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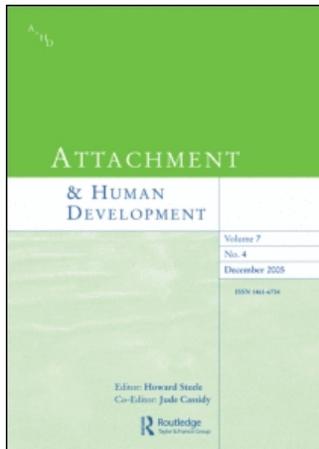
On: 12 June 2007

Access Details: [subscription number 767966020]

Publisher: Routledge

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Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Attachment & Human Development

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713394054>

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To cite this Article: Crawford, Thomas N., Shaver, Phillip R. and Goldsmith, H. Hill , 'How affect regulation moderates the association between anxious attachment and neuroticism', Attachment & Human Development, 9:2, 95 - 109

To link to this article: DOI: 10.1080/14616730701349747

URL: <http://dx.doi.org/10.1080/14616730701349747>

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How affect regulation moderates the association between anxious attachment and neuroticism

THOMAS N. CRAWFORD¹, PHILLIP R. SHAVER², &
H. HILL GOLDSMITH³

¹*Columbia University and New York State Psychiatric Institute, USA*, ²*University of California, Davis, USA*, and ³*University of Wisconsin-Madison, USA*

Abstract

Correlations between anxious attachment and neuroticism (usually about .40 to .50) prompt questions about whether self-reported anxious attachment captures a key construct in attachment theory or if it reflects a more general personality trait instead. A college sample of late adolescents and young adults ($N = 287$) was used to show that questionnaire measures of neuroticism and anxious attachment do not have a simple linear association; instead, neuroticism and anxious attachment have a more complex dynamic relationship that is moderated by avoidant attachment, an attachment style that reflects an interpersonally derived strategy for affect regulation. The association between neuroticism and anxious attachment is further moderated by conscientiousness, a personality trait that may reflect a more biologically mediated system of affect regulation. These separate moderating effects and the different affect regulation systems they reflect are discussed in the context of longstanding debates about how personality traits and attachment styles influence each other.

Keywords: *Attachment anxiety, avoidance, neuroticism, conscientiousness, affect regulation*

Introduction

Bowlby's (1969/1982, 1973, 1980) attachment theory can be used to understand how people feel insecure in close relationships, how emotional distress is regulated within such relationships, and how both influence the development of personality. The first goal of this paper is to clarify how self-reported attachment anxiety in romantic relationships is related to neuroticism, a key dimension of personality now recognized in most contemporary theories of personality (Caspi & Shiner, 2006). A second goal is to show how interpersonal strategies people adopt to regulate distress in close relationships serve to moderate the association between attachment anxiety and neuroticism. This paper also discusses how most contemporary personality theories hypothesize a separate dimension of conscientiousness, which broadly reflects people's tendencies to be attentive vs. distractible, persistent vs. unreliable, and orderly vs. careless. This paper's third goal is to describe ways in which conscientiousness pertains to affect regulation and to show that it also moderates the association between neuroticism and attachment anxiety.

Attachment insecurity in adults

In romantic relationships self-reported attachment insecurity has been shown to vary on separate dimensions of anxious and avoidant attachment (Brennan, Clark, & Shaver, 1998; Mikulincer, Shaver, & Pereg, 2003). Anxious attachment involves worry about being abandoned or rejected by others, and avoidant attachment involves discomfort with closeness and dependence. Brennan et al. (1998) argued that anxious and avoidant attachment in adolescents and adults are conceptually analogous to similar dimensions observed in infants by Ainsworth, Blehar, Waters, & Wall (1978, Figure 10, p. 102). Nevertheless, there are differences in the kinds of social relationships targeted by the corresponding literatures (child–parent vs. adult–adult) and the measurement techniques they use. Research on romantic relationships relies on self-report questionnaires that assess insecurity using dimensionally defined attachment “styles.” Even though dimensional assessments of attachment patterns in infants are plausible (Connell & Goldsmith, 1982; Fraley & Spieker, 2003; Thompson, Connell, & Bridges, 1988), child–caregiver relationships are usually classified into attachment categories or “types” using laboratory procedures such as the Strange Situation (Ainsworth et al., 1978). The Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985) is also used to classify how child–caregiver relationships are internalized in adolescents and adults based on how they remember and describe their relationships with primary caregivers during childhood.

