

THESIS

AN ATTACHMENT PERSPECTIVE ON HUMAN-EQUINE RELATIONSHIPS: THE
DEVELOPMENT OF THE HUMAN-EQUINE ATTACHMENT QUESTIONNAIRE

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ABSTRACT

AN ATTACHMENT PERSPECTIVE ON HUMAN-EQUINE RELATIONSHIPS: THE DEVELOPMENT OF THE HUMAN-EQUINE ATTACHMENT QUESTIONNAIRE

This research aimed to develop and validate the Human-Equine Attachment Questionnaire (HEAQ), a self-report scale to assess attachment within the human-equine bond. Attachment to animals, particularly horses, presents unique dynamics that require specialized measurement. This study explored attachment styles in human-horse relationships, focusing on secure, insecure-anxious, and insecure-avoidant dimensions. The HEAQ underwent rigorous psychometric evaluation, which included confirmatory factor analysis and an assessment of construct validity.

The data revealed that attachment within the human-equine bond is multifaceted, aligning with attachment styles observed in human-human relationships. Participants exhibited three distinct attachment styles – secure, insecure-anxious, and insecure-avoidant. This alignment confirms the existence of an attachment bond between humans and horses, which is complex and nuanced, featuring both secure and insecure attachment patterns. It is important to acknowledge that the internal reliability scores fell below recommended thresholds on the refined model. This is partly attributed to the reduced number of items within each factor post-misfit item removal, emphasizing the need for further scale refinement in order to enhance internal reliability.

The study also explored the validity of the HEAQ by assessing convergent and discriminant evidence. Correlations between the HEAQ subscales and established scales,

including the Pet Attachment Questionnaire (PAQ), Adult Attachment Scale (AAS), The Experiences in Close Relationships-Revised Scale (ECC-RS), the Big Five Inventory (BFI), and the Positivity scales, provided insights into the HEAQ's relationship with similar and distinct constructs. These findings highlighted the distinctive features of attachment within the human-equine bond and underscored the need for a specialized attachment scale tailored to the unique dynamics of the human-equine bond.

This research contributes to understanding the human-equine bond, with implications for the equine industry and Equine-Assisted Interventions (EAIs). The HEAQ's continued development will lead to a comprehensive assessment tool, facilitating further research into the dynamics of attachment within the human-equine bond and its potential impact on well-being in diverse contexts. Future research should focus on refining the HEAQ, examining item wording, exploring the attachment bond from the equine side, and assessing its applicability in various cultural and socio-economic contexts.

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INTRODUCTION

The relationship between horses and humans has been documented for thousands of years. Historically, horses have been pivotal to the development of human culture and civilization (Hall, 2005). Archeological records provide evidence that horses have been domesticated for at least 5000 years. While no longer necessary for work or transportation in developed countries of modern society, horses are increasingly used in recreational, sporting, and therapeutic relationships as companion animals. The physiological and psychological value of these relationships have been recognized as far back as 460 BC in the ancient Greek writing of Hippocrates (Fine & Andersen, 2021). As research in the field of psychology advances, interest in the value of the therapeutic effects of the human-horse bond has increased, leading to a rise in experimental intervention research in the field (DeAraugo et al., 2014; White-Lewis, 2020).

Equine assisted interventions (EAIs) are a growing subfield of the over-arching animal assisted interventions (AAIs) that utilizes horses in a variety of modalities targeting the improvement of human wellbeing and partnered with for the purpose of educational, recreational, and therapeutic benefits (Scopa et al., 2019; Arrazola & Merckies, 2020; Fine & Andersen, 2021). There is a lack of consensus of appropriate terminology for EAIs and they can include, but are not limited to, equine assisted services (EAS), equine assisted activities (EAA), equine assisted learning (EAL), equine assisted activities (EAA), equine assisted therapy (EAT), equine assisted activities and therapy (EAAT), equine assisted psychotherapy (EAP), hippotherapy, equine assisted activities (EAA) and a handful of variations of such terms.

Despite the rise of popularity of EAIs, there is also a lack of theoretical guidance informing the practice of professionals in the field (Bachi, 2013; Fine & Andersen, 2021).

Current research in the realm of AAIs highlights the fact that the human-animal bond widely varies in terms of attachment characteristics (DeAraugo et al., 2014; Arrazola & Merckies, 2020). To date, there is a scarcity of research in the area of human-to horse attachment and lingering questions over whether or not an attachment bond can exist within the human-equine dyad.

Attachment

In AAI research, the term attachment has often been used as an umbrella term referring to the general nature of bond formation. Few have explored the implications of attachment theory as applied to the human-equine bond, which may offer important insights (Bachi, 2013). An attachment bond is a specific type of connection that is developed over time, most studied in the child-caregiver relationships (Payne et al., 2016). In order to understand the potential of attachment in the human-equine bond, it is important to consider the vast amount of research that currently exists within human-human attachment (DeAraugo et al., 2014).

Attachment theory is based on the idea that humans form meaningful emotional bonds with one another (Tormalehto & Korkiamaki, 2020). Bowlby (1969) viewed attachment through an evolutionary lens and proposed that, rather than it being a learned process, people are born with an innate desire to form connections with one another for reasons of protection and survival. People who experience trauma at a young age, especially in the context of the family system, are impeded in their neurodevelopment and, as a result, have difficulty self-regulating emotions and forming healthy relationships (Yorke et al., 2013; Lesser & Pope, 2011).

Ainsworth (1978) expanded on this theorization by identifying levels of major attachment style: secure, insecure-anxious, and insecure-avoidant. Secure attachment is characterized by a person's ability to achieve emotional regulation independently and to have an overall feeling of safety within their environment and relationships. Anxious-insecure attachment

develops when there is inconsistency within the relationship. Attachment figures are unreliable and may or may not come through when needed. This can manifest in the dependency of validation from others and frequent reassurances of positive regard. Avoidant-insecure attachment develops when there has been a lack of responsiveness within a relationship. It is theorized that this could be impacted by a lack of essential environmental needs being met, such as protective barriers of access to adequate food and shelter. This can lead to withdrawal, internalization of emotions, and a need to cope with difficult situations alone.

In the Strange Situation experiment, Ainsworth (1978) identified four interactive behaviors associated in an attachment bond: 1) proximity maintenance: the desire to be near an attachment figure when experiencing stressful situations; 2) safe haven: the role of the attachment figure as a source of reassurance, comfort and support; 3) secure base: the tendency to use the attachment figure as center for exploration that bolsters self-development and sustains risk taking; 4) separation distress: expressed concern when the attachment figure is temporarily or permanently unavailable (Ainsworth, 1978; Zilcha-Mano, 2011, DeAraugo et al., 2014; (Tormalehto & Korkiamaki, 2020).

Attachment styles are believed to be relatively stable across different relationships and situations (Mikulincer & Shaver, 2016). Attachment style refers to the characteristic ways in which individuals relate to others in close relationships, based on their early experiences with caregivers. This can influence emotional, cognitive, and behavioral responses to stress and social interactions. Researchers in the field argue that attachment style is a central organizing principle of personality and social behavior, and that it shapes individuals' perceptions, feelings, and behaviors in various domains of life.

Historically, attachment styles are assumed to be developed in early childhood and traditional definitions are based on a child-caregiver relationship (Ainsworth & Bowlby, 1991; Lesser & Pope, 2011; Beck & Madresh, 2015). In later work, Bowlby (1988) asserted that a person's relationships and social interactions throughout the lifespan impact attachment and internal beliefs about whether or not we can depend on others for support.

Attachment Through the Lifespan. According to research in early childhood development, responsiveness of caregivers has strong implications in personality development and perceptions of self. In this construct, a child must have a nurturing relationship with a permanent primary caregiver. Children who experience trauma at a young age, especially in the context of the family system, are impeded in their neurodevelopment and, as a result, have difficulty self-regulating emotions and forming healthy relationships (Morris et.al., 2017). In contrast, children who develop a secure attachment with their primary caregiver tend to have better social and emotional outcomes later in life.

During adolescence, peer influence plays a key role in relationship formation and solidifies attachment. The patterns of interactions adolescents have in peer-relations varies and is influenced both by the home environment and the quality of peer relationships (Foulkes & Blakemore, 2018). Contributing factors can include the existence, or continuation, of maltreatment and the rejection or acceptance of peers. Social exclusion during this stage of life can have a large, and potentially long term, impact on neurodevelopment. The implications of this are great because bonds formed during this sensitive time can influence the quality of attachment bonds formed later in life.

Adult attachment research is primarily focused on romantic/partner relationships (Beck & Madresh, 2015). While research has confirmed that attachment styles are most malleable when

socialization processes are being formed, there is emerging evidence to show there is hope for attachment healing in adulthood. During this development period, there is a distinct shift away from the development of socialization processes and a shift towards selection effects (Fraley & Roisman, 2019). Identity formation has solidified, resulting in outward exploration and a desire to contribute to community (Erickson, 1950). As selection effects take over, people begin to have more autonomy in relational choices. The implication of this is that “foundations are not fate” and attachment healing can be found in the formation of healthy relationships (Fraley & Roisman, 2019, p. 27).

New research suggests that the quality of an attachment bond may differ from one relationship to another (Bohn, et al., 2023; Rice et al., 2020; Fraley et al., 2011). For example, an individual may have a secure attachment style with their romantic partner but an anxious attachment style with their parent. The specific characteristics of the relationship, such as the level of trust, emotional closeness, and responsiveness, can impact the quality of attachment. Some researchers argue that attachment styles are dynamic and can change over time because of interactions within healthy relationships (Simpson & Rholes, 2017).

Attachment Healing. It is clear that attachment plays a significant role in adult functioning and mental health (Ravitz et al. 2010; Mikulincer & Shaver, 2012; Liu et al., 2020). The type of attachment one develops as a child influences social functioning, coping strategies, stress response, psychological well-being, health behavior, and morbidity. Moreover, the attachment style an individual has is related to personality traits, including extroversion, agreeableness, neuroticism, and emotional control (Liu et al., 2020).

The importance of attachment healing stems from the fact that insecure attachment can lead to psychopathology and negative outcomes, such as depression, anxiety, and personality

disorders (Mikulincer & Shaver, 2016; Bohn et al., 2023). Less secure attachment to parents during adolescence is associated with clinically depressed symptoms, which, in turn, increases the risk of experiencing depressive symptoms in early adulthood (Mikulincer & Shaver, 2016; Nikolaou, 2022). Moreover, individuals with insecure attachment patterns may have negative perceptions of themselves and others, which can lead to the development of feelings of depression.

