Future Opinion Q, CFNI, CMNI) and say: "*Please complete this questionnaire. Once you're done, I will ask you to move on to the second packet* and hand participant **Booklet 3** (WAIS subtests). *Please follow the same instructions as before*. Leave the room, record time on **checklist** and **post – it note** (by door), and provide feedback to the other participants.

POSITIVE: "*Wow, (pause) that's really surprising that no one wanted to work with you during the previous task. [pause] The questionnaire shows* (point to the graph) *that you're the type who has rewarding relationships throughout life. You're likely to have a long and stable marriage and have friendships that will last into your later years. The odds are that you'll always have friends and people who care about you."*

- Hand participant **Booklet 2** (PANAS-3, Future Opinion Q, CFNI, CMNI) and say: "*Please complete this questionnaire. Once you're done, I will ask you to move on to the second packet* and hand participant **Booklet 3** (WAIS subtests). *Please follow the same instructions as before*. Leave the room, record time on **checklist and post – it note** (by door), and provide feedback to the other participants.

NEURAL: No feedback will be provided.

- Hand participant **Booklet 2** (PANAS-3, Future Opinion Q, CFNI, CMNI) and say: "*Please complete this questionnaire. Once you're done, I will ask you to move on to the second packet* and hand participant **Booklet 3** (WAIS subtests). *Please follow the same instructions as before*. Leave the room, record time on **checklist and post –it note (by door)**, and provide feedback to the other participants.

***__After about 10 minutes__**, walk into rooms and check how far along they are with Booklet 2 and Booklet 3. If they are done (or close to being done), hand them **Coding-3** and say: *"We would like for you to work on this task. Please note that this form differs from the previous one you completed – each number has a different symbol now."*

Both experimenters needed – will split participants (PANAS-4 and cort)

Cort # 4

Record ID, sample #, and time on tube

Experimenter 1 and 2: Split participants and after 15 minutes (look at checklist/post-it notes for time and walk in 15 minutes after recorded time), hand participant another *Salivettes® tube* and say *"We'll collect another saliva sample now. Please chew on the cotton swab and I will return shortly to tell you when you can spit it into the tube."* Start the stopwatch and hand them the **PANAS-4** to complete again. Repeat same procedures for all other participants.

Experimenter 1: After about 90 seconds, walk back into the participant #1 room and ask them to spit the cotton swab into the tube. As you collect Salivette tubes from participants, record their ID, # of sample and time prior to placing it into the bag (ex: **202-4**, standing for participant 202, saliva sample 4; time: 1:35pm). **Make sure that they are correctly marked.**

Experimenter 2 (will collect saliva and PANAS from the rest of the participants): Walk into participant #2 room to collect saliva sample (as Experimenter 1 is walking into participant 1 room to collect saliva sample). Say: *"The time is up, please spit the cotton swab back into the tube and close it."* As you collect Salivette tubes from participants, record their ID, # of sample and time prior to placing it into the bag (ex: **202-4**, standing for participant 202, saliva sample 4; time: 1:35pm). **Make sure that they are correctly marked.**

Then, hand them the **Daily Hassles Scale and Coding - 4** and ask them to complete it; also if they have any other forms they did not complete ask them to work on them now. When done they can read the **magazine provided (Nebraska Land).**

***After about 10 minutes**, walk into rooms and check how far along they are with Daily Hassles and Coding-4. If they are done (or close to being done), hand them **Coding-5** and say: *"We would like for you to work on this task. Please note that this form differs from the previous one you completed – each number has a different symbol now."*

- **Reminder: Experimenter 2** will collect Saliva samples and PANAS-4 for the rest of the participants while **Experimenter 1** runs the BAT with participant.

NOTE: Participant who completes BAT first will complete Daily Hassles afterwards, whereas everyone else does it before the BAT.

8. BAT

Experimenter 1: Take the first participant to room 66 (or room next to Sarata if in the PCC), ask them to sit in front of the computer for the next task.

- Start video instructions for the BAT.

VIDEO INSTRUCTIONS:
The experimenter will be with the participant during this demonstration! Open Experimenter folder on desktop and play the video.

- **VIDEO 1**
  - Start video 1 (double click on the screen for full screen mode)
  - At the end of video 1, hand participant the **Informed Consent Form B**
  - Answer questions the participant might have **BUT** do not provide any information that is not stated in the consent form or provided in the box below. You need to obtain signed consent before starting the experiment.
    - If they choose not to participate in this portion of the study, thank them for their time and ask them why they chose not to complete this portion of the study (and record their response on the tracking sheet). Then, have them complete the feedback sheet.

