

Exercise Habits, Adult Attachment Styles, and HPA-Axis Hypersensitivity

by
Zoe Chrisman-Miller

A THESIS

submitted to

Oregon State University

University Honors College

in partial fulfillment of
the requirements for the
degree of

Honors Baccalaureate of Science in Psychology
(Honors Associate)

Presented November 12, 2015
Commencement June 2016

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Zoe Chrisman-Miller for the degree of Honors Baccalaureate of Science in Psychology presented on November 12, 2015. Title: Exercise Habits, Adult Attachment Styles, and HPA-Axis Hypersensitivity.

Abstract approved: _____

Frank Bernieri

This is the first study to link exercise with adult romantic attachment style in a university setting. Previous research has associated insecure attachment styles, particularly those associated with high levels of anxiety, with increased pain sensitivity. This thesis hypothesizes that the mechanism responsible for this relationship will correlate with the experience of rigorous exercise as more physically painful, and thus to exercise avoidance. A volunteer sample of 148 participants (117 females, 31 males) was assessed. Participants were given The Relationship Questionnaire and a measure of exercise habits. We found that across all measures of exercise, individuals with anxious-type attachment styles exercised significantly less than those reporting secure attachment. It is argued in this thesis that the physiological mechanism for these findings involves the Hypothalamic-Pituitary-Adrenal (HPA) axis, which is a stress response system in humans. Specifically, it is proposed that early childhood stressors can lead to both HPA-axis hypersensitivity and to an anxious insecure attachment style. It is the HPA-Axis hyperactivity of adults that is likely the true underlying cause of both exercise aversion and anxiety-type attachment styles, and that it links the two behaviors.

Key Words: Adult Attachment, Exercise, HPA Axis, Stress
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presented on November 12, 2015.

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I understand that my project will become part of the permanent collection of Oregon State University, University Honors College. My signature below authorizes release of my project to any reader upon request.

Zoe Chrisman-Miller, Author

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Over the last decade, obesity, heart disease and physical health have increased noticeably. One American dies from a stroke every 4 minutes and over one third of the US adult population is obese (Centers for Disease Control and Prevention, 2015). With increases in obesity and heart disease and the knowledge that exercise can have a positive impact on both, it is important to determine why individuals avoid exercise. While the fitness craze in America has become popular in mainstream culture, a small portion of the population tends to be resistant to the common motivational techniques offered by personal trainers and physical fitness advocates. A quick search on Twitter and other social media sites yields thousands of results for the hash tag, “I hate working out.” Although most everyone would agree that the experience of intense physical exertion involves discomfort and pain, some of the population can ignore the immediate discomfort to push through for the long-term benefit. There may be an important individual difference in the *appraisal* of the experience such that physical exertion may generate a hyper-stress response in a small segment of the population and correlate with exercise avoidance.

The fitness community openly asserts the belief that individuals who dislike exercise are “lazy.” There seem to be a myriad of websites and motivational speakers who boast the mantra “suck it up” when advertising exercise opportunities (see below).



Figure 1. Common belief in modern fitness culture. Retrieved from www.journeytothegoal.com.

Unlike the vast majority who are able to “suck it up” and work through the pain, those who avoid exercise may experience intense physiological and emotional alarm during exercise activity. As a result, they may actually suffer more and justifiably *hate* the experience more than most of us can fathom.

This thesis examined a psychologically unexpected and provocative relationship between exercise habits and romantic attachment styles that provides evidence for a physiological mechanism to explain why some people literally suffer more than others during intense physical exertion. Specifically, if such a mechanism existed, one could derive the empirically testable hypothesis that individuals with an insecure anxious adult attachment style would exercise less frequently and less vigorously. Ultimately, the objective is to understand why individuals abstain from exercise despite knowing all of its benefits.

While exercise motivation is a separate topic to be understood (Dzewaltowski, 1989), this thesis focused on exercise *aversion*. This thesis will present evidence to argue that individuals with anxiety-type insecure attachment style have significantly reduced

exercise habits compared to securely attached individuals. If so, it would be the first study to find such a link between romantic attachment styles and exercise. More importantly, this non-intuitive result would posit empirical evidence in support of a mediating mechanism of anxiety and stress in the relationship between romantic attachment styles and exercise, which could be the subject for further research.

Chapter 1: Attachment Theory and Pain

Attachment Theory

In early analyses of infant development, John Bowlby noted that developmental abnormalities during childhood (i.e., stealing) could be linked to maternal separation (Bretherton, 1992). These findings led Bowlby to establish a model of parent-child interactional health rather than a Freudian model, which focused solely on the child's desires. Mary Ainsworth, a research assistant of Bowlby's, believed that children utilize the presence of their family to feel safe and explore and develop skills in other areas of life. Bowlby developed the theoretical model of an infant's tie to his or her mother in a series of published papers, which discussed the implications of separation anxiety and mourning in the infant-mother relationship (Bowlby, 1958; 1959; 1960). Separately, Ainsworth traveled to Uganda and observed the behaviors of Ugandan infants in response to their mothers' separation—she was struck by the salience of Bowlby's theories of infant attachment and the importance of the mother in perceiving a safe environment. Ainsworth returned and collaborated with Bowlby to note the implications of maternal separation on infant behavior.

In its most famous appearance in popular culture, attachment theory was developed to assess infant-mother relationships and the effects of stress on the maternal bond (Ainsworth, 1978). Bowlby and Ainsworth (1978) developed an experimental study—the Strange Situation—that allowed researchers to categorize various infant reactions to maternal separation. The pair worked to understand how parenting styles and early environments affect children in their development. Similarly, this experiment was

an important step in understanding how individual differences interact with various parenting styles to create developing individuals.

Ainsworth (1978) further developed the Attachment Theory, accompanied by several observations. Generally, the research showed that infants naturally show alarm in the face of maternal separation. Furthermore, the return of the mother in most children stops this alarm system and allows the infant to return to normal functioning. However, Ainsworth observed that some infants were not calmed by the return of their mother and reacted to the reunion in a distinct, patterned, and distressed way (Ainsworth, 1987). Ainsworth attributed this alarmed response to an *insecure* attachment to the mother. In contrast, infants who could be comforted by their mother were thought to have a *secure* attachment to the mother.

