

Attachment and Self-Regulation

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Abstract

Close relationships and self-regulation are inextricably intertwined, yet many of the details regarding how interpersonal processes influence self-regulation are not well understood. To gain a better understanding of this link, we investigated the association between attachment styles and self-regulatory mode orientations. According to regulatory mode theory, *locomotors* are concerned with initiating goal-directed movement, whereas *assessors* are concerned with appraising potential means and goals. We predicted that the presence of an attachment figure with whom one has an *anxious attachment* would be associated with higher assessment tendencies. In addition, we predicted that the presence of an attachment figure with whom one has an *avoidant attachment* would be associated with lower locomotion tendencies. Five studies ($N = 1,434$) supported our predictions, and demonstrated that attachment styles and self-regulatory mode orientations covary across interaction partners.

Keywords

self-regulation, close relationships, regulatory mode, attachment style

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Self-regulation occurs in a rich social context in which other people play a profound role in guiding individual action (Fitzsimons & Finkel, 2010; Fitzsimons, Finkel, & vanDellen, 2015; Orehek, in press; Orehek & Forest, 2016). Norms, expectations, evaluative standards, goals, and tendencies develop in close relationships (Baldwin, Carrell, & Lopez, 1990; Higgins, 1987) and influence the actor because embracing them has interpersonal consequences (Higgins, Klein, & Strauman, 1985; Leary, 2004). The influence of other people on self-regulation is derived from the need to establish and maintain secure relationships, which drives people to learn behavioral patterns that induce approving and rejecting responses (Bowlby, 1988; Leary & Baumeister, 2000). Thus, a complete understanding of self-regulation requires consideration of the role of close relationships.

Attachment theory is an especially useful framework for understanding the link between close relationships and self-regulation. An important role of attachment figures is to serve as a secure base from which individuals explore the environment and strive toward personal goals. As other authors have noted, the secure base function of attachment figures has been understudied (B. C. Feeney & Thrush, 2010) and is therefore ripe for theoretical development and empirical investigation (B. C. Feeney & Van Vleet, 2010). Recent research has shown that having a secure base generally benefits autonomous exploration of one's environment (Drake, Belsky, & Fearon, 2014; B. C. Feeney, 2004, 2007; B. C. Feeney & Thrush, 2010). Yet, it is not known which aspects

of self-regulation are influenced by a secure base, nor is it known how insecure attachment styles thwart individual exploration. The present research contributes to the understanding of close relationships and self-regulation by investigating the way attachment styles influence basic components of self-regulation.

Self-Regulation

Self-regulation operates via a negative feedback loop in which a person monitors the current status of his or her action in comparison with a reference value (Carver & Scheier, 1998). When the individual observes a discrepancy between his or her current state and a desired state, she/he engages in action to reduce the discrepancy. Thus, self-regulation is composed of two basic processes: A person must (a) make comparisons through a process of assessment, and (b) engage in the action necessary to move forward by locomoting. Together, the comparison process (i.e., assessment) and action initiation (i.e., locomotion) represent the two basic components of all self-regulation.

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Although both the comparison process and action initiation are required for all self-regulation, a person can place more or less emphasis on each function. Self-regulatory mode theory outlines the implications of the relative predominance placed on comparison processes and action tendencies (Higgins, Kruglanski, & Pierro, 2003; Kruglanski et al., 2000). According to the theory, assessment tendencies reflect an emphasis on the comparison process and locomotion tendencies reflect an emphasis on taking action. Specifically, *assessment* refers to the evaluative component of self-regulation and is concerned with comparing the relative quality of means and their end-states with potential alternatives. *Locomotion* refers to the commitment to initiate and maintain goal-directed progress and moving actively while overcoming unnecessary distractions or delays. To reiterate a common example (cf. Kruglanski et al., 2000), imagine a person enters a parking lot and is faced with a choice between either pulling into the first available spot far from the entrance, or driving around for some time to find the spot closest to the door. A person with strong assessment tendencies would be more inclined to spend considerable time hunting for the best parking spot while a person with strong locomotion tendencies would be more inclined to pull into the first available spot and begin walking toward the entrance.

Assessment and locomotion refer to self-regulatory states that vary across situations and across people. Some situations arouse greater assessment tendencies, whereas others arouse greater locomotion tendencies. Research supports this notion, showing that assessment and locomotion tendencies shift across contexts and are sensitive to situational inductions (Avnet & Higgins, 2003; Orehek, Mauro, Kruglanski, & van der Bles, 2012). In addition, some people display more assessment or locomotion tendencies, on average, than do other people (Kruglanski et al., 2000). The same pattern of results has been attained when assessment and locomotion have been measured as an individual difference variable or experimentally manipulated (Kruglanski, Orehek, Higgins, Pierro, & Shalev, 2010). These two basic components of self-regulation are independent of each other such that both tendencies can be strong, one can predominate, or both can be weak.

When a person is oriented toward assessment, she/he is concerned with critical evaluation of alternative goals and means (i.e., the comparison component of self-regulation), and when oriented toward locomotion, she/he is concerned with making quick and steady goal progress (i.e., the action component of self-regulation). Consistent with this conceptualization, assessors prefer investing effort in activities that allow for appraisals and critical thinking, are willing to invest resources into the acquisition of information (Klem, Higgins, & Kruglanski, 1996), and are likely to scrutinize information carefully and detect errors and inconsistencies comprising it (Kruglanski et al., 2000; Pierro, Orehek, & Kruglanski, 2009). Locomotors prefer to get started on new tasks immediately, to engage in swift movement through tasks

(Kruglanski et al., 2000), and exhibit less procrastination (Pierro, Giacomantonio, Pica, Kruglanski, & Higgins, 2011). Once sufficient progress has been achieved on the task at hand, locomotors deactivate thoughts related to the old task (Fitzsimons, Friesen, Orehek, & Kruglanski, 2009) and are comfortable replacing it with a new task (Kruglanski, Pierro, Higgins, & Capozza, 2007). Together, these results paint a clear picture of assessment as an orientation concerned with the comparison component and locomotion as an orientation concerned with the action initiation component of self-regulation.

Because the comparison and action components, captured by the locomotion and assessment variables, are basic components of all self-regulation, a complete understanding of the link between close relationships and self-regulation should explain how each dimension is influenced by close relationship dynamics. Thus, it is important to understand the social factors that lead individuals to develop or adopt a craving for comparison (assessment) or movement (locomotion). Although self-regulatory mode theory has acknowledged that social settings, socialization experiences, and close relationships may give rise to preferences for either orientation, little is known about how this occurs (Kruglanski et al., 2000). According to our analysis, attachment theory is a particularly useful framework for understanding the relative emphasis placed on these two self-regulatory functions because we expect that the attachment dimensions of anxiety and avoidance are likely sources of variation in assessment and locomotion tendencies. Next, we review attachment theory as it relates to self-regulation, and then present our specific hypotheses.

Attachment in Close Relationships

Attachment styles reflect a mental representation of the self and other based on a history of shared experiences (e.g., Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1960, 1969). Individuals become securely attached when their attachment figure is consistently available and responsive to their needs, manifesting himself or herself as a safe haven that can be relied on in times of threat and a secure base from which to explore the environment. However, individuals become insecurely attached when one's attachment figure is either inconsistently available or consistently unavailable. When an attachment figure is inconsistently available, the individual attempts to gain validation from the other while fearing the possibility of rejection, a pattern that results in the hyperactivation of the attachment system that characterizes an anxious attachment style. When an attachment figure is consistently unavailable, the individual tends to pursue independence and self-reliance, a pattern that results in the deactivation of the attachment system that characterizes an avoidant attachment style.