Possible questions	Response
Is the tarantula real?	"*Yes, the tarantula is real and alive.*"

Is the tarantula poisonous?	*"Tarantulas are not poisonous to humans. They have venom that they use when feeding on small insects. I can answer your question in more detail after the task. For now, remember that although there is no actual danger in this situation, it is expected that only few people will fully complete the task."*
Can the tarantula bite me?	*"Tarantulas feed on small insects. They bite their prey before feeding. The tarantula is capable of biting, but the risk of that happening is extremely low and it is less dangerous than a honey bee. I can answer your question in more detail after the task. For now, remember that although there is no actual danger in this situation, it is expected that only few people will fully complete the task."*

- *NOTE: If participants asks you any questions related to the spider (i.e., whether you handle it, or whether you're aftraid of it etc.)or inquires about the duration of the task or how many steps there are, say:*
- *"The experimental procedures prohibit me from giving you the exact duration. I will let you know when the task is over and will be glad to answer your questions after the experimental task. Also, remember that you are free to stop at any time and will still receive credits for your participation."*

- **VIDEO 2**
  - Start video 2 (SUDS scale)
  - At the end of video 3 ask participant the following "*Do you have any questions about the SUDS scale?"* If needed play the video again.
- **VIDEO 3**
  - Start video 3 (detailed description of BAT)
  - At the end of video 3, hand participant the confidential "**SUDS sheet #1**" attached to clip board. Have participant fold the sheet and place in the box.
  - If participant has specific questions, answer them. If they are related to the spider, stick to one of the explanations provided earlier, otherwise tell them that you will answer their questions at the end of the experiment.
- **BAT**
  - Ask the participant to stand up and say the following:

"I will now ask you to complete several steps. Please complete as much of the task as you are willing. Let me know when you want to stop."

While still in the room with the computer (66) say:

1. *"The first step is for you to enter the room on your right, and rapidly approach the spider sitting on the table across the room. Stop at the floor mark and wait for my next instruction. I will be communicating with you through an intercom system after that point and will provide information about each following step. Please wait for me to finish giving you the instructions before you attempt each following step. Keep in mind that you are free to stop at any time."*

EXPERIMENTER: "*Remember to approach the spider next door as rapidly as you are willing to." O*pen the door and say: *"You may start now."* When they reach table say: *"Please circle how anxious you feel right now on the SUDS rating sheet and place it in the box."* If the participant left the door open, close it and return to room 66.

Instructions provided through the intercom system:

2. *Now, look down at the spider in the closed terrarium.*

3. *Next, remove the lid of the terrarium and place it on the table. You may start now.*

4. *Next, place your hands on both sides of the terrarium where the marks are. You may start.*
5. *Next, remove the smaller container that is over the spider and place it on the table. You may start.*
6. *Next, place the palm of your right hand on the floor of the terrarium across from where the spider is. I will let you know when to remove your hand or you may do that at any time. Let me know if you do not wish to complete this step by raising your hand* (pause to see if they raise hand)*. You may start.*

After **10 seconds** are up, EXPERIMENTER says: *"Remove your hand* (pause while they do that).

EXPERIMENTER: for next steps make sure you keep track of duration using the stop watch. If they touch spider for a shorter duration, you will discontinue the task. If you end the task, tell them through the intercom: *"The task is over. I will come in the room now and ask you a few questions."*

7. *After I'm done giving you the instructions, gently touch the spider with one finger. I will tell you when the time is up or you may stop whenever you want. Let me know if you do not wish to complete this step by raising your hand* (pause to see if they raise hand*). You may start now.*
   After **5 seconds** say: *"You may remove your hand now."*
8. *The next step is to touch the spider with 3 fingers. I will tell you when to stop or you may stop when you decide to. Let me know if you do not wish to complete this step by raising your hand* (pause to see if they raise hand*). You may start now.*
   After **10 seconds** say: *"You may remove your hand now."*

EXPERIMENTER says: *"Now, you will have the opportunity to have the spider walk on your bare hand. I will come in the room now."* Take the stopwatch with you, walk in the room and say: *"Let me know if you wish to complete this step. If you don't want the spider on your hand, just say so."*

9. If they say *"yes,"* say: *"Please place your hand in the terrarium with the palm of your hand touching the floor of the terrarium."* Then, guide the spider with the stick so it is on participant's hand. Then say: *Please don't move or shake your hand. Just tell me when you want the spider off your hand.* (Keep track of the time on your stop watch).
   After **30 seconds**, remove the spider from their hand and place it to the side. Place container over the spider.