Infants with an *insecure* attachment behave in one of two ways during reunion with the mother. In one case, the infant shows no apparent anxiety but does not make eye contact in an effort to reinforce the bond—Ainsworth called this *avoidant* behavior. In the other case, the infant cannot be calmed by the return of the mother, is overly anxious, and is resistant to return to play—Ainsworth called this *ambivalent* behavior. Ainsworth reported that about 62% of infants displayed a *secure* attachment, while 38% displayed an *insecure* attachment (23% showing *avoidant* behavior, 15% showing *ambivalent* behavior).

Adult Attachment Theory

Hazan and Shaver (1987) extended Ainsworth's research to adult romantic relationships. In their report on the connection between romantic love and attachment

processes, Hazan and Shaver suggested that adult romantic relationships may mimic the infant/mother relationships that Ainsworth (1978) studied. The pair used Ainsworth and Bowlby's research on attachment styles to develop a theory about adult attachment in romantic relationships. Hazan and Shaver (1987) developed a self-report measure, the "love quiz," that extended Ainsworth's descriptions of the three attachment styles (*secure*, *avoidant*, *ambivalent*) to the lens of adult romantic relationships. The researchers found that Ainsworth's theory of infant attachment styles mapped very similarly to adults; that is, Hazan and Shaver found that adults behave very similarly to Ainsworth's infants in their attitudes towards relationships (1987).

Within the last 20 years, there have been various adaptations to Hazan and Shaver's theory on adult romantic attachment, particularly with regard to measurement and generalizability. Bartholomew and Horowitz (1991) developed a dynamic self-report measure, *The Relationship Questionnaire*, that assessed an individual's adult attachment style. Each of these style categories is derived from Ainsworth's (1978) assessment of maternal bonds and an infant's use of the mother as a secure base. In this model, "preoccupied" is equivalent to Ainsworth's *ambivalent* category. The *avoidant* category is divided into "dismissive" and "fearful." According to Ainsworth, "fearful" individuals have a negative assessment of the self and a high avoidance from others, and might therefore avoid contact to shelter themselves from rejection. "Dismissive" individuals are not likely to seek relational contact because of their low dependence on others.

Bartholomew and Horowitz provided a crucial insight into the working models of thoughts of self and others associated with adult attachment theory. Whereas Hazan and Shaver's model offered generalizability of Ainsworth's theory of child attachment,

Bartholomew and Horowitz proposed that adult attachment styles can be categorized along two axes; an individual's model of the self and an assessed model of "others," (see below).

		Thoughts of Self	
		Positive	Negative
Thoughts of Partner	Positive	<p>Secure Comfortable with intimacy and autonomy</p>	<p>Preoccupied Preoccupied with relationships</p>
	Negative	<p>Dismissive Dismissing of intimacy Strongly independent</p>	<p>Fearful Fearful of intimacy Socially avoidant</p>

Figure 2. Adapted from Bartholomew & Horowitz, (1991): A four-category model of adult attachments.

The "model of the self" functions as an individual's assessment of self-worth within a relationship. An individual with low self-worth is likely to assess others as being apprehensive about or even dismissive of their presence. These individuals rely on others for their own self-validation, and are thus very anxious about their relationships with others. Individuals with negative thoughts of self are likely to be high in emotional reactivity and be sensitive to the response of others. Behaviorally, these individuals appear as highly anxious and very sensitive. The two attachment styles associated with negative thoughts of self in Bartholomew and Horowitz's model have either preoccupied or fearful attachment styles. Preoccupied individuals have both a negative self-worth and a positive view of others in relationships. The terminology, which can be misleading to those unfamiliar with Bowlby's work, indicates that preoccupied individuals require a

high amount of validation from others and seek this validation through constant contact with their partners. In relationships, these individuals appear to be “clingy,” and can be hypersensitive to others’ responses. In contrast, fearful individuals, who also have a negative sense of self-worth, assess others as being unsupportive, and tend to avoid close relationships. Bartholomew and Horowitz developed a measure to assess these four categories of adult attachment called, *The Relationship Questionnaire*.

Secure. It is easy for me to become emotionally close to others. I am comfortable depending on others and having others depend on me. I don't worry about being alone or having others not accept me.

Dismissing I am comfortable without close emotional relationships. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on others or have others depend on me.

Preoccupied. I want to be completely emotionally intimate with others, but I often find that others are reluctant to get as close as I would like. I am uncomfortable being without close relationships, but I sometimes worry that others don't value me as much as I value them.

Fearful I am uncomfortable getting close to others. I want emotionally close relationships, but I find it difficult to trust others completely, or to depend on them. I worry that I will be hurt if I allow myself to become too close to others.

Figure 3. Adapted from Bartholomew & Horowitz, (1991) *The Relationship Questionnaire*.

It is clear from these definitions that both preoccupied and fearful attachment styles can be associated with high amounts of anxiety. Preoccupied individuals, though open to close relationships, are constantly wrought with fears of rejection and dismissal due to their negative sense of self. Fearful individuals, who crave approval from others, avoid close relationships in order to avoid their assessed inevitable rejection and thus never receive validation. The graph below displays the four attachment styles in action—how an individual’s internal working model is displayed in their cognitions (high or low anxiety) and their behaviors (high or low avoidance). In this respect, preoccupied

and fearful individuals frequently score similarly on tests that measure anxiety or neuroticism.

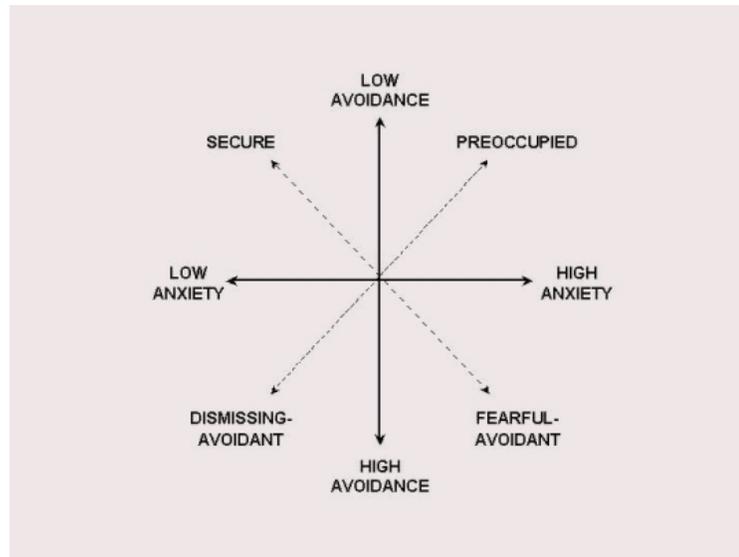


Figure 4. Adapted from Fraley & Shaver (2000), a two-dimensional model of adult attachment styles as described in Bartholomew & Horowitz's (1991) theory.