Most attachment researchers are familiar with debates over conceptual and methodological differences between these separate research traditions (Bartholomew & Shaver, 1998; Shaver & Mikulincer, 2002a, 2002b, 2004). Among other issues, investigators from the AAI and Strange Situation traditions question whether self-report questionnaires provide an adequate measure of attachment (e.g., Crowell & Treboux, 1995; Waters, Crowell, Elliott, Corcoran, & Treboux, 2002). Critics have argued that correlations between anxious attachment and personality traits are too high, thereby raising questions about the discriminant validity of the attachment construct.

The present article specifically addresses whether self-reported anxious attachment can be meaningfully distinguished from neuroticism, one of the broad personality traits hypothesized in the Five Factor Model of personality (Goldberg, 1992; John & Srivastava, 1999; McCrae & Costa, 1999). Neuroticism encompasses lower order facets of anxiousness, depression, self-consciousness, impulsiveness, and vulnerability, and it corresponds broadly to the construct of negative affectivity investigated in temperament research (Caspi & Shiner, 2006; Rothbart & Bates, 1998). The present research focuses on differences in affect regulation strategies hypothesized in attachment theory to clarify how neuroticism and attachment anxiety overlap but nevertheless remain distinct constructs.

Attachment and neuroticism

Some evidence already exists showing that anxious attachment can be differentiated from neuroticism. For instance, correlations between these variables rarely exceed .50, thus indicating that variation in one measure accounts for no more than 25% of the variation in the other (Shaver & Mikulincer, 2004). In questionnaire studies and laboratory experiments, anxious attachment has outperformed neuroticism as a predictor of relationship quality and attachment-related psychological processes when both variables were entered into regression models (e.g., Mikulincer, Gillath, & Shaver, 2002; Nofle & Shaver, 2006). Nevertheless, the association between anxious attachment and neuroticism is strong enough and theoretically important enough to merit further investigation and clarification.

Anxious attachment and neuroticism could be correlated because attachment anxiety is a form of neuroticism. Factor analyses of the lower-order facets of neuroticism show that people predisposed to one type of negative emotion are usually prone to other negative emotions (Clark, Watson, & Mineka, 1994; Tellegen, 1985), perhaps making the same people susceptible to insecurity about relationships as well. The link between attachment and neuroticism was suggested in a recent twin study (Crawford, Livesley, Jang, Shaver, Cohen, & Ganiban, 2007) investigating anxious attachment and emotional dysregulation, a broadly defined dimension of personality disorder that corresponds closely with neuroticism (Jang & Livesley, 1999; Schroeder, Wormworth, & Livesley, 2002). The connection between attachment anxiety and emotional dysregulation was indicated when these variables both loaded on the same higher-order factor (Crawford et al., 2007). Attachment anxiety was found to be heritable in this study, with genetic factors accounting for 40% of its variance. Furthermore, genetic effects explained much of the association between attachment anxiety and emotional dysregulation. On average, genetic factors accounted for 63% of the correlation between these variables. Avoidant attachment, in contrast, was unrelated to genetic factors and loaded onto a separate dimension of personality disorder that indexes inhibitedness. Although these preliminary findings need to be replicated in other samples, they suggest that it is plausible that heritable effects influencing neuroticism could also explain some of the variance in anxious attachment.

From another perspective, anxious attachment reflects worry about being rejected or abandoned that usually occurs under specific social circumstances. Anxious attachment may be pronounced in close relationships with parents or romantic partners but appear much less salient in relationships that are not as close. Also, anxious attachment may not pertain to situations that do not involve close relationships (e.g., academic testing) where neuroticism might still be relevant. As such, anxious attachment differs from the general predisposition to negative emotions measured as neuroticism. Furthermore, anxious attachment may be most evident when emotional distress or some other threatening experience triggers reactions and behaviors that researchers have attributed to the attachment system (Mikulincer & Shaver, 2003). Once these interpersonal behaviors are activated, people normally seek proximity to caregivers or romantic partners who can soothe them or provide emotional support. Given how anxious attachment is woven into this interpersonal form of affect regulation, it may not be accurate to characterize it as a variant or subtype of neuroticism.

