

Positive Psychology and Attachment: Positive Affect as a Mediator of Developmental Outcomes

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Abstract Fredrickson's (1998) broaden-and-build model and Bowlby's (1969) attachment theory provide alternate explanations for positive cognitive, social, physical, and psychological outcomes, positive affect and secure attachments, respectively. This study examined whether affect mediates the relationship between attachment and positive outcomes. The sample consisted of 99 undergraduate students from a small, public liberal arts college in the mid-Atlantic region. For people high in attachment anxiety, but not those high in attachment avoidance, affect partially mediated social and psychological outcomes and fully mediated health outcomes. People who scored high in attachment anxiety reported less positive affect and more negative affect, which results in poorer social, physical, and psychological outcomes than those with lower levels of attachment anxiety. Perhaps children with caregivers who are more responsive to their needs experience more positive affect; and, it is the experience of positive affect that yields developmental advantages.

Keywords Attachment · Broaden-and-build · Positive psychology · Developmental outcomes

Introduction

Research in the field of positive psychology has expanded the scope of psychology beyond its focus on mental illness to include the factors that promote happiness and well-being. There is correlational, longitudinal, and experimental

evidence that happiness is related to and, in some cases, predicts or causes success in four major domains including cognitive, social, physical, and psychological (see Lyubomirsky et al. 2005a for a review). Fredrickson (1998) provided a theoretical framework for the association between positive affect and positive outcomes through her broaden-and-build model.

The Broaden-and-Build Model

Although negative emotions lead to a specific set of narrow action tendencies (e.g., fight-or-flight), positive emotions lead to broadened thought-action tendencies (Fredrickson 1998). In other words, positive emotions *broaden* the way individuals process information and increase the type and amount of activities they want to pursue (Fredrickson and Branigan 2005). These broadened thoughts and actions allow an individual to *build* cognitive, social, physical, and psychological resources that can be accessed in times of need to promote survival (Fredrickson 1998, 2001).

Cognitive

Positive emotion has been found to have a broadening effect on perception, attention, and more complex cognitive processes. First, individuals induced into a positive mood were more likely to perceive peripheral visual information than those induced into a negative or neutral mood (Fredrickson and Branigan 2005; Brandt et al. 1992). Second, in a global–local visual processing task, people in a positive mood attended to the global rather than local elements of a figure demonstrating broadened attention (Basso et al. 1996; Fredrickson and Branigan 2005; Gasper and Clore 2002; Kimchi 1992). Finally, the cognitive broadening associated with positive emotions has also been

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found to be beneficial during more complex tasks including creative problem solving (Isen et al. 1987; Rowe et al. 2007), decision making (Bless et al. 1996; Isen and Means 1983; Kenealy 1988; Velten 1968), semantic categorization (Isen and Daubman 1984), and reading comprehension (Lyubomirsky et al. 2011).

Social

Research has indicated that people experiencing positive emotions have broadened action tendencies as evidenced by increased social interaction and openness to new experiences (Fredrickson and Branigan 2005). Positive affect has been consistently linked to extraversion and sociability in correlational, longitudinal, and experimental studies (Lyubomirsky et al. 2005a). People experiencing positive emotions are more likely to affiliate with others and report higher quality social interactions (Berry and Hansen 1996; DeNeve and Cooper 1998; Harker and Keltner 2001; Lucas et al. 2000). Thus, positive affect builds social relationships that can be called upon during times of need (Fredrickson 1998).

Physical

Positive emotions have a strong association with positive health and longevity (Danner et al. 2001; Lyubomirsky et al. 2005a; Pressman and Cohen 2005). In a meta-analysis of 150 studies, Howell et al. (2007) found that positive well-being was related to both short-and long-term health outcomes as well as the control of disease symptoms. The mechanism may be that positive emotions benefit physical development indirectly by undoing the harmful effects (e.g., increased heart rate) of negative emotions (Fredrickson and Levenson 1998; Fredrickson et al. 2000).

Psychological

Finally, positive emotions also help build psychological resources that can buffer against negative emotions (Fredrickson 1998). Positive emotions have been associated with resilience to negative life events (Folkman and Moskowitz 2000; Fredrickson et al. 2003; Tugade and Fredrickson 2004). Fredrickson et al. (2003) argued that positive affect helps build the trait of resiliency in individuals, allowing them to flourish when faced with difficult situations. Additionally, optimism has been identified as a protective factor against depression (Seligman 2006).