Adult Attachment and Pain

Attachment style research is both fairly recent and expansive; according to Google Scholar search engine, over 100,000 peer-reviewed articles have been published that include the keywords “psychological attachment” within the last five years. One of the intriguing physiologically-based concepts within this exploration is the association between pain and insecure attachment. In 2006, researchers reported an association between attachment styles, self-efficacy, anxiety and chronic pain (Meredith, Strong & Feeney, 2006). The researchers focused on “comfort with closeness,” which was assessed by the Attachment Style Questionnaire (Fossati, Feeney, Donati, Donini, Novella, Bagnato, Acquarini, & Maffei, 2003). In this study, “comfort with closeness” was equivalent to attachment avoidance. The authors then measured an individual’s

ability to complete a stressful task despite the pain experienced with that task. The authors found that avoidant and fearfully-attached individuals were less able to complete a task that was extremely painful. These results suggest that attachment avoidance contributes to an individual's assessment of their ability to resist pain as a distractor. This is important to the current hypothesis that an individual's attachment style will predict their ability to exercise despite the pain associated with physical exertion.

In addition to studying chronic pain, Meredith et al. (2006) were interested in the role that attachment insecurity plays in the experience of *acute pain*, and the concurrent cognitions that accompany pain. This was the first experiment to associate *pain self-efficacy*, or the ability to mentally manage pain, with adult attachment in a group free from chronic pain. The researchers proposed a theoretical model that linked adult attachment insecurity to both low self-efficacy and increased catastrophization, a combination that led to a decrease in perceived pain threshold (see below).

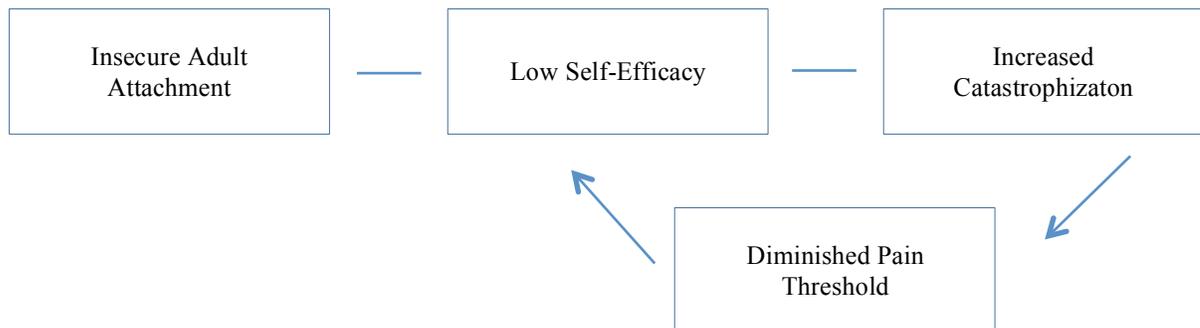


Figure 5. An interpretation of Meredith et al.'s (2006) theory of attachment, self-efficacy, catastrophization and pain thresholds.

Their model proposed that a) attachment insecurity is a predictor of low self-efficacy, b) when an individual perceives themselves as unable to handle a painful situation, they begin to catastrophize the situation which leads to c) a decrease in pain

threshold. The researchers found that levels of attachment security served as a mediating variable between post-task pain catastrophization and pain intensity (see figure 4). The researchers used a catastrophizing coping strategies scale to assess catastrophization and a 10-point scale to assess pain intensity with measurements taken 12 times over 4 minutes during an activity to assess overall pain intensity.

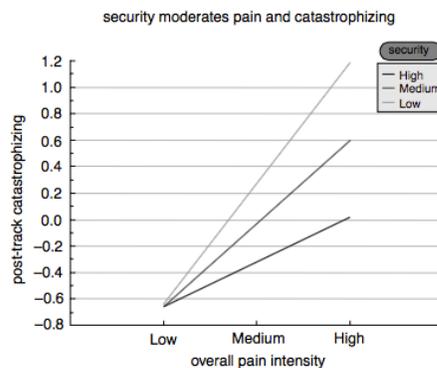


Figure 6. Adapted from Meredith et al. (2006). This graph displays the relationship between attachment security (high, medium and low), pain intensity and pain catastrophization.

As one can see from the graph, under the highest level of pain intensity, individuals with the lowest levels of attachment security displayed the highest levels of pain catastrophization. The opposite was true of securely attached individuals who reported lower levels of catastrophizing and more control over their pain. The researchers found that low levels of pain intensity were correlated with high amounts of catastrophizing *only* when an individual was insecurely attached. These results suggest that attachment style in some way moderates subjective appraisals of pain intensity. Further, it appears that insecurely attached individuals experience catastrophizing at low levels of pain more so than their securely-attached peers. If insecure attachment is related to high levels of

catastrophization at low levels of pain intensity, these findings may extend to the current hypothesis concerning pain catastrophization during exercise.

A number of studies (Mills-Koonce, Appleyard, Barnett, Deng, Putallaz & Cox, 2011; Kidd, Hamer & Steptoe, 2011; Pietromonaco, DeBuse & Powers, 2013) have found unexpected links between adult attachment theory and stress related psychological constructs. These relationships might appear to be coincidental, but Deniz & Isik found a large number of studies that associate adult romantic attachment styles and stress (Deniz & Isik, 2010). They postulated that there may be some underlying mechanism related to both attachment style and these various stress measures.

Exercise, particularly moderate to rigorous exercise, is associated with some amount of discomfort and pain (Yoshino & Klein, 2015). From Meredith et al.'s (2006) research, it can be inferred that individuals may subjectively appraise pain differently— one event may subjectively feel particularly more or less painful to an individual. As noted above, pain assessment and pain catastrophization may be influenced by an individual's attachment style.