Attachment theory has proven effective in explaining adult relationships, including adult relationships with

parents, romantic partners, and close peers (Hazan & Shaver, 1987). Adult attachment styles can best be represented along continua reflecting the two dimensions of avoidance and anxiety (K. A. Brennan, Clark, & Shaver, 1998; Fraley & Shaver, 2000; Fraley, Waller, & Brennan, 2000). Accordingly, secure attachment styles reflect low avoidant and anxiety tendencies. In support of the dimensional model of attachment, research has demonstrated the links between (a) anxious attachment and hyperactivation of the attachment system and (b) avoidant attachment and deactivation of the attachment system. For example, anxious attachment is positively associated with the experience of distress and avoidant attachment is negatively related to the experience of distress when one's partner is traveling (Fraley & Shaver, 1998), when in the presence of a partner during a stressful situation (Rholes, Simpson, & Oriña, 1999; Simpson, Rholes, & Nelligan, 1992; Simpson, Rholes, Oriña, & Grich, 2002), and when discussing conflict with a partner (Campbell, Simpson, Boldry, & Kashy, 2005; Simpson, Rholes, & Phillips, 1996). In addition, anxious attachment is positively related, and avoidant attachment is negatively related, to accessibility of thoughts associated with the potential of a partner leaving them (Fraley & Shaver, 1997), and to greater support seeking during a stressful situation (Collins & Feeney, 2000). These findings support the notion that attachment anxiety includes fear of rejection, unavailability, and abandonment by the partner while attachment avoidance includes disengagement from emotional-behavioral investment when facing challenging situations.

Preliminary research has demonstrated that attachment figures play an important role in individual exploration and self-regulation (Drake et al., 2014; Elliot & Reis, 2003; B. C. Feeney, 2004, 2007; B. C. Feeney & Thrush, 2010). For example, secure attachments are associated with greater self-control and school engagement among children (Drake et al., 2014). Among adults, secure attachment styles are associated with greater task engagement at work (Hazan & Shaver, 1990; Littman-Ovadia, Oren, & Lavy, 2013), the sense that exploration opportunities are available (B. C. Feeney, 2004), openness to exploration (Green & Campbell, 2000), autonomous goal pursuit (B. C. Feeney, 2007), achievement motivation, approach goals, mastery-approach goals (Elliot & Reis, 2003), and adaptive emotion regulation (Mikulincer, Orbach, & Iavnieli, 1998). These findings suggest that attachment styles may influence how individuals engage in self-regulation. While this research has demonstrated benefits of having a secure base for self-regulation, they stop short of detailing how a secure attachment style promotes such behavior or how anxious and attachment styles hinder such behavior. Thus, a gap in the understanding of attachment and self-regulation concerns the way attachment styles may influence components of self-regulation.

Attachment styles are relationship-specific, such that a person can simultaneously have an anxious attachment to his or her mother, an avoidant attachment to his or her father,

and a secure attachment to his or her romantic partner (Barry, Lakey, & Orehek, 2007; Cook, 2000; Fraley, Heffernan, Vicary, & Brumbaugh, 2011; La Guardia, Ryan, Couchman, & Deci, 2000). Based on this observation, we expect that the predicted connection between attachment styles and self-regulation will be relationship-specific. This is consistent with research showing that individual self-regulatory concerns shift as one moves from one relationship partner to another. The real or imagined presence of close others brings to mind the expectations and standards they have for the actor (Baldwin et al., 1990; Baldwin & Holmes, 1987; Higgins, 1987), and instigate pursuit of the goals to which they are associated (Fitzsimons & Bargh, 2003; Shah, 2003). In addition, close others can bring to mind ways of pursuing goals. For example, reminders of attachment figures have been shown to trigger secure, anxious, or avoidance goals, corresponding to the nature of the attachment style one has with the attachment figure (Gillath et al., 2006). Thus, we expect that attachment styles and self-regulatory orientations will shift depending on the person with whom one is interacting, and will covary across relationship partners.

The Present Research

Although previous research demonstrated that secure attachment is beneficial for successful self-regulation, it stopped short of investigating the differences between attachment avoidance and attachment anxiety and detailing how the basic assessment and locomotion components of self-regulation may be associated with each. We predicted that avoidant attachment would be associated with lower locomotion tendencies and that anxious attachment would be associated with higher assessment tendencies. The rationale for these predictions is provided below.

Hypotheses and Rationale

When in the presence of an attachment figure who serves as a secure base, a person should feel comfortable exploring their environment, knowing that their attachment figure is available to provide support when needed, will not unnecessarily interrupt, and is likely to respond to their efforts with approval (Bowlby, 1988; Elliot & Reis, 2003; B. C. Feeney, 2004; B. C. Feeney & Thrush, 2010). Thus, the person can feel free to explore his or her environment through locomotion without a need for excessive monitoring via assessment. That is, they feel at ease engaging in autonomous action and do not engage in excessive critical evaluation. Thus, we predict that a secure attachment should be characterized by high locomotion and moderate assessment.

When a person's attachment figure is inconsistently available to provide the support needed during exploration, the actor tends to adopt an anxious attachment style. Under these conditions, a person is likely to be critical and skeptical of exploration opportunities, making sure to evaluate the

activity carefully. By doing so, she/he can choose activities the attachment figure is likely to support, less likely to interrupt, and likely to approve. Thus, anxious attachment should be associated with heightened monitoring via assessment. This would not necessarily be accompanied by high or low locomotion. That is, she/he should display high monitoring of the best way to do things, whether they are going well, and whether they have approval, as indexed by heightened assessment tendencies.

When a person's attachment figure is consistently unavailable to provide assistance during exploration, the actor tends to adopt an avoidant attachment style. Under these conditions, the person should feel uncomfortable exploring his or her environment, and knowing that his or her attachment figure is unavailable to provide support when needed and is likely to respond to his or her efforts with disapproval. She/he should refrain from locomotion because she/he does not have a secure base from which to launch or a safe haven to which to retreat if things do not go well. Thus, we expect higher avoidant attachment to be associated with lower locomotion tendencies. We do not have reason to expect that avoidance would influence assessment tendencies. That is, she/he should display low craving for movement within the environment, as indexed by low locomotion tendencies.

In sum, we predict that the attachment anxiety dimension will be associated with high assessment tendencies and the attachment avoidance dimension will be associated with low locomotion tendencies. A secure attachment style characterized by low avoidance and low anxiety should therefore predict high locomotion and moderate assessment tendencies. In addition, we expect that attachment styles should predict self-regulatory behavior patterns consistent with the locomotion and assessment tendencies, and that these effects should be mediated by the self-regulatory orientations.

Study Overview

Our first study tested whether one's attachment styles with a best friend are associated with locomotion and assessment orientations while in his or her presence. In our second study, we manipulated attachment style activation by asking participants bring to mind a person with whom they had either a secure, anxious, or avoidant attachment style and measured subsequent regulatory mode orientations. In our third study, participants completed measures of attachment style and regulatory modes with respect to time spent with their mother, father, and closest peer (a common way of measuring variation across partners; Barry et al., 2007; La Guardia et al., 2000). This allowed us to investigate the extent to which attachment styles and regulatory mode orientations covary across relationship partners. Our final two studies measured behaviors that map directly onto locomotion and assessment tendencies. In our fourth study, we measured attachment styles with participants' closest peer, regulatory modes while in the imagined presence of their

closest peer, and the speed (essential aspect of locomotion)—accuracy (essential aspect of assessment) tradeoff during a laboratory task. In our fifth study, we measured attachment styles with students' closest peer at university, self-regulatory tendencies when in that person's presence, and the time in which course assignments were turned in. This allowed us to investigate behavior outside the lab that is a behavioral manifestation of high assessment and low locomotion self-regulatory tendencies (Pierro et al., 2011). In Studies 1 to 4, we intentionally collected larger samples than was suggested in published methodological papers. In Study 5, we collected data from all the students present in class on the day of data collection.