To address these negative outcomes, it is crucial to focus on healing attachment wounds. Attachment healing can promote a sense of security and reduce the risk of psychopathology (Lesser & Pope, 2011; Liu et al., 2020). Moreover, healing attachment wounds can lead to better relationship outcomes, including supportive behavior and satisfaction in relationships (Mikulincer & Shaver, 2012). For instance, positive perceptions of attachment security can predict supportive behavior and satisfaction in relationships (Bohn et al., 2023).

Alternate Models of Attachment. Since Bowlby's (1969) and Ainsworth's (1978) original work, several models of attachment have been proposed that explore different dimensions of attachment beyond the traditional secure-insecure attachment styles. These models include Hazan and Shaver's attachment theory (1987), Bartholomew's attachment theory (1990), and Main and Solomon's disorganized attachment theory (1986), each offering a unique perspective on the development and maintenance of attachment relationships. This research has expanded our understanding of attachment, providing valuable insights into the complexities of human relationships and the ways in which attachment styles can shape social and emotional functioning throughout the lifespan.

Hazan and Shaver (1987) proposed that romantic love can be viewed as a continuation of the attachment process that begins in infancy. They drew on Bowlby's (1969) work to argue that

the attachment system, which is initially activated through interactions with primary caregivers, continues to shape individuals' attachment styles in adulthood. In their theory, they identified three attachment styles in romantic relationships (Hazam & Shaver, 1987). These are similar to Ainsworth's (1979) attachment styles in infancy and include secure, insecure-anxious, and insecure-avoidant. People with secure attachment styles tend to feel comfortable with intimacy and seek it out in their relationships (Hazam & Shaver, 1987). Those with insecure anxiety often fear abandonment and seek reassurance from their partners. Those with insecure-avoidant style of attachment may struggle with forming close emotional bonds and may be hesitant to rely on others. This model has had a significant impact on the study of adult attachment and has led to the development of various measures for assessing attachment styles in romantic relationships including the Adult Attachment Scale (Collins & Read, 1990).

Bartholomew's (1990) model of attachment proposes that attachment styles can be classified into four distinct categories: secure, preoccupied, dismissing-avoidant, and fearful-avoidant. According to this model, an individual's attachment style results from the interaction between their self-image and their perception of others. Under this construct, early attachment experiences with primary caregivers are still considered important and are seen to shape perceptions of self and others. The four attachment styles are distinguished by varying levels of anxiety and avoidance. Secure individuals are seen to have low levels of both anxiety and avoidance, preoccupied individuals exhibiting high anxiety but low avoidance, dismissing-avoidant individuals displaying high avoidance but low anxiety, and fearful-avoidant individuals experiencing high levels of both anxiety and avoidance. The emphasis on the self in this approach adds another layer of complexity to understanding attachment relationships and provides insight into how individuals' own self-perceptions impact their attachment styles.

Main and Solomon's (1986) model of attachment builds on Ainsworth's (1979) models by suggesting that some infants exhibit a distinct type of insecure attachment style referred to as disorganized attachment. This style of attachment is characterized by conflict in attachment orientations. This disorientation results in fearful interactions with primary caregivers. Disorganized attachment is thought to arise when a caregiver serves as both a source of comfort and fear, creating a confusing and overwhelming attachment experience for the infant. The theory has been found to have important and meaningful consequences for child development and mental health outcomes (Granqvist et al., 2017). Additionally, their approach has deepened our understanding of the interplay between attachment and traumatic experiences, as disorganized attachment has been linked to early life adversity and traumatic stress (Macdonald, 2008).

While these alternative models of attachment provide valuable insights into attachment relationships, the current research is primarily based on Ainsworth's (1979) approach to attachment theory. The reason for this is because it is one of the foundational models of attachment theory, with a well-established empirical base and a comprehensive framework. Furthermore, the models of attachment that are presently utilized in AAIs have adopted a similar approach (Zilcha-Mano et al., 2011; Tormalehto & Korkiamaki, 2020). For this reason, it is important to align the research of the Human-Equine Attachment Questionnaire (HEAQ) with these existing models to facilitate a more comprehensive understanding of attachment dynamics specific to the human-equine bond.

Alternative Attachment Relationships

While romantic partners are often the primary source of attachment bonds for adults, research suggests that attachment bonds can also develop in a variety of other relationships and

contexts. (Bahn et al, 2023; Zilcha-Mano et al., 2011). Indeed, the original developers of attachment theory hoped that it would act as a theoretical guideline for future research in other interpersonal and social domains (Ainsworth & Bowlby, 1991). Therefore, it is important to consider a range of relationships when examining the potential of attachment bonds.

For example, research has shown that close friendships can provide individuals with a secure base from which to explore their environment and serve as a source of comfort and support during times of distress (Fraley et al., 2011; Bahn et al., 2023). This research has shown that individuals who perceive their friends as being available, responsive, and supportive during times of need are more likely to experience greater emotional security, decreased levels of stress, and improved mental health outcomes.

Context-specific attachment figures can also include individuals in professional settings, such as therapists in a therapeutic setting and leaders in organizational settings (Farber et al., 1995; Zilcha-Mano et al., 2021; Davidovitz et al., 2007). Additionally, some individuals may form attachment bonds with religious figures, such as God, spiritual leaders, or other deities, who can offer a sense of safety and security during times of distress (Cherniak, 2021). These relationships can serve as a source of comfort and support, particularly when primary attachment figures are unavailable or unreliable (Mikulincer & Shaver, 2016; Zilcha-Mano et al., 2011).

Pets as Attachment Figures

It is theorized that individuals who have experienced a disruption in their early childhood attachment and are seeking attachment healing, but have difficulty attaching to others, may be more receptive to animals (Johansen, et. al., 2014). This research suggests that successful bonding with animals may later translate into improved social interactions and healthier attachments with people. Research is increasingly validating the value of the human-animal

bonds as unique forms of supportive networks that provide emotional support in times of stress (Zilcha-Mano et al., 2011). For example, pets have been established as important members in the attachment hierarchy of their owners and are instrumental in their overall wellbeing (Meehan et al., 2017).

The inclination of owners to seek comfort from their pets during periods of stress supports the theory that animals can serve as attachment figures during times of distress (Zilcha-Mano et al., 2011). Pets are often seen as a source of unconditional love and acceptance and help fill in the psychological gaps by reducing feelings of isolation and loneliness (DeAraugo et al., 2014; Zilcha-Mano et al., 2011; Meehan et al., 2017; Bachi, 2013). Animals are seen as non-judgmental; they do not care about a person's past mistakes or physical appearance. Human-animal relationships are often characterized by stable, dependable, loyal, accepting, authentic, warm, empathetic, and tender qualities (DeAraugo, 2014; Payne et al., 2016). This bond formation has also been empirically found to fulfill the criteria of proximity seeking, safe haven, secure base, and potential for separation anxiety found in attachment bonds (Zilcha-Mano et al., 2011).

Human-Equine Attachment

Although previous research has shown evidence of attachment bonds in human-animal dyads, it is still unclear if horses can act as attachment figures since attachment in the human-equine bond has not yet been extensively researched (Tormalehto & Korkiamaki, 2020; Payne et al., 2016). Despite this, EIAs are rapidly expanding and becoming popular alternatives when traditional methods of therapy are not effective (Mueller & McCullough, 2017; Burgon et al., 2018). Much of what does exist in research points towards the efficacy of EIAs as a unique form

of AAI, something horse professionals have known intuitively for a long time. This can be attributed to the unique nature of the horse as a prey animal.

Unlike other animals commonly used in AAIs, horses are prey animals (Tormalehto & Korkiamaki, 2020; Burgon et.al., 2018). Understanding the physical and behavioral characteristics of this is crucial to developing a theoretical understanding of what attachment would look like within the human-equine bond. Horses are classified as prey animals because of their ability to interpret their surroundings and to evaluate the behavior of other social animals (ie predators) in order to identify potential threats and avoid danger (Goodwin, 1999).

Unique Nature of the Horse. When looking at this solely from the human perspective, the quality of the human-equine bond is seen through the responsiveness of the equine partner (Arrazola & Merckies, 2020). As prey, they display a certain vulnerability and display a unique ability to mirror the behaviors and emotions of their human counterparts (Bachi, 2013; Jones, 2017) This can be attributed to their vulnerability and instinctual attunement to their environment and the intentions of other animals around them (Tormalehto & Korkiamaki, 2020). As a species, horses are social beings who depend on the co-operation of their herds for survival, leading to highly developed non-verbal communicative skills (Burgon et al., 2018). These characteristics are displayed in the innate tendency of the horse to “sense, react, and respond” (Bachi, 2013, p. 192).

Research has indicated that this sensitivity to behavioral and emotional differences makes them especially responsive to the social behaviors of their human counterpart. Arrazola & Merckies (2020) were able to demonstrate that horses react differently depending on their human partners attachment style. For example, when paired with fearful or preoccupied humans, they will respond differently than when paired with those who are confident and poised. It is believed

that the horse can sense these differences through the person's muscle tone, initiation, and overall body language (Bachi, 2013). This ability to provide immediate emotional feedback enables their human counterpart to feel seen and, in some cases, understood. While this is not unique to horses compared to other species of animals, their reactivity as prey animals amplifies this ability (Tormalehto & Korkiamaki, 2020; Arrazola & Merckies, 2020).

Horses as Unique Attachment Figures. It is believed that horses display qualities of attachment that meet traditional features of an attachment relationship (Arrazola & Merckies, 2020). For example, Tormalehto & Korkiamaki, (2020) found that the responsive nature and presence of the horse, in other words, the proximity, was the clearest perceived attachment feature within the human-equine bond. Horses also have been shown to have a calming effect in therapeutic relationships, acting as a safe haven (Bachi, 2013; Burgon et al., 2018). Their established role as co-therapist and the unique environment created by their presence establishes a safe base for exploration of therapeutic processing (Arrazola & Merckies, 2020). Separation distress in the human-equine bond is mainly found in well established relationships that provide a foundation for deeper psychological connections (Tormalehto & Korkiamaki, 2020).

Lifespan of the Horse. Another fundamental difference between horses and other companion animals is their overall life expectancy. Given that true attachment bonds take time, this is important to consider. The average horse can live up to 33 years, and with advances in medicine and general care, can go even beyond this (Tucker, 2021). The quality of bond between a horse and its handler is established over time by everyday interactions (Maros et al., 2010). It is well established that gradually building the qualities found in attachment is what distinguishes it from other types of bond formation (Beck & Madresh, 2015).