If the participant states that they do not want to continue the task, say:	If the participant fully completes the BAT, say:
"OK, we are stopping the task. Before we	*"Before we return to the other room, please*

*return to the other room, please write down how anxious you feel **right now** using the same 0-100 scale on the first line of the confidential sheet that says 'end of task'* [present them with the folded "SUDS Sheet #2" attached to a clipboard]. *Then, please think about the point during the task when your anxiety was at its highest level. Please write down your **peak anxiety** rating on the second blank line, fold the paper and place it in the box "*	*write down how anxious you feel **right now** using the same 0-100 scale on the first line that says 'end of task'* [present them with the folded "SUDS Sheet #2" attached to a clipboard]. *Then, think about the point during the task when your anxiety was at its highest level. Please write down your **peak anxiety** rating on the second blank line, fold the paper and place it in the box."*

NOTE: Make sure you get their PEAK and END anxiety rating!

- Hand participant **PANAS-5** and have them complete it again

Experimenter 1: When the BAT is over, escort the participant to the waiting area and say: *"_____ will help you with the next task."* (If Experimenter 2 is with another participant, say: *"Please wait here for Experimenter 2, who will help you with the next task")*

Experimenter 2 will wait in from of 67 (or waiting area in PCC).

- As soon as participant arrives, record the time BAT was completed on tracking sheet (Experimenter 2 tracking sheet)
- Show participant to the bathroom so they can wash their hands

Experimenter 1 will take next participant to complete the BAT.

- Remember that **Experimenter 1** will run the BAT with participant, while **Experimenter 2** will collect Saliva samples and PANAS and will debrief participants.

Experimenter 2 will escort participant back to their original room and will hand them **Booklet 4** and say: *I will ask you to work on the same tasks again. Please take your time and do not rush through the tasks. I will return shortly.* Start your stopwatch and record time on Experimenter 2 Tracking Sheet (under time after BAT).
***For *participants 3 and 4*, **Experimenter 1** will hand out Booklet 4.

****After about 10 minutes**, walk into rooms and check how far along they are with Booklet 4. If they are done (or close to being done), hand them **Coding-6** and say: *"We would like for you to work on this task. Please note that this form differs from the previous one you completed – each number has a different symbol now."*

Cort # 5

Record ID, sample #, and time on tube

Experimenter 2: After 15 minutes, walk into participant's room and hand participant another *Salivettes® tube* and say *"We'll collect another saliva sample now. Please chew on the cotton swab and I will tell you when you can spit it into the tube."* Start the stopwatch and hand them the PANAS-6 to complete again. After about 90 seconds ask them to spit it into the tube. As you collect Salivette tubes from participants, record their ID, # of sample and time prior to placing it into the bag (ex: **202-5**, standing for participant 202, saliva sample 5; time: 1:35pm).

9. Feedback – AS YOU COLLECT SALIVA, HAND OUT FEEDBACK SHEET

Hand participant the Feedback sheet and ask them to complete it. When you collect it make sure they have answered all questions. **Make sure you have the correct feedback form** (they differ by condition – V-P1= Positive; V-N1=Negative, V-C1=Control)

10. Debriefing – IMMEDIATELY AFTER THEY HAVE COMPLETED FEEDBACK (it's recommended to wait outside their door for a minute or so)

- Then read the following debriefing information:

"Thank you for participating in this study. The knowledge gained by this study may help us to better understand the motivators of fearful avoidance. This study was designed to examine several variables that are believed to relate to fearful avoidance, including mood, sensitivity to feelings of anxiety stimuli, and how social interactions after an initial stressor may affect one's performance during a potentially anxiety-provoking situation.

After completing the packet of questionnaires, participants were asked to interact with their peers. Although you were informed that we were interested in studying social interactions, our goal was to examine the effect a social stressor has on one's anxiety and fear level. Thus, we did not have group work following the initial interaction and the other participants did not indicate that they did not want to interact with you. For the next task, participants were randomly assigned to one of three conditions (condition A, condition B, and condition C) that provided feedback about one's future relationships based on the personality questionnaire you completed. If you were assigned to condition A, you were informed that you are not likely to have fulfilling relationships in your life and that you would most likely end up alone in later life. If you were assigned to condition B, you were informed that you would have rewarding relationships throughout life. If you were assigned to condition C, you did not receive any feedback regarding the prospectus of your relationships. The information you received was not based on your responses to the questionnaire, but was part of the study's procedures. So, the feedback you got was bogus and not based on your responses. We also collected saliva on several occasions to allow us to further examine your reaction to the social interactions.

The data gathered from each participant will be aggregated with the data from all the other participants who were assigned to the same experimental condition and compared to data gathered from participants in the other condition. Thus, because each participant only provides data for one of the two experimental conditions, the responses from individual participants cannot be examined for reliability or truthfulness in any way.