Each of our studies measured relationship-specific attachment styles because previous research has determined that attachment styles are best characterized by a unique bond with a particular person (Barry et al., 2007; Cook, 2000; Fraley et al., 2011; La Guardia et al., 2000), and because self-regulatory tendencies vary across interaction partners (Baldwin et al., 1990; Baldwin & Holmes, 1987; Fitzsimons & Bargh, 2003; Gillath et al., 2006; Higgins, 1987; Shah, 2003). The specific target(s) for each study were selected because we determined that they would be the most relevant for a given sample and set of tasks (discussed further in the Method section).

Study 1: Correlations Among Attachment Styles and Regulatory Modes

In Study 1, we tested whether attachment styles were associated with locomotion and assessment tendencies. Participants completed measures of their attachment styles and regulatory modes with respect to times in which they were with their best friend. Because we used an internet sample who differed widely in age and other demographic factors, we determined that participants' best friend would be the relationship partner with whom they would all be able to identify and for which that person would have a similar role across participants (in contrast to comparing a 20-year-old's romantic partner or mother to a 70-year-old's). We expected attachment anxiety to be positively related to assessment, but not necessarily related to locomotion. We also expected that attachment avoidance would be negatively related to locomotion, but not necessarily related to assessment.

Method

Participants. Seven hundred participants in the United States were recruited through Amazon's Mechanical Turk. Fifty states were represented and participants received \$.40 for completion of the study. Participants (336 males, 349 females, 5 other, 10 missing) were between 18 and 75 years ($M = 31.59$, $SD = 11.22$).

Materials and procedure

Attachment styles. The Experiences in Close Relationships–Revised (ECR-RS; Fraley et al., 2000) is a 36-item measure in attachment avoidance (18 items) and anxiety (18 items). Research has demonstrated the scale’s reliability and validity (Fraley et al., 2011; Fraley et al., 2000). Because our predictions are based on a relationship-specific conceptualization of attachment, we adapted the scale to reflect participants’ relationship with their best friend. Participants rated their agreement with statements reflecting attachment avoidance (“I prefer not to show my best friend how I feel deep down”) and anxiety (“I often worry that my best friend will not want to stay with me”) on a 7-point scale from 1 (*strongly disagree*) to 7 (*strongly agree*). Internal reliability for avoidance was .95 ($M = 2.57, SD = 1.12$) and anxiety .95 ($M = 2.51, SD = 1.20$).

Regulatory mode. Participants completed the Regulatory Mode Questionnaire (RMQ; Kruglanski et al., 2000), which has 12 items that measure locomotion tendencies (“I am a doer”) and 12 items that measure assessment tendencies (“I spend a great deal of time taking inventory of my positive and negative characteristics”). Participants reported their agreement with each item on a 6-point Likert scale from 1 (*strongly disagree*) to 6 (*strongly agree*) regarding times in which their best friend is present. Internal reliability for locomotion was .82 ($M = 4.26, SD = .70$) and for assessment .83 ($M = 3.69, SD = .82$).

Results and Discussion

As in previous research (Fraley et al., 2011; Kruglanski et al., 2000), the two attachment styles were positively correlated ($r = .64, p < .001$), and the regulatory modes were not ($r = -.03, p = .45$). We therefore performed a multivariate multiple regression analysis whereby we predicted locomotion and assessment from the two attachment styles while controlling for the influence of the other attachment style.¹

Attachment avoidance and attachment anxiety predicted regulatory mode, Wilks’s $\lambda_{\text{avoidance}} = .96, F(2, 696) = 15.67, p < .001, \eta_p^2 = .04$; Wilks’s $\lambda_{\text{anxiety}} = .91, F(2, 696) = 35.10, p < .001, \eta_p^2 = .09$. We investigated this pattern by performing univariate analyses. Attachment avoidance was negatively related to locomotion ($B = -.16, t(697) = -5.50, p < .001, 95\% \text{ confidence interval (CI)} [-.21, -.10]$), but not related to assessment ($B = -.05, t(697) = -1.44, p = .15, 95\% \text{ CI} [-.12, .02]$). Attachment anxiety was positively related to assessment ($B = .23, t(697) = 7.32, p < .001, 95\% \text{ CI} [.17, .30]$), and negatively related to locomotion ($B = -.10, t(697) = -3.59, p < .001, 95\% \text{ CI} [-.15, -.04]$).

Study 1 provided evidence for the predicted link between anxious attachment and high assessment and avoidant attachment and low locomotion. We unexpectedly found that anxious attachment predicted low locomotion. This finding was not replicated in Studies 2 to 4, and therefore we do not consider it further.

Study 2: Experimental Manipulation of Attachment

Study 2 was designed to test whether the findings of Study 1 replicate when experimentally manipulating attachment style activation. Participants recalled a time when their behavior reflected either secure, avoidant, or anxious attachment. We expected that locomotion would be lower in the attachment avoidance condition as compared with attachment security and anxiety conditions. We expected that assessment tendencies would be higher in the attachment anxiety condition as compared with attachment security and avoidance conditions. This study built on our first study by testing the causal relationship between attachment styles and self-regulatory modes.

Method

Participants and design. One hundred seventy-two participants took part in our study through Amazon’s Mechanical Turk in exchange for \$.40. Thirty-seven states were represented and participants (86 males, 86 females) were between 18 and 72 years ($M = 30.49, SD = 11.69$). Participants were randomly assigned to one of three conditions (Attachment: secure; avoidant; anxious).

Materials and procedure

Attachment style manipulation. Participants completed an attachment style manipulation in which they were randomly assigned to recall times they displayed either secure, avoidant, or anxious attachment (adapted from Bartz & Lydon, 2004; Mikulincer & Shaver, 2001). Specifically, participants were asked to recall times they behaved in accordance with the three attachment style self-report items developed by Hazan and Shaver (1987). In the secure attachment condition, participants were asked to recall times “you” (the participant) “found it pretty easy to get close to others”; “were comfortable depending on others and having them depend on you”; and “did not worry about being abandoned or about someone getting too close to you.” In the avoidant attachment condition, participants were asked to recall times in which “you” (the participant) “were somewhat uncomfortable being close to others”; “found it difficult to trust others completely and to allow yourself to depend on them”; and “were nervous when anyone got too close, and friends wanted to be closer to you than you felt comfortable with.” In the anxious attachment condition, participants were asked to recall times in which “you” (the participant) “found that others didn’t got as close to you as you would like”; “worried that your friends didn’t really like you or that they would not stay friends with you for long”; and “liked to spend a whole lot of your time with other people, and that this scared them away.”

Regulatory mode. Participants completed the RMQ (Kruglanski et al., 2000) as our dependent measure. The internal

reliability was .83 ($M = 4.24$, $SD = .69$) for locomotion and .80 ($M = 3.96$, $SD = .73$) assessment.

Manipulation check. After completing our dependent variable, participants completed the Attachment Styles Questionnaire (ASQ; J. A. Feeney, Noller, & Hanrahan, 1994) as a check on the efficacy of our manipulation. Participants indicated their agreement with 22 statements reflecting avoidant (e.g., “I prefer to keep to myself”) and 18 anxious items (e.g., “It’s important that others like me”) on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Composite scores for each subscale ($\alpha_{\text{avoidance}} = .87$, $M = 3.76$, $SD = .81$; $\alpha_{\text{anxiety}} = .89$, $M = 3.80$, $SD = 1.00$) were calculated by averaging across appropriate items.

Results and Discussion

Manipulation check. We started by analyzing responses to the manipulation check using a between-subjects multivariate analysis of variance (MANOVA; Attachment Manipulation: secure vs. avoidant vs. anxious) with the Avoidance and Anxiety subscales ($r = .55$, $p < .001$) from the ASQ as the dependent variables. Our attachment style manipulation influenced participants’ self-reported attachment styles, Wilks’s $\lambda = .94$, $F(4, 338) = 2.52$, $p = .04$, $\eta_p^2 = .03$. Univariate analyses with attachment avoidance and attachment anxiety as separate dependent variables showed that the attachment style manipulation marginally influenced attachment avoidance, $F(2, 169) = 2.90$, $p = .06$, $\eta_p^2 = .03$, and attachment anxiety, $F(2, 169) = 2.34$, $p = .10$, $\eta_p^2 = .03$.

