

8-2021

IN SEARCH OF A SIMPLIFIED, OBJECTIVE ATTACHMENT STYLE ASSESSMENT: THE ATTACHMENT IMPLICIT MEASURE

Lisa Savage
lgrimes@nmu.edu

Follow this and additional works at: <https://commons.nmu.edu/theses>



Part of the [Child Psychology Commons](#), [Clinical Psychology Commons](#), [Developmental Psychology Commons](#), and the [Other Psychology Commons](#)

Recommended Citation

Savage, Lisa, "IN SEARCH OF A SIMPLIFIED, OBJECTIVE ATTACHMENT STYLE ASSESSMENT: THE ATTACHMENT IMPLICIT MEASURE" (2021). *All NMU Master's Theses*. 681.
<https://commons.nmu.edu/theses/681>

This Open Access is brought to you for free and open access by the Student Works at NMU Commons. It has been accepted for inclusion in All NMU Master's Theses by an authorized administrator of NMU Commons. For more information, please contact kmcdonou@nmu.edu, bsarjean@nmu.edu.

IN SEARCH OF A SIMPLIFIED, OBJECTIVE ATTACHMENT STYLE ASSESSMENT: THE
ATTACHMENT IMPLICIT MEASURE

By

Lisa M. Savage

THESIS

Submitted to
Northern Michigan University
In partial fulfillment of the requirements
For the degree of

MASTER OF SCIENCE

Office of Graduate Education and Research

April 2021

SIGNATURE APPROVAL FORM

IN SEARCH OF A SIMPLIFIED, OBJECTIVE ATTACHMENT STYLE ASSESSMENT: THE
ATTACHMENT IMPLICIT MEASURE

This thesis by Lisa M. Savage is recommended for approval by the student's Thesis Committee and Department Head in the Department of Psychological Science and by the Dean of Graduate Education and Research.



07/28/2021

Committee Chair: Dr. Jon Barch

Date



07/29/2021

First Reader: Dr. Christina Hartline

Date



07/28/2021

Second Reader (if required): Dr. Ashley Shayter

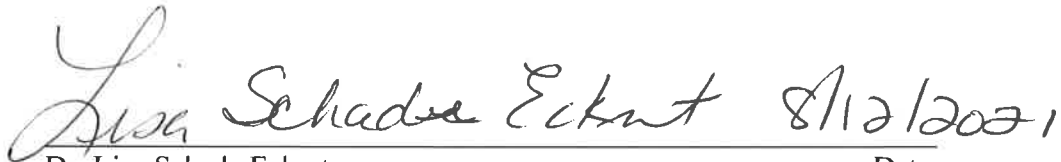
Date



07/28/2021

Department Head: Dr. Adam Prus

Date



Dr. Lisa Schade Eckert

Date

Dean of Graduate Education and Research

ABSTRACT

IN SEARCH OF A SIMPLIFIED, OBJECTIVE ATTACHMENT STYLE ASSESSMENT: THE ATTACHMENT IMPLICIT MEASURE

By

Lisa M. Savage

Attachment is a lasting bond between two people (Bowlby, 1958). Bonding starts at birth and lasts through the lifetime (Bowlby, 1958). Emotional and social development is impacted by attachment (Bowlby, 1976). Measuring attachment is beneficial to clinical psychologists and psychological research. There are both implicit and explicit measures of attachment. Explicit measures are subject to social desirability and other bias and require a person's honesty and understanding of self. Current implicit measures are lengthy and expensive to administer and score. The development of a more efficient implicit measure of attachment will benefit the field of psychology. The aim of this study was to validate a new attachment style measure. The Attachment Implicit Measure (AIM) was created in hopes of developing a better test for implicit attachment assessment. Participants were given a battery of online questionnaires and in person tests in order to assess the validity of the new attachment measure. Results did not yield significant findings for the validation of the AIM. Although, it was determined that a reaction time task may be a viable option for a new implicit measure of attachment style.

Copyright by
LISA M. SAVAGE
2021

DEDICATION

This thesis is dedicated to my husband, Zachary Savage, my children, Lilly and Landon and my mentor Jan Esh.

ACKNOWLEDGEMENTS

The author wishes to thank her thesis director, Dr. Jon Barch, for his expert advice and support; Elijah Nieman, for his knowledge on computer programming; her husband Zachary for his financial support; and Dr. Aaron and Lauren Delgaty for their advice and support. Without the help of these people, this project wouldn't have been possible.

This thesis follows the format from the *American Psychological Associations Publication Manual*.

TABLE OF CONTENTS

List of Tables	(vi)
List of Figures	(vii)
Introduction	1
Literature Review.....	3
Methods.....	20
Results.....	24
Discussion.....	33
References.....	39
Appendix A.....	45

LIST OF TABLES

Table 1: Descriptive Data for Explicit Measures.....	25
Table 2: RQ Style Counts along with Means and Standard Deviations for Associated Likeness Ratings.....	26
Table 3: Correlation Between Attachment Measures and Outcome Variables.....	27
Table 4: RQ and AIM Dummy Coded Regression Analyses for Each Outcome Variable.....	28
Table 5: Attachment Measures Predicting Outcome Variables.....	30
Table 6: Post-hoc Analysis Showing Relationships Between AIM Association Pairs and Outcome Variables.....	31

LIST OF FIGURES

Figure 1: Two-Dimensional Four-Category Model of Attachment.....	9
Figure 2: Attachment Style Categorization.....	26

Introduction

The parent-child bond is a fundamental development, necessary for survival. The quality of a child's first attachment will set the stage for future social development and emotional regulation (Bowlby, 1958 & 1969). There are two general categories of attachment, secure and insecure. A secure attachment is a balance between autonomy and closeness with others. Insecure attachments can be categorized into three different styles including ambivalent, avoidant, and disorganized (Ainsworth, 1964; Main & Solomon, 1986). These attachments are formed by a negative view of self, others, or both. Measuring attachment style is important within the field of psychology. Specifically, clinical psychology and psychological research use and benefit from attachment measures. This study will investigate a new implicit measure of the mother-child attachment bond, the Attachment Implicit Measure (AIM). Implicit measures allow assessment without the interference of conscious cognitive manipulation. Current implicit measures of attachment such as the Adult Attachment Interview (AAI) tend to be lengthy and expensive. Explicit measures are frequently used to eliminate some of the time and cost. However, explicit measures assume that people are aware of their cognitive associations and that they will respond truthfully. Research has demonstrated both of those assumptions are often not true. Finding a more efficient implicit measure of attachment will aid attachment research and help clinicians effectively support their clients. This study explored the predictive validity of a new measure, the AIM as compared to a commonly used explicit measure of adult attachment style, the Relationship Questionnaire. It was hypothesized that there would be a strong relationship between the explicit attachment measures and the AIM. Secondly, it was hypothesized that the AIM and the explicit attachment measures would both predict the outcome measures independently. Finally, it was hypothesized that the AIM would be a stronger predictor

of several outcome measures commonly associated with attachment style as compared to the explicit attachment measures.

Literature Review

Attachment Theory

John Bowlby was the pioneer of attachment theory. He described attachment as a lasting social connectedness between two individuals (Bowlby, 1958). This emotional bond with another person serves as a mechanism to keep an infant close to its mother for better chances of survival (Bowlby, 1958). Infants rely on their primary caregiver to respond to cues and effectively provide them with their needs. Bowlby (1958 & 1969) believed that the earliest bonds formed between child and caregiver had a tremendous and lasting impact on life. Attachment security plays an important role in development and can be either secure or insecure. Secure attachment occurs when children know they can depend on the caregiver to accurately decipher and meet their needs. Insecure attachments leave a child without a secure base to rely on, resulting in the development of unhealthy behaviors.

Attachment, the enduring emotional bond between an infant and their primary caregiver develops early on. Typically, in the first 12 months of life (Bowlby, 1959); however, attachments can be developed after the first year. The bond between the primary caregiver and child persists and is not easily broken (Bowlby, 1976). Attachment is a fundamental aspect of everyone's life.

In the early stages of life, infants show preference for their primary caregiver. Although, children typically end up forming more than one attachment bond. Once an established bond has occurred with the primary caregiver, a child will then start to form attachments with other familiar people (Ainsworth, 1964). People acquire and sustain attachment bonds throughout life. During adolescence, friends become a priority and early bonds may become second to new bonds with peers (Bowlby, 1976). The lifelong duration of attachment (Bowlby, 1976) makes these bonds an important part of life.