Potential Barriers to Horses as Attachment Figures. The formation of an attachment bond between humans and horses may face some instrumental barriers that may limit the intensity of the bond (Bachi, 2013; Vincent & Farkas, 2017; Tormalehto & Korkiamaki, 2020). For instance, the physical living arrangement of horses is different from that of most pets like cats and dogs, which often live indoors with their owners. Horses, on the other hand, are usually kept outside, which may affect the proximity factor that is a significant indicator of attachment in humans and pets. Additionally, horses are often boarded in facilities away from their handler's residence. As a result, horses may not serve as a safe haven or secure base in the same way. Thus, a specific attachment questionnaire within the human-equine bond may help researchers understand how attachment with horses differs from that with pets.

The Current Study

Although AAI and EAI have similar foundations, both fields have individual characteristics and terminology specific to their genre (Fine & Hendersen, 2021). Part of the nuance of these approaches is driven by species differences that drive what the human-animal bond looks like. Horses' unique acuity for emotional responsiveness is believed to lay the groundwork for an attachment bond. Many EAIs utilize this emotional attunement to mimic touch, proximity, relational stimulation, and responsiveness found in traditional attachment bonds, making horses popular therapeutic partners (Yorke et. al., 2013). This is accomplished through many forms of interactions such as grooming, petting, and riding. These types of experiences may also provide the ability for clients who are healing from attachment wounds to form new synapses in the brain and, subsequently, develop the ability to form healthier attachments in the future (Yorke et. al., 2013; Bachi, 2013).

It is increasingly evident that there is a need for empirically based reliable research to assess the impact of EAIs. This is not a new conceptualization. Researchers in the field have been calling for rigorous methodologies to assess the impact of EAIs for a number of years (Stern & Chur-hansen, 2019; Kazdin, 2019; Bachi, 2013; Fine & Andersen, 2021). If EAIs are being accepted and widely used, it is important that empirically sound research informs best practices. In order for this to happen, validated measures are needed to measure the influence of attachment on the effectiveness and positive outcomes of such programs.

To that end, the purpose of this research study was to use psychometric analysis techniques to develop a reliable and valid self-report scale to measure attachment in the human-equine bond, referred to as the Human-Equine Attachment Questionnaire (HEAQ; see Appendix A). It was expected that attachment orientations within the human-equine bond would be structured in terms of secure, insecure-anxious, and insecure-avoidant dimensions as similarly found in human-human relationships.

For the purpose of this research study, secure attachment is the human view that their relationship with their horse is safe and supportive (Bachi, 2013; Vincent & Farkas, 2017; Tormalehto & Korkiamaki, 2020). This is characterized by the human's behavior in seeking comfort from their horse, who provides a contact-exploration balance. Insecure-anxious attachment is defined as a person's concern over the availability of their horse. Specifically, if they can depend on their horse for support in times of need. This is characterized by attempts to maximize proximity to the horse as an attachment figure. Insecure- avoidant attachment is defined as a person's evasive behaviors and distrust of their horse's affinity towards them. This is characterized by discomfort with close physical contact and a desire to be self-reliant. This

may manifest in ignoring or disregarding the needs of the horse and/or aggressive behaviors towards them.

To explore the potential attachment between people and their horses, we began by conducting a systematic review of existing attachment scales. This review informed our understanding of the attachment dimensions we aimed to measure. To further validate the content, we engaged in in-depth discussions with subject matter experts in the field of EAIs. The insights gained from their experience influenced the HEAQ's development, ensuring that the questions were tailored to the nuances of the human-horse relationship while staying consistent with attachment theory.

To evaluate the expected structures of attachment the item total correlation was computed for each attachment dimension to determine the extent to which each item on the scale is correlated with the overall construct. Confirmatory factor analysis was utilized to assess the model fit of the attachment measure, which allowed for testing the degree to which the data fit the hypothesized factor structure of the scale. Internal consistency was assessed using both Cronbach's alpha and omega, which measure the degree of consistency of responses across items in the attachment measure.

Finally, construct validity was assessed by examining the degree to which the attachment measure correlates with other measures that are theoretically related to attachment. It was expected that there would be evidence for construct validity that supports the theory of a unique bond between humans and horses, which is not fully captured by current pet attachment measures. Convergent evidence was evaluated by looking at relationships between the HEAQ and the Pet Attachment Questionnaire (PAQ), the Positivity Scale, the Relationships Structure Questionnaire (ECR-RS), the Big Five Inventory (BFI), and the Adult Attachment Scale (AAS),

It was expected that the insecure anxious and insecure avoidant dimensions of the HEAQ would show strong positive correlations with the PAQ, providing evidence for the validity of the new scale. We also anticipated moderate correlations between the secure, insecure anxious, and insecure avoidant dimensions of the HEAQ and the corresponding dimensions of the Relationships Structure Questionnaire (ECR-RS) and the Adult Attachment Scale (AAS). Consistent with previous research, insecure-anxious was expected to be associated with the neuroticism category of the BFI, while insecure avoidant was expected to be inversely correlated with agreeableness and extraversion categories. Correlations with the Positivity Scale were expected to be minimal, as the measures are theoretically distinct. This information ensured that our research maintained a clear and distinct focus on attachment, and not a competing construct of assessing a person's positive outlook on life.

Methods

Participants

Participants for this study were 533 horse owners or those who rent/lease a horse and were over the age of 18 (see Table 1). Most of the participants identified as women (91%) and were between the ages of 18 and 44 (77%). Participants were recruited via email and social media postings both within the United States (79%) and internationally (21%). While fifty-two percent of participants reported that they were not responsible for the daily care of their horse, forty-three percent said that they had daily interactions with them (see Table 2). The majority of participants reported having owned, or rented/leased, their horse for more than 3 years (59%). All respondents volunteered to participate without any monetary reward.

Measures

Human-Equine Attachment Questionnaire (HEAQ). The final items of the HEAQ (see Appendix A) were composed of 24 questions, selectively refined from our initial set of 53 questions, that sought to assess measurements of attachment between people and their horses in the dimensions of secure (e.g., “My horse and I have a close relationship”); insecure-anxious (e.g., “I need reassurance from my horse to know that they love me”); and insecure-avoidant (e.g., “I feel indifferent about my relationship with my horse”). A 5-point Likert scale was used to score items, where a rating of 1 represents "strongly disagree" and a rating of 5 represents "strongly agree". In our scale development process, it's important to note that none of the items were designed to be reverse scored. Each item was intentionally crafted to align with the specific dimensions of attachment we aimed to measure, ensuring a consistent and straightforward assessment of attachment within the human-horse bond.

Pet Attachment Questionnaire (PAQ). The Pet Attachment Questionnaire (Zilchamano, 2011; see Appendix B) is composed of 24 questions that assess measurements of pet attachment in the dimensions of anxious (e.g., “I often worry that something bad will happen to my pet”) and avoidant (e.g., “I prefer to keep some distance from my pet”). Items are scored on a 7-point Likert-type scale with 1 being “disagree strongly” and 7 being “agree strongly”. The PAQ was used as a measure of construct validity to determine if the HEAQ is measuring a unique form of attachment to horses, or if it is simply measuring a general attachment to pets.

The Positivity Scale. The Positivity Scale (Caprara et al., 2012; see Appendix C) is a 5-point Likert-type scale that is composed of 8 questions. It was designed as a psychometric assessment of a person’s basic life outlook and their disposition to view life and experiences in a positive manner. The premise of considering construct validity with the positivity scale was to

rule out the possibility that the HEAQ is measuring a general tendency to view life and experiences positively, rather than measuring attachment. This serves as important discriminant evidence, highlighting that we are not conflating our attachment measure with a separate construct. By including this information, we are able to demonstrate that the HEAQ is specifically assessing attachment within the human-equine bond and not general positivity towards life experiences.

Relationship Structures (ECR-RS) Questionnaire. The Relationship Structures (ECR-RS) Questionnaire is an 8 question self-report scale that was developed to measure attachment in a variety of close relationship including those with the mother, father, romantic partner, and close friendships (Fraley et al., 2011; see Appendix D). Since the development of an attachment bond is relationship-specific it is important to consider multiple contexts for such relationships. The purpose of considering convergent evidence between the HEAQ and ECR-RS is to demonstrate the qualitative uniqueness of the bond between humans and horses, distinct from human-human relationships, while still measuring attachment. In other words, sufficient discriminant information to showcase the distinctiveness of the human-equine bond while maintaining enough convergent evidence to affirm that our measure effectively captures attachment."

Big Five Inventory (BFI). The Big Five Inventory (BFI) is a 44 item self-report measure that evaluates five dimensions of personality (John & Srivastava, 1999; see Appendix E). These traits include extraversion, agreeableness, conscientiousness, neuroticism and openness. The BFI was used as a measure of construct validity for the HEAQ to assess whether the scale is accurately measuring an individual's attachment to horses, rather than other personality traits or tendencies. In current research, insecure-anxious attachment has been shown to correlate with

neuroticism, while insecure avoidant has been shown to inversely correlate with agreeableness and extraversion (Zilcha-Mano, 2011; Liu et al., 2020). Therefore, for the purpose of this study, participants were only asked to answer questions in the categories of neuroticism, agreeableness, and extraversion

Adult Attachment Scale (AAS). The Adult Attachment Scale (Collins & Read, 1990; see Appendix F) is composed of 18 questions that were developed using Hazen and Shaver (1987) previous descriptions of Close, Depend, and Anxiety subscales. The scale assesses orientations in secure (e.g., “I am comfortable depending on others”); anxious (e.g., “I often worry that my partner does not really love me”); and avoidant (e.g., “I find it difficult to trust others completely”) measurements of adult attachment. Items are scored on a 5-point Likert-type scale. The AAS was used as a measure of construct validity to determine if the HEAQ is measuring a unique form of attachment to horses or if it is simply measuring a general attachment style.

Procedures

Items for the HEAQ were developed in a series of steps. First, we examined existing scales that considered attachment orientations in human-human relationships to familiarize ourselves with the orientation of established items (e.g., The Adult Attachment Scale; Collins & Read, 1990; The Relationships Questionnaire; Bartholomew & Horowitz, 1991). Second, we compared this with existing human-pet relationship measures and borrowed items that seemed appropriate and could be adapted to the human-equine bond (e.g., The Pet Attachment Questionnaire; Zilcha et al., 2011; The Lexington Attachment to Pets Scale; Johnson et al., 1992; The Pet Bereavement Questionnaire; Hunt & Padilla, 2006) We chose items that related to secure attachment (e.g., “My horse and I have a close relationship”) and anxious attachment

(e.g., “I worry that I don’t show my horse enough love”) and avoidant attachment (e.g., “My horse is often a nuisance to me”). The remaining questions were developed based on our research and feedback received from Subject Matter Experts (SME). See Table 8 for a breakdown of this information.