Planned pairwise comparisons showed that self-reported avoidance was higher in the attachment avoidance condition ($M = 3.90$, $SD = .87$) compared with the attachment security condition ($M = 3.56$, $SD = .80$), $t(169) = 2.33$, $p = .02$, Cohen’s $d = .36$, but not the anxiety condition ($M = 3.81$, $SD = .69$), $t(169) = .55$, $p = .58$, Cohen’s $d = .08$. Self-reported anxiety was higher in the attachment anxiety condition ($M = 4.04$, $SD = 1.06$) compared with the attachment security condition ($M = 3.63$, $SD = .92$), $t(169) = 2.15$, $p = .03$, Cohen’s $d = .33$, but not the attachment avoidance condition ($M = 3.78$, $SD = .99$), $t(169) = 1.39$, $p = .17$, Cohen’s $d = .21$. It seems that our manipulations were partially successful in inducing the intended attachment styles. While we seem to have raised both insecure attachment styles compared with a secure attachment style, it remains unclear whether we induced the specific insecure attachment styles that we attempted. Because attachment avoidance and attachment anxiety tend to be correlated (including in our studies), this may reflect something about the variables rather than a unique artifact of our manipulation.

Main analyses. We performed a between-subjects MANOVA (Attachment Manipulation: secure vs. avoidant vs. anxious) on regulatory modes. Experimentally induced attachment style affected locomotion and assessment, Wilks’s $\lambda = .94$, $F(4, 336) = 2.86$, $p = .02$, $\eta_p^2 = .03$. Univariate analyses

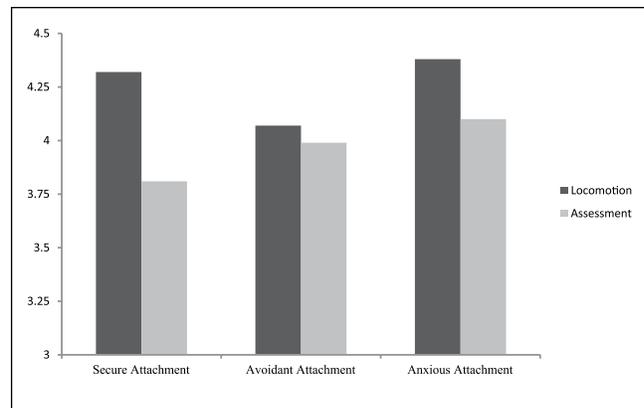


Figure 1. Experimentally manipulated attachment style (x-axis) and self-reported regulatory mode tendency (y-axis) in Study 2.

(see Figure 1) indicated that attachment style influenced locomotion, $F(2, 169) = 3.50$, $p = .03$, $\eta_p^2 = .04$, and marginally influenced assessment, $F(2, 169) = 2.24$, $p = .11$, $\eta_p^2 = .03$. Next, we conducted planned pairwise comparisons between attachment styles on each of the regulatory modes.

Participants in the avoidant attachment condition ($M = 4.07$, $SD = .71$) reported lower locomotion compared with the secure attachment condition ($M = 4.32$, $SD = .66$), $t(169) = -2.08$, $p = .04$, Cohen’s $d = .32$, and anxious attachment condition ($M = 4.38$, $SD = .67$), $t(169) = -2.38$, $p = .02$, Cohen’s $d = .37$. Participants in the anxious attachment condition ($M = 4.10$, $SD = .74$) reported higher assessment compared with participants in the secure attachment condition ($M = 3.81$, $SD = .63$), $t(169) = -2.07$, $p = .04$, Cohen’s $d = .32$. Participants in the anxious attachment condition did not differ from the avoidant attachment condition ($M = 3.99$, $SD = .78$) in their assessment tendencies, $t(169) = -.71$, $p = .45$, Cohen’s $d = .11$.

To test for divergent validity, we investigated whether anxious attachment influenced locomotion, and whether avoidant attachment influenced assessment. The anxious attachment and secure conditions did not differ in their locomotion tendencies, $t(169) = -.46$, $p = .64$, Cohen’s $d = .10$. The avoidant attachment and secure attachment conditions did not differ in their assessment tendencies, $t(169) = 1.46$, $p = .13$, Cohen’s $d = .22$. These null effects are consistent with our expectations.

The results from this study generally replicated results from Study 1 while experimentally manipulating the activation of attachment style. Our manipulation checks suggested that we may not have been successful in manipulating specific insecure attachment styles, but did reliably increase both avoidance and anxious attachment as compared with the secure attachment condition. Thus, focusing on the comparison between the secure condition and the predicted contrasts, we found that locomotion tendencies were lower in the avoidant condition than the secure condition and

assessment tendencies were higher in the anxious condition than the secure condition.

Study 3: Covariation Across Relationship Partners

We predicted that attachment styles and self-regulation tendencies would covary across relationship partners. If supported, this would further suggest that people emphasize different aspects of self-regulation depending on their interaction partner, and that which aspects of self-regulation will be emphasized is tied to the way they construe their relationship with the other person. To test this hypothesis, participants completed a measure of attachment style with respect to their mother, father, and best friend. In addition, they completed the regulatory mode questionnaire with respect to their tendencies when in the presence of each of those significant others. Our design enabled us to correlate attachment style and regulatory mode tendency at the trait level of analysis (capturing consistencies across interaction partners) as well as the social influence level of analysis (capturing variability across interaction partners). We expected to find the same relations among the variables at each of these levels of analysis.

Participants

One hundred seventy-four participants living in the United States were sampled through Amazon's Mechanical Turk in exchange for \$.40. Age ranged from 18 to 68 ($M = 31.07$, $SD = 10.00$), and 42 states were represented. Participants identified as male (84), female (87), or other (3).

Materials and Procedure

Participants completed measures of their attachment styles and regulatory modes when with their father-figure, mother-figure, and best friend (as in other research examining attachment style variability; Barry et al., 2007; La Guardia et al., 2000). The order of the relationship partners was counterbalanced. Participants completed all questionnaires related to a relationship partner before moving to the questionnaires associated with the next person.

Attachment style. Attachment style with each interaction partner was assessed via the ECR-RS (Fraley et al., 2000), as in Study 1. Internal consistency reliability for the Avoidance subscale was .95 (trait) and .97 (social) and was .99 (trait) and .93 (social) for the Anxiety subscale.

Regulatory mode tendencies. Participants completed the RMQ (Kruglanski et al., 2000) with respect to their time with each partner, as in Study 1. The internal reliability for locomotion was .92 (trait) and .74 (social), and for assessment .87 (trait) and .55 (social).

Results and Discussion

Our analytic approach was adapted from research using this type of design with attachment measures (Barry et al., 2007). We started by estimating the extent to which attachment style and regulatory mode reflect trait processes versus social influences using restricted maximum likelihood estimation with random factors. We first conducted univariate generalizability analyses (R. L. Brennan, 2001a) with relationship partner (i.e., the father-figure, mother-figure, and best friend) and items serving as within-subjects factors and participants serving as a between-subjects factor whereby partners were nested within participants. Next, we averaged across odd and even items to create two composite scores for each scale. This allowed for the odd and even composite scores to represent levels of the items factor and the highest-order interaction (i.e., partners nested within the participants \times items factor) served as the error term (see Barry et al., 2007, for more details).

The variance due to trait processes indicates the extent to which participants endorse similar attachment styles or employ the same regulatory mode tendencies across interaction partners. Variance due to social influences indicates the extent to which each of these behaviors varies systematically across the three interaction partners. Following previous research (Barry et al., 2007), we concluded that the variance due to trait versus social influences differed significantly when the 95% CIs of the variance estimates did not overlap.