Chapter 2: Stress Response Development

Psychologists use a variety of psychological and physiological measures to detect neurological stress responses in humans. During times of stress, the endocrine system functions as a hormonal response to perceived threat. Within the endocrine system, two systems work to control an individual's anxiety: the Sympathetic Adrenomedullary System (SAM) and the Hypothalamic-Pituitary-Adrenal (HPA) axis. The SAM is responsible for the "fight or flight response," or the immediate response that the body provides to combat stress. When activated, the SAM system triggers a chain of reactions, which ultimately results in the release of epinephrine and norepinephrine, commonly known as the adrenal hormones. A release of adrenaline leads to a number of "fight-or-flight" system responses such as an increased heart rate, blood flow and sweating. When the HPA axis is activated, a chain of hormones is released: first, corticotrophin-releasing hormone is secreted, which triggers the anterior pituitary gland to release adrenocorticotrophic hormone (ACTH). Lastly, the ACTH allows the adrenal gland to release a myriad of hormones including the familiar chemical, cortisol (Sanderson, 2004). Cortisol plays an important role in the maintenance of homeostasis within the body.

Cortisol is released in response to a perceived threat to homeostasis. Biologically, this hormone serves as our life-saver when the stress alarm is activated in the brain. In excess, however, cortisol can be detrimental to vital organs. It is important to be able to quantify a physiological stress response in the body in order to understand an individual's perceived psychological stress (Esposito & Bianchi, 2012) because humans respond physically to perceived psychological stresses as well as physical stresses. A widely used

assessment of stress in animals (including humans) is the measurement of cortisol levels, the hormone that indicates HPA axis activity (Miller, Chen & Zhou, 2007) (See Figure 7).

It has been found that developmental trauma plays a big role in cortisol regulation and thus HPA axis activity (Cicchetti & Rogosch, 2001). Researchers have determined that the period before an infant reaches 24 months is an extremely sensitive time of development for human stress response systems (McLaughlin, Sheridan, Tibu, Fox, Zeanah & Nelson, 2015). From birth, the human stress system develops in response to its environment. McLaughlin et al. (2004) found that individuals are extremely reactive in their development to their environment during this sensitive period of time.

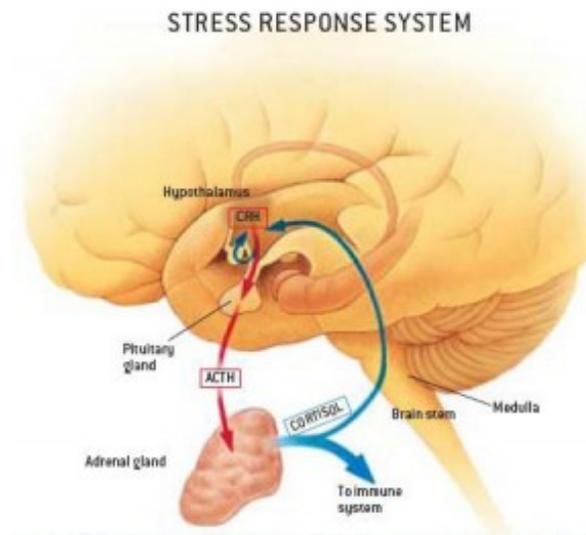


Figure 7. An anatomical model of the HPA axis. Retrieved from Sharin & Nemeroff (2011).

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The HPA axis has been implicated in many psychological disorders in addition to physical ones. HPA axis activation has been studied in association with the development of alcohol dependence (Reynolds, Saunders, Brewton, Winchester, Elgumati & Prendergast, 2015), drug use (Wetherell, 2014), eating disorders (Hass, Kohn, Clarke,

Allen, Madden, Muller, & Gaskin, 2009), and a variety of psychological and cognitive factors.

This thesis extends and applies this physiological mechanism beyond pain and psychological disorders to exercise. It is proposed that the development of the HPA axis in humans can be impacted by early life stressors associated with insecure maternal attachment, and that the resulting HPA axis hyperactivity in adults serves as a mechanism for exercise aversion. Although this study did not assess maternal attachment, it is believed that adult romantic attachment is highly correlated with patterns and development of infant attachment (Hamilton, 2003; Browne & Winkelman, 2007).

Chapter 3: Adult Attachment and Stress Response

In order to predict an individual's aversion to exercise, we must understand the connection between attachment styles, HPA axis development, and stress responses. Uhelski and Fuchs (2012) examined the effects of maternal separation on the physiological development and corticosterone responses of adult rats. It has been shown that early childhood stressors, such as maternal separation, can have lasting effects into adulthood and may contribute to a number of psychological and physiological illnesses. In accordance with these findings, Uhelsji and Fuchs (2012) found that, compared to their normally developed peers, Early Maternal Separation (EMS) rats demonstrated elevated neuroendocrine reactivity and enhanced anxiety in response to several stress-tests. In this study, elevated neuroendocrine activity is likely synonymous with elevated activity in the HPA axis.

In addition, in response to a noxious chemical stimulus exposure, EMS rats showed more signs of affective pain and anxiety. These findings suggest that maternal separation during development can change levels of stress hormones in the brain and may elevate an individual's sensitivity to stress. The rats that were separated from their mothers showed an increased stress response to the tests. This research is relevant to our theory because it suggests that early maternal separation, the variable that seems to predict an insecure attachment style (Quirin et al., 2008), also predicts a hypersensitive stress response (Uhelsji & Fuchs, 2012). This shared variable is a connection that might explain an individual's insecure attachment and their predicted aversion to exercise.

German researchers investigated the effects of maternal stress on HPA axis reactivity with an emphasis on prenatal psychosocial stress (Entringer, Kumsta,

Hellhammer, Wadhwa, & Wust, 2009). The researchers proposed that, like other early-life stressors, a mother's psychosocial stress during pregnancy may have a negative effect on the development and function of stress-response systems. Entringer et. al, (2009) examined an individual's increase in the Adrenocorticotrophic Hormone (ACTH) in response to the Trier Social Stress Test (TSST). ACTH is a hormone produced by the pituitary gland, which signals to the Adrenal gland a need for cortisol release. In this study, ACTH is a physiological indication of stress. The study monitored the differences in ACTH levels between individuals whose mothers had experienced prenatal stress and a comparison group. In contrast to the comparison group, individuals whose mothers had experienced stress in-vitro had a significant increase from baseline rates in their ACTH levels during the TSST. This increase in ACTH is an indication that a mother's prenatal stress has an effect on the stress response system of an individual. This research provides us with another indication that, in addition to producing an insecure attachment style (Bretherton, 1992), early life stressors contribute to the development of a hyperactive stress response.

