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Moving toward greater security: The effects of repeatedly priming attachment security and anxiety[☆]

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ABSTRACT

Contemporary models of personality development suggest that state-level changes that are maintained for long periods of time have the potential to coalesce into more enduring trait-level changes. In this research, we explored whether repeatedly increasing participants' state-level attachment security via priming might educe trait-level changes over the course of four months. Results indicated that both repeated security and anxiety primes were effective in reducing participants' trait levels of attachment anxiety over time. In contrast, neither prime generally affected participants' well-being. The fact that both primes had similar results suggests that one "active ingredient" in attachment priming may be reflecting upon close relationships—irrespective of the valence of those relationships. Moreover, our findings are compatible with the notion that repeated or prolonged changes to state-level security have the potential to coalesce into trait-level changes.

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1. Introduction

Individual differences in attachment security are associated with a wide array of meaningful outcomes in adulthood, including relationship functioning (e.g., Birnbaum, 2007; Birnbaum, Reis, Mikulincer, Gillath, & Orpaz, 2006; Brennan & Shaver, 1995; Conde, Figueiredo, & Bifulco, 2011), attitudes toward new acquaintances (Brumbaugh & Fraley, 2007), health outcomes (Pietromonaco & Powers, 2015), workplace preferences (e.g., Boatwright, Lopez, Sauer, VanDerWege, & Huber, 2010), memory functioning (e.g., Simpson, Rholes, & Winterheld, 2009), and even the strategies people use to respond to and mitigate environmental hazards (e.g., Ein-Dor, Mikulincer, & Shaver, 2011).

Given the implications of attachment styles for multiple life domains, researchers have naturally taken an interest in understanding how to change them. To that end, a growing body of research indicates that people's state-level attachment security can be temporarily increased using priming procedures, producing numerous benefits (e.g., Baldwin, Keelan, Fehr, Enns, &

Koh-Rangarajoo, 1996; Becker, Moscovitch, Behrmann, & Joordens, 1997; Gillath et al., 2006). Moreover, several emerging studies suggest that it may be possible to instill more enduring changes to people's attachment styles via *repeatedly* priming security over time (Carnelley & Rowe, 2007; Gillath, Selcuk, & Shaver, 2008). To date, however, this idea has only been studied over a relatively short duration: a maximum of several weeks. Thus, it remains unclear whether repeated priming techniques can shape people's attachment styles over longer periods of time. One of the aims of the present research was to advance our understanding of how priming methods function over longer timespans than those that have been examined previously. Specifically, we examined the consequences of repeatedly priming people with attachment security up to 16 times over the course of four months.

A second aim of the present research was to better understand the mechanisms underlying attachment priming by examining the implications of repeatedly priming attachment *insecurity*—and specifically attachment anxiety. Although security priming has been shown to have numerous beneficial consequences (e.g., Gillath et al., 2008; Mikulincer, Shaver, Sahdra, & Bar-On, 2013), much less is known about the effects of priming insecurity. At face value, one might reason that the effect of insecurity primes should be the opposite of the effect of security primes (e.g., Luke, Sedikides, & Carnelley, 2012; Mikulincer, Gillath, et al., 2001). There is, however, substantial reason to believe that insecurity primes should have *positive* psychological effects (e.g., Burton &

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King, 2008; King, 2002). To the extent that security and insecurity primes function similarly (e.g., both increase security), this may suggest that they share a common “active ingredient” (e.g., reflecting upon close relationships), and help elucidate the specific mechanisms underlying security priming. In the present research, we evaluate this possibility by examining the psychological effects of repeated attachment anxiety primes relative to both repeated security primes and an unprimed control group.

1.1. Attachment security priming: short or long-term effects?

As reviewed previously, individual differences in attachment styles have been linked to a wide range of consequential outcomes, such as relational functioning, health, and cognitive processes. For the past several decades, researchers have attempted to increase the internal validity of these associations by using experimental primes to temporarily manipulate people’s state-level attachment orientations in laboratory settings (e.g., Baldwin et al., 1996; Gillath et al., 2006). These primes capitalize upon a unique feature of the attachment system. Specifically, seeking physical proximity to an attachment figure fosters feelings of safety, comfort, and security. As individuals age, they gain the ability to internalize the process of proximity seeking, such that merely bringing to mind a mental representation of one’s attachment figures can provide adults with a sense of security and comfort (Bowlby, 1969; Mikulincer & Shaver, 2016). Thus, encouraging adults to think about their attachment figures through priming procedures can make them temporarily think, feel, and behave in ways that are similar to trait-secure individuals.