The spider used in this study is a Grammostola rosea (common name: Chilean rose tarantula). This species of spider was chosen because it is docile, calm, and slow-moving. This species of tarantula is often known to be very inactive for long periods of time, earning it the nickname of "pet rock". Most importantly, the spider does not pose any risk to participants because it not dangerous to humans. Tarantulas mostly eat small insects such as crickets and use venom when feeding. Their venom is harmful to their prey, but is not at all harmful humans (think of it as insecticide!). Most people are surprised to learn that a honey bee sting would cause more harm than the bite of a tarantula. This particular tarantula has been a friendly pet for over 10 years and has never bitten a human.

Although the situation did not present any true risk, the task was designed to be anxiety provoking and may have cause temporary discomfort. Also, some of the questionnaires included items related to potentially sensitive topics, such as your fears and emotional state. If you

experience any discomfort or problems resulting from participation in the study, psychological treatment is available on a sliding fee scale at the UNL Psychological Consultation Center, telephone (402) 472-2351.

Participation in this study is a unique experience, and participants may be tempted to share their experience with others. However, it is very important for the integrity of this study that future participants are not aware of the details of the experimental design. If you plan to discuss your participation in this study with others, please choose a person who is not a student at UNL, who would not have the option of signing up to participate in this study. We greatly appreciate your cooperation."

- Hand each participant the sheet with the PCC contact information.
- Then, ask the participant to sit and relax while listing to relaxing music (for about 10-15 minutes). Leave the room and record the time on Experimenter 2 tracking sheet (under time after debriefing).

Walk back to waiting area and complete same procedures with the other participant.

Experimenter 2: make sure that you keep track of the times on your tracking sheet (Experimenter 2 Tracking sheet).

Cort # 6

Record ID, sample #, and time on tube

Experimenter 2: 10 minutes later, walk into first room and hand participant another *Salivettes® tube* and say *"We'll collect another saliva sample now. Please chew on the cotton swab and I will tell you when you can spit it into the tube."* Start the stopwatch and hand them the **PANAS-7** to complete again. After about 90 seconds ask them to spit it into the tube. As you collect Salivette tubes from participants, record their ID, # of sample and time prior to placing it into the bag (ex: **202-6**, standing for participant 202, saliva sample 6; time: 1:35pm).

At the end, spend a minute or two building rapport with the participant. Ask them if they have any questions. If they seem uneasy, ask them how they are feeling and what concerns they have. If the participant asks any questions about the tarantula, answer any questions that you did not fully answer prior to beginning the task.

After participant leaves, return to the other rooms or waiting area depending on timing. Look at Experimenter 2 tracking sheet.

Possible questions	Complete Response
Is the tarantula poisonous? Or Can the tarantula bite me?	*"Tarantulas are not poisonous to humans. Tarantulas mostly eat small bugs, such as crickets. Although their venom is dangerous to cricket, tarantulas are not dangerous to humans. This particular species of tarantula is known to be docile, calm, slow moving, and very unlikely to bite a human. In fact, this spider is someone's pet, and is very used to being handled. So, although the tarantula appears large and scary-looking, there was no actual danger in this situation."*

To Do after all participants leave.

- After all participants leave, collect all forms from the boxes and transfer their SUDS ratings onto the BAT form (anxiety ratings from Sheet #1 and Sheet #2 go in the box on the top; the SUDS approach spider goes in the step 1 box). Paper clip all forms together and place in manila folder.
- Move materials back to room 51 (spider, intercom system, terrarium goes in room 67).
- Transfer participant group number to general tracking (from Experimenter 2).
- Email Milena (milena@huskers.unl.edu) at the end of your session and inform her how your session went, how many participants completed the study and whether there were any no shows. When identifying participants in the email, use their name code from the Participant Tracking Sheet. If they have any questions/concerns, please have them contact Milena by email. Milena will assign participation credit on Experimetri**x.**

IN CASE OF OVERLY HEIGHTENED ANXIETY AT ANY POINT

If the participant gets upset, first have him or her take a break, and if necessary, go to the restroom or get a drink of water.

If unduly high levels of anxiety are evident, take a time-out. Try deep breathing exercises. If that does not work, contact Milena.