Early life stressors have been shown to influence both the development of HPA axis reactivity and developmental attachment styles. An altered development of these components can have an enduring effect on a stress response mechanism within adults. Quirin, Pruessner, and Kuhl (2008), for example, examined the correlation between adult attachment anxiety and hypothalamus-pituitary-adrenal (HPA) axis regulation. This study examined an individual's heightened cortisol levels in response to an uncontrollable and unpredictable aversive noise, a test that has been shown to stimulate HPA system activation. The researchers used the Experiences in Close Relationships (ECR)

Questionnaire as an assessment of adult attachment styles. In contrast with a four-category model of attachment, the ECR assesses an individual's level of both attachment anxiety and attachment avoidance (see below) (Sibley, Fischer & Liu, 2005).

RQ model of others (dismissing + fearful prototypes) – (secure + preoccupied prototypes)
 ECR-R attachment-related avoidance ($\alpha = .94$)
 I prefer not to be too close to romantic partners
 I prefer not to show a partner how I feel deep down
 I usually discuss my problems and concerns with my partner (r)
 I tell my partner just about everything (r)
 I get uncomfortable when a romantic partner wants to get very close
 It helps to turn to my romantic partner in times of need (r)
 I am nervous when partners get too close to me
 It's easy for me to be affectionate with my partner (r)
 It's not difficult for me to get close to my partner (r)
 I am very comfortable being close to romantic partners (r)
 I talk things over with my partner (r)
 I feel comfortable sharing my private thoughts and feelings with my partner (r)
 I don't feel comfortable opening up to romantic partners
 I find it relatively easy to get close to my partner (r)
 I find it easy to depend on romantic partners (r)
 I feel comfortable depending on romantic partners (r)
 I find it difficult to allow myself to depend on romantic partners
 My partner really understands me and my needs (r)

RQ model of self (preoccupied + fearful prototypes) – (secure + dismissing prototypes)
 ECR-R attachment-related anxiety ($\alpha = .93$)
 I'm afraid that I will lose my partner's love
 I often worry that my partner will not want to stay with me
 I worry that romantic partners won't care about me as much as I care about them
 I often worry that my partner doesn't really love me
 I often wish that my partner's feelings for me were as strong as my feelings for him or her
 When my partner is out of sight, I worry that he or she might become interested in someone else
 When I show my feelings for romantic partners, I'm afraid they won't feel the same way about me
 I worry a lot about relationships
 I find that my partner(s) don't want to get as close as I would like
 My desire to be very close sometimes scares people away
 I worry that I won't measure up to other people
 It makes me mad that I don't get the affection and support I need from my partner
 I rarely worry about my partner leaving me (r)
 My romantic partner makes me doubt myself
 I'm afraid that once a romantic partner gets to know me, he or she won't like who I really am
 I do not often worry about being abandoned (r)
 Sometimes romantic partners change their feelings about me for no apparent reason
 My partner only seems to notice me when I'm angry

Figure 8. A factor-loading model of the *Experiences in Close Relationships-Revised* measure used in Quirin et. al.'s (2008) research. Adapted from Sibley, Fischer & Liu, 2005.

High levels of attachment anxiety on the ECR also correlate highly with both preoccupied and fearful attachment styles on Bartholomew's four-category model. This connection is important to the current thesis because it generalizes results found using the ECR-R to hypotheses using the Relationship Questionnaire (Bartholomew & Horowitz,

1991). The researchers (Quirin, et al., 2008) were particularly interested in attachment anxiety and HPA axis regulation, as individuals with high attachment anxiety have been shown to report higher levels of psychological stress in response to stressful events. In this study, individuals who had a higher level of attachment anxiety were shown to also have higher levels of cortisol in response to the stressor (see figure 8).

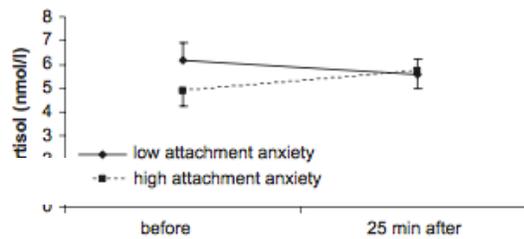


Figure 1 Cortisol changes (\pm S.E.) as a reaction to the stress procedure as a function of low versus high attachment anxiety (median split).

Figure 9. Quirin et al. (2008) found that individuals with high attachment anxiety, as reported on the ECR-R, experienced an increase in cortisol during a 25 minute period after a stressful event.

Quirin et al.'s (2008) results indicate that individuals with high attachment anxiety tend to experience an increase in cortisol following a stressful event. Further, increased psychological stress in attachment anxiety has been correlated with a tendency to engage in rumination (Shaver & Mikulincer, 2002). Due to the distracting and debilitating effects of rumination, we would expect that individuals with high attachment anxiety may be inclined to avoid stressful events.

Chapter 4: Adult Attachment and Exercise Habits Study

Overview

The above review of the literature reveals a connection between early childhood stressors, an insecure attachment style, and an aversion to uncomfortable stimuli including vigorous exercise. HPA axis reactivity is associated with a perceived threat to homeostasis, and humans will generally avoid activities that induce HPA axis hyperactivity. Researchers outside of attachment theorists have independently found that individuals exposed to childhood abuse or maternal separation may have a hyperactive HPA axis, which results in an oversensitive stress-response and reduced pain self-efficacy.

Experimental results suggest that a) individuals with high levels of attachment anxiety have a more reactive HPA axis, b) HPA axis reactivity is associated with a perceived threat to homeostasis, and c) humans will generally avoid activities, which induce these types of threats. This thesis proposed that individuals with a high level of attachment anxiety would avoid vigorous prolonged exercise because their hyperactive HPA axis response creates a threat response as opposed to a challenge response for the organism.

Students at Oregon State University were asked to participate in a study, “Attitudes Towards Relationships.” This study followed a pilot study conducted by Dr. Frank Bernieri, who found evidence of a possible link between exercise and attachment style. Participants were asked to complete the study online and completed several measures, including two measures of attachment styles and two assessments of exercise habits.