To this end, a large body of research suggests that, in comparison to unprimed control groups—or control groups primed with neutral topics or generalized positive affect—participants primed with attachment security are more empathic (Mikulincer, Gillath, et al., 2001), authentic (Gillath, Sesko, Shaver, & Chun, 2010), responsive (Mikulincer et al., 2013), generous (McClure, Bartz, & Lydon, 2013), creative (Mikulincer, Shaver, & Rom, 2011), benevolent (Mikulincer et al., 2003), altruistic (Mikulincer, Shaver, Gillath, & Nitzberg, 2005), tolerant/accepting of outgroup members (Boag & Carnelley, 2012; Mikulincer & Shaver, 2001), and even favorable toward unfamiliar abstract symbols (Mikulincer, Hirschberger, Nachmias, & Gillath, 2001). As compared with unprimed controls or neutral primes, security primes appear to absolve the negative effects of insecurities about one’s appearance (Park, 2007) or self-worth (Mikulincer, Shaver, Bar-On, & Sahdra, 2014), and security primes have even been shown to override the negative effects of cognitive depletion (Mikulincer et al., 2013) or mortality salience primes (Weise et al., 2008). In short, priming people with attachment security appears to cause them to behave in a more secure manner.

Nevertheless, the effects of these primes are likely to be short-lived (e.g., Becker et al., 1997). Recently, however, scholars have begun to emphasize that, although the effect of a single prime may be fleeting, repeated security priming may have the potential to instill lasting psychological benefits (Carnelley & Rowe, 2007; Gillath et al., 2008). Indeed, according to contemporary models of personality trait change, if state-level changes are maintained for a long enough time, they have the potential to coalesce into enduring trait changes (e.g., Hennecke, Bleidorn, Denissen, & Wood, 2014; Hudson & Fraley, 2015, 2016; Magidson, Roberts, Collado-Rodriguez, & Lejuez, 2012; Roberts & Jackson, 2008). These models suggest that it should be possible to increase people’s security over time by repeatedly inducing security in the short-term (i.e., repeatedly priming state-level security). Supporting this possibility, in one study, participants who were primed with attachment security multiple times over the course of several weeks (by writing about security fostering memories) self-reported greater increases in

positive self-views and relational expectations, as well as greater decreases in trait-level attachment anxiety, compared with a control group (who wrote about neutral topics, such as their daily commute; Carnelley & Rowe, 2007). A similar study found that participants repeatedly subliminally primed with security-related words over a three-week period experienced increases in self-esteem, positive mood, and compassion, relative to a control group primed with neutral words (Gillath et al., 2008). These studies suggest that repeatedly priming attachment security has the potential to increase psychological well-being and attachment security.

One limitation of these pioneering studies, however, is their relatively short duration. Thus, it remains unclear whether repeatedly priming participants with attachment security over longer periods of time can sculpt their attachment styles in a more enduring fashion. A second limitation of these studies is that they have typically assessed trait-like change using two-wave designs, in which attachment style at Time 2 was compared against attachment style at Time 1. However, as a number of scholars have argued (e.g., Fraley, Vicary, Brumbaugh, & Roisman, 2011), this kind of design cannot separate short-term and long-term change. That is, if a person has different attachment scores across two points in time on measures typically regarded as “trait” measures (e.g., Brennan, Clark, & Shaver, 1998; Fraley, Waller, & Brennan, 2000), that difference could emerge because of [a] short-term factors that produce transient changes to attachment style (e.g., temporary priming effects) or [b] long-term factors that produce enduring changes to attachment style (i.e., trait-like change). To determine whether attachment styles are changing in a more enduring way, it is necessary to assess attachment over multiple waves and determine whether a person’s trajectory across time has changed. One of the primary goals of the present research was to examine whether repeated security priming, relative to a control condition, is capable of producing increases in people’s rate of change in security across time. Thus, this investigation advances previous work by [a] using a much longer time span (four months) than previous studies and [b] focusing on trajectories or growth in security across multiple assessments.

1.2. Attachment insecurity priming

Although a large number of studies have documented the beneficial effects of security priming, far fewer studies have examined the effects of priming insecurity. At first blush, it might seem that insecurity primes should have effects opposite of security primes: they may momentarily decrease felt security. Seemingly supporting this idea, studies have found that, as compared with their security-primed peers, participants primed with insecurity—usually attachment anxiety—tend to report lower levels of felt security and energy (Luke et al., 2012), worse mood (Carnelley, Otway, & Rowe, 2016), higher perceptions of inequity in relationship vignettes (Grau & Doll, 2003), and less empathy and higher personal distress (Mikulincer, Gillath, et al., 2001). They also use fewer positive words in free-response essays (Carnelley & Rowe, 2010) and exhibit greater deceitful behavior in certain contexts (Chugh, Kern, Zhu, & Lee, 2014; Gillath et al., 2010).

One of the limitations of these studies, however, is that the effects of the insecurity primes were compared to security primes rather than to a true control group. Thus, the observed differences between conditions may be attributable to the action of the security prime rather than the action of the insecurity prime *per se*. The few studies that have directly compared an insecurity prime with an unprimed (or neutral-primed) control group have found either that insecurity primes have no effect as compared with the control group (Bowles & Meyer, 2008; Collins & Gillath, 2012), or that anxiety and security primes have similar positive effects, as compared with a control group (Gillath et al., 2010; Rowe et al., 2012). For instance, one study found that, in comparison to a control prime,

both anxiety and security primes increased subsequent reports of felt security and pain tolerance (Rowe et al., 2012). In short, the existing literature does not clearly support the assumption that insecurity priming has detrimental consequences for attachment or psychological functioning.