Early attachment sets the tone for future psychological development (Bowlby, 1959, 1976). The first attachment is used as a secure base (Ainsworth, 1979). This is the foundation for the child's growth. Early attachment will ultimately affect how individuals interact in relationships and their ability to regulate emotions (Bowlby, 1969). Infants are born without the ability to defend and care for themselves. Proximity seeking is part of the attachment system that keeps an infant close to its caregiver (Bowlby, 1982). During times of distress, seeking proximity to an attachment figure is designed to alleviate discomfort (Bowlby, 1982, 1988). A responsive caregiver soothes and comforts a child in times of need. A secure attachment involves co-regulation between the caregiver and infant (Bowlby, 1969). In time, this leads to the child's ability to develop self-regulation (Mikulincer et al., 2003). Research has indicated that secure attachments buffer against the development of affective disorders (Cantazaro & Wei, 2010; Jakobsen et al., 2012; Mikulincer et al., 2003).

In 1970, Mary Ainsworth expanded on Bowlby's work. Bowlby and Ainsworth worked together to elaborate on attachment. Ainsworth (1979) developed a method to explore and assess attachment, known as the Strange Situation procedure (*See also* Ainsworth et al., 2015). This popular assessment consists of observing 12 to 18 month old's in a new environment, where they are briefly left alone and reunited with their caregivers. Behavior during reunification is the main focus for assessment. During Ainsworth's research using the strange situation method, three types of attachment were defined and were used to describe the different behaviors expressed during the reunification process: secure, ambivalent insecure, and avoidant insecure (Ainsworth, 1964). Later a fourth category was added for children who exhibited behaviors toward attachment figures that did not fit the already established attachment styles, referred to as disorganized attachment (Ainsworth et al., 2015; Main, Kaplan, & Cassidy, 1985).

A secure attachment is developed when a caregiver is tuned in with the infant. When a caregiver understands the infant's cues and responds appropriately, the infant learns trust (Bowlby, 1969). This trust fosters the feeling of safety and openness needed for optimal development. Another factor for developing a secure attachment relies on the infant and primary caregiver engaging in social interactions that both find pleasurable (Bowlby, 1969). Positive social exchanges early on establish social competence and promote healthy relationships in the future. Ainsworth (1979) also noted that securely attached infants are more positive and display more prosocial behavior with others than that of insecurely attached infants. Insecurity in attachments occurs when there is insufficient interaction between mother and infant. Deprivation of an appropriate attachment environment causes the infant to lack trust of the mother's responsiveness (Ainsworth, 1964). The child does not form a secure base to explore from (Bowlby, 1969). Three types of insecure attachment styles have been defined: insecure-anxious, avoidant, and disorganized.

Insecure-anxious attachment is also known as anxious-ambivalent attachment style. Anxiously attached children are not confident of their caregiver's accessibility and responsiveness (Ainsworth et al., 2015). Infants with this level of security have experienced some positive interactions with the caregiver and only sometimes get accurate and prompt responses to their cues. This inconsistency causes the infant to have unstable expectations of his/her caregiver and leaves him/her unable to use the caregiver as a secure base to explore from (Ainsworth et al., 2015). Anxiously attached children have received loving interactions from the attachment figure, but because they have also experienced inaccessibility, they are worried about losing her. These infants tend to show increased ambivalent behavior to physical contact and

distress with strangers (Ainsworth et al., 2015). Later, anxious attachment leads to less persistence during tasks and being more easily frustrated (Ainsworth, 1979).

Another form of insecure attachment style is avoidant attachment. These infants have experienced mothers who are not attentive to their cues. The mother is more rejecting than mothers from the two previous attachment styles mentioned (Ainsworth et al., 2015; Bowlby, 1982). The infants do not have their need for closeness satisfied. More often, the primary caregiver is angry or annoyed at the infant (Ainsworth et al., 2015; Bowlby, 1982). This lack of attachment security causes avoidant and aggressive types of behavior in children (Ainsworth, 1979). Insecure children avoid the caregiver rather than seeking comfort during situations that activate the attachment system (Ainsworth et al., 2015).

Disorganized attachment refers to children who display confused and disoriented behaviors towards their caregiver. Disorganized attachment usually occurs due to fear of the attachment figure (Hesse & Main, 2006). Bowlby (1958 & 1969) explained the natural instinct for infants to seek proximity to their attachment figure when frightened. The attachment figure is the solution to the frightening experience (Bowlby, 1958, 1969). When children have a disorganized attachment, they are caught between seeking comfort and fearing the attachment figure. "Fright without solution" occurs, causing disorganized attachment (Hesse & Main, 1990, 2006). The attachment system activates when fear is present. In healthy relational dynamics, the primary caregiver is the deactivating solution. When the parent is the source of the fear, the appropriate function of the system is disrupted when under stress (Main & Hesse, 1990). Infants with disorganized attachment show conflicted behaviors such as, initially seeking proximity to the caregiver then abruptly stopping and turning away right before reaching attachment figure. The child will also have undirected or incomplete expressions and movements (Main &

Solomon, 1986, 1990). A freezing behavior may also occur. Freezing is defined as an infant stopping all movement for at least 20 seconds. (Main & Solomon, 1986, 1990). This attachment style in infancy correlates with later problems including peer relationships, affect dysregulation, and externalizing and internalizing disorders (Main & Solomon, 1986, 1990). Secure and both insecure-avoidant and insecure-anxious attachment styles are considered “organized,” compared to the disorganized attachment.

A secure attachment is the foundation for future social interactions and emotional regulation. Research has indicated that individuals with secure attachment styles seek support when faced with adversity (Mikulincer et al., 2003; Mikulincer & Shaver, 2007). Sheinbaum et al. (2015) studied how attachment style affects navigation through daily life. Specifically, after determining the attachment style of 206 young adults, the participants were randomly sent eight questionnaires a day for one week. The questionnaires inquired about current experiences and social context. Securely attached individuals showed more support seeking strategies and greater positive affect compared to insecurely attached individuals (Sheinbaum et al., 2015). Secure attachments are formed from appropriate caregiver interactions and healthy environments.

Appropriate caregiving environments consist of sensitive interactions, contact, and responsiveness (Ainsworth et al., 2015; Bowlby, 1969). When a caregiver is available and attentive to an infant’s needs, a secure attachment is formed. The experience of the mother’s repetitive and consistent positive response to the infant’s cues in the first year, leads to the infant trusting the mother as a secure base (Ainsworth et al., 2015). Early attachment security leads to more exploration and persistence during problem solving (Ainsworth, 1979). Children with secure attachments tend to be more resilient and more successful.

Bartholomew's Two-Dimensional Four-Category Model of Attachment

Bartholomew and Horowitz (1991) expanded on Bowlby, Ainsworth, and Main's attachment theory, conceptualizing a four-category model of adult attachment. This theoretical idea is based upon the "four attachment patterns derived from a combination of two dimensions" (Bartholomew & Horowitz, 1991). Bowlby's model of self and other, along with four attachment styles can be combined to categorize individuals into one of the attachment styles. Assessing an individual's model of self as positive or negative and his/her model of other as positive or negative determines the individual's attachment style representation.

Bowlby's (1958) theory that via caregivers a person concludes whether he/she is worthy of love or not and whether others are trustworthy or not, is the foundation of the model for positive and negative image of self and other. A secure attachment style is considered comfortable with autonomy and intimacy, resulting from a positive image of self and other. Contrary to a positive image of both self and other is a negative image of self and other, this falls into the fearful category of attachment style. Through experiences of being unlovable and others being rejecting and untrustworthy, a negative model of self and other is established. If a person has a positive image of self and a negative image of other, it is considered a dismissing attachment style. Lastly, a negative model of self and a positive model of other form a preoccupied attachment style. See *Figure 1* for Bartholomew and Horowitz's (1991) attachment model.

Figure 1

Two-Dimensional Four-Category Model of Attachment (Bartholomew & Horowitz, 1991)

		MODEL OF SELF (Dependence)	
		Positive (Low)	Negative (High)
MODEL OF OTHER (Avoidance)	Positive (Low)	CELL I SECURE Comfortable with intimacy and autonomy	CELL II PREOCCUPIED Preoccupied with relationships
	Negative (High)	CELL IV DISMISSING Dismissing of intimacy Counter-dependent	CELL III FEARFUL Fearful of intimacy Socially avoidant

Humans are inherently social, and relational aspects of life may greatly affect a person's quality of life. Knowing a person's attachment style will assist therapists and researchers when working with clients. Better measurements will aid professionals who are helping individuals working towards a better life. Understanding attachment theory and using Bartholomew and Horowitz's (1991) four-category model can yield a useful tool to help determine validity of a new implicit measure of attachment. The bipolar positive/negative valence in the four-category model is functionally inherent in most implicit association tests making the two theories compatible.

Implicit vs Explicit Cognition

Explicit memory refers to memories that a person can consciously recall. These types of memories are also known as declarative memories. There are three types of declarative memories: episodic, semantic, and spatial. Episodic memories are the recollection of specific events and experiences such as remembering one's first day of school. The semantic memory is

used to recall facts, concepts, and vocabulary. Spatial memory is the type of explicit memory responsible for remembering the environment and how to get from one place to another. Explicit memories must be consciously retrieved and require conscious attention (Bargh & Pietromonaco, 1982).