Appendix D: **Questionnaire Packet**

DEMOGRAPHIC INFORMATION

1. What is your age? _____

3. What do you consider your ethnicity?

- ❑ 1European American (non-Hispanic)
- ❑ 2African American (non-Hispanic)
- ❑ 3Hispanic
- ❑ 4Asian American
- ❑ 5Pacific Islander
- ❑ 6Native American/Alaskan Native
- ❑ 7Middle Easterner
- ❑ 8Other_____

4. What year of college are you in?

- ❑ 1First year / Freshman
- ❑ 2Second year / Sophomore
- ❑ 3Third year / Junior
- ❑ 4Fourth year / Senior
- ❑ 5Graduate school

5. Are you currently taking birth control (pills, the patch, or other hormonal birth control)?

- ❑ Yes

If yes, specify what you're taking: _____

- ❑ No

6. Are you taking any other medications?

- ❑ Yes

If yes, specify what you're taking: _____

- ❑ No

7. Do you have regular menstrual cycles?

- ❑ Yes
- ❑ No

8. How often do you usually have your period?

- ❑ More than once a month
- ❑ Once a month
- ❑ Less than once a month

9. How many days does your period usually last? _____

10. When was the first day of your last period? _____ (month/date)

INTAKE

_____

How many cups of coffee have had today? _____

How many cups of tea have you had today? _____

How much soda have you had today? _____

How many shots of spirits have you had today? _____

How many glasses of wine have you had today? _____

How many beers have you drank today? _____

Have you excercised or performed any strenuous work today? **YES** **NO**

If yes, how long did you do it for? _____

What time was your last meal? _____

What did you eat? _____

FSQ

For each item, please indicate how much you agree with the statement using the scale below.

Totally Disagree 1	**Disagree 2**	**Slightly Disagree 3**	**Neutral 4**	**Slightly Agree 5**	**Agree 6**	**Totally Agree 7**

1. If I came across a spider now, I would get help from someone else to remove it.	1	2	3	4	5	6	7
2. Currently, I am sometimes on the look out for spiders.	1	2	3	4	5	6	7
3. If I saw a spider now, I would think it will harm me.	1	2	3	4	5	6	7
4. I now think a lot about spiders.	1	2	3	4	5	6	7
5. I would be somewhat afraid to enter a room now, where I have seen a spider before.	1	2	3	4	5	6	7
6. I now would do anything to try to avoid a spider.	1	2	3	4	5	6	7
7. Currently, I sometimes think about getting bit by a spider.	1	2	3	4	5	6	7
8. If I encountered a spider now, I wouldn't be able to deal effectively with it.	1	2	3	4	5	6	7
9. If I encountered a spider now, it would take a long time to get it out of my mind.	1	2	3	4	5	6	7
10. If I encountered a spider now, I would leave the room.	1	2	3	4	5	6	7
11. If I saw a spider now, I would think it will try to jump on me.	1	2	3	4	5	6	7
12. If I saw a spider now, I would ask someone else to kill it.	1	2	3	4	5	6	7
13. If I encountered a spider now, I would have images of it trying to get me.	1	2	3	4	5	6	7
14. If I saw a spider now, I would be afraid of it.	1	2	3	4	5	6	7
15. If I saw a spider now, I would feel very panicky.	1	2	3	4	5	6	7
16. Spiders are one of my worst fears.	1	2	3	4	5	6	7
17. I would feel very nervous if I saw a spider now.	1	2	3	4	5	6	7
18. If I saw a spider now I would probably break out in a sweat and my heart would beat faster.	1	2	3	4	5	6	7

The Daily Hassles Scale

Directions: Hassles are irritants that can range from minor annoyances to fairly major pressures, problems, or difficulties. They can occur few or many times.

Listed in the center of the following pages are a number of ways in which a person can feel hassled. First, circle the hassles that have happened to you in the past month. Then look at the numbers on the right of the items you circled. Indicate by circling a 1, 2, or 3 how SEVERE each of the circled hassles has been for you in the past month. If a hassle did not occur in the last month do NOT circle it.

Hassles	SEVERITY 1. Somewhat severe 2. Moderately severe 3. Extremely severe		
(1) Misplacing or losing things ……	1	2	3
(2) Troublesome neighbors ……	1	2	3
(3) Social obligations ……	1	2	3
(4) Inconsiderate smokers ……..……..……	1	2	3
(5) Troubling thoughts about your future …..……	1	2	3
(6) Thoughts about death ..…….…..…….	1	2	3
(7) Health of a family member ……..……	1	2	3
(8) Not enough money for clothing ……	1	2	3
(9) Not enough money for housing ……..	1	2	3
(10) Concerns about owing money ...……..……	1	2	3
(11) Concerns about getting credit ……..……	1	2	3
(12) Concerns about money for emergencies ……..…	1	2	3
(13) Someone owes you money ..……	1	2	3
(14) Financial responsibility for someone who doesn't live with you ……	1	2	3
(15) Cutting down on electricity, water, etc. ……. ……..	1	2	3
(16) Smoking too much …..……..……..…	1	2	3