Furthermore, there are reasons to believe that insecurity priming could have *positive*—and not negative—consequences for attachment and well-being. First, priming manipulations serve to increase the mental accessibility of concepts in the mind (Collins & Loftus, 1975). And, although such manipulations sometimes have the potential to translate in simple ways into subsequent thoughts, feelings, and behaviors that “mirror” the prime (e.g., security primes can make people behave more securely), such primes can also activate a variety of other psychological processes that may press thoughts, feelings, and behaviors in diverging directions. For example, research suggests that meditating upon loved ones for a few minutes per day can increase psychological well-being (e.g., Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008). Moreover, one common method used to prime insecurity involves asking participants to reflect upon negative, anxiety-provoking memories from close relationships (e.g., Baldwin et al., 1996). Research in related fields suggests that structured reflection upon negative—even traumatic—experiences leads to *increases* in physical and psychological health (e.g., Burton & King, 2004, 2008; King, 2002). For instance, Burton and King (2008) randomly assigned participants to write about a traumatic experience or neutral control topic for a total of four minutes spread across two days. They found that those who wrote about negative experiences reported *better* health outcomes one month later, as compared with their peers who wrote about neutral topics. Such findings raise the possibility that insecurity primes that involve writing about negative relational experiences might also produce beneficial outcomes.

Why does writing about negative experiences produce *positive* psychological and physiological outcomes? Although the mechanisms underlying “writing cure” therapies remain poorly understood, theorists have identified several potential explanations. For one, re-exposure to negative memories in a safe, structured environment may allow people to reassess and reevaluate the sources of their stresses and fears—and potentially become habituated to them (Foa, Steketee, & Rothbaum, 1989). Similarly, journaling about negative experiences may increase people’s awareness of irrational emotions and schemata through which they construe prior events—and allow them to develop new and psychologically healthier schemas (Resick & Schnicke, 1992). Finally, expressive writing may help people create positive meaning even from deeply negative events (Boals, 2012). Thus, in contrast to unstructured rumination, which is negatively correlated with well-being (Harrington & Loffredo, 2010), structured cognitive processing of negative events (e.g., expressively writing about them) is associated with positive outcomes (Monson et al., 2006).

To summarize, manipulations of attachment insecurity often overlap considerably with “writing cure” therapies that have well-documented beneficial effects. Thus, it is reasonable to expect that priming insecurity could have positive psychological consequences. Indeed, this may explain why in one recent series of experiments, participants primed with attachment anxiety—by writing about and visualizing an anxiety-provoking experience in a close relationship—rated the priming experience as having been positive and pleasant (Hudson, 2016).

It is important to understand how insecurity primes function for at least two reasons. First, investigating insecurity priming effects can elucidate the mechanisms underlying security priming effects—potentially leading to the development of more effective security-promoting interventions in the future. For example, if both security and insecurity primes have positive effects in comparison to a control group, this might suggest that thinking about

close relationships *per se*—not necessarily secure ones—can have beneficial consequences. Thus, it is possible that security priming does not work via the kinds of mechanisms typically described in the literature (i.e., increasing the activation of primed concepts, which then cascade into concept-relevant affect and goals); it may set in motion a complex set of processes that are potentially beneficial regardless of the primed content. Second, if insecurity primes have positive effects, this may have implications for their use in research contexts. For example, insecurity primes may not be a valid manipulation of state-level insecurity—and thus may operationalize some entirely unexpected construct (see also Crowell, Fraley, & Roisman, 2016; Sakaluk, 2014). For these reasons, the second major goal of the present study was to investigate the effects of repeatedly priming attachment anxiety.

1.3. Overview of the present study

The present study was a four-month long, intensive longitudinal experiment. Participants were randomly assigned to one of three conditions. One group of participants was repeatedly primed with attachment security each week for four months. A second group was primed with attachment anxiety each week. The third group served as a true control and received no prime. Thus, we were able to directly compare the effects of the security and anxiety primes to a true control group—and avoid any potential pitfalls associated with only comparing the effects of the primes to each other. All participants provided repeated ratings of their attachment styles and psychological well-being.

These data were used to address two major issues. First, previous research suggests that repeatedly priming attachment security has numerous psychological benefits—at least over the course of three weeks (Carnelley & Rowe, 2007; Gillath et al., 2008). The present study was designed to examine whether attachment security priming leads to more enduring psychological benefits over a much longer timespan—four months—or whether the benefits would wane or even revert over such a long period of time (e.g., producing no net growth over longer periods of time). In other words, this study allowed us to determine whether repeated priming (i.e., activating state-level security over time) led to long-term growth in attachment styles. The second goal of the present study was to examine the effects of repeatedly priming attachment insecurity—particularly, anxiety. Given the similarity between anxiety primes (e.g., Baldwin et al., 1996) and journaling therapies (Burton & King, 2004, 2008), we expected that the repeated anxiety primes would have positive psychological effects.