In contrast, implicit or non-declarative memory refers to memories not in awareness. There is no sense of recall or conscious attention with non-declarative memories. Procedural memory is a form of implicit memory responsible for knowing things like riding a bike. Implicit memories affect behavior (Bargh & Pietromonaco, 1982; Lerner, Small, & Loewenstein, 2004). Sensations, emotions, perceptions, and actions are triggered by implicit memories (Tyng et al., 2017). Emotional experiences are likely to produce automatic influences in everyday life, affecting thoughts and behaviors (Bargh & Williams, 2006; Schacter, 1987). Priming is a stimulus that activates non-declarative memory. Priming research studies have shown evidence of implicit memories. Priming happens unconsciously as well.

Peoples' beliefs and understanding of the world are formed by implicit memories. Implicit cognition influences peoples' lives even though they are unaware of it (Bargh & Williams, 2006). Understanding a person's implicit memories is useful when trying to alter behaviors. Attuned awareness of one's internal thoughts needs to be obtained to help change unwanted behaviors (Zemel et al., 2016). Self-report measures rely on accurate introspection, which may be hard to achieve prior to a person becoming attentively aware of his/her reactions. There is also the issue of social desirability influencing responses or intentional lying. Indirect measures are required to assess a person's implicit beliefs. Even though past experiences are not remembered consciously they will influence a person's performance (Greenwald & Banaji,

1995). Greenwald et al. (1998) created the Implicit Association Test (IAT), a well-known measure of automatic associations.

The IAT is a reaction time test designed to measure implicit attitudes (Greenwald et al., 1998). A person's underlying automatic responses are assessed through a performance speed-sorting task. The strength of association between concepts is measured with the idea that a quicker response occurs when closely related items share a response key (Greenwald et al., 1998). This is a block style procedure using two response keys to classify four categories of stimuli (Greenwald et al., 2003). Stimuli specific to the participant's aim are presented for classification into categories. The individual is instructed to sort the items as quickly as possible without making errors. Both practice trials and test trials are part of seven blocks. During the practice trials concept words (e.g., male, female) and evaluation words (e.g., good, bad) are sorted separately into their correlated categories. In the test trials the categories are combined, and the subject is asked to sort both concept and evaluation words (e.g., male/good, female/bad). The instructions are clear, and the task is meant to be easily understood. Assessing which stimuli are more quickly classified to a category suggests the strength of implicit association.

Greenwald and Banaji's (1998) findings indicate that the IAT is beneficial for assessing differences in associations between pairs of semantic or social categories (e.g., male/female). They suggest that the IAT is adaptable to assess a wide range of associations, more specifically those that evaluate self-concept and self-esteem (Greenwald & Banaji, 1998; Greenwald & Farnham, 2000). Since Greenwald & Banaji's (1998) original findings, the IAT has been used and adapted as was suggested. Project Implicit was launched in 2011, led by Bethany Teachman (University of Virginia) and Matt Nock (Harvard University). This organization is a collaboration between researchers interested in implicit cognition.

Attachment Assessments

There are multiple implicit and explicit measures of attachment. The explicit measures of attachment tend to be quicker and less costly but may be less reliable due to the possibility of the respondent intentionally or unintentionally skewing results. Implicit measures, including the first measures of attachment (Ainsworth's (1979) Strange Situation Classification), are highly regarded in both research and clinical psychology. Due to ease and efficiency, explicit measures tend to be the go to choice when assessing attachment style in the majority of published research.

Implicit Measures of Attachment

Ainsworth developed a procedure to observe and measure attachment type based on Bowlby's theory of attachment styles. This procedure is known as the Strange Situation Classification. As discussed earlier, the Strange Situation investigates how attachment behaviors vary between children. The experimental procedure takes place in a small room and is based on observation of the behavior of an infant (aged one to two years) during an eight-part sequence each section lasting about three minutes a piece (Ainsworth et al., 2015). The behaviors of a child during the procedure involving reunification with the mother who was previously removed indicates which attachment style category the child fits into. Securely attached children often exhibit distress when their mothers leave and happiness at their return. Insecure-Anxious attachment style is defined by intense distress when mother leaves and upon mother's return the child approaches but resists contact from her. A child with an avoidant attachment will show no signs of distress when the mother leaves and very little interest in her return. Fearfully attached children will have contradictory behaviors. The child may start to approach his/her mother upon return but suddenly freeze. The child may also display apprehension towards the caregiver. This measure is only suitable for children aged one to two years old.

With the goal of measuring an individual's attachment style later in life, the Adult Attachment Interview (AAI) was created. Carol George, Nancy Kaplan, and Mary Main (1985) created the AAI as a way to assess the attachment style of adults. The AAI is a semi-structured interview that takes approximately one hour. The interviewer asks the speaker questions about his/her attachment history (Main, Hesse, & Kaplan, 2005). Exactly what the speaker says is less important compared to the mental state of the speaker throughout the interview (Main, et al., 2005). There are four patterns distinguished by the AAI: Secure-Autonomous, Dismissing, Preoccupied, and Unresolved. Building upon the AAI, the Child Attachment Interview (CAI) was developed several years after (Target et al., 2003). Target et al. (2003) adapted the AAI to create a semi-structured attachment interview that would work for children aged seven to 11 years.

Another attachment assessment is the Adult Attachment Projective Picture System (AAP). Carole George and Malcolm West (2011) developed the AAP, which follows the principles from Bowlby's attachment theories and Ainsworth's Strange Situation assessment. The AAP was created as a more clinically appropriate version of the AAI (George & West, 2011). George & West (2011) believed that the attachment system must be activated to properly assess attachment. This was the reason behind creating a picture set. The pictures are scenes intended to elicit attachment distress (George & West, 2011). Bowlby and Ainsworth defined fear, desperation, solitude, and death as important attachment activators, and the pictures were created with these activators in mind. The AAP includes picture scenes of individuals and attachment dyads. The characters range in age in order to account for the fact that attachment occurs across the entire life span (George & West, 2011). Administration takes approximately 30 minutes to complete. The interviewer gives the respondent the pictures and asks him/her to

describe the scene. The recorded transcripts take approximately one hour to analyze. Convergent validity has been found between the AAI and the AAP (George & West, 2011).

Explicit Measures of Attachment

Multiple explicit measures of attachment style have been developed over time. These measures include a variety of self-report questionnaires. Researchers have created and adapted explicit assessments of attachment for various uses. Some of the commonly used ones are described in this section.

Shaver and Hazan (1987) developed a self-report assessment to measure attachment style using the original three attachment style model. Bartholomew and Horowitz (1991) adapted Shaver and Hazan's (1987) measure, creating The Relationships Questionnaire (RQ). The RQ includes the fourth category of attachment, fearful, along with the original three. This self-report measure describes all four attachment styles in short paragraphs (Bartholomew and Horowitz (1991). The respondents are instructed to rate how much each category represents them. This questionnaire can also be taken by a friend or family member and the respondent is then asked to rate the other person for each category.

Another self-report measure is the Experiences in Close Relationships (ECR) scale (Brennan et al., 1998). Similar to the RQ, the ECR uses the four styles of attachment model. Attachment anxiety and attachment avoidance are the focus of the questionnaire. Respondents answer a series of questions related to attachment avoidance and anxiety on a 5-point Likert scale (Strongly Disagree to Strongly Agree). For example, "I worry a lot about my relationships" and "I do not often worry about being abandoned." By assessing these two dimensions, the individual's attachment style is distinguished. A secure attachment is low on both dimensions. A preoccupied attachment is high on anxiety and low on avoidance and a dismissing-avoidant

attachment is low on anxiety and high on avoidance. Lastly, a fearful-avoidant attachment is high on both dimensions (Brennan et al., 1998). The ECR was developed and used for adult assessment.

Later, Brenning et al. (2011) developed the Experiences in Close Relationships Scale-Revised (ECR-RC). The ECR-RC was designed for children and early adolescence. The methods are the same for both assessments. The ECR-RC questions were modified to be developmentally appropriate and related to children. For example, instead of “I feel comfortable sharing my private thoughts and feelings with my partner,” “I find it easy to tell my mother what I think and how I feel” is used (Brenning et al., 2011). The instructions include rating each question for one’s mother and father. Respondents are categorized into one of the four attachment styles using the same criteria as the ECR.

According to Bowlby (1967) the attachment relationship is represented cognitively as an internal working model or mental representation of the relationship figure. Responding to the excessive number and variety of interpersonal relationship measurement scales available, with the aim of improving psychological measurement of individuals’ internal relationship representations, Barch (2015) simultaneously administered 14 of the most popular measures to 628 participants. Among other findings, a series of factor analyses on all items from the scales resulted in the development of a new 12-item instrument, the Relational Schema Scale. The scale measures components of an adult’s internal representation of his/her relationship (i.e. relational schema) with a target attachment figure including acceptance, appreciation, warmth, closeness, emotional reliance, and affection.