The proportion of variance reflecting trait processes and social influences for attachment style and regulatory mode are displayed in Table 1. The variance in avoidance reflecting social influences (88%, $p < .05$) was significantly greater than the variance reflecting trait influences (6%, $p = ns$). For anxiety, we found no significant differences between trait (36%, $p < .05$) and social (47%, $p < .05$) influences. Locomotion was significantly more trait-like (52%, $p < .05$) than socially influenced (17%, $p < .05$). The variance reflecting trait influences for assessment (51%, $p < .05$) was significantly greater than the variance reflecting social influences (12%, $p < .05$). These findings are consistent with previous research on the characteristics of regulatory mode tendencies (Kruglanski et al., 2000) and attachment styles (Barry et al., 2007; Cook, 2000; La Guardia et al., 2000).

To estimate correlations between attachment style and regulatory mode, we calculated Pearson correlations (R. L. Brennan, 2001b) using percentile bootstrapping (Mooney & Duval, 1993). First, we examined correlations between the two attachment styles and between the two regulatory modes. As in previous research (Fraley et al., 2011; Kruglanski et al., 2000), anxious and avoidant attachment were correlated ($r = .64$, $p < .001$), but locomotion and assessment were not ($r = -.02$, $p = .71$). We proceeded with calculating correlations between the attachment dimensions and regulatory modes while partialling out the alternative attachment style in each analysis to account for the shared variance between the two styles.

Table 1. Variance Components, Standard Errors, and Proportion of Variance Accounted for by Trait and Social Influences in Study 3.

Source	Variance component	Standard Error	Proportion of variance
Avoidance			
Trait	0.004	.01	.06
Social	1.90	.01	.88*
Anxiety			
Trait	0.70	.11	.36*
Social	0.91	.07	.47*
Locomotion			
Trait	0.40	.05	.52*
Social	0.13	<.001	.17*
Assessment			
Trait	0.45	.06	.51*
Social	0.10	<.001	.12*

* $p < .05$.**Table 2.** Trait Influences: Multivariate Generalizability Correlations for Social Influences in Study 3.

	Anxiety	Locomotion	Assessment
Anxiety	—	-.14 (.09)	.28 (.07)**
Locomotion		—	.12 (.10)
Assessment			—

Note. Standard errors are presented in parentheses.

** $p < .001$.**Table 3.** Social Influences: Multivariate Generalizability Correlations for Social Influences With Avoidance Partialled Out for Study 3.

	Anxiety	Locomotion	Assessment
Anxiety	—	-.02 (.03)	.10 (.03)*
Locomotion		—	—
Assessment			—

Note. Standard errors are presented in parentheses.

* $p < .05$.

At a trait level of analysis (see Table 2), anxiety was positively correlated with assessment, but was not correlated with locomotion. Those with a trait-like disposition toward attachment anxiety across all relationship partners were also high in assessment tendencies. We did not calculate correlations between avoidance and the regulatory mode tendencies at the trait level because our earlier analyses showed that avoidance was not subject to trait influences.

We then calculated Pearson correlations at the social influence level of analysis (see Tables 3 and 4). Anxiety was positively correlated with assessment, but was unrelated to locomotion. In addition, avoidance was negatively related to locomotion, and was unrelated to assessment. In other words, the presence of attachment figures who fostered anxiety was associated with assessment tendencies, and the presence of

Table 4. Social Influences: Multivariate Generalizability Correlations for Social Influences With Anxiety Partialled Out for Study 3.

	Anxiety	Locomotion	Assessment
Anxiety	—	-.12 (.03)*	.03 (.02)
Locomotion		—	—
Assessment			—

Note. Standard errors are presented in parentheses.

* $p < .05$.

attachment figures who fostered avoidance was associated with lower locomotion tendencies.

Our prediction that avoidant attachment is related to lower locomotion and that anxious attachment is related to higher assessment was corroborated. The present study utilized a design that was capable of isolating trait from social influences on the connection between attachment style and regulatory mode. These analyses showed that when attachment anxiety was consistently high (low) across partners, assessment tendencies were also consistently high (low) across partners. In addition, these analyses showed that attachment anxiety and assessment covaried across interaction partners. That is, when in the presence of a partner who arouses high (low) attachment anxiety, participants tended to have high (low) assessment tendencies. When in the presence of a partner who arouses high (low) attachment avoidance, participants tended to have low (high) locomotion tendencies.

Study 4: Behavior in the Lab

In Study 4, we tested the consequences of attachment style—regulatory mode linkages for behavior. Kruglanski and colleagues (2000) report that high (vs. low) locomotors spent less time completing a proofreading task while high (vs. low) assessors found more errors. Locomotion predicted how quickly people moved through the task, whereas assessment

predicted how accurately people completed it. Based on these findings, we measured participants' attachment style and regulatory mode tendencies and presented them with a proofreading task. We expected that attachment avoidance would be associated with slower speed through decreased locomotion tendencies and that attachment anxiety would be associated with increased accuracy through increased assessment tendencies.

Participants

One hundred eighty-seven American students participated in our study for course credit. Participants (81 males, 106 females, one other) were 18 to 23 years old ($M = 18.60$, $SD = .96$).

Materials and Procedure

Attachment style. Participants completed the ECR-RS (Fraley et al., 2000) with regard to their closest peer. Because participants were university students, we determined that this prompt would be likely to elicit the person with whom they are closest. Internal consistency reliability for avoidance was .86 ($M = 1.98$, $SD = .68$) and was .93 ($M = 2.08$, $SD = .95$) for anxiety.

Regulatory mode. Participants completed the RMQ (Kruglanski et al., 2000) while in the imagined presence of their closest peer. The internal reliability for locomotion was .82 ($M = 4.36$, $SD = .68$) and for assessment .81 ($M = 4.08$, $SD = .77$).

Speed and accuracy. To measure speed and accuracy while completing a task, we presented participants with a proofreading exercise (cf. Kruglanski et al., 2000). Participants read the first 324 words from the essay "The Trouble With Fries" by Malcolm Gladwell (*The New Yorker*, March 5, 2001). We embedded 16 errors in the essay, including eight spelling errors and eight grammar errors. Participants were asked to circle any errors due to spelling and/or grammar. A research assistant was in the room with participants and recorded how long they spent using a stopwatch. Participants' speed was measured in seconds. Because time to complete the task was skewed, we tried a logarithmic transformation and square root transformation to normalize the data. The square root transformation best normalized our data, and was therefore applied. Participants' accuracy was measured as a number between 0 and 16 (false hits were not counted).

Results and Discussion

We tested whether regulatory modes mediated the link between attachment styles and speed and accuracy by conducting separate analyses on the two dependent variables

(following Kruglanski et al., 2000). As in our other studies, the two attachment styles were positively correlated ($r = .50$, $p < .001$), but the two regulatory modes were unrelated to each other ($r = .02$, $p = .74$). When using one of the attachment styles as a predictor, we controlled for the other attachment style.

We started our analyses by testing whether the two attachment styles were associated with participants' speed and accuracy on the proofreading task. Neither avoidance ($B = .39$, $t(179) = 1.42$, $p = .16$, 95% CI $[-.15, .93]$), nor anxiety ($B = .14$, $t(179) = .75$, $p = .46$, 95% CI $[-.24, .52]$), was associated with speed. Anxiety was also not associated with accuracy ($B = .16$, $t(179) = .54$, $p = .59$, 95% CI $[-.41, .73]$), but avoidance was marginally associated with less accuracy ($B = -.78$, $t(179) = -1.89$, $p = .06$, 95% CI $[-1.59, .03]$). Attachment, however, may still have an indirect effect on our dependent variables (e.g., through regulatory modes), so we proceeded by testing for the predicted mediations. Establishing a total relationship between a predictor and outcome variable is not a necessary precondition for the presence of mediation, instead leaving open the option that an independent variable may exert its influence through a potential mediator.