The item-generation process resulted in a total of 53 items (22 from the Pet Attachment Questionnaire; 9 Pet Bereavement Questionnaire; 12 Lexington Attachment to Pets Scale; 10 self-constructed). We then consulted with various Subject Matter Experts (SMEs) with extensive experience in scale development, attachment theory, and Equine-Assisted Interventions (EAIs). In all, we received comprehensive feedback from 7 SMEs, all possessing doctorate or professional degrees and were researchers from Colorado State University, and the University of Queensland . Four of these were actively engaged in equine therapy and services. This group played a vital role in guiding and enriching the scale development process. Specifically, we asked about the relevance of each item towards the appropriateness of the defined construct and for suggestions of what might be missing, revised or clarified. After incorporating this feedback filtering to remove redundancy, and setting each sub-scale measuring specific dimensions, we ended up with a total of 24 items (8 related to secure attachment; 8 related to insecure-anxious; 8 related to insecure-avoidant).

The proposal for this study was submitted to and approved by the Colorado State University Institutional Review Board prior to initiating the research. When asked to participate in the survey, participants electronically received details about the purpose and procedures of the study. Participants provided demographic information about their involvement with horses followed by the PAQ and accompanying scales in the order mentioned above. Data were

obtained online using Qualtrics (<https://www.qualtrics.com>). All information gathered was kept confidential and no personal identifying information was collected.

To ensure a diverse sampling pool, participants were primarily recruited electronically. This involved distributing flyers with a QR code via email to animal science departments in universities and various horse professionals across the US and Australia. Additionally, we engaged with online forums and social media groups related to horses, seeking permission from administrators before sharing our study information. Reddit proved to be particularly effective in generating participant engagement. These combined recruitment efforts ultimately resulted in a total of 533 participants who met the necessary qualifications.

Data Analysis

In order to determine factor loadings in the dimensions of secure, insecure-anxious, and insecure-avoidant, researchers conducted a confirmatory factor analysis (CFA). A CFA is a statistical test used to determine how well the items in a scale fit the intended factors of the proposed construct. In this case, the CFA was used to verify whether the factor structures of the HEAQ items fit a 3-factor model: secure, insecure-anxious, and insecure-avoidant.

Given that Confirmatory Factor Analyses (CFAs) rely on statistical tests to assess the model fit with the data, we conducted several fit indices, including the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI) and the Root Mean Squared Error of Approximation (RMSEA). The criterion goodness of fit that was used were values of at least 0.90 for the CFI and TLI and between the range of 0.80 to 0.10 for the RMSEA. To develop model fit, individual items were assessed for discrepancies and loading within each dimension. In the context of this analysis, discrepancies refer to instances where an item did not align well with the underlying dimension it was intended to measure. Items that demonstrated such discrepancies, often termed

'misfits,' were systematically identified and subsequently removed from the scale. To test for internal consistency, Cronbach's alpha was reported for each individual factor. Omega was also reported as a reliability coefficient (Raykov & Marcoulides, 2011). These psychometric analyses were run using R studio.

To build on the evidence for construct validity, and to support the need for an attachment scale above and beyond what is currently used in pet attachment, convergent and discriminant evidence was also considered. This was viewed on a convergence continuum, a method used to evaluate how different scales are related to one another. We examined patterns of varying levels of expected correlation to show that the HEAQ was measuring attachment and to rule out plausible alternative explanations. For example, on one end of the continuum we wanted to show: a strong correlation with the HEAQ and PAQ as these constructs are similar in nature, a moderate correlation with ECR-RS and the AAS as these all measure attachment but in human-human relationships; a discriminant correlation with the Positivity Scale as this is a different construct; and to establish construct validity with the BFI consistent with current literature.

Results

Item Analysis

When determining model fit, it was important to assess how well an item aligned with the construct being measured. This is referred to as the index of its difficulty and is evaluated by examining the mean scores of each item (DeVellis, 2012). Since the HEAQ items were measured on a 5-point Likert scale, a mean close to 5 would indicate high endorsement of participants and indicates that most participants agreed strongly with the statement. Conversely, low endorsement of an item, represented by a mean close to 1 indicates that most participants strongly disagreed with the statement. Excessive endorsement, whether low or high, can be problematic because it

indicates that the item is not effectively measuring the construct's full range of attachment responses and therefore is not assessing the intended construct.

When looking at the index of difficulty for the secure items (Q16, Q19, Q22, Q25, Q28, Q31, Q34, Q37), the highest item was Q16 "*Being close to my horse is pleasant for me*" (mean = 4.83) (see table 3). The lowest item was Q34 "*I love my horse because they never judge me*" (mean = 3.55). Most secure item means were on the higher end of the rating scale. On its own, this information may indicate that the secure items were easier for participants to endorse, even by those individuals who may not be securely attached.

When looking at the index of difficulty for the anxious items (Q17, Q20, Q23, Q26, Q29, Q32, Q35, Q38), the highest item was Q17 "*I often worry about what I would do if something bad happened to my horse*" (mean = 4.16). The lowest item was Q38 "*I worry a lot about the relationship I have with my horse*" (mean = 2.22). Most anxious item means were somewhere in the middle of the rating scale. This is ideal because it may indicate that these items were effectively capturing a range of attachment orientations.

When looking at the index of difficulty for the avoidant items (Q18, Q21, Q24, Q27, Q30, Q33, Q36, Q39), the highest item was Q36 "*I think my horse is just a horse*" (mean = 2.17). The lowest item was Q24 "*I do not feel attached to my horse*" (mean = 1.31). Most avoidant items mean were on the lower end of the rating scale . On its own, this information may indicate that the avoidant items were more difficult for participants to endorse, even by those individuals who may be avoidantly attached.

Item Discrimination

On its own, the difficulty of an item can tell us information about how likely participants were to endorse an item but does not necessarily speak towards the quality of that item.

Therefore, it is important to consider item discrimination because it is sensitive towards the distinction between individual participants. One way to look at this is through item total correlation, which can show us how well an item differentiates between participants. While excessively high or low endorsement levels may pose challenges, they can still offer useful information in understanding attachment nuances. For example, an item in the insecure-avoidant domain may be difficult for most participants to endorse since most of the respondents did not fall into this category. However, those who do belong to this domain can offer unique insights that contribute significantly to our understanding of attachment within that specific spectrum. Therefore, it is important to look at an item holistically and understand its discriminative ability.

When analyzing item discrimination, the closer the item is to 1, the more information it is giving. The most discriminating secure item on the HEAQ was Q28 "*I consider my horse to be a great companion*" ($r = 0.71$) (see table 3). The least discriminating secure item was Q16 "*Being close to my horse is pleasant for me*" ($r = 0.34$). The most discriminating anxious item on the HEAQ was Q26 "*I need reassurance from my horse to know that they love me*" ($r = 0.61$). The least discriminating anxious item was Q17 "*I often worry about what I would do if something bad happened to my horse*" ($r = 0.44$). The most discriminating avoidant item on the HEAQ was Q24 "*I do not feel attached to my horse*" ($r = 0.58$). The least discriminating avoidant item was Q18 "*My horse is often a nuisance to me*" ($r = 0.38$). It's worth noting that all item discrimination values on the HEAQ were positive and substantial. This indicates that, while there was some variability, the HEAQ effectively distinguished between participants based on their attachment styles.

Model Fit

Assessment of fit between our observed data and that of the predicted model were examined using CFA in the dimensions of secure, insecure-anxious, and insecure- avoidant. We wanted to show that the scale questions were measuring attachment and that they were correlated with each other within the separate dimensions of secure, insecure-anxious, and insecure avoidant. According to Raykov & Marcoulides (2011), a CFA can help us to confirm these factor loadings and tell us how well these underlying factors explain the observed variance. Recognizing that a perfect model fit is unrealistic, we systematically assessed several fit indices, aiming to discern a cohesive trend among them. The expectation was that these indices would consistently align in their indications towards the degree of variance between our predicted model and the observed data. This process offers insights into the differences between our model and the empirical dataset.

Single Factor Model. To begin identifying the best model fit a single factor analysis was performed containing all the HEAQ items. A Chi-square test of model fit was calculated to compare to the observed data. Under the single factor model, the Chi-Square test was significant $X^2 = 1538.64$, $p < .05$ and $df = 252$ (see Table 4). The RMSEA criteria of below .10 was not achieved. The CFI and TLI did not achieve the threshold 0.9 [CFI: 0.61; TLI:0.57). Since we were not expecting our model to be a single factor, these numbers are not concerning.

Three Factor Model. For the three-factor model that separated HEAQ items into the dimensions of secure, insecure-anxious, and insecure- avoidant, the Chi-Square-test was significant, $X^2 = 1283.16$ (See Table 4). The RMSEA criteria of below 0.10 was achieved at 0.09. However, the CFI and TLI did not achieve the threshold 0.90 [CFI: 0.68; TLI:0.65). This three-factor model represents a significant advancement compared to the one-factor model,

highlighting improvements in the scale's ability to capture the multifaceted nature of human-equine attachment.

Adjusting Model for Best Fit. To further develop and refine model fit, individual items were assessed for discrepancies and systematically eliminated. This elimination process ensured that the retained items effectively captured the intended dimensions of attachment. When eliminating items, it is helpful to begin looking at the discrepancy matrix. This done by calculating discrepancies between an actual correlation matrix and the matrix predicted by the factor model so that individual issues between items can be identified (McDonald & Ho, 2002) This matrix shows how items pair with one another and highlights potential sources of misfits which may not be as evident in other fit indices. The values on this matrix should be between the values of -0.10 and 0.10 , which represent standardized discrepancies (McDonald, 1999).

In order to ascertain the viability of achieving a strong fit with the theoretical three-factor model, individual items were assessed for discrepancies and loading within each dimension. Misfits were systematically removed through a methodical process of iterative testing. This involved identifying disparities between the actual data and the predictions made by our model, which served as a guide to assess how effectively our model aligned with the data. At each stage, we diligently assessed and tested for improvements in the model fit. This approach was crucial to ensure that our scale remained theoretically sound while achieving optimal fit. A total of 12 items were removed. Justification for the removal of each item is provided in Table 6. We then ran the factor model that excluded misfits. The Chi-Square-test improved $X^2 = 104.76$ (See Table 5). The RMSEA, CFI and TLI were greatly improved [RMSEA: 0.05; CFI: 0.96; TLI: 0.94).