Attachment Theory and Development

As outlined in Fredrickson's (1998) broaden-and-build model, positive affect is associated with positive outcomes

in all four major areas of development (i.e., cognitive, social, physical, and psychological). However, secure attachment style has been identified independently as foundational to having beneficial outcomes in these four areas as well (see Ranson and Urichuk 2008 for a review). Although some question the relationship between attachment and developmental outcomes due to methodological problems (Lamb 1987), Bowlby's original theory of attachment predicts, and subsequent research supports, the relationship between the secure attachment style and positive outcomes.

Bowlby (1969) described three attachment styles including secure and insecure, which has two sub-types. The secure attachment style develops as a result of consistent and responsive caregiving during the first year of life. These secure children view their attachment figure as a safe base for exploring their environments and seek proximity to the caregiver in times of distress. Children who have insecure avoidant styles of attachment have early caregivers who were consistently unresponsive to the child's proximity seeking and maintaining attachment behaviors. Finally, the caregivers of children who develop an insecure anxious/ambivalent style of attachment were inconsistent in their responsiveness to the children's bids for attention. Attachment styles developed in the first year of life have been found to be moderately stable over the lifespan, which has implications for long-term, developmental outcomes (Fraleay 2002).

Cognitive

Children who have secure attachments tend to approach novel stimuli and environments (Bowlby 1969). These opportunities for exploring and learning about the environment should lead to cognitive advantages for people with secure attachment styles (Belsky and Cassidy 1994). Research has supported this prediction indicating that children who have secure attachment styles demonstrate some cognitive advantages from infancy through adolescence. Although a meta-analysis on the relationship between attachment and IQ showed a relatively weak association (van Ijzendoorn et al. 1995), there is some evidence that maternal attachment style may be predictive of child's IQ (Crandell and Hobson 1999). In addition, children with secure attachments have demonstrated specific cognitive advantages in terms of better language skills (McElwain et al. 2008; van Ijzendoorn et al. 1995) and better academic performance (Aviezer et al. 2002) including higher grade point averages (Jacobson and Hofmann 1997).

Social

In addition, Bowlby's (1969) theory predicts that attachment style would have a long-term impact on social relationships. He proposed that children develop internal working models

based on the relationships they had with their primary caregivers that affect future social interactions and relationships. Many studies have supported the impact of attachment style on social development in early childhood. Children with secure attachment styles demonstrate increased social competence (Cohn 1990; Easterbrooks and Lamb 1979; Lieberman 1977; McElwain et al. 2008; Schmidt et al. 2002a; Sroufe 2005; Urban et al. 1991), more frequent and positive peer interactions (Booth et al. 1991; Easterbrooks and Lamb 1979; Pastor 1981), and greater cooperation (Londerville and Main 1981). Children, especially boys, with insecure attachment styles have demonstrated more aggression and behavior problems than those with secure styles of attachment (Cohn 1990; Pastor 1981; Renken et al. 1989; Schmidt et al. 2002b). These social benefits extend to middle childhood as well when children with secure attachments are found to be more popular (Bohlin et al. 2000; Cohn 1990), have higher self-esteem (Cassidy 1988; Huntsinger and Luecken 2004), and less social anxiety (Bohlin et al. 2000).

Physical

The increased exploration associated with secure attachment styles should promote physical health (Bowlby 1969). Although there has been less research conducted in the area of physical health, the existing research supports physical advantages to secure attachments (Ranson and Urichuk 2008). Nachmias et al. (1996) found that attachment style moderated the relationship between behavioral inhibition and stress reactivity. Among highly inhibited toddlers, those with secure parental attachments had lower levels of the stress hormone cortisol than those with insecure attachments, which the authors suggested was due to maternal–child interactions that interfered with the ability of an insecurely attached child to cope with stressful situations. Poor maternal–child interaction may also contribute to acute and chronic health problems at age two (Mäntymaa et al. 2003). Mäntymaa et al. (2003) concluded that infants who demonstrated avoidant behaviors were at risk for future health problems. The health benefits may also extend into adulthood when women who report secure attachment styles also reported fewer physical symptoms, doctors visits, and lower health care costs (Ciechanowski et al. 2002; Kotler et al. 1994; Schmidt et al. 2002a). Finally, secure attachment style appears to be associated with health promoting and disease preventing behaviors (e.g., less drug use, less risky sexual behavior, and more exercise) in adults (Huntsinger and Luecken 2004; Walsh 1992).