2. Method

2.1. Participants

Students in an introductory personality psychology course participated in exchange for extra credit. Participants were provided with a link to the study website, and were required to register a user account to participate. Students were instructed to complete one wave of the study per week throughout the 16-week semester.

A total of 144 participants provided at least one wave of attachment data.¹ Eleven of these students opted to not complete the priming task in any wave and were excluded from data analyses. The final sample consisted of 133 participants who were predominantly (69%)

¹ As part of a larger study, students completed a battery of personality questionnaires each week. To keep the weekly questionnaires a manageable length, some questionnaires were presented only on even- or odd-numbered waves. Attachment measures were collected only on even-numbered waves. A total of 158 participants completed the first wave, 144 of whom also completed the second wave during which attachment measures were first collected.

female with an average age of 20.15 years ($SD = 1.57$). Participants were asked to nominate all races with which they identified; in the final sample, 48% of participants identified as White, 35% as Asian, 10% as Hispanic, 8% as Black, and 2% as Native American.

On average, each participant provided 12.53 waves of data. Attachment measures were collected only in even-numbered waves (yielding 6.91 usable waves per participant); however, some students stopped participating in the attachment primes as the study progressed. As described in greater detail below, data from waves after students stopped participating in the primes were omitted from analyses, resulting in a final average of 5.63 usable waves per participant. Assuming that between 30% and 70% of the variance in our outcome measures is within-persons, this sample size would afford approximately 80–95% power to detect average-sized effects (equivalent to $r \sim 0.21$; Richard, Bond, & Stokes-Zoota, 2003).

Attrition analyses revealed that no study variables were related to total number of waves completed, r s ranged from $r = -0.11$, 95% confidence interval (CI) $[-0.27, 0.05]$ (avoidance) to $r = 0.04$, 95% CI $[-0.13, 0.20]$ (positive affect). Experimental condition was also unrelated to number of waves of data provided by participants (security prime vs. unprimed control $\beta = -0.06$, 95% CI $[-0.25, 0.14]$; anxiety prime vs. unprimed control $\beta = -0.14$, 95% CI $[-0.33, 0.06]$).

2.2. Measures

2.2.1. Attachment orientations

On even-numbered waves, participants provided self-report ratings of their attachment styles using the 12-item Experiences in Close Relationships – Short Form (ECR-S; Wei, Russell, Mallinckrodt, & Vogel, 2007). The ECR-S contains subscales to measure attachment anxiety (e.g., “I worry that romantic partners won’t care about me as much as I care about them”) and attachment avoidance (e.g., “I try to avoid getting too close to my partner”). All items were rated on a scale ranging from *strongly disagree* (1) to *strongly agree* (5), and were averaged to form composites for anxiety (Time 2 $\alpha = 0.68$) and avoidance (Time 2 $\alpha = 0.82$). A prototypically *secure* individual is low in both attachment anxiety and avoidance.

2.2.2. Well-being

Participants provided self-report ratings of their subjective well-being using the 5-item Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985), the 20-item Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), and the 8-item emotional stability subscale from the Big Five Inventory (BFI; John & Srivastava, 1999). The SWLS was administered every wave, and contains five items that measure participants’ overall assessment of their well-being (e.g., “In most ways my life is close to ideal”). These items were rated using a scale ranging from *strongly disagree* (1) to *strongly agree* (5) and were averaged together to form a composite (Time-1 $\alpha = 0.82$).

The PANAS was administered on even-numbered waves. Participants were asked to rate the extent to which, during the previous week, they had felt 10 positive emotions (e.g., interested, excited, enthusiastic, proud) and 10 negative ones (e.g., distressed, upset, guilty, nervous). All items were rated on a scale running from *very slightly or not at all* (1) to *moderately* (3) to *extremely* (5). Items were averaged to form separate composites for positive and negative affect (Time-2 α s = 0.85 and 0.86, respectively).

The emotional stability subscale from the BFI was administered every wave. Participants rated 8 self-descriptions (e.g., “I see myself as someone who is emotionally stable, not easily upset”) on a scale ranging from *strongly disagree* (1) to *strongly agree* (5). Items were averaged together to form a composite (Time-1 $\alpha = 0.82$).

2.3. Procedure

As part of a larger study,² students registered a user account on the study website and were encouraged to complete a battery of personality measures once per week for the 16-week semester. Participants were instructed to complete one wave per week; but to afford leniency and flexibility, they could complete new waves as frequently as once every 5 days. Participants who waited longer than 6 days between completing assessment waves were sent automated email reminders.

During the first wave, participants were randomly assigned to one of three experimental groups. Two of the groups received an attachment prime (Baldwin et al., 1996). To disguise the purpose of the primes, these participants were provided with the cover story that we were interested in how they remember events and what happens to those memories over time. Participants in the first group were primed with memories that matched Hazan and Shaver’s (1987) description of prototypical secure attachment. Specifically, at the end of every wave (i.e., up to 16 times), these participants were asked to “take a few moments to remember a real experience with a romantic partner, family member, or best friend, during which you felt feelings that match the description:”

“I felt the person was relatively easy to feel close to. I felt comfortable depending on them and having them depend on me. I felt confident that they really loved me and would not abandon me and would not try to distance themselves from me. I felt comfortable with the level of closeness that we both wanted in the relationship.”