Attachment and co-regulation of affect

Rather than having a simple linear association, we propose that anxious attachment and neuroticism have a more dynamic connection that hinges on how negative affect is regulated in relationships with parents, close friends, and romantic partners. In attachment theory, the child and caregiver are viewed as acting together to co-regulate the child's affect: the child seeking emotional comfort when distressed and the caregiver supplying it when needed (Mikulincer et al., 2003). Depending on the availability and responsiveness of the caregiver, co-regulation of affect is "internalized" by the child and then gradually develops into a capacity for self-regulation of affect. When caregivers are unavailable or unresponsive, children often adopt what attachment theorists call secondary attachment strategies to regulate negative affect. Children and adolescents with an anxious attachment pattern typically adopt hyperactivating strategies (Cassidy & Kobak, 1988) that cause them to be perpetually on the alert for threats, separations, and betrayals by attachment figures. Hyperactivating strategies may involve excessive proximity seeking that is intended to reduce attachment anxiety but tends to elicit thoughts and expectations that exacerbate it instead.

In contrast, young people with an avoidant attachment style usually adopt deactivating strategies (Cassidy & Kobak, 1988) that limit close contact with primary caregivers and down-regulate emotional distress. Young people use this strategy to protect themselves from feeling unwanted or rejected by attachment figures who are aloof or emotionally unavailable. Insofar as avoidant attachment and deactivating strategies dampen emotional distress, they may have an attenuating effect on the association between neuroticism and anxious attachment.

Other forms of affect-regulation

Regulatory functions of the nervous system have been considered in research dating as far back as Pavlov. In the contemporary temperament literature, Rothbart and colleagues (Rothbart, Ahadi, Hershey, & Fisher, 2001; Rothbart, Ellis, Rueda, & Posner, 2003) have identified a higher-order factor labeled effortful control that reflects children's capacities to plan behavior, inhibit inappropriate responses, and focus and shift attention. Effortful control plays a central role in emotion regulation (Eisenberg, Fabes, Guthrie, & Reiser, 2000; Eisenberg & Morris, 2002), which can be achieved in part by control over attention, motivation, behavior, and cognition. Effortful control is thought to reflect willful control and thus differs from other less voluntary forms of behavioral inhibition (e.g., low extraversion) (Eisenberg, Smith, Sadovsky, & Spinard, 2004; Nigg, 2000). Individual differences in effortful control and emotion regulation may be related to biological differences in executive attentional systems in the anterior attention network in the midprefrontal cortex (Gillath, Bunge, Shaver, Wendelken, & Mikulincer, 2005; Rueda, Posner, & Rothbart, 2004). Some forms of effortful control appear in development as early as 6-months old and then increase markedly during the preschool years. Effortful control continues to develop as its neural underpinnings mature throughout childhood and early adulthood (Eisenberg, Spinrad, et al., 2004; Murphy, Eisenberg, Fabes, Shepard, & Guthrie, 1999; Posner & Rothbart, 1998; Williams, Ponesse, Achacar, Logan, & Tannock, 1999).

Ahadi and Rothbart (1994) suggest a developmental connection between early appearing processes of effortful control and subsequent personality structure hypothesized in the Big Five model of personality. Conceptually, effortful control corresponds most to the conscientiousness dimension (Caspi & Shiner, 2006), even though effortful control may be a somewhat broader construct (Kohnstamm, Zhang, Slotboom, & Elphick, 1998). When assessed in adolescents and adults, conscientiousness reflects differences in people's tendencies to be responsible, attentive, persistent, orderly, and planful. The low end of this personality dimension reflects tendencies to be irresponsible, unreliable, careless, and distractible. These personality traits clearly overlap with differences in people's capacities to plan behavior, inhibit inappropriate responses, and focus and shift attention that are encompassed in effortful control. Correlations between conscientiousness scores and subscales indexing effortful control (mean $r = .48$, range = .27 to .66) document the empirical association between these variables (Halverson et al., 2003).

At present there have been few studies examining the biological basis of conscientiousness (Stough, Donaldson, Scarlata, & Giorciari, 2001), thus contrasting with research that hypothesizes specific associations between effortful control and attentional systems in the midprefrontal cortex. The available twin studies show that conscientiousness and effortful control are both moderately heritable (Jang, Livesley, & Vernon, 1996; Yamagata, Takahashi, Kijima, Maekawa, Ono, & Ando, 2005), thus suggesting a biological mechanism underlying these dimensions of personality and temperament. However, it is currently unclear whether these variables are influenced by a common set of genes.