Internal Consistency

Cronbach's alpha is a statistical measure intended to show the extent to which items go together and how much of the variance can be attributed to a common source (Raykov & Marcoulides, 2011). It is generally accepted that this value should be above 0.70. Reported alpha values reflect the revised scale, after items were removed. Within the secure items, the alpha value was 0.65. In the anxious factor model, the alpha value was 0.65. In the avoidant factor model, the alpha value was 0.67. It is important to keep in mind that alpha can underestimate our reliability as it is more realistically a measure of shared variance and tends to underperform when assessing homogeneity in multidimensional scales (Raykov & Marcoulides, 2011).

Research has shown that the Omega coefficient can be a more robust measure of internal consistency (McNeish, 2018). It is generally accepted that a good range will be above 0.70. Reported omega values reflect the revised scale, after items were removed. Within the secure items, the omega value was 0.68. In the anxious factor model, the omega value was 0.67. In the avoidant factor model, the omega value was 0.68. The results suggest that the omega coefficients for the secure, anxious, and avoidant factor models in the study were slightly below the generally accepted threshold of 0.70 for good internal consistency reliability.

It's important to note that these lower Omega coefficient values are partly a result of the relatively small number of items retained within each scale. Specifically, the final secure factor comprised of 4 items, the anxious factor had 4 items, and the avoidant factor included 4 items. These limited item counts impact the overall reliability of the scale by reducing the number of items contributing to the measurement. Furthermore, these lower internal consistency values suggest the need for potential refinement and expansion of the scale to enhance its reliability.

This process could entail the development and inclusion of additional items tailored to better capture the intricate aspects of attachment within the human-equine bond.

Construct Validity

Convergent validity is the extent to which a measure correlates with other measures that are supposed to assess similar constructs or traits (DeVallis, 2017). Discriminant validity is the extent a measure does not correlate with other measures that are supposed to measure different constructs or traits. Both types of evidence are important in establishing construct validity by eliminating alternative explanations for observed correlations. (Raykov & Marcoulides, 2011). By doing so, they help confirm that the new measure is indeed measuring what it is intended to measure, and not some other construct or trait. Good convergent validity demonstrates that the scale measures the intended construct as well as other scales in the field, while good discriminant validity demonstrates that it measures a specific construct and not something else.

In our study, we examined the correlations of responses to the secure, insecure-anxious, and insecure-avoidant subscales of the HEAQ with various scales, including the PAQ, the Positivity Scale, the ECCR-RS, the BFI, and the AAS (Table 7). To assess the strength of these relationships, we categorized associations as very small (around 0.05), small (around 0.10), medium (around 0.20), large (around 0.30), or very large (around 0.40) (Funder & Ozer, 2019). These criteria guided our assessment of the strength of relationships within the study (Appendix G). We expected the HEAQ scales to have strong correlations with PAQ items because both measures assess attachment within the human-animal bond. This expectation was supported as the insecure-anxious scale of the HEAQ exhibited a strong correlation with the anxious scale of the PAQ ($r = 0.58$; $p < 0.05$), and the insecure-avoidant subscale of the HEAQ showed a strong correlation with avoidant items of the PAQ ($r = 0.47$; $p < 0.05$).

We expected the HEAQ scales to have medium correlations to the corresponding dimensions in the AAS and the ECC-RS, given that attachment with animals is distinct from attachment with humans but shares some similar constructs. Our hypothesis was partially supported. The insecure-anxious subscale of the HEAQ had a strong correlation with the anxious scale of the AAS ($r = 0.43$; $p < 0.05$) and medium correlation with the anxious scale of the ECR-RS ($r = 0.29$; $p < 0.05$). Surprisingly, the insecure-avoidant subscale of the HEAQ did not exhibit significant correlations with the insecure-avoidant scales of the AAS ($r = -0.08$; $p > 0.05$) or ECR-RS ($r = 0.06$; $p > 0.05$). Additionally, we expected medium correlations between the secure subscale of the HEAQ and the corresponding subscale of the AAS, but no significant correlation was found ($r = -0.10$; $p > 0.05$). When looking at the patterns of correlations, these findings ultimately underscore the unique characteristics of attachment within the human-equine bond that do not precisely align with standard human attachment models.

The insecure anxious subscale of the HEAQ was expected to have correlations with the BFI subscale of neuroticism consistent with those of existing attachment scales. This hypothesis was supported. The insecure anxious subscale of the HEAQ ($r = 0.26$; $p < 0.05$) and the PAQ ($r = 0.29$; $p < 0.05$) and the AAS ($r = 0.25$; $p < 0.05$) were moderately correlated with neuroticism, whereas the ECR-RS ($r = 0.17$; $p < 0.05$) had a smaller correlation with this trait. Items of the insecure avoidant subscale of the HEAQ were also expected to have correlations with the BFI subscales of agreeableness and extraversion consistent with those of existing attachment scales. This hypothesis was supported. The insecure avoidant subscale of the HEAQ showed inverse correlations with extroversion ($r = -0.15$, $p < 0.05$), as did the ECR-RS ($r = -0.13$, $p < 0.05$) and the AAS ($r = -0.14$, $p < 0.05$). The insecure avoidant subscales of the HEAQ ($r = -0.05$; $p >$

0.05), PAQ ($r = 0.02$; $p > 0.05$), ECR-RS ($r = -0.03$; $p > 0.05$), and AAS ($r = -0.01$; $p > 0.05$) were not significantly correlated with agreeableness.

Correlations of the HEAQ scales with the Positivity Scale were expected to be minimal, as the measures are theoretically distinct. This hypothesis was partially supported. The Positivity scale were inversely correlated with the of the insecure anxious subscale of the HEAQ ($r = -0.27$; $p < 0.05$), the PAQ ($r = -0.26$; $p < 0.05$), the ECR-RS ($r = -0.34$; $p < 0.05$), and the AAS ($r = -0.35$; $p < 0.05$). The Positivity scale was not shown to be significantly correlated with the HEAQ subscale of avoidant items ($r = -0.05$; $p > 0.05$). These results suggest that there is some discriminant evidence between the HEAQ and the Positivity Scale, which supports the theoretical distinctiveness of these two measures indicating that they are not measuring the same underlying construct.

Discussion

The primary objective of this research was to develop a reliable and valid self-report scale to measure attachment in the human-equine bond referred to as the Human-Equine Attachment Questionnaire (HEAQ). The complexity of attachment in human-animal bond formation is influenced by the unique characteristics of each species and it is important to explore the need for a validated measure unique to of the human-equine bond that goes beyond what currently exists in human-animal research. Additionally, the study aimed to explore potential correlations between attachment styles in human-human relationships and those in human-horse relationships.

When interpreting the results of the HEAQ, it is important to consider that certain patterns might be expected when taking samples from the general population (i.e. those that are not actively seeking treatment for attachment issues) that are consistent with current research in

attachment (Mickelson et al., 1997; Ravitz et al., 2010; Fraley, 2019). First, a majority of individuals display secure attachment patterns, meaning that they generally feel comfortable with closeness and intimacy in relationships, trust others, and are able to regulate their emotions effectively. Second, social desirability may play a small role in how individuals report their attachment styles. While social desirability has not been a major concern in attachment research, it is important to keep in mind that people may feel pressure to portray themselves as having strong bonds with their horses to meet societal expectations and avoid negative judgments (Vilar et al., 2020).

The study results suggest that, similar to attachment orientations in both interpersonal relationships and those that people form with their pets, equine attachment can be organized in terms of secure, insecure anxious, and insecure avoidant attachment. The findings underscore the importance of including a balanced mix of items that are both low and high endorsement levels to accurately capture the full range of attachment responses. The secure items generally had high endorsement levels, as indicated by relatively high means, aligning with existing attachment research. The means for the anxious items fell within the middle range, indicating their ability to effectively measure the full spectrum of each type of attachment. On the other hand, the avoidant items consistently displayed lower endorsement rates, even among individuals who might demonstrate avoidant attachment tendencies. This suggests that these items were harder for participants to endorse. These results emphasize the importance of examining both item difficulty and item discrimination when evaluating the quality of attachment measures. The analysis of item discrimination showed that some items were more effective than others in differentiating between individuals and capturing the nuances of specific attachment domains. For example, Q39 “I feel indifferent about my relationship with my horse” was difficult for

participants to endorse but had strong item discrimination suggesting that this item is successful in differentiating individuals with avoidant attachment styles from other attachment styles.

Therefore, this item was retained.

The CFA confirmed that the single factor model was not appropriate and that a three-factor model provided a better fit, although it still did not reach the desired threshold for some fit indices. To further refine the model, individual items were assessed for discrepancies and systematically eliminated to develop a better fitting model. The discrepancies matrix provided information on how each item was paired with others and highlighted potential misfits (see Table 5). For example, Q37 “I am confident in the relationship I have with my horse” had large negative discrepancies with items in the Insecure-Anxious domain. The wording of this item suggests that it may have tapped into aspects of both secure and anxious items.

It is important to note that we were careful not to over-prune the items and ensured that each item that was removed had a theoretical justification (see Table 6). This was done to maintain the theoretical coherence of the HEAQ and to make sure that the removed items did not significantly change the conceptualization of the construct being measured. Following the removal of misfit items, the CFA was rerun, resulting in significant improvement in the Chi-square test and the fit indices of RMSEA, CFI, and TLI.

The Cronbach’s alpha and Omega coefficient for the secure, anxious, and avoidant factor models in the study fell below the threshold of 0.70 for good consistency reliability. These lower values can be partly attributed to the reduced number of items in each factor after the removal of misfit items. Specifically, each factor consisted of only four items, impacting the overall reliability by limiting the number of items contributing to the measurement. This emphasizes the need for potential refinement and expansion of the HEAQ scale to enhance its reliability. This

could involve the development and inclusion of additional items designed to capture the nuanced aspects of attachment within the human-equine bond more effectively.

Given the theorization that the human-equine bond is a unique form of animal attachment, this information supports the need for a specialized scale. This is indicated by the poor performance of many items that were adapted from the human-human attachment measures. Future research should build upon these findings by further developing questions with this information in mind. For example, item #22 "I miss my horse when we are apart" may not fully capture the nuance of the human-equine relationship. Unlike other companion animals, horses live separately from their owners. Rewording this question to consider how the human-equine bond manifests when they are separated might be more appropriate and better represent what researchers aim to capture.