Participants were instructed to write about the memory in a provided text area. To encourage them to elaborate on the memory, the prompt and text area were displayed for a minimum of 70 s before a button appeared that allowed them to progress.

Participants in the second experimental condition were asked to write about a memory matching Hazan and Shaver’s (1987) definition of prototypical attachment anxiety:

“I felt the person was reluctant to get as close as I would have liked. I felt worried that the person didn’t really love me, or that they might try to distance themselves from me—perhaps even abandon me. I would’ve liked to have felt very close with this person, and I worried that my desire to be close might scare them away.”

We primed attachment anxiety, and not avoidance, for three reasons. First, most research examining insecurity priming has used anxiety primes (e.g., Bartz & Lydon, 2004; Birnbaum & Reis, 2012; Gillath et al., 2010; Rowe et al., 2012). Second, scholars have argued that successfully priming attachment avoidance may be considerably more difficult than priming anxiety (Crowell et al., 2016).³ Third and finally, we have used single-session anxiety primes in previous lab studies, and participants exposed to the anxiety primes rated

² Data from these participants are reported in a manuscript examining the links between participants’ desires and attempts to change their personality traits and their psychological well-being (Hudson & Fraley, 2016). The analyses contained within this manuscript are not reported elsewhere. Importantly, all questionnaires and methods included in the larger study were either constant across priming conditions, or were fully crossed with the priming manipulations—and thus cannot explain systematic differences between the prime groups reported in this article.

³ Crowell et al. (2016) argue that state-level attachment anxiety is a cognitive-affective state that, at face, could be changed by exposing participants to stimuli that produces anxiety toward their relationships. Avoidance, in contrast, represents variation in motivational-behavioral strategies for regulating vulnerability. It seems unlikely that primes, which merely increase the semantic accessibility of concepts, would strongly influence participants’ behavioral strategies, especially if those run counter to their ingrained strategies.

the priming experience as having been positive (Hudson, 2016). Thus, we were confident that the anxiety primes would be, at worst, benign, and at best, beneficial (e.g., Burton & King, 2008; King, 2002).

Participants in the final group served as true controls—they neither recalled a memory nor engaged in any sort of writing task. Participants were kept in the same experimental group throughout the entire study—and thus wrote about either a secure memory, an anxious memory, or did not write about a memory at every single wave.

Presumably due to the online nature of the study and the lack of accountability afforded by a laboratory setting, some students opted to skip the priming task, either providing no response, responses similar to “I have no such memory,” or irrelevant responses. A total of 170 responses (an average of 1.28 waves per participant) were discarded for failing to complete the priming task.^{4,5}

In all waves, participants rated their life satisfaction and emotional stability. In even-numbered waves, we collected measures of attachment styles and psychological well-being. Importantly, all self-report measures came *before* the primes each wave (i.e., the primes were the last task completed at each wave). Thus, our analyses do not capture the immediate effects of the primes on the outcome variables—but rather the delayed and accumulating effects of the primes over time. At the end of the study, participants were awarded pro-rated extra credit based on the number of waves they had completed, and were provided with a personalized results webpage that summarized their personality traits and attachment styles, and how those variables had changed over the course of the semester.

3. Results

3.1. Analysis strategy

We used multilevel models (MLMs) to examine growth in participants' attachment styles and subjective well-being over time. All attachment and well-being variables were standardized across all observations before being entered into the model (see Ackerman, Donnellan, & Kashy, 2011). *Time* was centered at Time 1 and scaled in terms of months (i.e., days since Time 1, divided by 30).⁶ Consequently, the *Month* parameters in all of our models capture the *standardized* increase in the outcome per 30 days. In all of our models, we also examined the extent to which the attachment primes moderated growth in the outcomes. To do so, the experimental conditions were dummy coded with the control group as the reference group. For example, the MLM examining growth in attachment anxiety as a function of the experimental primes was:

$$\begin{aligned} (Anxiety)_{ij} = & b_0 + b_1(Month)_{ij} + b_2(Security\ Prime)_j \\ & + b_3(Anxiety\ Prime)_j + b_4(Month)_{ij}(Security\ Prime)_j \\ & + b_5(Month)_{ij}(Anxiety\ Prime)_j + U_j + \varepsilon_{ij} \end{aligned}$$

Because the experimental conditions were dummy-coded with the unprimed control as the reference group, the $b_1(Month)$ coefficient represents the average monthly growth in attachment anxiety in the control group. In turn, the $b_4(Month)(Security\ Prime)$

⁴ For students who stopped responding to the primes, there was generally a clear “cut point” where they transitioned from responding appropriately to the prime each week to skipping the prime and/or providing irrelevant responses each week. It was rare for students to skip the prime one week and then return to completing it in subsequent weeks. Consequently, dropping waves in which students did not respond to the primes effectively increased the early attrition rate—it generally did not have the effect of using intermittent waves from individual students.