For this study we hypothesized that avoidant attachment and conscientiousness each represent separate forms of affect regulation. We also predicted that each would moderate the association between neuroticism and attachment anxiety. High conscientiousness (i.e., high control over emotions) was expected to attenuate the association between neuroticism and attachment anxiety. Insofar as low conscientiousness may represent a constitutional deficit in affect regulation, it was expected to amplify the association between neuroticism and attachment anxiety. Insofar as avoidant attachment mobilizes deactivating strategies learned in close relationships, we hypothesized that it would attenuate the association between neuroticism and attachment anxiety. In people who have not learned or adopted avoidant attachment strategies, we expected that the association between neuroticism and attachment anxiety would be especially strong.

Method

Participants

Our sample of 287 undergraduate psychology students was 71% female, 38% Asian American, 36% Caucasian (but not Latino), 2% African American, and 2% Pacific Islander. Nine percent of the sample identified themselves as Latino (any race). Other participants (about 14% of the sample) identified themselves as international students from Asia, Latin America, and the Middle East or declined to specify their race or ethnicity. Mean age was 19.5 ($SD = 1.5$, range = 18 to 27). Average annual income in the participants' families was about \$50,000. Participants received credit in introductory psychology courses in exchange for completing a series of questionnaires.

Measures

Anxious and avoidant attachment. The Experiences in Close Relationships Inventory (ECR; Brennan et al., 1998) is a standard measure of anxious and avoidant attachment that assesses each dimension with 18 items ($\alpha = .91$ and $.94$, respectively) scored on 7-point scales (1 = disagree strongly, 7 = agree strongly). The inventory asks respondents how they experience romantic relationships in general, not just how they experience a current relationship. Items on the attachment anxiety scale assess insecurities about being abandoned, worries about not being liked enough by romantic partners, and concerns about not receiving approval and reassurance from others. Items on the avoidance scale assess discomfort when romantic partners get too close, difficulties opening up to romantic partners or depending on them, and tendencies to pull away from others.

Neuroticism and conscientiousness. The Big Five Inventory (BFI; John, Donahue, & Kentle, 1991) is a 44-item measure of the higher-order personality dimensions hypothesized in the Five Factor Model of personality. BFI scales have good internal consistency (mean $\alpha > .80$), high convergent validity with other Big Five instruments developed by Costa and McCrae (1992) and Goldberg (1992) (mean $r = .75$ and $.80$, respectively), and excellent test-retest reliabilities across 90 days (mean $r = .85$) (Benet-Martinez & John, 1998). Neuroticism is measured with items that assess whether the respondent "worries a lot," "can be tense," "gets nervous easily," "is depressed, blue," and "can be moody." Reverse-scored items include "remains calm in tense situations," "is emotionally stable, not easily upset," and "is relaxed, handles stress well." Conscientiousness is measured with items that assess whether the respondent "does a thorough job," "does things efficiently," "makes

plans, follows through with them,” “is a reliable worker,” and “perseveres until the task is finished.” Reverse-scored items include “is easily distracted,” “can be somewhat careless,” “tends to be lazy,” and “tends to be disorganized.”

Data analyses

To facilitate interpretation of the interactions hypothesized here, attachment and personality variables were standardized with means centered at zero and standard deviations fixed to 1.00. Dummy codes (0, 1) were created for membership in any racial or ethnic group comprising 5% or more of the sample. When separate variables for Asian American, Caucasian, Latino ethnic groups, and family income were entered into regression models, they were all unrelated to attachment anxiety. Gender was also unrelated to attachment anxiety as a main effect or in interaction with neuroticism, avoidant attachment, or conscientiousness. Race, ethnicity, gender, and family income were therefore dropped from models investigating the specific effects hypothesized in this study. Multiple regression models were used to assess the main effects of age, neuroticism, avoidant attachment, and conscientiousness as predictors of attachment anxiety. Separate interactions between neuroticism and avoidance and between neuroticism and conscientiousness were also included in the model.

Results

Table I reports correlations between the two attachment dimensions and the Big Five personality traits. In absolute terms, avoidant attachment had only modest associations with anxious attachment and the Big Five personality traits (mean $r = |.23|$). This indicates that avoidant attachment can be differentiated from anxious attachment and the five higher-order personality traits. In contrast, attachment anxiety was clearly more associated with neuroticism ($r = .50$) than with the other Big Five traits (mean $r = |.15|$).