The current study also aimed to assess the construct validity of the HEAQ. The validity analysis revealed evidence of a high correlation between the HEAQ and the PAQ, which was expected since both measures assess attachment within the human-animal bond. We expected the HEAQ scales to have medium correlations to the corresponding dimensions in the AAS and the ECC-RS, given that attachment with animals is distinct from attachment with humans but shares some similar constructs. Our hypothesis was partially supported. Surprisingly, the insecure-avoidant subscale of the HEAQ did not exhibit significant correlations with the insecure-avoidant scales of the AAS. When looking at the patterns of correlations, these findings ultimately underscore the unique characteristics of attachment within the human-equine bond that do not precisely align with standard human attachment models. Moreover, our expectations for correlations with the BFI subscales of neuroticism and agreeableness were met, aligning with established attachment scales. Additionally, the inverse correlations observed between the

Positivity Scale and the insecure-anxious subscale of the HEAQ, despite the lack of significant correlation with the HEAQ subscale of avoidant items, provide evidence of discriminant validity. These findings collectively support the theoretical distinctiveness of the HEAQ and the Positivity Scale, emphasizing that they measure distinct constructs within the context of the human-equine bond.

It is important to consider how these results align with current research in attachment. In a recent review of adult attachment measures, Justo-Nuñez et al. (2022) findings highlighted a scarcity of self-report measures that demonstrate good psychometric properties for adult secure attachment across various criteria. Given this limitation and inconsistency in the field of attachment, the results of the HEAQ are not surprising. However, this reinforces the need for examining content validity, which assesses whether the content adequately represents the construct. It also further supports the need for refinement of existing measures. This suggests that while the measures used in the development of the HEAQ may be useful for assessing attachment within the human-equine bond, the reliability and validity of those scales should be further evaluated.

Limitations

While this study provides valuable insights into the human-equine bond, it is important to acknowledge limitations. One significant limitation is that the study focused solely on the human side of the relationship. The unique aspect of the human-animal bond is the reciprocal and mutually beneficial nature of the relationship. The shared connection between human and animal is motivated and characterized by positive contributions to the overall health and wellbeing of both parties. As such, the current study's limitation in only examining the human side of the relationship may have missed a critical component of attachment. Measuring the equine side,

while challenging, could involve assessing equine behaviors and responses within the bond. Humans often misinterpret communication cues because they anthropomorphize horse behavior, potentially attributing to a breakdown in the attachment bond. Gaining a more comprehensive understanding can provide valuable insights into these dynamics and contribute to enhancing future relationships. Another potential limitation is the lack of information about whether the HEAQ is suitable for use with individuals who regularly interact with horses but do not own them or lease. This includes individuals who build an attachment bond with a horse through social networks, recreational sports, and/or therapeutic settings. Additionally, it is important to consider the potential limitations of the HEAQ and similar measures in capturing the complexity of the human-equine attachment bond across diverse populations and settings. For example, horse ownership on reservations may represent a unique and valuable opportunity to study the role of horses in promoting well-being in indigenous communities.

An additional aspect to consider is the absence of socio-economic status (SES) data in our study. It is worth noting that there is a common misconception that horse ownership is exclusively limited to affluent individuals. Horses play a significant role in numerous communities, even serving as sources of income and fulfilling various work-related purposes. Additionally, it is not uncommon for individuals facing financial challenges to own horses. This further supports the argument that horses can hold significant positions within a person's attachment hierarchy. The absence of this data may limit our understanding of the compounding effects of SES on the nature of the attachment bond in such contexts. Future research should consider collecting SES data and examine the adaptability of the HEAQ to accommodate diverse populations.

Future Research

Future research could focus on examining potential reasons why certain items may be more or less difficult to endorse for participants and how this may impact the validity of the measure. Investigating the wording or phrasing of the items and making necessary adjustments to better capture the nuances of the human-equine bond could improve the accuracy and usefulness of the HEAQ. Additionally, studying populations with a higher likelihood of displaying insecure attachment styles, such as individuals with a history of trauma, can provide a better understanding of how attachment styles manifest within the human-animal bond.

It would also be beneficial to examine whether the HEAQ is appropriate for use with different populations. For example, those who regularly interact with horses through social networks, recreational sports, and/or therapeutic settings, etc. Additionally, there is some debate in the realm of EIAs about whether a horse that a client interacts with for 1-hour/week truly serves in the role of attachment figure. It would be valuable to know how attachment operates in different contexts to inform best practices in the field of EIAs. Specifically, those that seek to promote attachment security in specific populations.

Furthermore, the current study focused only on the human side of the relationship. The unique aspect of the human-animal bond is the reciprocal and mutually beneficial nature of the relationship. It is a shared connection motivated and characterized by positive contribution to the overall health and wellbeing of both. Future research should investigate the horse's role in the bond and its impact on the quality of the relationship. This could facilitate the adaptable utilization of horses as companion animals and partners in therapeutic settings.

Additionally, research should focus on exploring the applicability of the HEAQ in diverse cultural and socio-economic contexts to better understand how these factors impact the

attachment bond between humans and horses. Specifically, studies should investigate the adaptability of the HEAQ to accommodate individuals who may be using horses in the context of work or for activities that provide family income and examine how socio-economic status impacts the human-equine attachment bond in these populations. This would require more inclusive sampling strategies that account for diverse socio-economic backgrounds and cultural contexts.

Conclusion

Real-world implications of this study are noteworthy. Once the HEAQ is fully developed and ready for use, it can contribute to expanding our knowledge of the health impacts of horse ownership, similar to existing research on other companion animals. This knowledge can contribute to the equine industry by shedding light on the role of horses in promoting well-being and potentially influencing practices related to horse ownership, specifically in the realm of EAIs. By gaining insights into attachment dynamics within the human-equine bond, practitioners can develop interventions that promote attachment security among specific populations.

The current study has laid the foundation for the development of the HEAQ as a reliable and valid self-report scale to measure attachment in the human-equine bond. However, further refinement of the scale is necessary based on the findings and feedback received. The researchers plan to incorporate the insights gained from this study into the refinement process of the HEAQ, employing a psychometric approach to scale development. This iterative process of refinement will enhance the scale's validity, reliability, and its ability to accurately capture the nuances of the human-equine bond.

The next steps involve conducting further research to evaluate the psychometric properties of the refined HEAQ, including internal consistency and factor structure. By

continuously refining and improving the measurement instrument, we aim to create a comprehensive and accurate assessment tool that captures the unique dynamics of the human-equine attachment bond. This will contribute to advancing our knowledge of attachment within the human-equine bond and its implications in various contexts.

Table 1
Survey respondents by selected demographics

	Total N	(%)
Total	533	
Gender		
Men	27	5%
Women	483	91%
Nonbinary	9	2%
Not reported	14	2%
Age (years)		
18-24	131	24%
25-44	284	53%
45-64	89	17%
>65	29	5%
Region/outside US*		
Midwest	93	17%
Northeast	55	10%
South	115	22%
West	116	22%
Outside US	111	21%
Horse owner	465	87%
Lease/rent	68	13%
Own/lease more than one horse		
Yes	260	49%
No	266	50%

Table 2
Selected horse demographics

	Number	%
Responsible for daily care		
Yes	231	43%
No	277	52%
Unknown	25	5%
How often interact with horse		
Daily	227	43%
4-6 days/week	156	29%
1-3 days/week	110	21%
Less than once/week	9	2%
Occasionally	7	1%
Where did you acquire your horse?		
I bred the horse	25	5%
Private sale	296	55%
Horse dealer/trainer	25	5%
Breeder	34	6%
Rescue organization	29	5%
Livestock sale	8	1%
On loan	52	10%
A gift	29	5%
Other	11	2%
Approximately how long have you had your horse?		
Less than 1 year	79	15%
1-2 years	62	12%
2-3 years	54	10%
More than 3 years	314	59%
Is this your first horse?		
Yes	164	31%
No	344	64%
Unknown	25	5%
How old was your horse when you acquired it?		
Between birth and 1 year	49	9%
1-2 years	16	3%
2-3 years	35	6%
3-5 years	75	14%
5-7 years	90	17%
7-10 years	84	16%
Over 10 years	157	29%
Unknown	3	0.05%

Table 3
Descriptive Table

Item Text	Mean	SD	N	Item-Total Correlation
<i>Secure Items</i>				
16. Being close to my horse is please for me	4.83	0.55	469	0.34
19. Signs of affection from my horse boost my self-worth	4.35	0.80	469	0.68
22. I miss my horse when we are apart	4.23	0.78	469	0.37
25. My horse and I have a close relationship	4.26	0.74	469	0.54
28. I consider my horse to be a great companion	4.49	0.66	469	0.52
31. I enjoy spending quality time with my horse	4.69	0.53	469	0.47
34. I love my horse because they never judge me	3.55	1.10	469	0.69
37. I am confident in the relationship I have with my horse.	4.26	0.66	469	0.47
<i>Insecure-Anxious Items</i>				
17. I often worry about what I would do if something bad happened to my horse	4.16	0.95	469	0.48
20. I get frustrated when my horse is not emotionally responsive to me	2.60	0.95	469	0.71
23. I feel frustrated when my horse does not seem to be available when I need them	2.51	1.00	469	0.46

26. I need reassurance from my horse to know that they love me	2.49	1.06	469	0.55
29. I feel lonely without my horse	3.32	1.12	469	0.52
32. I would never get over it if I lost my horse	3.15	1.21	469	0.38
35. I worry that I don't show my horse enough love	2.81	1.21	469	0.57
38. I worry a lot about the relationship I have with my horse	2.22	1.00	469	0.50

Insecure Avoidant Items

18. My horse is often a nuisance to me	1.74	0.83	469	0.62
21. I do not feel connected to my horse	1.52	0.74	469	0.52
24. I do not feel attached to my horse	1.31	0.53	469	0.44
27. If necessary, I would be able to give away my horse without any emotion	1.32	0.67	469	0.61
30. I avoid spending time with my horse	1.31	0.55	469	0.47
33. When I'm away from my horse, I hardly think about them	1.84	0.73	469	0.53
36. I think my horse is just a horse	2.17	1.09	469	0.49
39. I feel indifferent about my relationship with my horse	1.52	0.72	469	0.65

Table 4

Fit Statistics of Tested Models

Model	Chi-Square	df	RMS EA	CFI	TLI
One Factor CFA	1538.64	252	0.104	0.608	0.57
	0				1
Two Factor CFA	643.177	120	0.106	0.690	0.63
					9
Three Factor CFA	1283.16	249	0.094	0.685	0.65
	4				1
Final CFA	104.765	51	0.047	0.957	0.945

Table 5
Fit Statistics of Tested Models

Model	Chi-Square	df	RMSE A	CFI	TLI
Three Factor CFA	1283.16	249	0.094	0.68 5	0.65 1
Removed item #37	1071.187	227	0.089	0.72 0	0.68 8
Removed item #20	885.828	206	0.084	0.75 7	0.72 8
Removed item #23	774.571	186	0.082	0.781	0.752
Removed item #38	652.270	167	0.079	0.809	0.782
Removed item #30	559.382	171	0.077	0.828	0.803
Removed item #21	412.152	132	0.067	0.869	0.849
Removed item #35	362.708	116	0.067	0.881	0.860
Removed item #19	302.835	101	0.065	0.893	0.873
Removed item #22	250.721	87	0.063	0.900	0.879
Removed item #24	190.252	74	0.058	0.917	0.898
Removed item #34	143.365	62	0.053	0.938	0.922
Removed item #18	104.765	51	0.047	0.957	0.945