⁵ As a point of comparison, we have used identical primes in other laboratory-based studies (e.g., Hudson & Fraley, 2018). Across more than 750 in-lab participants, it was extremely rare for participants to provide no and/or irrelevant responses to the priming tasks.

⁶ Thus, at Time 1, *Month* = 0 for all participants. If a participant completed wave 2 six days later, *Month* would be equal to 6/30 = 0.20.

interaction captures the extent to which the growth among those primed with security *differed* from the growth in the control group (i.e., the simple growth in the security prime group is equivalent to $b_1 + b_4$). Similarly, the $b_5(Month)(Anxiety\ Prime)$ interaction captures the extent to which growth in the anxiety prime group *differed* from that in the control group.

3.2. Effects of attachment priming on trait attachment styles

3.2.1. Attachment anxiety

First, we examined the extent to which repeatedly priming attachment security and anxiety affected people's levels of attachment anxiety. As can be seen in Table 1, participants in the control group did not experience statistically significant changes in attachment anxiety over time, simple $b_{month} = -0.04$, 95% CI [-0.10, 0.01]. In contrast, the security prime significantly moderated growth in attachment anxiety ($b_{month \times security\ prime} = -0.08$, 95% CI [-0.16, -0.001]), such that people repeatedly primed with security tended to decrease 0.12 SDs in attachment anxiety each month (simple $b_{month} = -0.12$, 95% CI [-0.18, -0.07]). Thus, summing over the entire duration of the study, participants primed with security were predicted to decrease, on average, nearly one half standard deviation in attachment anxiety ($b = -0.48$; 95% CI [-0.72, -0.28]). Although the moderating effect of the anxiety prime was not statistically significant (i.e., the anxiety prime group did not statistically significantly differ from the control group in terms of growth in attachment anxiety; $b_{month \times anxiety\ prime} = -0.07$, 95% CI [-0.15, 0.02]), simple slope analyses revealed that participants repeatedly primed with attachment anxiety also *did* experience statistically significant declines in attachment anxiety—0.11 SDs—each month (i.e., growth in attachment anxiety in the anxiety prime group was statistically significantly different from zero; simple $b_{month} = -0.11$, 95% CI [-0.18, -0.04]). Thus, as can be seen in Fig. 1, the effects of the security prime and anxiety prime were virtually indistinguishable from one another—both reduced attachment anxiety over time. Indeed, as compared to the *security prime* (i.e., when the model was respecified such that the security prime was the reference group), the anxiety prime had an effect on neither the intercept ($b_{anxiety\ prime} = -0.01$, 95% CI [-0.19, 0.16]) nor slope ($b_{month \times anxiety\ prime} = 0.01$, 95% CI [-0.08, 0.10]).^{7,8}

⁷ If the security prime and anxiety prime conditions are collapsed together, participants exposed to *any prime* experienced greater drops in attachment anxiety each month, as compared with the control group ($b_{month \times any\ prime} = -0.07$, 95% CI [-0.14, -0.01]; among primed participants, simple $b_{month} = -0.12$, 95% CI [-0.16, -0.07]).

⁸ Reviewers requested analyses of the text of participants' prime essays. For each essay, we computed (1) the total number of words used; (2) the total number of positive words used, based on a dictionary of more than 500 positive word stems; and (3) the total number of negative words used, based on a dictionary of more than 500 negative word stems. With respect to total words used, on average, participants' essays were relatively short ($M = 55.21$ words; $SD = 28.04$), and tended to get shorter as time progressed (6.03 fewer words per month; 95% CI [-9.38, -2.68]). There were, however, no differences in total words used across the security and anxiety prime conditions ($b_{prime} = 3.44$, 95% CI [-7.92, 14.80]) or growth in words used across time ($b_{month \times prime} = -3.61$, 95% CI [-7.96, 0.74]). With respect to positive and negative words, participants in the security prime condition used, on average, 2.52 more positive words (95% CI [0.78, 4.26]) and 1.72 fewer negative words (95% CI [-2.81, -0.61]) than did participants in the anxiety prime group. There was, however, no growth in positive or negative words across time in either group—and thus the primes did not moderate growth across time in positive words ($b_{month \times prime} = 0.04$, 95% CI [-0.87, 0.79]) or negative words ($b_{month \times prime} = 0.11$, 95% CI [-0.40, 0.62]). Finally, controlling for positive and negative words used did not change the estimates of simple growth in attachment anxiety within the anxiety prime group (controlled simple $b_{month} = -0.10$, 95% CI [-0.18, -0.03]) or the security prime group (controlled simple $b_{month} = -0.13$, 95% CI [-0.19, -0.07]). These analyses seem to indicate that, although participants in the security prime condition wrote more positive essays than did participants in the anxiety prime condition, systematic changes in the valence of participants' essays across time cannot explain the decreases in attachment anxiety observed in our study.

Table 1
Effects of primes and time on attachment anxiety.