Developmental Outcomes Related to Attachment

Based on previous attachment research and theory, there are several individual difference outcome measures that are important for assessing or comparing the predictive validity of attachment measures. For example, literature has suggested a relationship between self-esteem and attachment styles (Bartholomew & Horowitz, 1991; Bylsma et al., 1997; Collins & Read, 1990; Feeny & Noller, 1990; Hazan & Shaver, 1994). Self-esteem is defined as an individual's attitude about the worth of oneself. The notion that an infant's self is built upon repeated experiences with the caregiver suggests that an individual's self-worth is defined by the attachment relationship (Bylsma et al., 1997). Research following Bowlby's (1997) theories has shown sufficient evidence of an overlap between self-esteem and attachment styles (Bylsma et al., 1997). Specifically, secure and dismissing attachment models report higher self-esteem than individuals who report preoccupied or fearful attachment styles (Bartholomew & Horowitz, 1991; Bylsma et al., 1997; Griffin & Bartholomew, 1994). The Rosenberg Self Esteem Scale (1965) has been used as a measure of self-esteem in multiple studies on attachment style and self-esteem (Bartholomew & Horowitz, 1991; Bylsma et al., 1997; Ren et al., 2011).

Similarly, self-criticism tends to be more prevalent in individuals with anxious or avoidant attachments stemming from a negative working model of self and other. Cantazaro and Wei (2010) found that both anxious and avoidant attachment have mediating pathways that lead to depressive symptoms. Researchers have found that depression is positively associated with attachment anxiety and avoidance (Armsden et al. 1990; Kobak & Sceety, 1988; Roberts et al., 1996). Although, others have found a stronger relation between attachment anxiety and depression than avoidance (Cooper et al., 1998; Wei et al., 2004; Wei et al., 2005). The Beck Depression Inventory (BDI) is a self-report questionnaire that has been widely used to measure

symptoms of depression (Beck et al., 1961). Measuring depressive symptoms may help indicate an individual's attachment style.

Another measure that has been used in research to assess attachment style is the Sociability Scale (Cheek & Buss, 1981). Following Bartholomew and Horowitz's (1991) four-category model of attachment, attachment style is determined by either a positive or a negative view of self and other. The sociability scale determines a person's preference for being with people or alone (Cheek & Buss, 1981). Previous research found that high sociability, reflecting a positive image of others, positively correlates with secure and preoccupied attachment and negatively correlates with the fearful and dismissing categories (Bartholomew & Horowitz, 1991).

Cheek and Buss (1981) explored the correlation between sociability and shyness when the two are defined independently. They discovered that shyness is not just the lack of sociability, meaning a person can be shy and sociable (Cheek & Buss, 1981). Shyness is defined as one's reactions (e.g. tension, concern, feelings of awkwardness and discomfort) to being with unfamiliar individuals (Cheek & Buss, 1981). Shyness may indicate one's general view of self and/or other. Higher levels of shyness could indicate a negative view of others or fear of others having a negative view of them due to low self-worth.

Research findings indicate that secure parent-child attachment can reduce the chance of later internalizing behaviors such as anxiety (Jakobsen et al., 2012). Earlier findings found significant results for a relation between insecure attachment and anxiety (Warren et al., 1997). Therefore, a person's level of anxiety may be influenced by his/her attachment style. The State Trait Anxiety Inventory (STAI) is a widely used measure to assess a person's current and general

level of anxiety, making the STAI a potential indicator of attachment security (Spielberger et al., 1983).

IAT & Attachment

There have been a few research studies on using a modified IAT to assess attachment. Previous research has indicated potential for the use of a reaction time test to measure implicit attachment style. Ren et al. (2011) created a self-IAT and other-IAT to explore the validity of the IAT as a measure of adult attachment to mothers in a Chinese context. Relationships between explicit and implicit measures of adult attachment were compared as well. Their research found sufficient evidence for the self-IAT and other-IAT as a reliable and valid measure of attachment (Ren et al., 2011). Findings conclude a significant positive correlation between both IAT's and subjective well-being but not explicit self-esteem (Ren, et al., 2011).

Following the two-dimensional attachment model of self and other, Ren et al. (2011) pointed out that self-IAT should correlate with the self-model dimension measured by the ECR and RQ but not with other-IAT. Whereas the other-IAT should correlate with the other-model dimension but not the self-model dimension. This was not supported by their study. Results indicated that the self-IAT is highly related to the other-IAT. Ren et al. (2011) consider the Chinese culture could be the cause of this discrepancy. Unlike the Western culture, Chinese children often identify themselves through relationships with their parents and are especially close to their mother resulting from the Chinese one-child policy (Ren et al., 2011). Conversely, Western culture tends to promote independence.

Venta et al. (2016) expanded on Ren's et al. (2011) research by conducting an English version of self-IAT, mother-IAT, and adding a father-IAT. Unable to recruit an adequate number of male participants, Venta et al. (2016) only explored the results of female participants. Another

difference is that the IAT scores were only compared to RQ, ECR-R, and Inventory of Interpersonal Problems (IIP) scores. Research findings suggest potential for good psychometric properties of the attachment IATs (Venta et al., 2016). Evidence of concurrent and convergent validity was limited but results concluded significant internal consistency and correlations among the three versions of the attachment IATs.

There are multiple ways to measure attachment, including explicit options, implicit options, and related measures that correlate with attachment style. Though the current assessment options are useful, there are some downfalls. As mentioned earlier, explicit measures have the potential of being skewed by the respondent. Using an implicit measure keeps top-down processing from potentially interfering with the results but the well-established implicit options are lengthier and more expensive than the explicit options. Finding an efficient way to measure implicit attachment style reliably and validly will benefit the field of psychological research and clinical psychology.

Accordingly, the AIM was produced to measure implicit attachment style more efficiently. It is superior to existing implicit measures because it is quick and does not require a lot of examiner training. It was hypothesized that the AIM would demonstrate convergent validity with the explicit measures. It was also hypothesized that it would predict the expected outcome measures stronger than the explicit measures.

Methods

Participants

Male and female undergraduate students at Northern Michigan University (NMU) were recruited. Complete data was acquired from 98 participants (31 males and 67 females).

Measures

1. Rosenberg Self-Esteem Scale (Rosenberg, 1965) measures global self-worth by assessing positive and negative feelings about the self. This 10-item scale uses a 4-point Likert scale, ranging from Strongly Agree to Strongly Disagree. A sample item is “On a whole, I am satisfied with myself.”

2. The Beck Depression Inventory (BDI) (Beck et al., 1961) is a 21-item self-report assessment that measures symptoms and characteristic attitudes of depression. For each of the 21 items, one of the four phrases (numbered 0 to 3) is chosen. For example:

- 0 I do not feel sad.
- 1 I feel sad
- 2 I am sad all the time and I can't snap out of it.
- 3 I am so sad and unhappy that I can't stand it.

The BDI is available in the public domain which is why it was used instead of the BDI-II.

Results indicated appropriate correlations with the RQ suggesting that the BDI is a sufficient measure.

3. The Revised Cheek and Buss Shyness Scale (RCBS) (Cheek, 1983) is a 13-item measure of shyness. Each statement is self-rated on a Likert scale ranging from very uncharacteristic/untrue to very characteristic/true. A sample item is “I feel tense when I’m with people I don’t know well.”

4. The State Trait Anxiety Inventory (STAI) (Spielberger et al., 1983) measures both trait and state anxiety. The STAI includes 20 statements that are self-rated on a 4-point Likert scale (Almost Never to Almost Always). For example, “I feel nervous and restless.”
5. The Sociability Scale (Cheek & Buss, 1981) measures the degree to which people like to socialize with others. This is a 5-item assessment that uses a Likert scale. A sample item is, “I welcome the opportunity to mix socially with people.”
6. The Relationship Questionnaire (RQ) (Bartholomew & Horowitz, 1991) is designed to measure attachment style. The RQ uses the four-category model of attachment (e.g. Secure, Dismissing, Preoccupied, and Fearful). There are four short paragraphs, one describing each of the attachment styles. Using a 7-point Likert scale (Disagree Strongly to Agree Strongly) the respondent rates how much they relate to each paragraph.
7. The Experiences in Close Relationships-Revised (ECR-R) Questionnaire (Fraley et al., 2000) measures attachment style by assessing individual differences of attachment anxiety and attachment avoidance. There are 36-items, rated on a 7-point Likert scale that ranges from Strongly Disagree to Strongly Agree. A sample item is “I’m afraid that I will lose my partner’s love.” Respondents are instructed to answer with how they feel in general rather than about a specific or current relationship.
8. The Relational Schema Scale (Barch, 2015) is a 12 item measure of individuals’ internal relationship representations of a specified target relational figure such as a mother, father, or teacher. Items are measured on a 7-point Likert type scale ranging from Strongly Agree to Strongly Disagree. Sample items include “If upset, I would seek comfort from _____.” And “_____ really cared about me.”