We first tested whether attachment styles were associated with the two regulatory modes by conducting two separate regression analyses on locomotion and assessment. As expected, assessment regulatory mode was positively associated with attachment anxiety ($B = .21$, $t(186) = 3.21$, $p = .002$, 95% CI $[.08, .33]$), but not related with attachment avoidance ($B = -.02$, $t(186) = -.22$, $p = .83$, 95% CI $[-.20, .16]$). Locomotion regulatory mode was negatively associated with attachment avoidance ($B = -.22$, $t(186) = -2.75$, $p = .01$, 95% CI $[-.38, -.06]$), but was not related to attachment anxiety ($B = -.09$, $t(186) = 1.52$, $p = .13$, 95% CI $[-.20, .03]$).

We next examined whether the predicted mediators (locomotion and assessment) were predictive of speed and accuracy while controlling for attachment styles. As expected, locomotion was associated with faster speed on the proofreading task ($B = -.53$, $t(177) = -2.09$, $p = .04$, 95% CI $[-1.03, -.03]$), but assessment was not ($B = .11$, $t(177) = .47$, $p = .64$, 95% CI $[-.33, .55]$). Assessment was associated with better accuracy on the proofreading task ($B = .70$, $t(177) = 2.10$, $p = .04$, 95% CI $[.04, 1.37]$), and locomotion was not ($B = -.36$, $t(177) = -.94$, $p = .35$, 95% CI $[-1.11, -.40]$).

Based on these findings, we tested whether locomotion mediated the link between attachment avoidance and speed and whether assessment mediated the link between attachment anxiety and accuracy. Using the distribution of the product of coefficients method (Tofighi & MacKinnon, 2011), we found support for both mediation pathways. This resampling approach for testing mediation is commonly used and simulation studies have shown that it offers a number of advantages compared with some other approaches for testing mediation, including greater statistical power (e.g., MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002).

Specifically, locomotion mediated the link between attachment avoidance and speed ($M\alpha\beta = .12$, $SE\alpha\beta = .07$; 95% CI [.004, .28]), whereas assessment mediated the link between attachment anxiety and accuracy ($M\alpha\beta = .15$, $SE\alpha\beta = .09$; 95% CI [.006, .34]).

Study 5: Behavior in an Educational Context

In our final study, we measured participants' attachment styles, regulatory mode tendencies, self-reported procrastination tendencies, and observed their behavior on three homework assignments. Previous research has demonstrated that procrastination is predicted by low locomotion and high assessment (Pierro et al., 2011). High assessors procrastinate due to a "paralysis by analysis" in which their scrutinizing and evaluation can produce perfectionism that hinders forward progress. Low locomotors procrastinate due to a lack of concern with getting started and continuing to make forward progress. Thus, procrastination is a quintessential high assessment and low locomotion tendency. The present study was designed to test whether attachment styles would predict procrastination tendencies, and whether the relation would be mediated by assessment and locomotion. In addition, our design allowed us to test the downstream consequences for participant's actual behavior in an academic setting. Specifically, we investigated whether our previous findings extend to participants' actual academic behavior over a period of 65 days.

Participants

Undergraduates ($N = 201$; 151 female; mean age = 19.8) were recruited from two introductory level sections of the same course. Their ages ranged from 18 to 35 ($M = 19.8$, $SD = 1.87$). Of the total, 164 were Caucasian (82%), 22 were Asian (11%), five were African American (2.5%), and three identified as Hispanic or "other" (3%). During the first class following the withdrawal deadline, participants completed three questionnaires and provided consent to track their performance on three written assignments over the course of the semester. Participants were compensated with a choice of candy bar for their participation.

Materials

Attachment style. Participants completed the ECR-RS (Fraley et al., 2000) with regard to their closest school peer. We determined that participants' closest school peer would be the person most likely to have an influence on their self-regulatory behavioral tendencies in the domain of academics. Internal reliability was .95 for the Avoidance subscale ($M = 2.23$, $SD = 1.03$) and .94 for the Anxious subscale ($M = 2.29$, $SD = 1.08$).

Regulatory mode. Participants completed the RMQ (Kruglanski et al., 2000) while in the imagined presence of their closest school peer. Cronbach's alpha was .83 for the Locomotion scale ($M = 4.42$, $SD = .62$) and .81 for the Assessment scale ($M = 4.29$, $SD = .65$).

Procrastination. Participants completed Tuckman's (1991) 16-item Procrastination scale with respect to times in which they are with their closest school peer. An example item is "When I am in the actual or imagined presence of my closest peer . . . I needlessly delay finishing jobs, even when they're important." Participants were asked to indicate the extent to which they agreed with each of these items using a 1 (*that's NOT me for sure*) to 4 (*that's me for sure*) scale. Internal reliability was .92 ($M = 2.28$; $SD = .58$).

Behavioral procrastination. We measured behavioral procrastination similarly to Tice and Baumeister (1997) via the time students uploaded three homework assignments. Assignment 1 was distributed the same day the self-report measures were completed and was due 12 days later. Assignment 2 was distributed 13 days after the self-report measures were completed and was due 10 days later. Assignment 3 was distributed 55 days after the self-report measures were completed and was due 10 days later.

Assignment 1 required students to expose themselves to a persuasion attempt (such as a salesperson) and write a one-page reflection of the experience. Assignment 2 asked students to observe the distance from which different social groups stood from one another and write a one-page report on their observations. Assignment 3 required students to enact a "day of compassion" during which they spent the day acting as compassionately as possible, then wrote a one-page reflection. Assignments submitted early were negatively valued (e.g., -60 for 60 min before the deadline) and assignments submitted late were positively valued (+60 for 60 min late). Students submitted their assignments an average of 1,308 min before the deadline ($SD = 1476$).

Grades. Assignments were graded by teaching assistants using a rubric. Grades were standardized for each assignment. Students averaged 92.89% ($SD = 11.19$).

Results and Discussion

Data preparation. We checked for potential dependence among the data obtained from the two sections by calculating intraclass correlations for our variables of interest. All intraclass correlations were below .02. Because an intraclass correlation coefficient of .10 or larger is generally considered a reason to model such dependency (Raudenbush & Bryk, 2002), we did not include class section as a variable in our analyses.

We tested our hypotheses using structural equation modeling. We used latent variables (instead of observed variables) because our dependent variables (time to turn in

assignments and assignment grades) have not been tested for their reliability and validity. While using latent variables can come with the cost of reduced statistical power, the estimates it produces are often more accurate than those produced using observed variables because latent variable modeling corrects for measurement error (e.g., Ledgerwood & Shrout, 2011).

We created seven latent factors (attachment avoidance; attachment anxiety; locomotion regulatory mode; assessment regulatory mode; self-reported procrastination; time to submit the assignments; grade on assignments). Because we were interested in the relationships among these variables rather than the factor loadings of each item to its corresponding latent variable, the first factor loading for each latent variable was fixed to “1.”

To construct our latent variables, we followed the recommendations of Williams and O’Boyle (2008). We used a partial disaggregation model whereby we averaged across subsets of items (instead of using all items of a questionnaire as separate indicators). Attachment avoidance and anxiety were measured with 18 items each, while locomotion and assessment were measured with 12 items each and self-reported procrastination with 16 items. We created three-item subsets for attachment avoidance (six items per parcel), anxiety (six items per parcel), locomotion (four items per parcel), and assessment (four items per parcel) and created four parcels for self-reported procrastination (four items per parcel). Because the latent variables of time to submit assignments and grade received on each assignment consisted of three indicators each, we used all three indicators to estimate these two latent variables. All parcels were created by randomly assigning items to parcels (Little, Cunningham, Shahar, & Widaman, 2002).