Psychological

Finally, attachment theory has suggested that attachment styles lead to different styles of affect regulation that have

implications for psychological development (Mikulincer et al. 2003). People who have a secure style of attachment seek out the support of others to combat negative moods; whereas those with insecure attachment styles use less adaptive strategies (Fraley and Shaver 1998; Mikulincer et al. 1998; Priel and Shamai 1995; Simpson et al. 1992). People with the insecure anxious attachment style use a hyperactivating strategy in which they ruminate on negative thoughts and emotions (Mikulincer et al. 2003), while people with the insecure avoidant style regulate negative affect through a deactivating strategy in which they isolate themselves from others (Fraley and Shaver 1997; Mikulincer et al. 2003). The more adaptive coping strategies (i.e., support-seeking) used by people with secure attachments have direct implications for psychological health (Mikulincer et al. 2003).

Research has also supported the link between attachment style and psychopathology. Children with an insecure attachment style have been found to demonstrate less ego resiliency than children with secure attachment styles (Arend et al. 1979; Sroufe 2005; Urban et al. 1991). Later in life, people who had insecure attachments are also more likely than those with secure styles of attachment to be diagnosed with internalizing disorders such as anxiety and depression (Mickelson et al. 1997; de Ruiter and van Ijzendoorn 1997; Sroufe 2005; Warren et al. 1997) as well as externalizing disorders such as conduct disorders and substance abuse disorders (Holland et al. 1993; Rothbaum and Weisz 1994; Rubin et al. 2003; Sroufe 2005). In summary, attachment style has been found consistently to be related to mental health.

The Current Study

The broaden-and-build theory (Fredrickson 2001) and attachment theory provide two alternate explanations with separate bodies of research that attempt to explain successful cognitive, social, physical, and psychological outcomes: positive affect and secure attachment, respectively. Although there have been some attempts to relate attachment theory to the field of positive psychology conceptually (Mikulincer and Shaver 2005; Mikulincer et al. 2003), little empirical work has been conducted. Mikulincer & Shaver (2005) and Mikulincer et al. (2003) have argued that attachment security plays a significant role in affect regulation. For example, people low in attachment anxiety and avoidance are more likely to recall positive information that alleviates distress when induced into a negative mood than those high in either attachment anxiety or avoidance. In addition, priming participants to think of a loving attachment figure has been associated with the attribution of positive affect to neutral stimuli indicating that positive emotion is clearly part of the secure-base

schema (Mikulincer et al. 2001). The researchers have suggested that there is a “broaden-and-build cycle of attachment security (p. 82)” in which secure attachment is associated with building resources that can be drawn on during stressful circumstances to maintain mental health (Mikulincer et al. 2003). However, Ryan et al. (2007) question the ability of attachment theory to serve as a framework for the field of positive psychology as well as whether general positive outcomes can be understood in terms of “mechanisms derived from moments of threat to safety, and proximity seeking in the face of them” (p. 178). Fundamentally, the question remains, whether attachment style is necessary to explain beneficial developmental outcomes or if the experience of positive affect, regardless of the source, is sufficient. To address this question, analyses were conducted to examine if affect mediates the relationship between attachment and positive outcomes in the following four areas: cognitive, social, physical, and psychological.

Method

Participants

The sample consisted of 99 undergraduate students from a small, public liberal arts college in the mid-Atlantic region who volunteered for the study and received credit toward their general psychology course. Participants included 75 female and 24 male college students between the ages of 18 and 52, with a mean age of 19 ($SD = 1.11$). Approximately 80.8 % of the participants were Caucasian, 4.0 % African American, 8.1 % Hispanic, 8.1 % Asian or Pacific Islander, 1.0 % Alaskan Native, and 6.1 % defined themselves as other. These demographics are representative of the student population at this university.

Materials

Participants were given a survey consisting of several different questionnaires that assessed subjective well-being, attachment, and the four types of resources described in Fredrickson’s (1998) broaden-and-build theory: psychological, social, cognitive, and physical resources.

Attachment

Although much of the research on attachment in adults has been conducted using this three group conceptualization of attachment (Hazan and Shaver 1987), more current research has conceptualized attachment styles using the two independent dimensions of anxiety and avoidance where secure attachment is operationally defined as having low scores on both anxiety and avoidance (Brennan et al.