9. Attachment Implicit Measure (AIM) is a computer-based test designed to measure implicit attachment style. It is a modified version of Greenwald et al.'s (1998) Implicit Association Test (IAT). The strength of association between attachment concepts is measured. The respondent is asked to quickly sort words into categories (Me, Mom, Positive, and Negative). The task involves seven blocks that include both practice and test trials. Trials pair "Me" or "Mom" with Positive or Negative so that the time it takes the person to respond to the combined categories can be scored.

Procedure

The AIM study was one of multiple extra credit options available for undergraduate psychology courses at NMU. Students received information about the study via email, course announcements, and digital flyers. An email with an available link for participation was sent to potential participants. Students who chose to participate followed a provided link to a Qualtrics survey. The first page of the survey informed participants about the study and requested their consent to participate. If they chose to consent, an initial battery of surveys was administered. These surveys included the RCBS, Rosenberg Self-Esteem Scale, BDI, and STAI. Questions were presented in random order. Once the battery of questionnaires was completed, the participants were directed to an online appointment scheduling system and prompted to schedule a date and time they were available to complete the experiment at Northern Michigan University's Social Psychology lab.

When participants arrived at the lab, they were verbally reminded that their participation was voluntary and that they may leave the study at any time without penalty. Participants who chose to continue were asked to fill out a computerized version of the RQ, the ECR-R and the Relational Schema Scale. Following this, participants performed the AIM task. After all

assessments were complete, the participants received a participation verification slip they could use to obtain extra credit in one of their psychology courses.

Results

Participant Exclusions

Exclusion criteria was assessed first. Participants who completed the online Qualtrics survey but failed to appear for an appointment to complete the study were excluded. This resulted in 102 participants with complete data. At this point, any participants for whom more than 10 percent of trials had a latency less than 300 milliseconds were excluded because this is an indication of task disengagement or speed-clicking to complete the task as quickly as possible without regard for accuracy. This eliminated three more of the participants, all of whom were too fast. Finally, one participant was eliminated due to a physical disability that interfered with physical reaction time ability and mother being present for experiment, resulting in 98 participants for further assessment.

Explicit Measures

The explicit assessments included in the Qualtrics survey are standardized measures each with their own scoring process. Accordingly, the scale score results of The Revised Cheek and Buss Shyness Scale (Cheek, 1983), Rosenberg Self-Esteem Scale (Rosenberg, 1965), Beck's Depression Inventory (Beck et al, 1961), State Trait Anxiety Inventory (Spielberger et al, 1983), Sociability Scale (Cheek & Buss, 1981), the Relational Schema Scale (Barch, 2015), Experiences in Close Relationships-Revised Questionnaire (Fraley et al., 2000), and The Relationship Questionnaire (Bartholomew & Horowitz, 1991) were calculated. Due to a technology error in the data collection process, data for the ECR-R were incomplete so only the Anxiety subscale was able to be included in the analysis. A descriptive table of means, standard deviations, ranges, and alpha coefficients was created for these measures. The alpha coefficients of the outcome measure scales ranged from .81 to .95, which demonstrates strong internal

reliability. The basic psychometric properties of the outcome measures were sufficient (see Table 1). A separate table was created to show the descriptive statistics for the categorical attachment type data produced by the RQ (see Table 2).

Table 1

Descriptive data for explicit measures.

	Mean	SD	Cronbach's Alpha
ECR-R Anxiety	64	21.72	0.93
Relational Schema	47.29	12.41	0.95
Self-Esteem	28.69	5.81	0.91
Sociability	16.9	4.47	0.81
Depression	10.27	9.68	0.92
Shyness	38.32	10.19	0.89
Anxiety	45.28	12.79	0.94

Table 2

RQ style counts along with means and standard deviations for associated likeness ratings.

RQ Best Style	N	RQ Style Ratings			
		Secure	Preoccupied	Avoidant	Fearful
Secure	32	6.4(0.5)	2.9(1.6)	3.7(1.6)	3.2(1.6)
Preoccupied	15	4.5(1.3)	6.7(0.4)	3.2(1.7)	3.9(1.9)
Avoidant	18	4.2(1.6)	2.0(1.1)	6.1(1.4)	3.5(1.8)
Fearful	33	3.1(1.6)	3.5(1.7)	3.5(1.7)	6.6(0.5)

mean(SD)

Implicit Measures

Following Greenwald et al.'s (2003) recommendations, participants' reaction times for the AIM were assessed using the nine-stage D measure scoring algorithm. Quicker reaction time represents a stronger implicit association. Once the mean average reaction times were calculated, the faster of each category (mom/positive or mom/negative and self/positive or self/negative) was used to determine the participant's implicit attachment style. Based upon Bartholomew's

two-dimensional four-category model of adult attachment (Bartholomew & Shaver, 1998), participants' results were categorized into one of the four attachment styles, secure, preoccupied, dismissing, or fearful. See Figure 2.

Figure 2

Attachment Style Categorization

	Self	Mom
Secure	Positive	Positive
Preoccupied	Negative	Positive
Dismissing	Positive	Negative
Fearful	Negative	Negative

A correlation table including all the measures was produced. Correlations between the RQ scores and the outcome variables were as expected. Results indicated significant correlations between RQ attachment style and depression, anxiety, self-esteem, sociability, and shyness. For example, RQ Secure was significantly negatively correlated with depression ($r = -.409, p < .01$), negatively correlated with anxiety ($r = -.479, p < .01$), positively correlated with self-esteem ($r = .416, p < .01$), positively correlated with sociability ($r = .358, p < .01$), and negatively correlated with shyness ($r = -.405, p < .01$). The correlation results for the AIM attachment styles did not show any significant relationships with the outcome variables. See Table 3 for all RQ and AIM attachment type correlations with the developmental outcome variables.

Table 3***Correlation Between Attachment Measures and Outcome Variables***

	Depression	Anxiety	Self-Esteem	Sociability	Shyness
RQ Secure	-.409**	-.479**	.416**	.358**	-.405**
RQ Preoccupied	.259**	.291**	-.289**	0.014	0.197
RQ Avoidant	-0.04	-0.097	0.126	-.256*	0.038
RQ Fearful	.289**	.365**	-.320**	-0.164	.245*
AIM Secure	0.067	0.027	0.033	0.015	0.036
AIM Preoccupied	0.068	0.121	-0.163	0.043	0.016
AIM Avoidant	-0.049	-0.15	0.157	-0.003	-0.161
AIM Fearful	-0.076	0.02	-0.019	-0.065	0.169

** Significant at .01

* Significant at .05

Next, a series of regression analyses were performed to determine how much of the variance in outcome measure scores could be accounted for by the attachment measures. To accomplish this, linear regression with the categorical attachment type variables was used to determine whether the AIM scores and the RQ scores predicted the outcome variables as expected. Dummy codes were created for the categorical variables. After the categorical variables were properly coded, a regression analysis was performed for each of the outcome variables: Depression, Anxiety, Self-esteem, Sociability, and Shyness. The same process was used to determine RQ scores. The regression analysis showed significant results of the RQ attachment style data predicting the outcome variables as expected. Again, the AIM did not yield any significant predictive findings. See Table 4.

Table 4***RQ and AIM Dummy Coded Regression Analyses for Each Outcome Variable***

	<i>t</i>	<i>p</i>	<i>B</i>	<i>F</i>	<i>df</i>	<i>p</i>	adj. <i>R</i> ²
RQ Types & Depression				9.26	3	.000	.203
Secure (constant)	3.61	.000	5.19				
Preoccupied	4.24	.000	12.22				
Avoidant	1.31	.193	3.34				
Fearful	4.27	.000	8.9				
AIM Types & Depression				0.47	3	.706	-.017
Secure (constant)	3.66	.000	12.63				
Preoccupied	-0.37	.712	-1.41				
Avoidant	-0.90	.371	-3.41				
Fearful	-0.77	.443	-3.29				
RQ Types & Anxiety				14.56	3	.000	.295
Secure (constant)	20.90	.000	37.39				
Preoccupied	5.09	.000	18.19				
Avoidant	1.53	.128	4.85				
Fearful	5.53	.000	14.31				
AIM Types & Anxiety				1.04	3	.380	.001
Secure (constant)	10.46	.000	47.25				
Preoccupied	0.06	.949	.32				
Avoidant	-0.95	.347	-4.70				
Fearful	-0.32	.751	-1.78				
RQ Types & Self-Esteem				9.81	3	.000	.214
Secure (constant)	36.89	.000	31.64				
Preoccupied	-4.40	.000	-7.56				
Avoidant	-0.97	.337	-1.46				
Fearful	-4.23	.000	-5.25				
AIM Types & Self-Esteem				1.41	3	.246	.012
Secure (constant)	14.22	.000	29				
Preoccupied	-0.76	.451	-1.70				
Avoidant	0.46	.648	1.03				
Fearful	-0.16	.874	-0.40				
RQ Types & Sociability				6.12	3	.001	.137
Secure (constant)	27.52	.000	19.06				
Preoccupied	-1.30	.195	-1.81				
Avoidant	-3.70	.000	-4.53				
Fearful	-3.42	.001	-3.42				
AIM Types & Sociability				.135	3	.939	-.027
Secure (constant)	10.30	.000	16.50				
Preoccupied	0.27	.790	0.47				
Avoidant	0.36	.721	0.63				
Fearful	-0.08	.933	-0.17				
RQ Types & Shyness				6.69	3	.000	.150
Secure (constant)	21.13	.000	33.08				
Preoccupied	3.54	.001	11.08				
Avoidant	2.06	.043	5.68				
Fearful	3.79	.000	8.58				
AIM Types & Shyness				1.34	3	.267	.010
Secure (constant)	11.09	.000	39.75				
Preoccupied	-0.28	.781	-1.10				
Avoidant	-0.91	.368	-3.57				
Fearful	0.54	.592	2.38				