Predictor	<i>b</i>	95% Confidence interval	
		Lower bound	Upper bound
Intercept	0.08	-0.03	0.18
Month	-0.04	-0.10	0.01
Security Prime	0.13	-0.02	0.28
Anxiety Prime	0.11	-0.06	0.28
Month × Security Prime	-0.08	-0.16	-0.001
Month × Anxiety Prime	-0.07	-0.15	0.02
Trait Anxiety	1.00	0.96	1.04
Trait Avoidance	0.00	-0.03	0.04

Note: Anxiety and avoidance were standardized before being entered into the model; time was scaled in terms of months; the primes were dummy coded with the control group as the reference group; 95% confidence intervals for parameter estimates in **boldface** do not include zero.

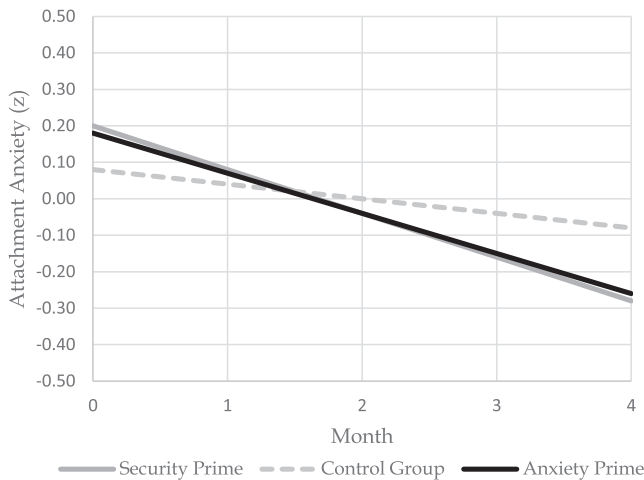


Fig. 1. Main effects of the security and anxiety primes on growth in attachment anxiety.

As a series of post hoc analyses, we examined whether participants' personal mean levels of attachment anxiety across the study moderated the impact of the primes.⁹ These analyses capture whether the primes had differential effects on people who were relatively high or low in attachment anxiety. For example, it may be the case that the security and anxiety primes were especially beneficial for people with high mean levels of attachment anxiety. As can be seen in Table 2, people's mean-levels of attachment anxiety moderated the impact of the anxiety prime ($b_{\text{trait anxiety} \times \text{month} \times \text{anxiety prime}} = -0.17$, 95% CI [-0.26, -0.08]), but did not moderate the effects of the security prime ($b_{\text{trait anxiety} \times \text{month} \times \text{security prime}} = -0.01$, 95% CI [-0.10, 0.08]). Fig. 2 illustrates the model-predicted growth in attachment anxiety in all three prime groups, for persons with low mean-levels of attachment anxiety (1 SD below the mean) and for those with high mean-levels of attachment anxiety (1 SD above the mean). For highly anxious individuals, the anxiety prime produced relatively sharp declines in attachment anxiety—0.18 SDs each month (simple $b_{\text{month}} = -0.18$, 95% CI [-0.27, -0.09]). Thus, highly anxious individuals exposed to the anxiety prime were expected to drop, on average, 0.72 SDs (95% CI [-1.08, -0.36]) in anxiety over the entire duration of the study. In contrast, relatively secure individuals primed with attachment anxiety experienced no within-person growth in attachment anxiety over time (simple $b_{\text{month}} = -0.02$, 95% CI [-0.13, 0.08]).

⁹ Participants' personal mean levels of anxiety were computed by averaging their reported anxiety across all available waves.

Table 2
Trait-level Anxiety × Prime interactions and time predicting attachment anxiety.

Predictor	<i>b</i>	95% Confidence interval	
		Lower bound	Upper bound
Intercept	0.08	-0.03	0.18
Month	-0.05	-0.10	0.01
Security Prime	0.11	-0.04	0.26
Anxiety Prime	0.09	-0.07	0.26
Month × Security Prime	-0.07	-0.15	0.004
Month × Anxiety Prime	-0.06	-0.14	0.03
Trait Anxiety	0.84	0.73	0.95
Trait Anxiety × Month	0.09	0.04	0.15
Trait Anxiety × Security Prime	0.03	-0.15	0.20
Trait Anxiety × Anxiety Prime	0.27	0.09	0.45
Trait Anxiety × Security Prime × Month	-0.01	-0.10	0.08
Trait Anxiety × Anxiety Prime × Month	-0.17	-0.26	-0.08
Trait Avoidance	0.00	-0.04	0.04

Note: Anxiety and avoidance were standardized before being entered into the model; time was scaled in terms of months; the primes were dummy coded with the control group as the reference group; 95% confidence intervals for parameter estimates in **boldface** do not include zero.

To summarize, both the security and anxiety primes led to relative declines in individuals' attachment anxiety, as compared to the unprimed control group. The security-fostering effect of the anxiety prime was especially prominent for those with high mean levels of attachment anxiety.