1998). Therefore, the independent variable was assessed using the Multi-item Measure of Adult Romantic Attachment (Brennan et al. 1998). This is a 36-item self-report measure of attachment in adults with two 18-item subscales. The anxiety scale consists of items such as “I worry a lot about my relationships.” The avoidance scale consists of items such as “I prefer not to show my partner how I feel deep down.” Each item is rated on a seven point scale that ranges from *disagree strongly* to *agree strongly*. Reliability for the anxiety scale has been found to be 0.91, while the avoidance scale was 0.94 (Brennan et al. 1998). In this sample, Cronbach’s alpha was 0.92 and 0.92, respectively.

Affect

The mediator was operationalized using the positive and negative affect schedule (PANAS) to measure a participant’s positive and negative affective states during the past week (Watson et al. 1988). Participants rated their current emotional experience on a list of twenty items, ten that exhibit positive affect and ten that exhibit negative affect, on a scale from 1 (*very slightly or not at all*) to 5 (*extremely*). The PANAS has been found to have a reliability of 0.87 and 0.89 on the positive and negative affect scales, respectively (Watson et al. 1988). Cronbach’s alpha for the positive affect scale (PAS) was 0.84 and the negative affect scale (NAS) was 0.87 in this sample. Although the broaden-and-build theory is specific to the role of positive affect in building resources, the NAS was included in the analyses based on dispute over whether positive affect and negative affect operate as two independent dimensions (Watson and Tellegen 1985) or as two ends of one bipolar dimension (Barrett and Russell 1998; Russell and Carroll 1999). If the latter, the NAS should negatively correlate with the developmental outcomes investigated.

Cognitive Outcome

Participants provided their high school grade point average (GPA) as an indicator of their cognitive outcomes as in some prior studies on attachment (e.g., Jacobson and Hofmann 1997). Self-reported GPA has been found to be highly correlated with GPA obtained from transcripts (Nofle and Robins 2007).

Social Outcome

The Duke-UNC Social Support Questionnaire (SSQ) was administered to assess participants’ level of social support. Participants rated statements such as “I get help around the house,” and “I get love and affection,” on a scale of 1 (*much less than I would like*) to 5 (*as much as I would like*). The SSQ has been shown to have an internal reliability of

0.64 (Broadhead et al. 1988). Cronbach's alpha for this sample was 0.88.

Physical Outcome

Medical Outcomes Study Short Form Health Survey (MOS-SF-12) measures six constructs regarding individual physical and mental functioning (Stewart et al. 1988). This questionnaire has a reliability of 0.81 (Stewart et al. 1988), while Cronbach's alpha in this sample was 0.86. In this study, the health perception subscale was utilized as a measure of physical outcome. Physical health was assessed by self-report of overall health status (i.e., 1, *Excellent*, to 5, *Poor*) and rating the application of statements relating to health and illness on a scale of 1 (*definitely true*) to 5 (*definitely false*).

Psychological Outcomes

Several different aspects of participants' psychological resources were assessed. Questionnaires were used to measure two aspects of positive resources, including resiliency and optimism as well as two aspects of negative psychological functioning (i.e., stress and depression). First, the Ego-resiliency scale measures an individual's ability to cope with life stresses and adapt to new environmental contexts. Participants were asked to rate how much a list of 14 characteristics applied to themselves, such as "I enjoy trying new foods" and "I get over my anger at someone reasonably quickly," on a scale of 1, *does not apply at all*, to 4, *applies very strongly* (Block and Kremen 1996). This scale has a reported reliability of 0.76 (Block and Kremen 1996). Cronbach's alpha for the sample used was 0.77.

Second, the revised life orientation task (LOT-R) was given to participants in order to measure individuals' dispositions to having an optimistic personality. The LOT-R measures individual differences in trait optimism. It consists of ten questions (four are filler items) such as "In uncertain times, I usually expect the best" and "Overall, I expect more good things to happen to me than bad." Participants were asked to rate their agreement to these statements on a scale of 1 (*I disagree a lot*) to 5 (*I agree a lot*). The LOT-R has been used widely in research to measure trait optimism. It has sufficient reliability ($\alpha = 0.82$) as well as predictive and discriminant validity (Scheier et al. 1994). Cronbach's alpha for this sample was 0.76.