Table II reports results from multiple regression analyses. Age was negatively associated with attachment anxiety ($\beta = -.13$), indicating that worries about abandonment decreased with age in this college sample. There was a clear linear association between neuroticism and attachment anxiety ($\beta = .42$) even when the main effects of age, conscientiousness, and avoidance were taken into account.

Figure 1 depicts how neurotic traits and avoidant attachment interacted as predictors of anxious attachment. The solid line shows how high avoidance ($z = 1.5$) attenuated the association between high neuroticism and high anxiety, but only when z scores for neuroticism exceeded 1.00. Below this crossover point, high avoidance was associated with more anxiety than would be expected based on neuroticism scores alone. The dashed line shows how low avoidance ($z = -1.5$) was associated with higher anxiety, once again, when

Table I. Correlations between attachment anxiety and avoidance and Big Five personality traits.

Attachment anxiety	Big Five personality traits				
	N	E	A	C	O
Attachment anxiety	.50	-.13	-.19	-.24	.05
Attachment avoidance	.18	-.30	-.24	-.26	-.09

N = neuroticism, E = extraversion, A = agreeableness, C = conscientiousness, O = openness.

Table II. Main and interaction effects of neuroticism, conscientiousness, and attachment avoidance as predictors of attachment anxiety.

	Beta (<i>SE</i>)	β	<i>p</i>
Age	-0.086 (.032)	-0.131	0.008
Neuroticism	0.417 (.052)	0.418	0.000
Attachment avoidance	0.174 (.052)	0.171	0.001
Conscientiousness	-0.076 (.052)	-0.076	0.144
Neuroticism \times Avoidance	-0.162 (.049)	-0.174	0.001
Neuroticism \times Conscientiousness	-0.162 (.052)	-0.158	0.002

N = 287; Multiple *R*: 0.580; Squared multiple *R*: 0.336.

Adjusted squared multiple *R*: 0.322.

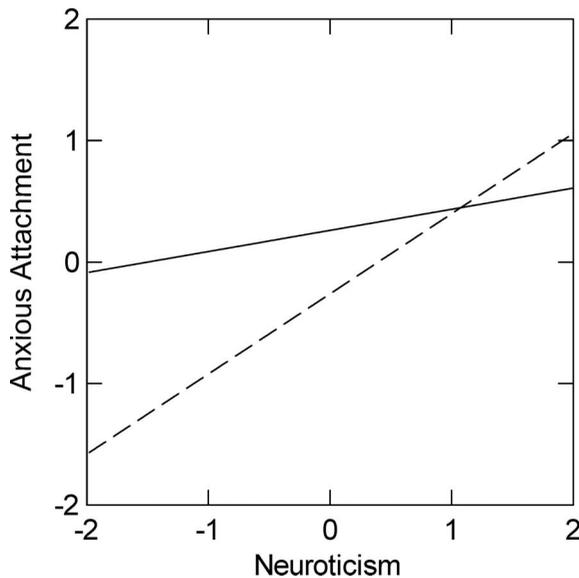


Figure 1. The relationship between neuroticism and anxious attachment is contingent on level of avoidance. Note: The solid line depicts high avoidance ($z = 1.5$) and the dashed line depicts low avoidance ($z = -1.5$).

neuroticism exceeded 1.00. Otherwise, low avoidance was associated with anxiety scores below what would be expected based on neuroticism alone. The combination of low avoidance and low anxiety (i.e., secure attachment) was most likely to occur when neuroticism was also low.

Table II shows that conscientiousness had no main effect on attachment anxiety. As hypothesized, this form of self-regulation interacted with neuroticism to predict attachment anxiety. The solid line in Figure 2 shows how high conscientiousness ($z = 1.5$) attenuated attachment anxiety when neuroticism was high. When neuroticism was lower, high conscientiousness was associated with higher anxiety than would be expected based on neuroticism alone. The dashed line shows how low conscientiousness ($z = -1.5$) increased attachment anxiety when neuroticism was high. In other words, deficits in self-regulation amplified the association between high neuroticism and high attachment anxiety. When neuroticism was lower, low conscientiousness was linked with lower levels of attachment