Next the beta coefficients were used to generate predicted scores for each of the outcome variables for each of the RQ and AIM attachment types. See Table 5.

Table 5

Attachment Measures Predicting Outcome Variables

	Depression	Anxiety	Self-Esteem	Sociability	Shyness
RQ Secure	5.19	37.39	31.64	19.06	33.08
RQ Preoccupied	17.42	55.58	24.08	17.25	44.17
RQ Avoidant	8.53	42.24	30.17	14.53	38.76
RQ Fearful	14.09	51.70	26.39	15.64	41.67
AIM Secure	12.63	47.25	29	16.50	39.75
AIM Preoccupied	11.22	47.57	27.30	16.97	38.65
AIM Avoidant	9.21	42.55	30.03	17.13	36.18
AIM Fearful	9.33	45.47	28.60	16.33	42.13

Due to the overall poor performance of the AIM in terms of predictive validity, the planned concurrent validity analyses involving the Relational Schema Scale and the ECR-R were not carried out.

Post-hoc Analysis

Lastly, a post-hoc analysis was performed to assess the AIM more closely. Relationships between the AIM reaction times for individual association pairs (e.g., mom word and positive word pairings) compared to the outcome variables were assessed. It was discovered that some of the association pairs were appropriately correlating with some of the outcome variables. For example, self-esteem significantly correlated with mom positive ($r = .299, p < .01$). At this point, it was determined that the measurement of implicit associations was working to some extent, but the task format of forcing two pairs, such as mom and positive with self and negative, to be cognitively sorted at the same time was potentially problematic. See Table 6.

Table 6***Post-hoc Analysis Showing Relationships Between AIM Association Pairs and Outcome Variables***

		Self -	Self +	Mom -	Mom +
Self-esteem	Pearson Correlation	.230*	-0.048	0.088	.299**
	Sig. (2-tailed)	0.023	0.642	0.389	0.003
	N	98	98	98	98
Depression	Pearson Correlation	-.202*	-0.092	-0.159	-.274**
	Sig. (2-tailed)	0.046	0.367	0.118	0.006
	N	98	98	98	98
Anxiety	Pearson Correlation	-.225*	-0.032	-0.128	-.311**
	Sig. (2-tailed)	0.026	0.753	0.209	0.002
	N	98	98	98	98

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

Discussion

The aim of this study was to build upon Ren et al.'s (2011) progress towards developing an implicit attachment test. Changes were made in hopes of improving efficiency by combining Ren et al.'s (2011) method of using multiple IAT's into one IAT assessment, which is more similar to how numerous popular IAT's are commonly structured (Harvard Project Implicit, n.d.). The AIM was developed using previous research combining the social psychological use with IAT and Bartholomew and Horowitz's (1991) theory on assessing attachment style. Specifically, the IAT was designed to assess whether an individual has a positive versus negative view of self and other. This was the first study to combine the self and other assessment into one IAT. This study did not find significant findings to support the hypothesis. Although, there is some promise for the use of a reaction time task to assess implicit attachment related cognitive associations, which are the basis for the internal attachment relationship representation types. Further research is needed to examine other varieties of implicit, reaction time measures of attachment type.

The basic psychometric performance of the outcome measures was sufficient. This indicates that the assessment of depression, anxiety, self-esteem, sociability, and shyness provided reliable and valid results to compare with the attachment measures. The data showed many significant correlations between the RQ results and the outcome measures. As discussed earlier, RQ Secure significantly negatively correlated with depression, anxiety, and shyness and positively correlated with self-esteem and sociability. RQ Preoccupied positively correlated with depression, anxiety, shyness, and sociability and negatively correlated with self-esteem. RQ Avoidant had a significant negative correlation with sociability. Lastly, RQ Fearful had a significant positive correlation with depression, anxiety, and shyness and a significant negative

correlation with self-esteem and sociability. These results support previous research showing that attachment style affects psychological health and emotion regulation (Bowlby, 1959 & 1969). Specifically, people with secure attachment tend to show less anxiety whereas insecurely attached individuals have higher levels of anxiety (Jakobsen et al., 2012; Warren et al., 1997). There were no significant correlations between the AIM and the outcome measures.

The hypothesis that the AIM and the explicit attachment measures would both predict the outcome measures independently was partially supported. The RQ predicted the outcome measures as expected. However, the AIM did not predict the outcome measures as was hypothesized. Therefore, the hypothesis that the AIM would be a stronger predictor of several of the outcome measures was also disconfirmed. It was obvious that the AIM did not perform as a valid attachment measure. It had no predictive power for any of the outcome measures that would be expected from previous research on attachment.

AIM results indicated that most people were either positive self and negative mom or vice versa. This categorizes most individuals as having either preoccupied or avoidant attachment style. Very few people had both positive or both negative which yield the attachment styles secure and fearful. This is the opposite of what the RQ results suggest with the majority of participants being either secure or fearful. It also does not match previous attachment research suggesting that a majority of people have a secure attachment (Lavine & Heller, 2012). This may be explained by the test design. Individuals were required to put negative to self at the same time as positive to mom and vice versa. This may have caused incongruently disruptive delays in reaction time for individuals who implicitly wanted to put positive (or negative) to both self and mom.

Future research on assessment of implicit attachment may benefit from the use of a different style reaction time task. The typical IAT involves two binary classification tasks, a target task and an attribute task, that have to be performed with two response keys. Importantly, the key assignment varies across the two IAT test blocks. In the compatible block, participants are instructed to press one key for the positively evaluated target category (e.g., candy) as well as the positive pole of the attribute dimension (e.g., love), and to press the other key for the more negatively evaluated target category (e.g., snakes) as well as the negative pole of the attribute dimension (e.g., hate). In the incompatible block, negative targets and positive attributes are assigned to the same key (and positive targets and negative attributes to the other key, respectively). Participants typically respond faster and more accurately in compatible compared to incompatible IAT blocks. The performance difference between compatible and incompatible blocks (compatibility effect, IAT effect, or IAT score) is then interpreted as a measure for the strength of associations between the respective categories (Greenwald et al., 1998). The problem for using this format of implicit cognitive association measurement for assessing attachment type is, what if someone feels positively about both candy and snakes or negatively about both.

A Go/No Go version of implicit attachment style test may be a viable option. The Go/No Go Association Task (GNAT) can be used for automatic social cognition towards a target category (Nosek & Banaji, 2001). This style assessment would be able to assess an individual's implicit feelings of self and other separately while eliminating the conflicting instinct of someone who feels positively about both self and other or negative about both self and other. Priming would be used with the GNAT and would be necessary for an attachment style version of the task. Both mom and self would be primed, separately, during the task. There would need to be four block conditions. Block conditions would consist of ones that prime mom when the

participant would be instructed to “click” for all positive words. Other blocks would consist of the prime mom while the participant is asked to “click” for negative words. The other two types of blocks would be primed with self and participants would be asked to click for either positive or negative words. Assessment would compare which blocks were easiest by assessing which were faster and had less errors.

Other tasks that may be appropriate include the Lexical Decision Task or an Implicit Association Test-Recoding Free (IAT-RF). While the category-response assignment is constant throughout a block of trials in the standard IAT, it varies randomly from trial to trial in the IAT-RF (Rothermund et al., 2009). Consequently, scores in those procedures are obtained by computing performance differences between compatible and incompatible trials (only mom-positive and mom-negative or only self-positive and self-negative trials) rather than between compatible and incompatible blocks (Rothermund et al., 2009). This variation of the IAT might resolve the issue of possible conflicting responses that the AIM is experiencing.