Third, the Perceived Stress Scale (PSS) was used to measure participants' appraisal of situations in their life as stressful. The scale consists of ten items asking participants to rate the frequency of stressful events that occurred in the past month (e.g., How often have you been upset because of something that happened unexpectedly?) on a scale

from 1 (*never*) to 5 (*very often*). The PSS is a state measure of stress that has adequate reliability, 0.85 (Cohen et al. 1983). Cronbach's alpha for this sample was 0.89.

Finally, participants completed the Center for Epidemiologic Studies Depression Scale (CES-D), which measures depressive symptoms in non-clinical populations. Participants were asked to read twenty statements related to depression and rate how many times they have felt these depressive symptoms over the past week on a scale from 0, *rarely or none of the time (<1 day)*, to 3, *most or all of the time (5–7 days)* (Radloff 1977). The test–retest reliability of this measure is 0.90 (Radloff 1977). The Cronbach's alpha was 0.93 in this sample.

Procedure

After obtaining approval of the university's Institutional Review Board, data were collected in two large groups of approximately 50 participants each. Participants were given informed consent and one hour to complete the survey consisting of the measures listed above in addition to some demographic questions pertaining to age, race, ethnicity, and academic class standing. All participants were treated according to the ethical guidelines of the American Psychological Association (APA 2001).

Results

Descriptive statistics for each variable are reported in Table 1. About a fourth (25.5 %) of the participants indicated having mild to significant depressive symptoms on the CES-D as indicated by a score of 16 or above, which is similar to other non-clinical samples (Radloff 1977). Data were analyzed to determine if affect mediates the relationship between attachment and positive outcomes in the following four areas: cognitive, social, physical, and psychological (see Fig. 1). The most common approach to mediation is the four-step process described by Kenny et al. (1998), which requires a significant correlation between the predictor (X) and the outcome (Y); between the predictor (X) and the mediator (M); as well as between the mediator (M) and the outcome (Y) after controlling for the predictor (X) prior to the examination of a mediational relationship. However, there is mounting evidence that not all of these conditions are necessary for a mediation to exist (Preacher and Hayes 2008). Additionally, MacKinnon et al. (2004) evaluated the power and Type I error rate of the four-step approach and recommended that it should only be used with large samples. Therefore, an approach to mediation was used that permits the examination of multiple mediators using a bootstrapping method to generate estimates of the indirect effects of each mediator in the model (Preacher

Table 1 Descriptive statistics

	Mean	SD
<i>Independent variables</i>		
Anxiety	3.52	1.19
Avoidance	3.02	1.10
<i>Mediators</i>		
Positive affect	34.82	6.13
Negative affect	23.63	7.66
<i>Outcomes</i>		
High school GPA	3.67	0.39
Physical health	75.17	20.19
Social support	3.88	0.81
Ego resiliency	3.01	0.41
Optimism	20.19	4.31
Perceived stress	1.80	0.71
Depression	12.65	10.51

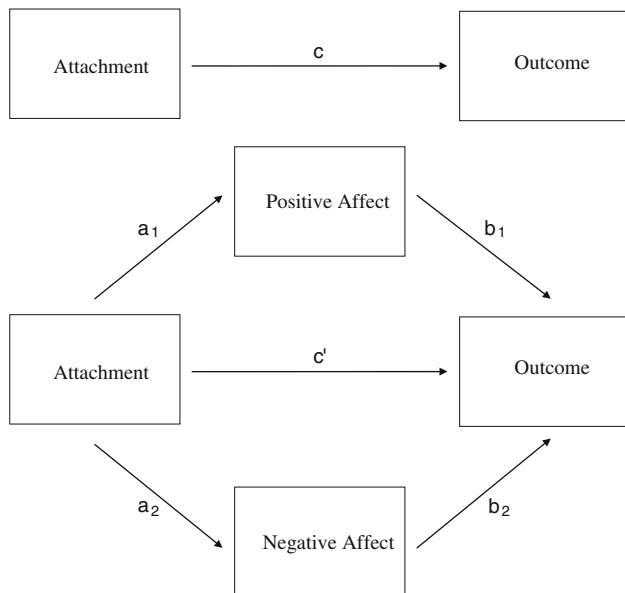


Fig. 1 This is the general analytic model for affect as a mediator of attachment and developmental outcomes. The model was tested separately for both anxiety and avoidant attachment well as each developmental outcome (i.e., cognitive, physical, social, ego resiliency, optimism, perceived stress, and depression). The *c* coefficient represents the relationship between attachment and the outcome without controlling for affect. The *c'* coefficient represents the relationship between attachment and outcome after controlling for both positive and negative affect. The *a* and *b* paths represent the relationship of attachment to the outcome as mediated by affect

and Hayes 2008). The correlation between the PAS and NAS was conducted and was found not to be significant, $r(97) = 0.03, p > 0.05$. Therefore, the specific indirect effects of each mediator should not be attenuated due to collinearity of the mediators.