Using partial disaggregation (vs. using all available items as indicators) has several advantages when studying relationships among latent variables rather than testing the dimensionality of each variable, including a lower chance of finding dual factor loadings and correlated error terms and a higher chance of achieving good model fit. It allows for a more favorable ratio of indicators to sample size. If we had treated all items as indicators, a total of 171 parameters would have been estimated in our tested model, compared with our chosen approach with parcels, where we estimated 51 parameters. Given recommendations of sample size in structural equation modeling (e.g., Kline, 2005) suggesting five observations per parameter, we would have needed 855 participants in the first case but 255 in the second case (closer to our sample size of 201).

Main analyses. We conducted two tests for sequential mediation (see Figure 2) whereby attachment styles predicted students’ assignment grades through the following consecutive mediators: regulatory modes, trait procrastination, and time to submit the assignments. Specifically, attachment avoidance (anxiety) predicted locomotion (assessment); locomotion and

assessment, in turn, predicted trait procrastination (while controlling for attachment avoidance and anxiety); trait procrastination predicted time to submit assignments (while controlling for attachment avoidance, attachment anxiety, locomotion, and assessment); and time to submit assignments predicted assignment grade (while controlling for attachment avoidance, attachment anxiety, locomotion, assessment, and trait procrastination).

We constrained the pathways between attachment avoidance and assessment and between attachment anxiety and locomotion to be zero and we allowed the two attachment styles to covary. The sample variance-covariance matrix is displayed in Table 5 in Supplemental Materials.

The normalized estimate of Mardia’s coefficient suggested significant deviations from normality, $z = 12.31$, $p < .001$. We therefore used scaled maximum likelihood estimators corrected for non-normality in interpreting the results of the following analyses (Satorra & Bentler, 1988). The observed and model covariance matrices differed significantly, Satorra-Bentler $\chi^2(202) = 256.26$, $p = .01$. To assess model fit, we used both incremental (comparative fit index [CFI]) and absolute (goodness-of-fit statistic [GFI], root mean square error approximation [RMSEA], and standardized root mean square residual [SRMR]) fit indices. Although all these but the GFI suggested good fit (CFI = .97; GFI = .89; RMSEA = .04, 90% CI [.02, .05]; SRMR = .07), a LaGrange Multiplier test suggested that fit could be further improved by adding a correlated error term between students’ grades on Assignments 1 and 3. Doing so significantly improved model fit, Δ Satorra-Bentler $\chi^2(1) = 8.65$, $p = .003$. Even though significant differences between the observed and model covariance matrices still existed, Satorra-Bentler $\chi^2(201) = 238.86$, $p = .04$, all fit indices suggested good fit: CFI = .98; GFI = .90; RMSEA = .04, 90% CI [.02, .05]; SRMR = .07. Moreover, a new LaGrange multiplier test suggested that fit could be further improved by allowing the second attachment avoidance parcel to also load on the attachment anxiety factor, a suggestion which was not supported theoretically. We therefore proceeded with the planned analyses without this change. Finally, a Wald’s test did not suggest that any pathways should be dropped.

All factors except grades on assignments appeared to be well identified, displaying high construct validity (see Table 6 in the Supplemental Materials and Figure 3). Specifically, this factor had one factor loading that was non-significant (the grade received for Assignment 2). Yet, we chose to retain the grade received for Assignment 2 as an indicator of this factor because we needed at least three indicators to create a viable factor for grades received on assignments (e.g., Kaplan, 2008). Running the analyses without time to submit, and grade for, Assignment 2 (i.e., with time to submit and grades received as two composite scores rather than two latent factors) did not change the pattern of results, although it made the pathways between self-reported procrastination

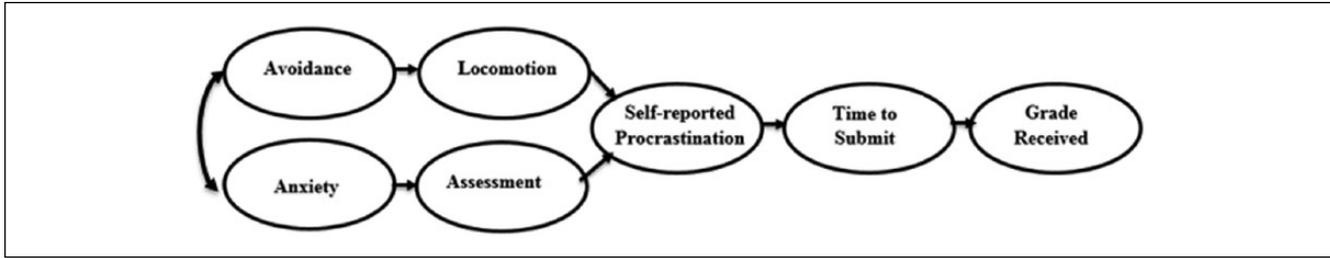


Figure 2. Structural model tested in Study 5.

Note. For clarity, the measurement model and the disturbances have been omitted from the figure.

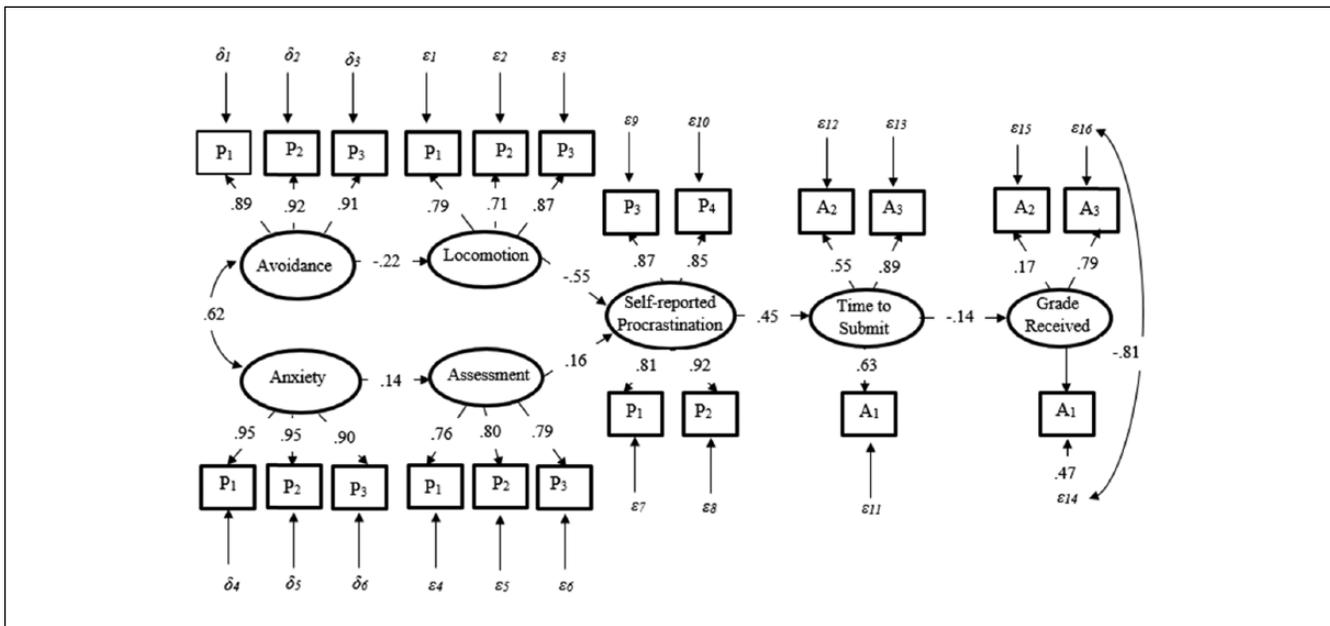


Figure 3. Measurement and structural models tested for Study 5.