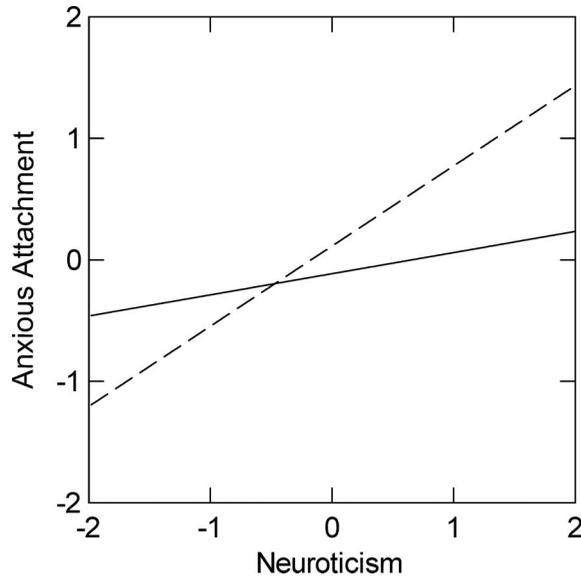


Figure 2. The relationship between neuroticism and anxious attachment is contingent on level of conscientiousness. *Note:* The solid line depicts high conscientiousness ($z = 1.5$) and the dashed line depicts low conscientiousness ($z = -1.5$).

anxiety. This crossover effect clearly resembles the one observed for avoidance but is a fully independent effect.

Although we specified neuroticism as a predictor variable and attachment anxiety as the dependent variable, we caution against any inferences of unidirectional causal effects in this cross-sectional study. When the same analyses were performed reversing the placement of these variables (i.e., making neuroticism the dependent variable and attachment anxiety the predictor variable interacting with avoidance and conscientiousness), they yielded crossover effects that were essentially the same as those in Figures 1 and 2. Although our data do not support any causal inferences about how attachment anxiety and neuroticism are related, they clearly demonstrate that their relationship is contingent on individual differences in avoidant attachment and conscientiousness.

Discussion

The relation between neuroticism and anxious attachment cannot be described as a simple linear association between two variables. Our results indicate that covariation between these dimensions of personality and attachment insecurity is more dynamic and reflects the independent influence of two separate systems of affect regulation. As hypothesized in attachment theory, avoidant attachment is a learned form of affect regulation that limits exposure to attachment anxiety (Calkins, 2004; Mikulincer et al., 2003). We conceptualized conscientiousness, one of the major traits in the Five Factor Model, as a separate form of self-regulation that further moderates the association between neuroticism and attachment anxiety. To our knowledge, conscientiousness has not been investigated previously as a moderator of the relationship between self-reported attachment anxiety and neuroticism.

Attachment anxiety and neuroticism

Before discussing affect regulation effects, it is worth considering what might explain the main linear association between attachment anxiety and neuroticism. Insofar as neuroticism increases susceptibility to negative affect, it may also lead to more frequent activation of the attachment system. In other words, people high in neuroticism may experience a greater need for comfort from attachment figures and perhaps also worry more about its availability. In the Strange Situation and AAI literature, attachment anxiety is often traced to insecurely attached parents who provide inconsistent or unpredictable parenting (Fonagy, Steele, & Steele, 1991; van IJzendoorn, 1995), thereby creating an emotional environment that generates or reinforces attachment anxiety in children. Neuroticism may also be influenced by disturbances within the family environment. Dysfunctional parenting may contribute to elevated internalizing symptoms in children (Berg-Nielsen, Vikan, & Dahl, 2002), which include anxiety, sadness, and other manifestations of neuroticism and negative affectivity (Anthony, Lonigan, Hooe, & Phillips, 2002). Heritable factors may also play a role in the association between attachment anxiety and neuroticism. As noted above, shared genetic effects accounted for approximately 63% of the association between anxious attachment and traits indexing emotional dysregulation, a dimension of personality disorder closely related to neuroticism (Crawford et al., 2007). Although further twin research is needed, it is plausible that genetic effects influencing the personality trait of neuroticism will be shared with those that influence attachment anxiety. When heritable effects and interpersonal experiences are combined, they may have mutually reinforcing effects that strengthen the association between attachment anxiety and neuroticism.

Avoidant attachment

As depicted in Figure 1, avoidant attachment moderated anxiety about being abandoned or rejected when neuroticism was high. In people with high neuroticism scores, high avoidance thus appeared to down-regulate these anxieties. This finding is consistent with the idea that people avoid becoming too close to others as a way to limit exposure to attachment anxiety, especially when caregivers or romantic partners are distant or unavailable. However, Figure 1 shows that high avoidance helped to down-regulate anxiety only when neuroticism reached a certain threshold. Below that crossover point, high avoidance was associated with higher anxiety than would be expected based on neuroticism alone. This effect probably cannot be explained solely by the dynamic relationship between the personality and attachment variables considered here. Instead, difficulties in close relationships that went unmeasured in this study may account for relative elevations in anxiety and avoidance that occurred when neuroticism was low.