A mediation analysis was conducted separately for the avoidance and anxiety subscales of the attachment measure for each of the four outcome areas. The analyses were conducted based on 5,000 bootstrap samples using the indirect script for SPSS (Preacher and Hayes 2008) available <http://www.afhayes.com/spss-sas-and-mplus-macros-and-code.html>. The analyses used raw score (unstandardized) coefficients, which are reported in Table 2 for attachment anxiety and Table 3 for attachment avoidance. The indirect script tests the significance of individual coefficients (e.g., *a*, *b*, *c*, and *c'*) using *t* tests. The strength of the mediated effect of attachment on a given outcome through state positive and negative affect was estimated by the *a* × *b* paths and tested for significance using the bias corrected and accelerated 95 % confidence intervals. Confidence intervals (CI) were used to determine the significance of the mediation because the indirect effect of X on Y may not be normally distributed in small samples; normal distribution is necessary for *p* values to be valid. A mediator was considered to be statistically significant if the CI did not overlap zero. The *R*² total for each model was also reported in the tables.

Examination of the results revealed that state affect mediated the relationship between attachment and many of the developmental outcomes for the anxiety subscale, but not the avoidance subscale. In terms of attachment avoidance, it had a significant inverse relationship to both physical health perceptions and social support (*c* path); however, it was not related to positive or negative state affect (*a* paths). Although state PA and NA were related to many of the outcomes investigated in this study (*b* paths), none of the indirect (*a* × *b*) paths were significant for the avoidance subscale (see Table 3). Therefore, only the results for the anxiety subscale will be discussed further.

For GPA, physical health, social support, ego resiliency, and optimism, the indirect effects (i.e., the *a* × *b* path) are negative because state positive affect had a negative correlation with attachment anxiety (*a* path) and a positive correlation with the outcome (*b* path). Therefore, the product of the *a* × *b* path (i.e., the indirect effects) has a negative sign. The reverse pattern held when negative affect served as the mediator, again, yielding a negative sign for the indirect effect of these pathways. The indirect effects for the remaining outcomes (i.e., perceived stress and depression) had a positive sign because state positive affect had a negative correlation with both the independent variable, anxiety, as well as the dependent variables of stress and depression. Alternatively, when state negative affect served as the mediator, it had a positive correlation with both attachment anxiety and the outcomes of anxiety and depression.

In general, attachment anxiety was significantly related to decreased positive affect, increased negative affect, as well as worse physical, social, and psychological outcomes.

Table 2 Mediation of the effect of anxiety on outcomes through positive and negative affect

	Total effect	Direct effect	Mediation by positive affect			Mediation by negative affect			Total R ²
	c	c'	a1	b1	a1 × b1	a2	b2	a2 × b2	
Cognitive	0.03	0.06	−0.14**	0.06	−0.01	0.25**	−0.08	−0.02	0.03
Physical	−5.50**	−1.95	−0.16**	7.11	−1.14 ^a	0.23***	−10.33***	−2.38 ^a	0.21***
Social	−0.27***	−0.21**	−0.14**	0.31*	−0.04 ^a	0.23***	−0.09	−0.02	0.21***
Resiliency	−0.13***	−0.08*	−0.15**	0.21**	−0.03 ^a	0.25***	−0.06	−0.02	0.23***
Optimism	−2.00***	−1.16***	−0.15**	2.55***	−0.38 ^a	0.25***	−1.85***	−0.46 ^a	0.49***
Stress	0.33***	0.14**	−0.15**	−0.35***	0.05 ^a	0.25***	0.56***	0.14 ^a	0.63***
Depression	4.84***	2.39**	−0.16**	−5.34***	0.85 ^a	0.23***	6.87***	1.58 ^a	0.54***

Hayes recommends using unstandardized values for causal modeling (<http://afhayes.com/macrofaq.html>); therefore, coefficients can exceed 1