Hassles	SEVERITY 1. Somewhat severe 2. Moderately severe 3. Extremely severe		
(17) Use of alcohol ……	1	2	3
(18) Personal use of drugs ……	1	2	3
(19) Too many responsibilities ……	1	2	3
(20) Decisions about having children ……	1	2	3
(21) Non-family members living in your house ……	1	2	3
(22) Care for pet ……	1	2	3
(23) Planning meals ……	1	2	3
(24) Concerned about the meaning of life ……	1	2	3
(25) Trouble relaxing ……	1	2	3
(26) Trouble making decisions ……	1	2	3
(27) Problems getting along with fellow workers ……	1	2	3
(28) Customers or clients give you a hard time ……	1	2	3
(29) Home maintenance (inside) ……	1	2	3
(30) Concerns about job security ……	1	2	3
(31) Concerns about retirement ……	1	2	3
(32) Laid-off or out of work ……	1	2	3
(33) Don't like current work duties ……	1	2	3
(34) Don't like fellow workers ……	1	2	3
(35) Not enough money for basic necessities ……	1	2	3
(36) Not enough money for food ……	1	2	3
(37) Too many interruptions ……	1	2	3

Hassles	SEVERITY 1. Somewhat severe 2. Moderately severe 3. Extremely severe		
(38) Unexpected company ……	1	2	3
(39) Too much time on hands ……	1	2	3
(40) Having to wait ……	1	2	3
(41) Concerns about accidents ……	1	2	3
(42) Being lonely ……	1	2	3
(43) Not enough money for health care ……	1	2	3
(44) Fear of confrontation ……	1	2	3
(45) Financial security ……	1	2	3
(46) Silly practical mistakes ……	1	2	3
(47) Inability to express yourself ……	1	2	3
(48) Physical illness ……	1	2	3
(49) Side effects of medication ……	1	2	3
(50) Concerns about medical treatment ……	1	2	3
(51) Physical appearance ……	1	2	3
(52) Fear of rejection ……	1	2	3
(53) Difficulties with getting pregnant ……	1	2	3
(54) Sexual problems that result from physical problems ……	1	2	3
(55) Sexual problems other than those resulting from physical problems ……	1	2	3
(56) Concerns about health in general ……	1	2	3
(57) Not seeing enough people ……	1	2	3
(58) Friends or relatives too far away ……	1	2	3

Hassles	SEVERITY 1. Somewhat severe 2. Moderately severe 3. Extremely severe		
(59) Preparing meals	1	2	3
(60) Wasting time	1	2	3
(61) Auto maintenance	1	2	3
(62) Filling out forms	1	2	3
(63) Neighborhood deterioration	1	2	3
(64) Financing children's education	1	2	3
(65) Problems with employees	1	2	3
(66) Problems on job due to being a woman or man	1	2	3
(67) Declining physical abilities	1	2	3
(68) Being exploited	1	2	3
(69) Concerns about bodily functions	1	2	3
(70) Rising prices of common goods	1	2	3
(71) Not getting enough rest	1	2	3
(72) Not getting enough sleep	1	2	3
(73) Problems with aging parents	1	2	3
(74) Problems with your children	1	2	3
(75) Problems with persons younger than yourself	1	2	3
(76) Problems with your lover	1	2	3
(77) Difficulties seeing or hearing	1	2	3
(78) Overloaded with family responsibilities	1	2	3
(79) Too many things to do	1	2	3

Hassles	SEVERITY 1. Somewhat severe 2. Moderately severe 3. Extremely severe		
(80) Unchallenging work …….……	1	2	3
(81) Concerns about meeting high standards ……..…	1	2	3
(82) Financial dealings with friends or acquaintances ……..……	1	2	3
(83) Job dissatisfactions ……..……	1	2	3
(84) Worries about decisions to change jobs ……..…	1	2	3
(85) Trouble with reading, writing or spelling abilities ……..……	1	2	3
(86) Too many meetings ……	1	2	3
(87) Problems with divorce or separation ..…….	1	2	3
(88) Trouble with arithmetic skills ……..……...	1	2	3
(89) Gossip ……..……	1	2	3
(90) Legal problems ……..……..…..…	1	2	3
(91) Concerns about weight ……...….	1	2	3
(92) Not enough time to do the things you need to do ……	1	2	3
(93) Television ……..……	1	2	3
(94) Not enough personal energy ……..…	1	2	3
(95) Concerns about inner conflicts ..……..……	1	2	3
(96) Feel conflicted over what to do ……	1	2	3
(97) Regrets over past decisions ……..……	1	2	3
(98) Menstrual (period) problems ..……	1	2	3
(99) The weather ……..……	1	2	3
(100) Nightmares ……..……	1	2	3