Low avoidance, conversely, was associated with a net increase in attachment anxiety when neuroticism exceeded the crossover threshold. If neurotic people lack effective interpersonal strategies to reduce attachment anxiety, worries about abandonment may become amplified. These elevations in attachment anxiety may reflect hyperactivating strategies (Cassidy & Kobak, 1988) that tend to exacerbate abandonment fears instead of containing them. In contrast, anxiety was lowest when neuroticism and avoidance were both low. If low neuroticism means lower exposure to negative affect, then lower stress will be placed on the attachment system and that may make it easier to maintain secure attachment (low anxiety and low avoidance).

Based on the twin data currently available, avoidant attachment appears to be attributable only to shared experiences within the family and other environmental effects (Crawford

et al., 2007). This finding is consistent with attachment theory's expectation that socially mediated factors learned within the family contribute to the formation and maintenance of avoidant attachment as an affect regulation strategy. This finding also suggests that avoidance is an interpersonal form of affect regulation that may differentiate it from conscientiousness and effortful control. We know that conscientiousness and effortful control are influenced by genetic factors (Jang et al., 1996; Yamagata et al., 2005); as such, they may represent an affect regulation system that is more biologically mediated than avoidant attachment. However, further research into conscientiousness is needed to confirm that it develops out of emotion regulation associated with effortful control in infants and children; additional research is also needed to determine whether any specific biological mechanisms mediate the association between these variables.

Conscientiousness

As illustrated in Figure 2, high conscientiousness (i.e., high control over negative emotions) attenuated the association between neuroticism and anxious attachment. Like effortful control in temperament research, conscientiousness appears to encompass individual differences in voluntary self-control as well as differences in attention (vs. distractibility) that are thought to play roles in self-regulation (Caspi & Shiner, 2006). The interaction between neuroticism and conscientiousness had a crossover effect similar to neuroticism's interaction with avoidant attachment. When compared with high avoidance, however, high conscientiousness appears to limit elevations in attachment anxiety across a wider range of neuroticism scores. Attenuation effects associated with high conscientiousness occurred when z scores for neuroticism were above -0.5 , whereas attenuation from high avoidance occurred only when z scores for neuroticism exceeded 1.0 . Attenuating effects associated with conscientiousness thus occurred well within the normal range of neuroticism whereas attenuation attributable to avoidance began only when neuroticism was more elevated.

Below the crossover point in Figure 2, high conscientiousness was associated with higher attachment anxiety than expected based on neuroticism alone. This suggests that high conscientiousness may sometimes be detrimental to attachment security, just as it can be detrimental to performance in certain contexts (Tett & Burnett, 2003; Yeo & Neal, 2004). If self-control manifests in excessive caution, for instance, it might contribute to higher levels of attachment anxiety when neuroticism is low. On the other hand, it could be that increases in attachment anxiety cause people to become more cautious. In any event, attachment anxiety levels may not be problematic in this context insofar as they still remain below mean levels in Figure 2 when neuroticism is low.

Low conscientiousness may be comparable to low avoidance insofar as it reflects a reduced capacity for affect regulation. The absence of voluntary control over emotions may result in a maximal effect of neuroticism on anxious attachment because there are few self-regulatory resources available to restrain it. It could be that distractibility (i.e., low attention) interferes with affect regulation if one upsetting experience triggers other upsetting experiences encountered in close relationships, thereby making attachment anxiety more diffuse. Once again, the observed increase in anxiety occurred only when neuroticism exceeded the crossover point in Figure 2. Below that threshold, low conscientiousness was accompanied by net reductions in attachment anxiety. It may be that when neuroticism and anxious attachment are both low, self-control may not be necessary or at times may even get in the way.

Statistically, neuroticism's separate interactions with conscientiousness and avoidance represent fully independent effects. In reality, there is likely to be some overlap between the

moderating effects of conscientiousness and avoidant attachment. For example, deactivating strategies in avoidant attachment may mobilize behaviors requiring voluntary self-control (e.g., deliberate distancing behaviors) even when their underlying motivation, as hypothesized in attachment theory, may be unconscious. Given such overlap it may be difficult at times to separate out the moderating influences associated with avoidant attachment and conscientiousness.