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

^a 95 % CI does not overlap 0

Table 3 Mediation of the effect of avoidance on outcomes through positive and negative affect

	Total effect	Direct effect	Mediation by positive affect			Mediation by negative affect			Total R ²
	c	c'	a1	b1	a1 × b1	a2	b2	a2 × b2	
Cognitive	0.01	0.01	−0.03	0.02	0.001	0.04	−0.04	0.001	0.01
Physical	−4.62*	−3.89*	−0.02	8.22*	−0.16	0.05	−11.18***	−0.56	0.24***
Social	−0.15*	−0.13	−0.02	0.42**	−0.01	0.05	−0.20	−0.01	0.17***
Resiliency	0.01	0.02	−0.02	0.24***	0.00	0.04	−0.12*	0.00	0.19***
Optimism	−0.55	−0.39	−0.02	3.15***	−0.06	0.04	−2.51***	−0.10	0.41***
Stress	0.10	0.07	−0.02	−0.43***	0.01	0.04	0.63***	0.03	0.60***
Depression	−0.02	−0.57	−0.02	−6.67***	0.13	0.05	8.4***	0.42	0.50***

Hayes recommends using unstandardized values for causal modeling (<http://afhayes.com/macrofaq.html>); therefore, coefficients can exceed 1

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Although positive and negative affective states were not significant mediators of the relationship between attachment anxiety and the measure of cognitive resources (i.e., GPA), all other mediation models for attachment anxiety were significant. Full mediation was observed for physical health status (i.e., the c path was significant, but the c' path was not). In all other models, partial mediation occurred. Positive affect alone partially mediated the relationship between attachment anxiety and both social support and ego resiliency. Both state PA and NA partially mediated the relationship between attachment anxiety and optimism, perceived stress, and symptoms of depression.

Discussion

The current study examined the mediation of attachment style and positive outcomes by state affect in four developmental areas including cognitive, social, physical, and psychological. The study was conducted in an attempt to reconcile two possible explanations for these positive outcomes proposed by the broaden-and-build theory

(Fredrickson 1998) and attachment theory (Bowlby 1969). The results of the study indicate that affect does mediate positive outcomes in three of these four areas, with the exception of the cognitive domain, for people high on attachment anxiety, but not for those high on attachment avoidance. People who score high in attachment anxiety tend to report less state positive affect and more state negative affect, which results in poorer social, physical, and psychological outcomes than those with lower levels of attachment anxiety. However, full mediation only existed for the relationship between attachment and physical health (i.e., there was no relationship between attachment and physical health after removing the variability in health associated with state affect). Therefore, while there may be overlap between attachment and state affect in explaining positive social and psychological outcomes, the construct of attachment adds some additional explanatory power over and above affective state alone.

This study found that the social, health, and psychological outcomes are related to the anxious, but not avoidant dimension of attachment. These findings are consistent with previous research that identified attachment

style as a moderator of the impact of affect (Mikulincer and Sheffi 2000). Mikulincer and Sheffi found that positive affect increased performance on two cognitive tasks (i.e., creative problem solving and categorization) for people with secure attachment styles, reduced performance for people with anxious attachment styles, but did not impact the performance of people with avoidant attachment styles.

A possible explanation for the differential impact that state affect has on people with different attachment styles may be related to how attachment style impacts the way they experience and regulate emotion (Fuendeling 1998) as well as to the coping strategies used by each (Mikulincer and Sheffi 2000). People with an anxious style of attachment report feeling overwhelmed by negative emotions reporting easy access to negative memories (Mikulincer and Orbach 1995). They have been found to use a hyperactivating strategy in which they ruminate on negative thoughts and emotions (Mikulincer et al. 2003). Rumination has been associated with poor cognitive performance (Lyubomirsky et al. 2003, 2011), interpersonal problem solving (Lyubomirsky and Nolen-Hoeksema 1995), social relationships (see Nolen-Hoeksema et al. 2008 for a review), physical health (Thomsen et al. 2004) and psychological outcomes such as anxiety and depression (Nolen-Hoeksema et al. 2008). However, positive affect has been proposed to break the cycle of rumination (Lyubomirsky et al. 2011), which may result in more optimal developmental outcomes. In addition, positive affect has been found to undo the negative physiological effects of negative emotion (Fredrickson and Levenson 1998; Fredrickson et al. 2000), which may explain why there was full mediation of the relationship between attachment style and health outcomes for the anxious attachment dimension.