Table 6

Item Removal for Model Fit

Dropped Item	Discrepancies with the same dimension	Discrepancies in other dimensions	Conceptual Explanation
Item #37	19, 25	20, 23, 26, 35, 38	This item had large negative discrepancies with items in the Anxious subscale. The wording of this item, "...confident...", may tap into aspects of both secure and anxious attachment.
Item #20	23, 26, 29, 32	19, 25, 28, 18, 21, 24, 30, 33, 39	This item had large discrepancies with items across all 3 subscales. The wording of this item "...frustrated..." may make it too similar with item 23.
Item #23	26, 35, 38	19, 25, 28, 18, 21, 24, 30, 33, 39	The wording "...frustrated..." may not be measuring anxious attachment as we intended.
Item #38	26, 35	16, 25, 28, 18, 21, 24, 30	This item had a lot of discrepancies across both secure and avoidant subscales. The wording of this item "... a lot..." maybe misleading.
Item #30	18, 27	31, 26, 32, 35	This item had large discrepancies with anxious items. The wording "...avoid..." maybe to strongly/directly stated. Also, this may tap into social desirability.
Item #21	18, 24	19, 25, 26, 35	This item is very similar to Q24 "I do not feel attached to my horse". The wording "...connected..." may not be theoretically aligned or measuring attachment.

Item #35	26	25, 34, 18, 24, 33	This is the point I felt we were over pruning the anxious items. The wording "... love..." may not be getting at what we want. Perhaps rewording this to "I often worry that I don't spend enough time with my horse" might be better? The wording "...often..." to separate out secure attachment.
Item #19		26, 18	Large discrepancy with item #26. Both are worded very similarly, and it is a possible duplicate item. To avoid over pruning insecure-anxious, item #19 was removed.
Item #22		29, 33	Item is similar to Item #33. The wording "... miss ..." may not be capturing the nuance of the human-equine relationship. Unlike other companion animals, horses live separately. The owner may be used to or expect to be apart from them and so wouldn't necessarily miss them. Rewording this question may help.
Item #24		25, 26, 32	This question maybe to direct and tapping into social desirability
Item #34		29, 32, 39	This question seems to have large discrepancies with insecure-anxious items.

Item #18		17. 26	Ultimately, I think this is a good avoidant question, but I'm not sure that it applies in the human/horse relationship. Unlike an animal that you live with, you have the opportunity to get away. Rewording this question may better capture the nuance of insecure avoidant.
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Table 7
Correlations for Convergent Validity

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. HEAQ Secure													
2. HEAQ Anxious	.41**												
3. HEAQ Avoidant	-.68**	-.24**											
4. PAQ Anxious	.18**	.58**	-.01										
5. PAQ Avoidant	-.34**	.01	.47**	.03									
6. Positivity	-.04	-.27**	-.05	-.26**	-.10*								
7. ECRRS Global Anxious	.02	.29**	.11*	.29**	.15**	-.34**							
8. ECRRS Global Avoidant	-.08	.10*	.06	.10	.12*	-.33**	.57**						
9. BFI Extroversion	.09	-.09	-.15**	-.11*	-.05	.36**	-.14**	-.13*					
10. BFI Agreeableness	.03	.07	-.05	.06	.02	-.08	.08	-.03	.22**				
11. BFI Neuroticism	.19**	.26**	-.07	.29**	-.03	-.21**	.17**	.12*	.06	.24**			
12. AAS Secure	-.10	-.29**	-.00	-.25**	-.06	.41**	-.47**	-.46**	.26**	.04	-.20**		
13. AAS Anxious	.13*	.43**	.08	.47**	.12*	-.35**	.64**	.28**	-.13*	.09	.25**	-.50**	
14. AAS Avoidant	.20**	.35**	-.08	.31**	.06	-.34**	.42**	.49**	-.14**	-.01	.26**	-.68**	.46**

Note. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). * indicates $p < .05$. ** indicates $p < .01$.

Table 8

Item Development

HEAQ Items	Originals
<i>Pet Attachment Questionnaire (PAQ)</i>	
Q16. Being close to my horse is pleasant for me	Being close to my pet is pleasant for me
Q17. I often worry about what I would do if something bad happened to my horse.	I'm often worried about what I'll do if something bad happens to my pet
Q18 My horse is often a nuisance to me	Often my pet is a nuisance to me
Q19. Signs of affection from my horse boost my self-worth.	Signs of affection from my pet bolster my self-worth
Q20. I get frustrated when my horse is not emotionally responsive to me.	I feel frustrated if my pet doesn't seem to be available for me when I need it
Q21. I do not feel connected to my horse	I feel distant from my pet
Q23. I feel frustrated when my horse does not seem to be available when I need them	I get angry when my pet doesn't want to be close to me as much as I would like it to
Q24. I do not feel attached to my horse	I'm not very attached to my pet
Q26. I need reassurance from my horse to know that they love me	I need a lot of reassurance from my pet that it loves me
Q27. If necessary, I would be able to give away my horse without any emotion	If necessary, I would be able to give away my pet without any emotion
Q30. I avoid spending time with my horse	I try to avoid getting too close to my pet
Q33. When I'm away from my horse, I hardly think about them	When I'm away from my pet for a long period of time, I hardly think about it
<i>Pet Bereavement Questionnaire (PBQ)</i>	
Q22. I miss my horse when we are	I miss my pet enormously

apart

Q29. I feel lonely without my horse

I feel lonely without my pet

Q32. I would never get over it if I lost my horse

I'll never get over the loss of my pet

Q35. I worry that I don't show my horse enough love

I wish I had shown my pet more love

The Lexington Attachment to Pets Scale (LAPS)

Q25. My horse and I have a close relationship

My pet and I have a very close relationship

Q28. I consider my horse to be a great companion

I consider my pet to be a great companion

Q34. I love my horse because they never judge me

I love my pet because it never judges me

Q36. I think my horse is just a horse

I think my pet is just a pet

Subject Matter Experts

Q31. I enjoy spending quality time with my horse.

Q37. I am confident in the relationship I have with my horse

Q38. I worry a lot about the relationship I have with my horse

Q39. I feel indifferent about my relationship with my horse

Table 9
Final HEAQ Items

Secure Items

- 16. Being close to my horse is please for me

- 25. My horse and I have a close relationship

- 28. I consider my horse to be a great companion

- 31. I enjoy spending quality time with my horse

Insecure-Anxious Items

- 17. I often worry about what I would do if something bad happened to my horse

- 26. I need reassurance from my horse to know that they love me

- 29. I feel lonely without my horse

- 32. I would never get over it if I lost my horse

Insecure Avoidant Items

- 27. If necessary, I would be able to give away my horse without any emotion

- 33. When I'm away from my horse, I hardly think about them

- 36. I think my horse is just a horse

- 39. I feel indifferent about my relationship with my horse

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Appendix A

Human- Equine Attachment Questionnaire (HEAQ).

Instructions:

We will be asking you several questions about your relationship with your horse. If you own or interact with more than one horse regularly, then think of only one horse while answering the following questions.

On a scale of 1 to 5, with 5 being strongly disagree and 1 being strongly agree, please answer the following questions.

Secure Attachment

1. Being close to my horse is pleasant for me
2. Signs of affection from my horse boost my self-worth
3. I miss my horse when we are apart
4. My horse and I have a close relationship
5. I consider my horse to be a great companion
6. I enjoy spending quality time with my horse
7. I love my horse because they never judge me
8. I am confident in the relationship I have with my horse

Anxious Attachment

9. I often worry about what I would do if something bad happened to my horse
10. I get frustrated when my horse is not emotionally responsive to me
11. I feel frustrated when my horse does not seem to be available when I need them
12. I need reassurance from my horse to know that they love me
13. I feel lonely without my horse
14. I would never get over it if I lost my horse
15. I worry that I don't show my horse enough love
16. I worry a lot about the relationship I have with my horse

Avoidant Attachment

17. My horse is often a nuisance to me
18. I do not feel connected to my horse
19. I do not feel attached to my horse
20. If necessary, I would be able to give away my horse without any emotional difficulties
21. I avoid spending time with my horse
22. When I'm away from my horse, I hardly think about them
23. I think my horse is just a horse
24. I feel indifferent about my relationship with my horse

Appendix B

Pet Attachment Questionnaire (Zilcha-Mano, Mikulincer, & Shaver, 2011)

The following statements concern how you feel in the relationship with your pet. We are interested in how you experience the relationship with a specific pet. If you have more than one pet, please select the one that you have the closest relationship with, and answer all the below questions about your relationship with this specific pet. Respond to each statement by indicating how much you agree or disagree with it, using the following rating scale:

1	2	3	4	5	6	7
Disagree Strongly	Neutral/Mixed	Agree Strongly

1. Being close to my pet was pleasant for me.	1	2	3	4	5	6	7
2. I often worried about what I'd do if something bad happened to my pet	1	2	3	4	5	6	7
3. I preferred not to be too close to my pet	1	2	3	4	5	6	7
4. Sometimes I felt that I forced my pet to show more commitment and desire to be close to me	1	2	3	4	5	6	7
5. I preferred to keep some distance from my pet	1	2	3	4	5	6	7
6. If I couldn't get my pet to show interest in me, I got upset or angry	1	2	3	4	5	6	7
7. My pet was often a nuisance to me	1	2	3	4	5	6	7
8. Signs of affection from my pet bolstered my self-worth	1	2	3	4	5	6	7
9. I felt distant from my pet	1	2	3	4	5	6	7
10. I often felt that my pet didn't allow me to get as close as I would have liked	1	2	3	4	5	6	7
11. I wasn't very attached to my pet	1	2	3	4	5	6	7
12. I got angry when my pet didn't want to be as close to me as I would have liked	1	2	3	4	5	6	7
13. If necessary, I would have liked to be able to give away my pet without any difficulties	1	2	3	4	5	6	7
14. I got frustrated when my pet was not around as much as I would like it to be	1	2	3	4	5	6	7
15. I had no problem parting with my pet for a long duration	1	2	3	4	5	6	7
16. I needed shows of affection from my pet to feel there is someone who accepted me as I am	1	2	3	4	5	6	7
17. I got uncomfortable when my pet wanted to be close to	1	2	3	4	5	6	7
18. I felt frustrated if my pet didn't seem to be available for me when I needed it	1	2	3	4	5	6	7
19. I got nervous when my pet got too close to me	1	2	3	4	5	6	7

20. Without acts of affection from my pet I felt worthless	1	2	3	4	5	6	7
21. I wanted to get close to my pet, but I kept pulling away	1	2	3	4	5	6	7
22. I was worried about being left alone without my pet	1	2	3	4	5	6	7
23. I tried to avoid getting too close to my pet	1	2	3	4	5	6	7
24. I needed expressions of love from my pet to feel valuable	1	2	3	4	5	6	7
25. When I was away from my pet for a long period of time, I hardly thought about it	1	2	3	4	5	6	7
26. I needed a lot of reassurance from my pet to know that it loved me	1	2	3	4	5	6	7

To code the PAQ, you should reverse score item no. 1.