Methods

Participants. The study consisted of 148 participants (117 Female, 31 Male) ranging in age from 17-57 with a mean age of 20 years (see table 1). The participants were all Oregon State University students who were enrolled in a psychology course through the university. Participants were treated in accord with the ethical standards established by the American Psychological Association (APA, 2010).

Procedure. All students participated in the study through an online database called SONA. Each participant was guaranteed to receive 1 credit-hour of extra credit for participating in the study. The study was described as an assessment of attitudes towards relationships and was to be completed online through any internet connection. The link to the study was provided on the SONA website, and each participant was led directly to the opening page of the study. All participants were treated according to the APA guidelines.

Materials. The study was a within-subjects study designed and administered through *Qualtrics*, a survey-design program employed by Oregon State University. The survey was estimated to take 20-50 minutes to complete, and included several measures of relationship status and quality, adult attachment style, several other personality measures and measures of daily exercise habits.

Participants were given measures of coping with stress, daily experiences and childhood habits. For attachment style measurement, the Bartholomew Scale of Adult Attachment was provided (Bartholomew & Horowitz, 1990). This scale presented participants with four short paragraphs describing different attitudes towards romantic relationships (See Figure 3). The paragraph descriptions were not labeled with their

corresponding attachment style. Each participant was asked to choose only one option that best fit their own attitudes towards romantic relationships.

A series of sliding-scale questions were used to measure exercise. For example, participants were asked, “In the past 5 months, how many weeks have you worked out (e.g., cycling, jogging, dancing, kick boxing, Stair Master, etc.) *at least 3 or more times during the week?*” Participants were able to choose from 6 options, each representative of an increasing number of weeks (0, 1-4, 5-8 etc.) The three research questions are referred to as Q19, Q20 and Q21 in this report, and appeared in the study as follows:

Q19: “In the past 5 months, how many weeks have you worked out (e.g., cycling, jogging, dancing, kick boxing, Stair Master, etc.) *at least 3 or more times during the week?*”

Q20: In the past 5 months, indicate the number of weeks you have worked out at least 3 or more times in those weeks where *each session lasted 60 minutes or longer?*

Q21: In the past 5 months, indicate the number of weeks you have worked out for *more than seven hours in those weeks?*

Results

Analyses were performed on participant data using Microsoft Excel 14.2.0 and SPSS 22.0. Descriptive statistics were run for demographic information including age, gender and attachment style. Mean age of participants was 20.0 years (SD = 3.58). As can be seen in Table 1, the distribution of participants across attachment styles was consistent with previous reports by Hazan and Shaver (1987) who reported that most

participants were categorized as being securely attached and the rest were distributed among the three insecurely attached categories.

Figure 10 displays the mean responses to each of the three exercise measures separately for participants within each attachment style as assessed by Bartholomew’s scale. The bars associated with the two high anxiety attachment styles (Preoccupied and Fearful) have been emphasized with a red dashed line for comparison purposes.

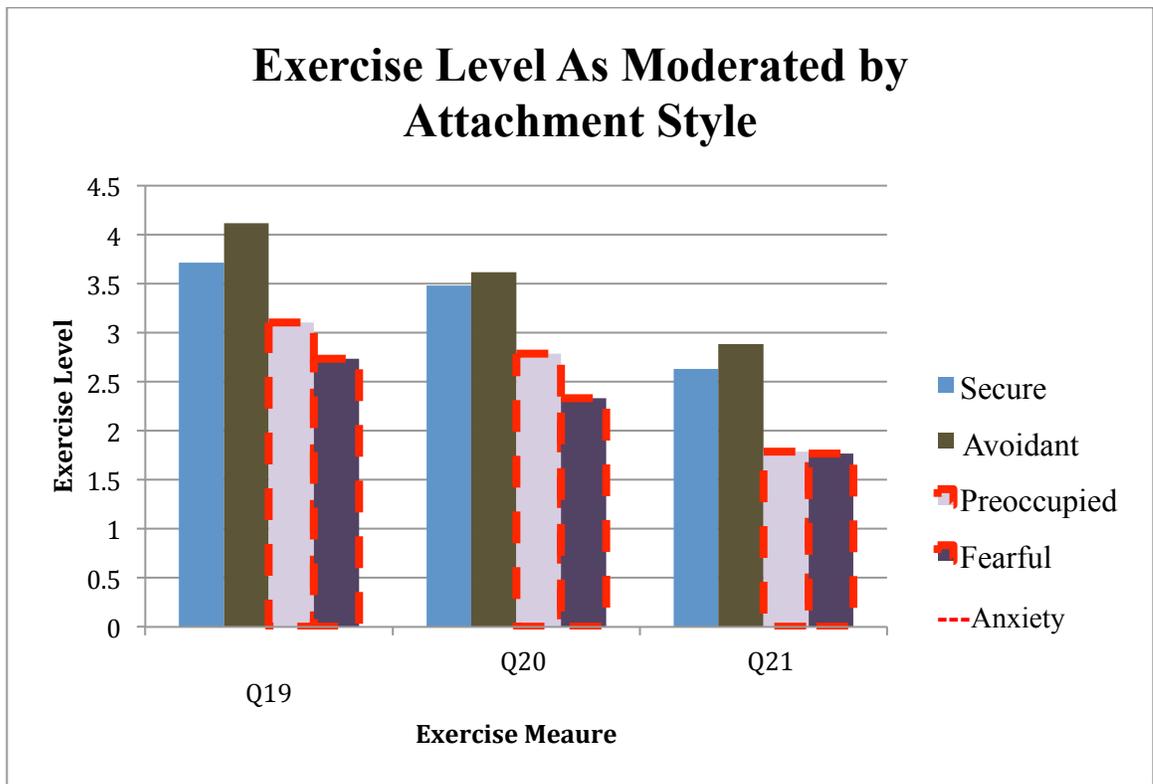


Figure 10. Q19: “In the past 5 months, how many weeks have you worked out *at least 3 or more times during the week?*” Q20: “In the past 5 months, indicate the number of weeks you have worked out at least 3 or more times in those weeks where *each session lasted 60 minutes or longer?*” Q21: “In the past 5 months, indicate the number of weeks you have worked out for *more than seven hours in those weeks?*”

A one-way, four level, between-subjects ANOVA was performed to compare the effect of attachment style on exercise level for each of the three exercise measures (see Table 2). For Q19, there was a significant effect of attachment style on the number of weeks a participant exercised more than 3 times per week. The ANOVA testing the null hypothesis of no difference was significant ($F(3, 144) = 4.08, p = .008, \eta_p^2 = 0.08$). For Q20, there was a significant effect of attachment style on the number of weeks where a participant had exercised for 60 minutes, 3 or more times per week. The ANOVA testing the null hypothesis of no difference generated was significant ($F(3, 144) = 4.89, p = .003, \eta_p^2 = 0.09$). For Q21, there was a significant effect of attachment style on the number of weeks a participant had exercised for more than 7 hours each week. The ANOVA testing the null hypothesis of no difference generated was significant ($F(3, 144) = 4.08, p = .008, \eta_p^2 = .08$). These results suggest that, within a five-month period, an individual's attachment style had an effect on their exercise habits.