Differences in the experience of emotion and coping styles of people high in avoidance may also address why affect did not mediate the relationship between the avoidance dimension of attachment and developmental outcomes (Fuendeling 1998; Mikulincer and Sheffi 2000). People with avoidant styles of attachment show greater physiological reactivity to negative affect than do people with secure attachments (e.g., Dozier and Kobak 1992; Feeney and Kirkpatrick 1996), which may make them more vulnerable to the adverse consequences of experiencing negative emotions and require more positive affect to undo these effects. Therefore, future research should examine the moderational effect of attachment style on emotion in addition to the mediational effect observed in this study.

In addition, people who have the avoidant attachment style use a deactivating strategy in which they tend to suppress negative emotions (Kotler et al. 1994), have poor access to negative memories (Mikulincer and Orbach 1995), and withdraw from others (Mikulincer et al. 2003). Given that social relationships are one of the primary

sources of positive affect identified in the literature (Lyubomirsky et al. 2005a), they may have fewer opportunities to experience positive affect. Finally, people high in avoidance interpret affect as less relevant information than those with a secure style of attachment (Mikulincer et al. 2003), which may make them less likely to benefit from positive affect when they do experience it. Based on prior research, people high in attachment avoidance appear to be more sensitive to the adverse physiological consequences of negative affect, experience positive affect less frequently due to withdrawal from social relationships, and pay less attention to positive affect when it is experienced. All of these factors may limit the ability of positive affect to ameliorate the adverse consequences of the negative affect they experience.

Limitations and Future Research

Although GPA has been used in prior attachment studies as a measure of cognitive development (Jacobson and Hofmann 1997), it does not appear that it was a useful measure of cognitive resources in this study. No relationship was found between either attachment or affect and GPA as the measure of cognitive resources; therefore, no mediational relationship was found either. The failure to find a relationship between high school GPA and affect may be due to a slightly restricted range in GPA due to the admissions criteria of the university (GPAs ranged from 2.5 to 4.6). Alternatively, GPA may only measure the broad construct of academic achievement; therefore, other measures of more specific cognitive resources should be examined (e.g., creative problem solving). Future research is required to examine the interplay of attachment and affect on cognitive resources.

Although state affect attenuated the relationship between attachment and developmental outcomes in almost all cases, except cognitive, full mediation only occurred for physical health status. The failure to find full mediation may be due to the use of a state measure of affect (i.e., during the past week) rather than trait measure (Rosenberg 1998). A state measure of affect was utilized in this study for several reasons. First, the PANAS is a widely used measure of affect with excellent psychometric properties. Second, using a state measure of affect allowed for temporal ordering of the attachment and affect measures in the mediation model. Finally, given that affect is a relatively stable trait with a high heritability rate (~50%; Lyubomirsky et al. 2005b), a state measure of affect was thought to be fairly representative of a person's trait level of positive affect. It should also be noted that the use of a state affect measure may have exacerbated the inability to find a relationship with our measure of cognitive resources (i.e., high school GPA) because there was no overlap in the

reference periods for the two measures. Future studies should examine trait affect as a mediator of attachment and developmental outcomes.

A final limitation that should be noted relates to the study design. The current study utilized a cross-sectional design. As a result, causal relationships cannot be implied among attachment, positive affect, and outcomes in cognitive, social, physical, or psychological domains of development. Further longitudinal research needs to be conducted in order to confirm the pathways proposed. In addition, a convenience sample of undergraduate students in general psychology courses at a small liberal arts university was used. Given the homogeneous nature of the sample, generalization of the results to other populations should be made cautiously. The findings need to be replicated in additional samples in future studies.

Although additional research is necessary to explore the relationships between attachment and affect on developmental outcomes, this study has attempted to reconcile two independent bodies of research on factors influencing cognitive, social, physical, and psychological outcomes. Lamb (1987) has criticized that conclusions about the impact of attachment on long-term outcomes should be tempered based on study designs that preclude causal inferences as well as the need for stability in caregiving environments to observe these outcomes. Perhaps Fredrickson's (1998) broaden-and-build model provides a more straightforward explanation for the advantages seen among children with secure attachment styles. In other words, children who have caregivers who are more responsive to their needs experience more positive affect; and, it is the experience of positive affect that yields developmental advantages.

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