Hassles	SEVERITY 1. Somewhat severe 2. Moderately severe 3. Extremely severe		
(101) Concerns about getting ahead	1	2	3
(102) Hassles from boss or supervisor	1	2	3
(103) Difficulties with friends	1	2	3
(104) Not enough time for family	1	2	3
(105) Transportation problems	1	2	3
(106) Not enough money for transportation	1	2	3
(107) Not enough money for entertainment and recreation	1	2	3
(108) Shopping	1	2	3
(109) Prejudice and discrimination from others	1	2	3
(110) Property, investments or taxes	1	2	3
(111) Not enough time for entertainment and recreation	1	2	3
(112) Yardwork or outside home maintenance	1	2	3
(113) Concerns about news events	1	2	3
(114) Noise	1	2	3
(115) Crime	1	2	3
(116) Traffic	1	2	3
(117) Pollution	1	2	3

Have we missed any of your hassles? If so, write them in below:

(118) _____ 1 2 3

ONE MORE THING: HAS THERE BEEN A CHANGE IN YOUR LIFE THAT AFFECTED HOW YOU ANSWERED THIS SCALE? IF SO, TELL US WHAT IT WAS:

_____

Appendix E: **PANAS**

PANAS-1

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel ***this way right now***, that is, how you feel ***at this very moment***. Use the following scale to record your answers.

Very Slightly or Not at All	**Slightly**	**Moderately**	**Quite A Bit**	**Extremely**
1	***2***	***3***	***4***	***5***

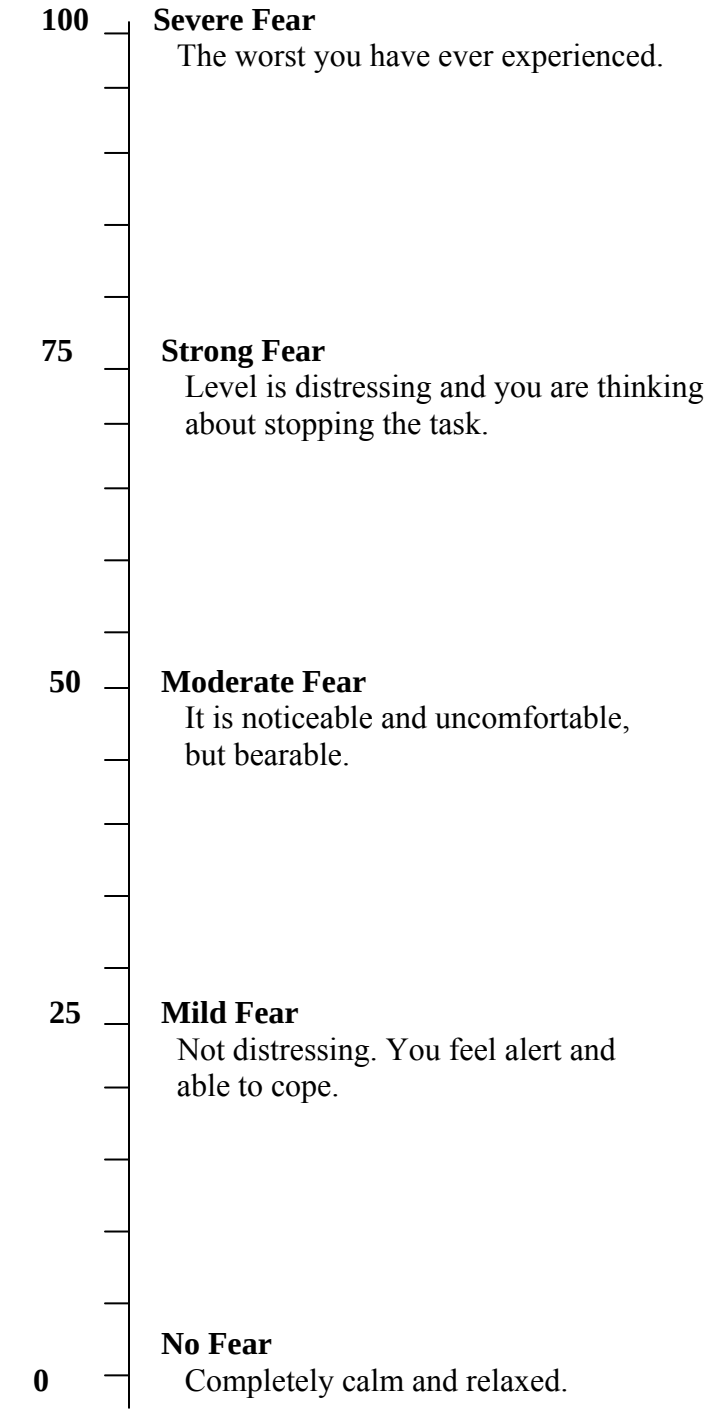
1	Interested	_____	8	Hostile	_____	14	Inspired	_____
2	Distressed	_____	9	Enthusiastic	_____	15	Nervous	_____
3	Excited	_____	10	Proud	_____	16	Determined	_____
4	Upset	_____	11	Irritable	_____	17	Attentive	_____
5	Strong	_____	12	Alert	_____	18	Jittery	_____
6	Guilty	_____	13	Ashamed	_____	19	Active	_____
7	Scared	_____				20	Afraid	_____