A second one-way, two level ANOVA was conducted to assess the effect that attachment anxiety had on an individual's exercise habits (see table 3). Attachment styles were re-categorized into two groups, low anxiety (secure and avoidant attachment styles) and high anxiety (preoccupied and fearful attachment styles) (see figure 11). For Q19, there was a significant effect of attachment anxiety on the number of weeks a participant exercised more than 3 times per week. The ANOVA testing the null hypothesis of no difference was significant ($F(1, 146) = 10.53, p = .001, \eta_p^2 = .07$). For Q20, there was a significant effect of attachment anxiety on the number of weeks where a participant had exercised for 60 minutes, 3 or more times per week. The ANOVA testing the null

hypothesis of no difference generated was significant ($F(1, 146) = 13.62, p = .000, \eta_p^2 = .09$). For Q21, there was a significant effect of attachment anxiety on the number of weeks a participant had exercised for more than 7 hours each week. The ANOVA testing the null hypothesis of no difference generated was significant ($F(1, 146) = 11.831, p = .001, \eta_p^2 = .07$). These results collectively suggest that, in accordance with the hypothesis, attachment anxiety (high vs low) has an effect on exercise habits within a university setting.

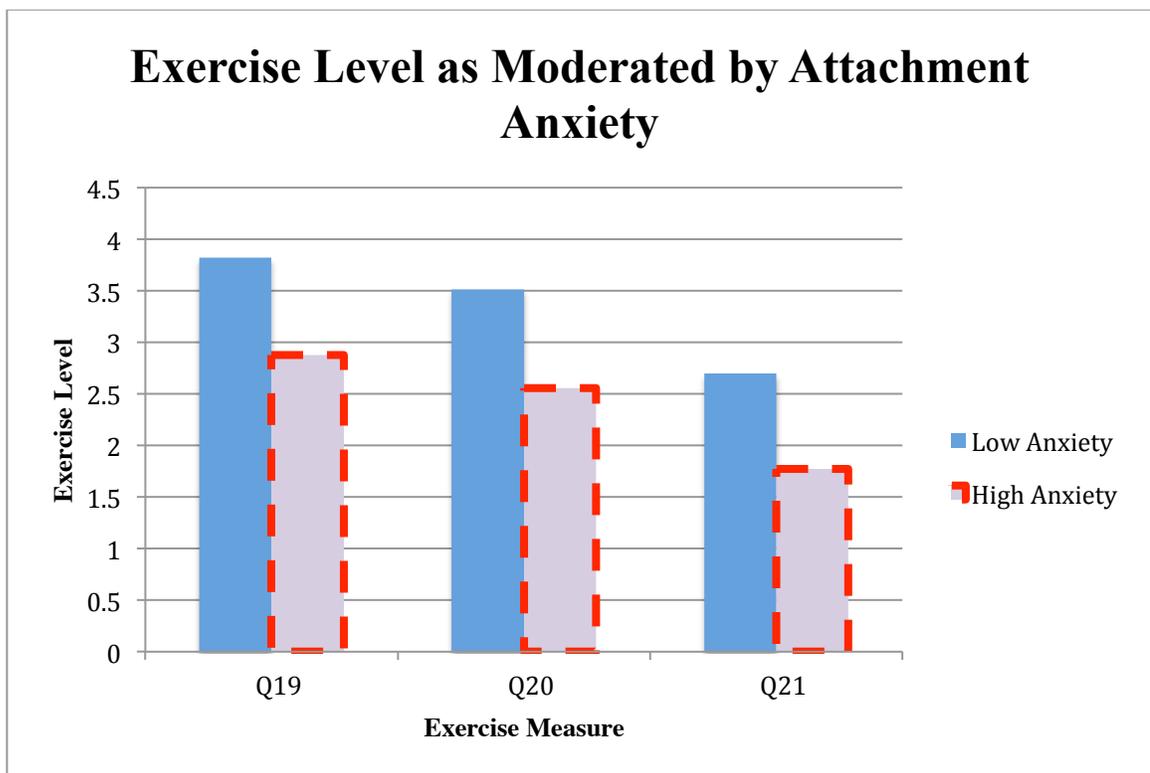


Figure 11. This figure displays the effect of attachment anxiety on exercise. Attachment styles were categorized as low anxiety (secure and avoidant) or high anxiety (preoccupied or fearful).

Chapter 5: Discussion and Conclusion

Discussion

The results of this study revealed that attachment styles play a role in the amount of exercise completed within a university population during the spring term of a university year. The findings for responses to all three relevant exercise questions were significant. The amount of exercise reported from the high-anxiety attached individuals was significantly lower than that from the low anxiety attachment styles. That is, individuals with either a secure or avoidant attachment style reported exercising significantly more frequently and for longer durations than did individuals with preoccupied or fearful attachment styles. In accordance with our hypothesis, attachment style anxiety served as a predictor for exercise habits.

Previous research has shown that preoccupied individuals have a lower tolerance of pain and thus a lower pain threshold (Meredith et al., 2006). This thesis extended and applied this idea to exercise, speculating that preoccupied and fearful individuals would exercise less frequently, particularly at rigorous levels. From the data displayed in Figure 10, it is clear that there is a connection between both preoccupied and fearful attachment styles in frequency of exercise.