Developmental considerations

This cross-sectional sample of college students provides information about the transitional period between late adolescence and early adulthood. As such, it is unclear whether the dynamic effects of affect regulation reported here will also be found in other developmental periods. Given how developmental changes in effortful control emerge starting in infancy and extend into early adulthood (Eisenberg, Spinrad, et al., 2004; Murphy et al., 1999; Posner & Rothbart, 1998; Williams et al., 1999), it is unclear when the corresponding neural systems are mature enough to moderate attachment anxiety's relationship with neuroticism or its earlier manifestation in negative affectivity. Children may initially rely on socially mediated co-regulation of affect while biologically mediated effortful control emerges developmentally and then evolve into the broad personality trait of conscientiousness. As voluntary control over negative emotion gradually matures throughout childhood and adolescence, it may enable young people to become more autonomous in their relationships with key attachment figures. However, if one system of affect regulation becomes dysfunctional, more reliance may be shifted onto the other system for controlling negative affect. In the absence of one or the other system, young people may become inflexible in how they regulate affect when only one system is functionally available to them.

Significance and limitations

This study shows that the relationship between neuroticism and anxious attachment is influenced by multiple factors that appear to operate at different levels of analysis. Our research focused on separate systems of affect regulation and the moderating effects they have on the association between anxious attachment and neuroticism. There may be mediating factors as well that could include specific mechanisms attributable to genetic effects, socially acquired expectations about relationships, and the external influence of caregivers or romantic partners: factors that were not assessed in the present study.

Based on evidence that genetic factors contribute to individual differences in conscientiousness and effortful control but not attachment avoidance, we speculate that affect regulation associated with these constructs may be more biologically mediated, and that avoidance attachment may be more socially mediated instead. It is important to note, however, that twin studies show that effortful control and conscientiousness are only partially heritable (Goldsmith, Buss, & Lemery, 1997; Jang et al., 1996). Some specific social factors have been implicated in the development of effortful control, e.g., authoritarian parenting in Chinese families (Zhou, Eisenberg, Wang, & Reiser, 2004). Co-regulation of affect through avoidant attachment, in turn, is not exclusively mediated by interpersonal experiences. Attachment insecurity is closely linked with the expectations people form about caregivers or romantic partners, and these mental representations must be implemented in neural systems, presumably those that are involved in learning and memory. As such, neither form of affect regulation investigated here is exclusively biological or exclusively interpersonal. In relative terms, however, interpersonal factors appear more

pronounced in co-regulation of affect in close relationships. Although more research is needed, it may be that biological or constitutional factors are more salient in conscientiousness and effortful control.

Our findings were based on a college sample, thus leaving it unclear whether our results will generalize to other populations. Although our sample was predominantly female (71%), there was no evidence of any gender differences in main effects or interactions predicting anxious attachment. (This absence of gender differences has been the rule in attachment research.) Because we used brief measures of neuroticism and conscientiousness, which are higher-order factors in the Five Factor Model, we cannot specify which lower-order facets contribute to the observed effects and which ones are unrelated. Future research is needed for finer grained analyses of the moderating effects we observed. Finally, our findings were based on self-report measures of attachment styles; additional research is also needed to determine if similar findings can be observed using interview-based assessments of attachment using the AAI.

Concluding remarks

When critics argue that questionnaire measures of anxious attachment assess a construct that is too similar to neuroticism, they appear to be questioning whether the unique explanatory power of attachment theory will be lost if one of its key dimensions is encompassed by the Five Factor Model of personality. Despite the popularity and utility of the Five Factor Model, it is important to recognize that its higher-order factors are so broadly defined that they often fail to account for interesting individual differences in human experience that are important to understand. It is worth recalling that personality encompasses more than higher-order traits like neuroticism and its facets; it also includes the attachment styles we investigated here as well as personal goals, coping styles, defensive styles, motives, life stories, identities, and various other individual characteristics (McAdams, 1995). We argue that different components of personality are likely to be interwoven in dynamic ways and that they function optimally when they are organized in a flexible and adaptive manner. However, individual components may become bound and inflexible if they conflict with each other, or they may combine in mutually reinforcing ways that are difficult to contain if affect-regulation systems function poorly or fail. Accordingly, knowing that anxious attachment and neuroticism covary may tell us very little if we do not also understand how they interact with avoidant attachment and conscientiousness and the regulatory processes they represent.

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