An individual's score in the avoidant dimension is the sum of the odd numbered questions. An individual's score in the anxiety dimension is the sum of the even numbered questions.

Appendix C

The Positivity Scale

Instructions:

The Following statements describe how a person might act in certain situations. Please indicate if you strongly agree, agree, neither agree or disagree, disagree, or strongly agree with each of these statements by circling the appropriate answer.

Strongly agree

Agree

Neither agree or disagree

Disagree

Strongly Disagree

Secure Attachment

1. I have great faith in the future
2. I am satisfied with my life
3. Others are generally here for me when I need them
4. I look forward to the future with hope and enthusiasm
5. On the whole, I am satisfied with myself
6. At times, the future seems unclear to me (reverse scored)
7. I feel I have many things to be proud of
8. I generally feel confident in myself

Appendix D

Relationship Structures (ECR-RS) Questionnaire

This questionnaire is designed to assess the way in which you mentally represent important people in your life. You'll be asked to answer questions about your parents, your romantic partners, and your friends. Please indicate the extent to which you agree or disagree with each statement by circling a number for each item.

Strongly agree

Agree

Neither agree or disagree

Disagree

Strongly Disagree

Instructions used for each relationship domain.

- Please answer the following questions about your mother or a mother-like figure.
- Please answer the following questions about your father or a father-like figure.
- Please answer the following questions about your dating or marital partner.
 - **Note:** If you are not currently in a dating or marital relationship with someone, answer these questions with respect to a former partner or a relationship that you would like to have with someone.
- Please answer the following questions about your best friend.

Questionnaire items

It helps to turn to this person in times of need.

I usually discuss my problems and concerns with this person.

I talk things over with this person.

I find it easy to depend on this person.

I don't feel comfortable opening up to this person.

I prefer not to show this person how I feel deep down.

I often worry that this person doesn't really care for me.

I'm afraid that this person may abandon me.

I worry that this person won't care about me as much as I care about him or her.

Appendix E

The Big Five Inventory (BFI)

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

Disagree Strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree Strongly
1	2	3	4	5

I see Myself as Someone Who...

___ 1. Is talkative

___ 23. Tends to be lazy

___ 2. Tends to find fault with others

___ 24. Is emotionally stable, not easily upset

___ 3. Does a thorough job

___ 25. Is inventive

___ 4. Is depressed, blue

___ 26. Has an assertive personality

___ 5. Is original, comes up with new ideas

___ 27. Can be cold and aloof

___ 6. Is reserved

___ 28. Perseveres until the task is finished

___ 7. Is helpful and unselfish with others

___ 29. Can be moody

___ 8. Can be somewhat careless

___ 30. Values artistic, aesthetic experiences

___ 9. Is relaxed, handles stress well

___ 31. Is sometimes shy, inhibited

___ 10. Is curious about many different things

___ 32. Is considerate and kind to almost everyone

___ 11. Is full of energy

___ 33. Does things efficiently

___ 12. Starts quarrels with others

___ 34. Remains calm in tense situations

___ 13. Is a reliable worker

___ 35. Prefers work that is routine

___ 14. Can be tense

___ 36. Is outgoing, sociable

___ 15. Is ingenious, a deep thinker

___ 37. Is sometimes rude to others

___ 16. Generates a lot of enthusiasm

___ 17. Has a forgiving nature

___ 18. Tends to be disorganized

___ 19. Worries a lot

___ 20. Has an active imagination

___ 21. Tends to be quiet

___ 22. Is generally trusting

___ 38. Makes plans and follows through with them

___ 39. Gets nervous easily

___ 40. Likes to reflect, play with ideas

___ 41. Has few artistic interests

___ 42. Likes to cooperate with others

___ 43. Is easily distracted

___ 44. Is sophisticated in art, music, or literature

Scoring:

BFI scale scoring (“R” denotes reverse-scored items):

Extraversion: 1, 6R, 11, 16, 21R, 26, 31R, 36

Agreeableness: 2R, 7, 12R, 17, 22, 27R, 32, 37R, 42

Conscientiousness: 3, 8R, 13, 18R, 23R, 28, 33, 38, 43R

Neuroticism: 4, 9R, 14, 19, 24R, 29, 34R, 39

Openness: 5, 10, 15, 20, 25, 30, 35R, 40, 41R, 44

Appendix F

Statistics Solutions

Advancement Through Clarity
<http://www.statisticssolutions.com>

Adult Attachment Scale (AAS)

The **Adult Attachment Scale (AAS)** was officially developed in 1990 but built on the earlier work of Hazen & Shaver (1987) and Levy & Davis (1988). The scale was developed by decomposing the original three prototypical descriptions (Hazen & Shaver, 1987) into a series of 18 items.

The scale consists of 18 items scored on a 5 point likert-type scale. It measures adult attachment styles named "Secure", "Anxious" and "Avoidant", defined as:

- Secure = high scores on Close and Depend subscales, low score on Anxiety subscale
- Anxious = high score on Anxiety subscale, moderate scores on Close and Depend subscales
- Avoidant = low scores on Close, Depend, and Anxiety subscales

The 18 items that compromise the measure are as follows:

- I find it difficult to allow myself to depend on others (Av)
- People are never there when you need them (Av)
- I am comfortable depending on others (S)
- I know that others will be there when I need them (S)
- I find it difficult to trust others completely (Av)
- I am not sure that I can always depend on others to be there when I need them (Ax)
- I do not often worry about being abandoned (S)
- I often worry that my partner does not really love me (Ax)
- I find others are reluctant to get as close as I would like (Ax)
- I often worry my partner will not want to stay with me (Ax)
- I want to merge completely with another person (Ax)
- My desire to merge sometimes scares people away (Ax)
- I find it relatively easy to get close to others (S)
- I do not often worry about someone getting close to me (S)
- I am somewhat uncomfortable being close to others (Av)
- I am nervous when anyone gets too close (Av)
- I am comfortable having others depend on me (S)
- Often, love partners want me to be more intimate than I feel comfortable being (Av)

Note: (S)= Secure, (Av)= Avoidant, (Ax)= Anxious/Ambivalent

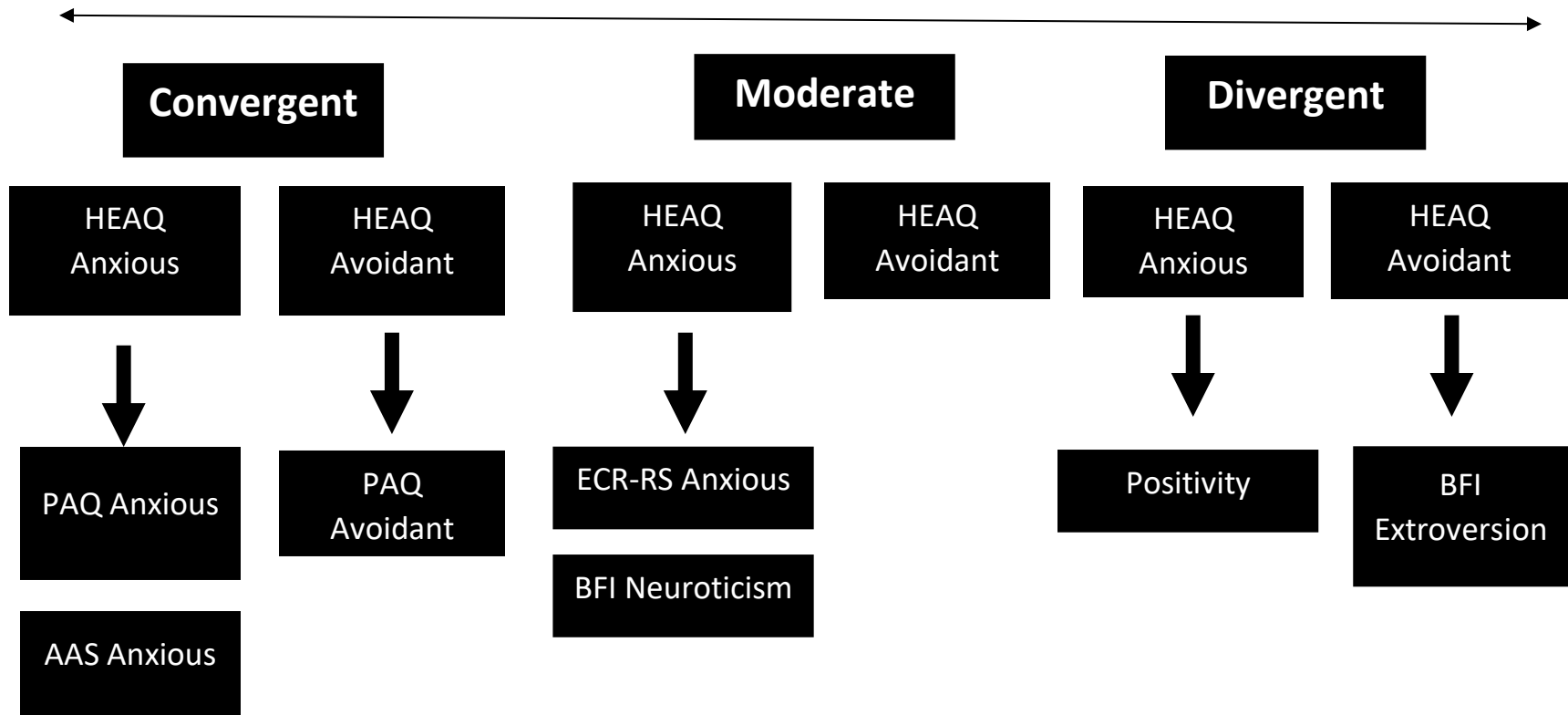
Authors

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Reliability and Validity

Appendix G

Construct Validity Continuum



*No significant correlations: AAS secure, Agreeableness, Positivity (with secure attachment)