Appendix F: **SUDS**

SUDS Sheet- #1

Fear Ratings

1. _____ (beginning)



Appendix G: **BAT Steps**

Spider BAT

Scores:
_____ Total # of BAT Steps

_____ Anticipatory SUDS
_____ Peak SUDS
_____ End of Task SUDS

	Step	**Completed?**
1	Approach spider rapidly	Yes No SUDS_____
2	Look down at spider in the closed terrarium	Yes No
3	Remove the lid of the terrarium	Yes No
4	Place your hands on both sides of the terrarium (by mark)	Yes No
5	Remove the small container over spider	Yes No
6	Place palm of hand on the floor of the terrarium (across from where spider is)	Yes No
7	Gently touch spider with one finger for 5 seconds	Yes No
8	Gently touch the spider for 10 seconds with 3 fingers	Yes No
9	Let spider walk on bare hand for 30 seconds	Yes No

Appendix H: **Feedback – Future Belonging**

Feedback

We would like to hear about your experience. Please answer the following questions.

1. The spider task was too easy. I didn't feel very anxious. **True / False**

2. The spider task was too difficult. I felt too anxious to finish the task. **True / False**

3. I had a good experience talking with other participants. **True / False**

4. I did not enjoy talking with the other participants. **True / False**

5. I have experience with tarantulas (either I have owned a pet tarantula, or I have spent time with a friend's pet tarantula). **True / False**

6. If you answered **True in #5**, please briefly describe how much and what kind of experience you have had with spiders:

_____

_____

7. Think back to the point when the experimenter came in the room the first time and said that no one wanted to work with you. Think a little bit about what they said. What was your reaction **at the time**?

A. I was disappointed. I felt rejected. I was kind of bummed out.

B. I figured they must have made a mistake.

C. I figured they must have been lying to me.

8. The second time the experimenter talked to you, do you remember hearing that you are likely to have many friends and people who care about you? **YES** **NO**

9. What was your reaction **at the time**?

A. It made me happy; I felt really good about the future.

B. I figured they must have made a mistake.

C. I figured they must have been lying to me.

Thank you!

Appendix I: **Feedback – Future Alone**

Feedback

We would like to hear about your experience. Please answer the following questions.

1. The spider task was too easy. I didn't feel very anxious. **True / False**

2. The spider task was too difficult. I felt too anxious to finish the task. **True / False**

3. I had a good experience talking with other participants. **True / False**

4. I did not enjoy talking with the other participants. **True / False**

5. I have experience with tarantulas (either I have owned a pet tarantula, or I have spent time with a friend's pet tarantula). **True / False**

6. If you answered **True in #5**, please briefly describe how much and what kind of experience you have had with spiders:

_____

_____

7. Think back to the point when the experimenter came in the room the first time and said that no one wanted to work with you. Think a little bit about what they said. What was your reaction **at the time**?

A. I was disappointed. I felt rejected. I was kind of bummed out.

B. I figured they must have made a mistake.

C. I figured they must have been lying to me.

8. The second time the experimenter talked to you, do you remember hearing that you are likely to end up alone with few friends in life? **YES** **NO**

9. What was your reaction **at the time**?

A. I was disappointed. I felt rejected. I was kind of bummed out.

B. I figured they must have made a mistake.

C. I figured they must have been lying to me.

Thank you!

Appendix J: **Feedback – Control**

Feedback

We would like to hear about your experience. Please answer the following questions.

1. The spider task was too easy. I didn't feel very anxious.	**True / False**
2. The spider task was too difficult. I felt too anxious to finish the task.	**True / False**
3. I had a good experience talking with other participants.	**True / False**
4. I did not enjoy talking with the other participants.	**True / False**
5. I have experience with tarantulas (either I have owned a pet tarantula, or I have spent time with a friend's pet tarantula).	**True / False**

6. If you answered **True in #5**, please briefly describe how much and what kind of experience you have had with spiders:

_____

_____

7. Think back to the point when the experimenter came in the room the first time and said that no one wanted to work with you. Think a little bit about what they said. What was your reaction **at the time**?

A. I was disappointed. I felt rejected. I was kind of bummed out.

B. I figured they must have made a mistake.

C. I figured they must have been lying to me.

Thank you!