Note. Indicator P refers to Parcel (e.g., P1 = Parcel 1 for a given factor). Indicator A refers to Assignment (e.g., A1 refers to Assignment 1). All pathways between factors were statistically significant at $p = .05$ or below.

and time to submit assignments ($B = .83, z = 4.05, p < .001$) and between time to submit assignments and assignment grade ($B = -1.25, z = -4.36, p < .001$) stronger than in the analyses reported below.

As expected, attachment avoidance was associated with low locomotion tendencies ($B = -.22, z = -4.03, p < .001$) while attachment anxiety was associated with high assessment tendencies ($B = .14, z = 3.82, p < .001$). Attachment avoidance explained $R^2 = 12.7\%$ of the variance in students' locomotion tendencies while attachment anxiety explained $R^2 = 8.5\%$ of the variance in their assessment tendencies. Also as expected, locomotion was associated with low trait procrastination ($B = -.55, z = -7.31, p < .001$), and assessment was associated with high trait procrastination ($B = .16, z = 2.04, p = .04$). Students' regulatory mode tendencies explained $R^2 = 46.7\%$ of the variance in their self-reported procrastination. Self-reported procrastination, in turn, predicted when students submitted their assignments, such that students who self-reported higher procrastination also

submitted their assignments later than students who self-reported lower procrastination ($B = .45, z = 2.98, p = .003$). Self-reported procrastination explained $R^2 = 11.7\%$ of the variance in students' time to submit assignments. Finally, time of assignment submission predicted grades, with students who submitted their assignments later receiving a lower grade than students who submitted their assignments earlier ($B = -.14, z = -1.95, p = .05$). Time of submission explained $R^2 = 14.6\%$ of the variance in students' grades.

The primary purpose of this study was to collect behavioral evidence for the predicted consequences of attachment styles. We therefore calculated the indirect effects of attachment styles on time it took students to submit their assignments (i.e., from attachment avoidance to locomotion to self-reported procrastination to actual procrastination in the classroom as well as from attachment anxiety to assessment to self-reported procrastination to actual procrastination in the classroom). To this end, we calculated 95% bootstrapped

CI for each of these indirect effects (based on 1,000 samples). Both of these indirect effects significantly differed from zero: indirect effect avoidance = .0546 (95% CI [.019, .1047]); indirect effect anxiety = .0103 (95% CI [.0004, .02648]). The results of this study therefore support our prediction that attachment styles influence behavior through self-regulatory tendencies.²

General Discussion

The present research adds to a growing interest in the connection between close relationships and self-regulation. All self-regulation requires assessment (making comparisons between the current state and desired states) and locomotion (moving from state to state Kruglanski et al., 2000). The aim of the present research was to investigate whether the social context is associated with the tendency to emphasize the assessment or locomotion component of self-regulation. We adopted an attachment theoretical perspective, which suggests that significant others can serve as a secure base from which to autonomously explore the environment (e.g., Ainsworth et al., 1978). Because attachment anxiety reflects uneasiness regarding whether an attachment figure will be available to serve as a secure base, we expected that it would be associated with critical consideration of exploration opportunities, as indexed by higher assessment tendencies. Because attachment avoidance reflects the presumption that an attachment figure is not available to support exploration, we expected that it would be associated with decreased willingness to engage in meaningful action, as indexed by lower locomotion tendencies. Confirming our predictions, we found that anxious attachment is positively associated with assessment tendencies and that avoidant attachment is negatively associated with locomotion tendencies. Individuals with a secure attachment seem to feel comfortable engaging in action without unnecessary or excessive comparison, as indexed by high locomotion and moderate assessment tendencies.

When in the presence of a person who serves as a secure base (i.e., with whom one has a secure attachment), individuals feel free to locomote and are unburdened by the need to engage in excessive assessment. Exploration of the environment is disrupted in both forms of insecure attachments. When attachment anxiety is low, exploration is hindered by excessive assessment. When attachment avoidance is low, exploration is hindered by lower locomotion.

The present research supports a domain-general view of attachment in which attachment figures are thought to influence broad-based psychological functioning, including autonomous exploration, individual self-regulation, and work performance (Belsky & Cassidy, 1994; Drake et al., 2014; Elliot & Reis, 2003; Hazan & Shaver, 1990). We found that attachment styles are associated with emphases placed on the comparison and action orientations involved in self-regulation. This research provides a more detailed

understanding of how attachment figures influence basic self-regulation processes. It also supports a relationship-specific view of attachment in which attachment styles and their complementary self-regulatory tendencies covary across relationship partners (Barry et al., 2007; Cook, 2000; Fraley et al., 2011; La Guardia et al., 2000). That is, we found support for the notion that individuals display different attachment styles and correspondingly different self-regulatory tendencies across different attachment figures.

This research suggests that attempts to improve or alter the course of self-regulation should consider the role of interpersonal processes. Parents, teachers, friends, and romantic partners influence the way a person approaches self-regulation. This means that to reduce procrastination and increase exploration, care should be given to the people who surround the actor. For example, academic settings such as universities should give greater consideration to social factors when seeking to facilitate student success. Employers should consider personal relationships when attempting to improve worker productivity. While social context is generally understood to influence behavior in these domains, the present research suggests specific types of relationship patterns that may foster specific types of behaviors. Future research could explore whether altering one's social context to spend more time with partners with whom they have a secure attachment reliably improves self-regulation. In addition to the self-regulation constructs measured in these studies, future research could investigate whether attachment styles influence other aspects of self-regulation.

These results may also have important implications for research and theory on psychosocial development. It is well known that childhood self-control abilities predict important behaviors in adulthood (Mischel et al., 2011). In addition, regulatory modes are strong predictors of performance in school settings, including our Study 5 and previous research (Kruglanski et al., 2000). Given that self-regulatory tendencies can be shaped early in life, and that these self-regulatory tendencies predict important life outcomes, a potentially fruitful avenue for future research could examine the way in which attachment styles among young children are linked to locomotion and assessment tendencies. Attachment styles with caregivers early in life may contribute to the development of locomotion and assessment tendencies. This heretofore unexamined developmental approach to self-regulatory orientations would mark a substantial contribution to understanding the way in which socialization processes influence individuals' approach to self-regulation. While authors have noted the importance of understanding self-regulatory development (e.g., Drake et al., 2014; Heckhausen & Dweck, 1998), much more research is needed.

One limitation of the present research is that we cannot make a conclusive statement regarding the direction of causality between our variables. Our second study experimentally manipulated attachment styles, demonstrating in that study, that attachment styles caused regulatory modes. Our

third study showed that attachment styles and regulatory modes covaried across relationship partners. The most plausible explanation is that the attachment style one has with each partner drives the fluctuations in regulatory modes, it remains possible that regulatory modes caused attachment styles, or that some third variable caused each. Even if attachment styles cause regulatory modes, it remains possible that the reverse pattern also holds true. Thus, it is possible that a recursive process unfolds such that attachment styles cause regulatory modes and that regulatory modes cause attachment styles, thereby reinforcing each other over time.

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Supplemental Material

The supplemental material is available with the online version of the article.

Notes

1. We did not have a hypothesis for the interaction between anxious and avoidant attachment in predicting the regulatory modes. However, in each study we performed an exploratory analysis to see whether an interaction effect emerged. In Study 1, we found an interaction between the two attachment styles in predicting assessment tendencies, $b = -.05$, $t(696) = -2.14$, $p = .03$, 95% CI [-.09, -.004]. Because the interaction was found only for assessment in this study and was not replicated in our subsequent studies, it is not considered further.
2. We also calculated indirect effects from avoidance and anxiety to student grades. As in the analyses above, we calculated 95% bootstrapped confidence intervals for each of the two indirect effects based on 1,000 samples. None of the indirect effects were statistically significant, as both included zero in their confidence interval. The indirect effect for avoidance was $-.0062$ (95% CI [-.0177, .0008]) and for anxiety $-.0012$ (95% CI [-.0042, .0002]).

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