Another limitation of this study was that no other implicit measure of attachment was assessed. It would be beneficial to look at correlations between the AIM and another implicit measure of attachment. Originally, the methods for this study included the assessment of implicit attachment using an attachment interview. Due to Covid-19, no other implicit measure of attachment was assessed. Including an attachment interview would also provide information of the participants family background. In the future adding another implicit measure of attachment will yield important information when validating a new implicit measure of attachment.

Interestingly, although the RQ produced much more typical results for the percentage of individuals with each attachment style over the AIM, it showed an increased number of individuals with fearful attachment. Ainsworth et al.’s (1978) studies recognizing three

attachment styles found roughly 70 percent of American infants were secure, 20 percent were avoidant, and 10 percent were preoccupied. In 2012, Lavine and Heller stated that just over 50 percent of individuals fell into the secure attachment category, 20 percent were preoccupied, 25 percent were avoidant, and only three to five percent were fearfully attached. A large meta-analysis showed that overall AAI classification from a wide range of non-clinical individuals indicated 50 percent were secure, 24 percent were avoidant, nine percent were preoccupied, and 16 percent were fearful (Bakermans-Kranenburg & Van IJzendoorn, 2009). The present study, consisting of 98 Northern Michigan University undergraduate students, found approximately 32 percent of individuals were classified as secure, 15 percent as preoccupied, 18 percent as avoidant, and 33 percent as fearful attachment style.

RQ results from this study indicated a much larger percentage of individuals have a fearful attachment than previous research has found. This leaves the question of what could have caused this large increase in fearfully attached individuals? There are several potential reasons for the unusual amount of fearfully classified individuals. It could be by chance that this study happened to represent more individuals with fearful attachment than the general public represents. Another possibility could be that the number of fearfully attached individuals is increasing in present-day America. As technology advances and the amount of virtual interaction increases, while in-person social interactions decrease, people may be relating more to Bartholomew and Horowitz's (1991) description of fearful attachment style more than the other attachment descriptions.

The pandemic may also be a contributing factor. The current conditions due to the worldwide pandemic from Covid-19 could have influenced the results. There were many unseen and sudden changes due to Covid-19 and a lack of social interaction with the quarantine

restrictions. Individuals may have been experiencing heightened anxiety, depression, and/or other mental health issues during the pandemic as well. Unexpectedly, this study occurred in the midst of the pandemic and therefore that may have influenced individuals' self-reported attachment style. An implicit measure of attachment should not be influenced by environmental factors such as a pandemic but explicit measures such as the RQ may be. Finding a valid, effective, and efficient implicit measure of attachment would greatly benefit the field of psychology, especially during times of unexpected worldwide events such as a pandemic.

References

- Ainsworth, M. (1978) *Patterns of attachment: a psychological study of the strange situation*. Lawrence Erlbaum Associates.
- Ainsworth, M. D., (1979). Infant- Mother Attachment, *34*(10), 932–937. doi: 10.1037/0003-066X.34.10.932
- Ainsworth, M. D., Blehar, M., Waters, E., & Wall, S. N. (2015). *Patterns of Attachment: a psychological study of the strange situation* (Classic ed.). N.p.: Routledge.
- Ainsworth, M. D. (1964, January). Patterns of attachment behavior shown by the infant in interaction with his mother. *Merrill-Palmer Quarterly of Behavior and Development*, *10*(1), 51-58.
- Armsden, G. C., McCauley, E., Greenberg, M. T., Burke, P. M., & Mitchell, J. R. (1990). Parent and peer attachment in early adolescent depression. *Journal of Abnormal Child Psychology*, *18*, 683–697.
- Bakermans-Kranenburg, M., & Van IJzendoorn, M. (2009). The first 10,000 adult attachment interviews: Distributions of adult attachment representations in clinical and non-clinical groups. *Attachment & Human Development*, *11*(3), 223-263. [https://doi-org.nmu.idm.oclc.org/10.1080/14616730902814762](https://doi.org/nmu.idm.oclc.org/10.1080/14616730902814762)
- Bargh, J. A., & Williams, E. L. (2006). The automaticity of social life. *Current Directions in Psychological Science*, *15*(1), 1–4. <https://doi.org/10.1111/j.0963-7214.2006.00395.x>
- Bargh, J. A., & Pietromonaco, P. (1982). Automatic information processing and social perception: The influence of trait information presented outside of conscious awareness on impression formation. *Journal of Personality and Social Psychology*, *43*(3), 437–449. <https://doi.org/10.1037/0022-3514.43.3.437>

- Bartholomew, K., & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology*, 61(2), 226–244.
<https://doi.org/10.1037/0022-3514.61.2.226>
- Beck, A.T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961) An inventory for measuring depression. *Archives of General Psychiatry*, 4, 561-571.
- Bowlby, J. (1988). *A secure base: Clinical applications of attachment theory*. London: Routledge.
- Bowlby, J. (1982, October). Attachment and loss retrospect and prospect. *American Journal of Orthopsychiatry*, 52, 664-678.
- Bowlby, J. (1976). The making and breaking of affectional bonds. *The British Journal of Psychiatry*, 130, 201-210.
- Bowlby, J. (1969). *Attachment and Loss: Volume 1 Attachment (Second ed.)*. New York, NY: Basic Books.
- Bowlby, J. (1958). The nature of the child's tie to his mother. *The International Journal of Psycho-Analysis*, 39(5), 350–373.
- Bowlby, J. (1959). Separation anxiety. *International Journal of Psycho-Analysts*, XLI, 1-25.
- Brennan, K.; Clark, C.; Shaver, P. (1998). Self-report measures of adult romantic attachment. In J. Simpson and W. Rholes, *Attachment Theory and Close Relationships*. (pp. 46 – 76). New York: Guilford Press.
- Brenning, K., Soenens, B., Braet, C., & Bosmans, G. (2011). An adaptation of the experiences in close relationships scale-revised for use with children and adolescents. *Journal of Social and Personal Relationships*, 28(8), 1048–1072.
<https://doi.org/10.1177/0265407511402418>

- Bylsma, W. H., Cozzarelli, C., & Sumer, N. (1997). Relation between adult attachment styles and global self-esteem. *Basic and Applied Social Psychology, 19*(1), 1–16.
https://doi.org/10.1207/s15324834basp1901_1
- Cantazaro, A., & Wei, M. (2010). Adult attachment, dependence, self-criticism, and depressive symptoms: A test of a mediational model. *Journal of Personality, 78*(4), 1135–1162.
<https://doi.org/10.1111/j.1467-6494.2010.00645.x>
- Cheek, J.M. (1983). Unpublished, Wellesley College, Wellesley, MA 02181
- Cheek, J. M., & Buss, A. H. (1981). Shyness and Sociability. *Journal of Personality and Social Psychology, 41*, (330-339).
- Collins, N. L., & Read, S. J. (1990). Adult attachment, working models, and relationship quality in dating couples. *Journal of Personality and Social Psychology, 58*, 644-663
- Cooper, L. M., Shaver, P. R., & Collins, N. L. (1998). Attachment styles, emotion regulation, and adjustment in adolescence. *Journal of Personality and Social Psychology, 74*, 1380–1397.
- Feeny, J., & Noller, P. (1990). Attachment style as a predictor of adult romantic relationships. *Journal of Personality and Social Psychology, 58*, 2S1-291.
- Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item-response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology, 78*, 350-365.
- George, C., Main, M., & Kaplan, N. (1985). Adult Attachment Interview. *PsycTESTS Dataset*.
[doi:10.1037/t02879-000](https://doi.org/10.1037/t02879-000)

- George, C., & West, M. (2011). The adult attachment projective picture system: Integrating attachment into clinical assessment. *Journal of Personality Assessment*, 93(5), 407–416. <https://doi.org/10.1080/00223891.2011.594133>
- Gillath, O., Hart, J., Nofhle, E. E., & Stockdale, G. D. (2009). Development and validation of a state adult attachment measure (SAAM). *Journal of Research in Personality*, 43(3), 362–373. <https://doi.org/10.1016/j.jrp.2008.12.009>
- Greenwald, A. G. & Banaji, M. R., (1995). Implicit social cognition: Attitudes, self-esteem, and stereotypes implicit social cognition: Introduction and overview. *Psychological Review* (Vol. 102).
- Greenwald, A. G., & Farnham S. D. (2000). Using the Implicit Association Test to measure self-esteem and self-concept. *Journal of Personality and Social Psychology*, 79(6), 1022–1038. <https://doi.org/10.1037/0022-3514.79.6.1022>
- Greenwald, A. G., McGhee, D., and Schwartz, J. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology*, (74)6: 1464–1480.
- Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the Implicit Association Test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology*, 85(2), 197–216. <https://doi.org/10.1037/0022-3514.85.2.197>
- Griffin, D. W., & Bartholomew, K. (1994). Model of the self and other: Fundamental dimensions underlying measures of adult attachment. *Journal of Personality and Social Psychology*, 67, 430-445.
- Hazan, C, & Shaver, P. R. (1994). Attachment as an organizational framework for research on close relationships. *Psychological Inquiry*, 5, 1-22.