From the various results reviewed in this thesis, several conclusions can be drawn about the association between attachment styles, stress and pain. By understanding the development of the HPA axis and stress response system, it is clear that an individual's early childhood environment plays an important role in later life well-being and self-efficacy. Further, from Ainsworth's (1978) research on infant behavior, it seems that an individual's attachment to their primary caregiver is a critical component of the early

childhood environment, particularly with respect to its stress. Therefore, if an individual experiences a traumatic event at a young age, or is exposed to a psychologically detrimental environment during crucial developmental years, he or she is more likely to: a) have developed a hyperactive HPA axis and experience a lower perceived control during stressful situations and b) have an insecure attachment style as an adult. From these two principles, we derived the testable hypothesis that insecurely attached adults, particularly those with an anxious insecure style, would be more averse to exercise (i.e., exercise less). If so, then we expect this to occur via the HPA axis hyperactivity mechanism that is related to both.

The ability to reliably and validly measure both adult attachment styles and exercise habits is a crucial part of this research. While the Relationship Questionnaire is a widely-used and reliable measure of adult attachment (Ravitz, Maunder, Hunter, Sthankiya, & Lancee, 2010), it has also been noted that this one item questionnaire lacks important psychometric properties. Although a detailed analysis was not offered here, an additional adult attachment measure was used in this study. The Experiences in Close Relationships-*revised* (Fraley et al., 2011) is a multi-item scale that generates a relationship anxiety value that conceptually maps on to the preoccupied and fearful categories of Bartholomew's model. The pattern of results attained by this measure confirmed the data reported earlier; relationship anxiety was negatively correlated with exercise. The strength of this latter relationship was weaker than that found using the Bartholomew scale, however. Whereas the negative correlation was significant for Q19, the negative correlation failed to reach statistical significance for the remaining two items.

Taken together, the results from the two different measures of relationship attachment clearly show that relationship anxiety is negatively related exercise levels.

In terms of assessing exercise levels, little research has been conducted about the most effective and valid way to measure exercise habits. A more in-depth questionnaire into the perceived intensity of regular exercise, as well as the overall rigor of an individual's exercise habits, would provide more differentiation among individuals.

In addition to considering reliability and validity, it is important to note that attachment style may not be the only factor influencing exercise habits. Other possible influences, not studied in this thesis, could include course load, whether the student is working or not, health factors, or other determinative life influences.

In order to fully understand the association between an individual's attachment style and exercise habits, it is important to understand how the HPA axis serves as a mechanism between anxiety-type attachment styles and perceived pain during exercise. Further research is required to directly assess the proposed differences in HPA axis activity during exercise across individuals with different attachment styles. One possible way to measure a spike in HPA axis activity is by directly measuring cortisol levels during exercise. Cortisol levels for individuals with a high anxiety attachment style should elevate more quickly during the onset of physical activity, indicating an alarm response to the exertion.

With this endeavor comes the exploration of internal working models during exercise and what might be interpreted as verbalized expressions of HPA axis hypersensitivity. An individual might report feelings of not being in control of their own body during exercise; a perception that may be indicative of heightened levels of cortisol,

and thus HPA axis activation. The important aspect of this research to note is that cortisol release is normal for humans—it is part of an organic response to stress. Further, it is normal for individuals to release many different types of hormones during exercise, including cortisol (Stokes, Gilbert, Hall, Andrews, & Thompson, 2013). However, an individual with a hyperactive HPA axis may experience cortisol release at much lower levels of exertion, thus deterring them from rigorous or long periods of exercise. It is crucial, then, to assess anxiety during exercise to confirm the role that HPA axis activation plays in perceptions of pain, and to target specific physical activities that create anxiety for these individuals.

Conclusion

Society today holds very strict standards of physical beauty—standards that seem impossible to achieve without serious dedication to physical exercise. Achieving these standards may be more difficult for the individuals for whom exercise is daunting, stressful and painful; for whom the physical pain and anxiety that accompanies exercise is unbearable? With rates of diabetes, obesity and heart disease verging on national epidemics, it seems overly simplistic to continue to hold the current beliefs held by the marketers of Nike that anyone can “just do it” and get fit. Rather, it’s important as a society to examine the reasons *why* individuals avoid exercise.

This thesis suggests that anxiety and HPA axis hypersensitivity play a role in an individual’s resistance to exercise. To the extent this is true, it may be beneficial to target specific exercise activities that keep cortisol levels low in these individuals and work around the anxiety that comes with over exertion. Physical Trainers and physicians

should be aware of an individual's attitudes towards exercise, and utilize these tools to develop specific training programs that accommodate and perhaps even reduce high levels of anxiety. In addition, mental health counselors should be aware that their anxiously-attached clients may have these particular aversions to exercise. The therapist-client relationship will play a role in helping individuals understand their own aversions to exercise and find coping mechanisms to their hypersensitive stress responses.

Table 1*Demographic Information of Sample by Count*

Demographic	Count	Sample %
Gender		
<i>Male</i>	31	20.9%
<i>Female</i>	117	79.1%
Attachment Style		
<i>Secure</i>	73	49.3%
<i>Avoidant</i>	26	17.6%
<i>Preoccupied</i>	19	12.8%
<i>Fearful</i>	30	20.3%

Table 2:*One-way ANOVA Results of Exercise Items.*

Exercise Measure	<i>df</i>	<i>F</i>	<i>eta</i> ²	<i>p</i>
Q19: In the past 5 months, how many weeks have you worked out (e.g., cycling, jogging, dancing, kick boxing, Stair Master, etc.) <i>at least 3 or more times during the week?</i>	3, 144	4.075	0.08	0.008
Q20: In the past 5 months, indicate the number of weeks you have worked out at least 3 or more times in those weeks where <i>each session lasted 60 minutes or longer?</i>	3, 144	4.890	0.09	0.003
Q21: In the past 5 months, indicate the number of weeks you have worked out for <i>more than seven hours in those weeks?</i>	3, 144	4.079	0.08	0.008

Table 3:*One-way ANOVA Results of High vs Low Anxiety*

Exercise Measure	<i>df</i>	<i>F</i>	<i>eta</i> ²	<i>p</i>
Q19: In the past 5 months, how many weeks have you worked out (e.g., cycling, jogging, dancing, kick boxing, Stair Master, etc.) <i>at least 3 or more times during the week?</i>	1, 146	10.533	0.07	0.001
Q20: In the past 5 months, indicate the number of weeks you have worked out at least 3 or more times in those weeks where <i>each session lasted 60 minutes or longer?</i>	1, 146	13.615	0.09	0.000
Q21: In the past 5 months, indicate the number of weeks you have worked out for <i>more than seven hours in those weeks?</i>	1, 146	11.831	0.07	0.001

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