- Hesse, E., & Main, M. (2006). Frightened, threatening, and dissociative parental in low-risk samples: Description, discussion, and interpretations. *Development and Psychopathology, 18*, 309-343.
- Jakobsen, I. S., Horwood, L. J., & Fergusson, D. M. (2012). Childhood anxiety/withdrawal, adolescent parent-child attachment and later risk of depression and anxiety disorder. *Journal of Child and Family Studies, 21*(2), 303–310.
<https://doi.org/10.1007/s10826-011-9476-x>
- Kobak, R. R., & Sceery, A. (1988). Attachment in late adolescence: Working models, affect regulation, and representations of the self and others. *Child Development, 59*, 135–146.
- Levine, A., Heller, R. (2012). *Attached: The new science of adult attachment and how it can help you find - and keep - love* (pp. 8-9). Tarcherperigee.
- Lerner, J. S., Small, D. A., & Loewenstein, G. (2004). Heart strings and purse strings: Carryover effects of emotions on economic decisions. *Psychological Science, 15*(5), 337–341.
<https://doi.org/10.1111/j.0956-7976.2004.00679.x>
- Main, M., & Hesse, E. (1990). *Parents' unresolved traumatic experiences are related to infant disorganized attachment status: Is frightened and/or frightening parental behavior the linking mechanism?* In M. T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *The John D. and Catherine T. MacArthur Foundation series on mental health and development. Attachment in the preschool years: Theory, research, and intervention* (p. 161–182). University of Chicago Press.
- Main, M., Kaplan, N., & Cassidy, J. (1985). Security in infancy, childhood, and adulthood: A move to the level of representation. *Monographs of the Society for Research in Child Development, 50*(1-2), 66–104. <https://doi.org/10.2307/3333827>

- Main, M., & Solomon, J. (1986). Discovery of an insecure-disorganized/disoriented attachment pattern. In T. Brazelton, T. Berry, & M. W. Yogman (Eds.), *Affective development in infancy* (pp. 95–124). Westport, CT: Ablex Publishing.
- Main, M., & Solomon, J. (1990). Procedures for identifying infants as disorganized/disoriented during the Ainsworth strange situation. In M. T. Greenberg, D. Cicchetti, & E. M. Cummings (Eds.), *Attachment in preschool years: Theory, research, and intervention* (pp. 121–160). Chicago, IL: University of Chicago.
- Mikulincer, M., & Shaver, P. R. (2007). *Attachment in adulthood: Structure, dynamics, and change*. New York: Guilford Press.
- Mikulincer, M., Shaver, P. R., & Pereg, D. (2003). Attachment theory and affect regulation: The dynamics, development, and cognitive consequences of attachment-related strategies. In *Motivation and Emotion*, 27(2). (pp. 77–102). <https://doi.org/10.1023/A:1024515519160>
- Nosek, B. A., & Banaji, M. R. (2001, December). The Go/No Go Association Task. *Social Cognition*, 19(6), 625-664.
- Project implicit. (n.d.). Retrieved April 08, 2021, from <https://implicit.harvard.edu/implicit/>
- Ren, Z., Wang, D., Yang, A., Li, M., & Higgins, L. T. (2011). Implicit and explicit measures of adult attachment to mothers in a Chinese context. *Social Behavior and Personality*, 39(5), 701–712. <https://doi.org/10.2224/sbp.2011.39.5.701>
- Roberts, J., Gotlib, I., & Kassel, J. (1996). Adult attachment security and symptoms of depression: The mediating roles of dysfunctional attitudes and low self-esteem. *Journal of Personality and Social Psychology*, 70, 310–320.
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.

- Rothermund, K., Teige-Mocigemba, S., Gast, A., & Wentura, D. (2009). Minimizing the influence of recoding in the Implicit Association Test: The Recoding-Free Implicit Association Test (IAT-RF). *Quarterly Journal of Experimental Psychology (2006)*, 62(1), 84–98. <https://doi.org/10.1080/17470210701822975>
- Schacter, D. L. (1987). Implicit memory: History and current status. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 13(3), 501–518. <https://doi.org/10.1037/0278-7393.13.3.501>
- Scientific Council on the Developing Child at Harvard University (Center on the Developing Child). (2015). *Supportive relationships and active skill-building strengthen the foundations of resilience*.
- Shaver, C., Hazan, P. (1987). Being lonely, falling in love. *Journal of Social Behavior and Personality*, 2(2).
- Sheinbaum, T., Kwapil, T. R., Ballespí, S., Mitjavila, M., Chun, C. A., Silvia, P. J., & Barrantes-Vidal, N. (2015). Attachment style predicts affect, cognitive appraisals, and social functioning in daily life. *Frontiers in Psychology*, 6(296). DOI: 10.3389/fpsyg.2015.00296
- Spielberger, C. D. (1983). *State-Trait Anxiety Inventory for Adults (STAI-AD)* [Database record]. APA PsycTests.
- Target, M., Fonagy, P. & Shmueli-goetz, Y. (2003) Attachment representations in school-age children: The development of the child attachment interview (CAI), *Journal of Child Psychotherapy*, 29(2), 171-186, DOI: 10.1080/0075417031000138433
- Teachman, B., & Nock, M. (2011). *ProjectImplicit*. <https://www.projectimplicit.net/>

- Tyng, C. M., Amin, H. U., Saad, M. N. M., & Malik, A. S. (2017, August 24). The influences of emotion on learning and memory. *Frontiers in Psychology*. Frontiers Media S.A. <https://doi.org/10.3389/fpsyg.2017.01454>
- Venta, A., Jardin, C., Kalpakci, A., & Sharp, C. (2016). The development and preliminary psychometric evaluation of an attachment implicit association task. *Bulletin of the Menninger Clinic*, *80*(3), 255–280. <https://doi.org/10.1521/bumc.2016.80.3.255>
- Warren, S. L., Huston, L., Egeland, B., & Sroufe, L. A. (1997). Child and adolescent anxiety disorders and early attachment. *Journal of the American Academy of Child and Adolescent Psychiatry*, *36*(5), 637–644. <https://doi.org/10.1097/00004583-199705000-00014>
- Wei, M., Mallinckrodt, B., Larson, L. M., & Zakalik, R. A. (2005). Adult attachment, depressive symptoms, and validation from self versus others. *Journal of Counseling Psychology*, *52*, 368–377.
- Wei, M., Mallinckrodt, B., Russell, D. W., & Abraham, W. T. (2004). Maladaptive perfectionism as a mediator and moderator between adult attachment and depressive mood. *Journal of Counseling Psychology*, *51*, 201–212.
- Zemel, O., Ronel, N., & Einat, T. (2016). The impact of introspection and resilience on abstention and desistance from delinquent behavior among adolescents at risk. *European Journal of Criminology*, *13*(1), 111–128. <https://doi.org/10.1177/1477370815587770>

APPENDIX A



**NORTHERN MICHIGAN
UNIVERSITY**

Memorandum

OFFICE OF GRADUATE EDUCATION AND RESEARCH

1401 Presque Isle Avenue
Marquette, MI 49855-5301
906-227-2300
906-227-2315
www.nmu.edu/graduatestudies

TO: Lisa Savage
Psychological Sciences Department

CC: Jon Barch
Psychological Sciences Department

DATE: February 21, 2020

FROM: Lisa Schade Eckert 
Dean of Graduate Education and Research

SUBJECT: **IRB Proposal HS20-1104**
IRB Approval Date: 2/21/2020
Proposed Project Dates: 2/21/2020 – 10/01/2020
“Measuring Internal Attachment Style Using The Attachment Association
Implicit Measure (AAIM): A Validation Study”

Your proposal “Measuring Internal Attachment Style Using The Attachment Association Implicit Measure (AAIM): A Validation Study” has been approved by the NMU Institutional Review Board. Include your proposal number (HS20-1104) on all research materials and on any correspondence regarding this project.

- A. If a subject suffers an injury during research, or if there is an incident of non-compliance with IRB policies and procedures, you must take immediate action to assist the subject and notify the IRB chair (dereande@nmu.edu) and NMU’s IRB administrator (leckert@nmu.edu) within 48 hours. Additionally, you must complete an Unanticipated Problem or Adverse Event Form for Research Involving Human Subjects.
- B. Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant.
- C. If you find that modifications of investigators, methods, or procedures are necessary, you must submit a Project Modification Form for Research Involving Human Subjects before collecting data. Any changes or revisions to your approved research plan must be approved by the IRB prior to implementation.

All forms can be found at the NMU Grants and Research website:
<http://www.nmu.edu/grantsandresearch/node/102>