3.2.2. Avoidance

As can be seen in Table 3, participants in the control group tended to experience small declines in attachment avoidance each month, $b_{\text{month}} = -0.06$, 95% CI [-0.10, -0.01]. Neither the security prime nor anxiety prime moderated this growth over time, $b_{\text{month} \times \text{security prime}} = -0.03$, 95% CI [-0.10, 0.04]; $b_{\text{month} \times \text{anxiety prime}} = 0.04$, 95% CI [-0.04, 0.12]. Moreover, follow-up analyses revealed that participants' mean levels of avoidance moderated the effects of neither the security prime ($b_{\text{avoidance} \times \text{month} \times \text{security prime}} = -0.01$, 95% CI [-0.09, 0.07]) nor the anxiety prime ($b_{\text{avoidance} \times \text{month} \times \text{anxiety prime}} = -0.07$, 95% CI [-0.15, 0.01]). Thus, our primes were unrelated to changes in attachment avoidance.

3.3. Effects of the security and anxiety primes on subjective well-being

For our final series of analyses, we examined the extent to which repeatedly priming attachment security and anxiety influenced participants' subjective well-being over time. As can be seen in Tables 4–7, participants in the control group tended to slightly decrease in positive affect ($b_{\text{month}} = -0.08$, 95% CI [-0.16, -0.001]), life satisfaction ($b_{\text{month}} = -0.04$, 95% CI [-0.09, 0.01]), and negative affect ($b_{\text{month}} = -0.06$, 95% CI [-0.14, 0.01]) each month (though the latter two effects were not statistically significant). In contrast, participants tended to increase about one-twentieth of a standard deviation in emotional stability each month ($b_{\text{month}} = 0.05$, 95% CI [0.01, 0.10]).

Neither the security prime nor the anxiety prime moderated growth in any of these well-being variables over time, all $|b_{\text{month} \times \text{prime}}| \leq 0.07$. In fact, the only effect of the primes on well-being was that the security prime appeared to produce an immediate half-standard deviation gain in positive affect, $b_{\text{security prime}} = 0.50$, 95% CI [0.16, 0.84]. However, the security prime did not influence growth in positive affect, $b_{\text{month} \times \text{security prime}} = -0.03$, 95% CI [-0.15, 0.08]. Thus, as is depicted in Fig. 3, although the participants in the security prime group reported much greater positive affect than did participants in either other group across all waves, the trajectories of the three groups' positive affect were indistinguishable from one another. Notably, the anxiety prime did not

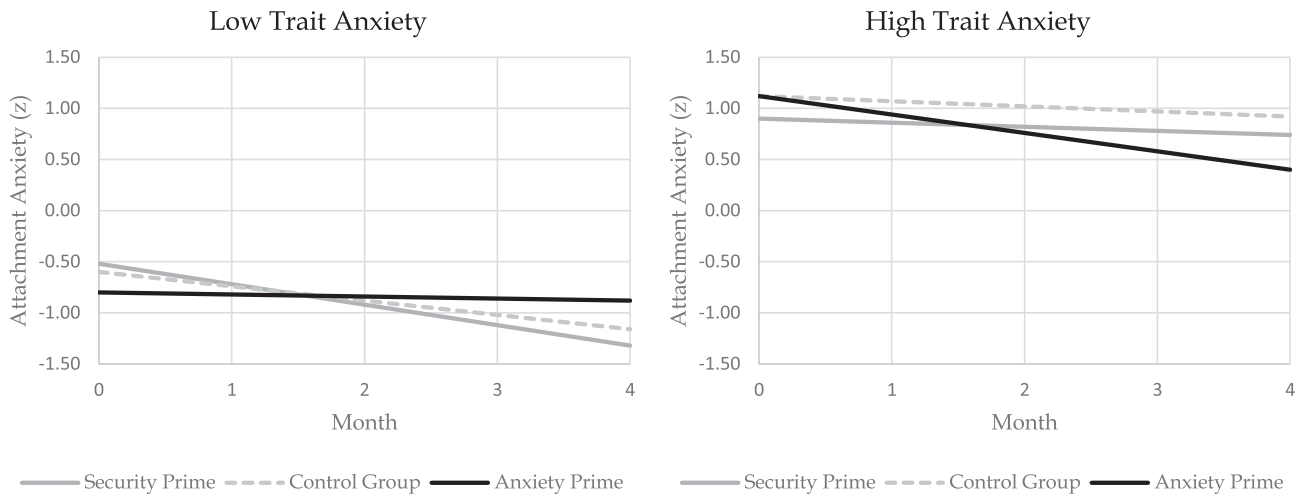


Fig. 2. Simple effects of the security and anxiety primes on growth in attachment anxiety for individuals low (1 SD below the mean) and high (1 SD above the mean) in trait (i.e., person-mean) attachment anxiety.

Table 3
Effects of primes and time on attachment avoidance.

Predictor	<i>b</i>	95% Confidence interval	
		Lower bound	Upper bound
Intercept	0.10	0.00	0.19
Month	-0.06	-0.10	-0.01
Security Prime	0.04	-0.09	0.18
Anxiety Prime	-0.07	-0.22	0.08
Month × Security Prime	-0.03	-0.10	0.04
Month × Anxiety Prime	0.04	-0.04	0.12
Trait Anxiety	0.00	-0.03	0.04
Trait Avoidance	1.00	0.97	1.03

Note: Anxiety and avoidance were standardized before being entered into the model; time was scaled in terms of months; the primes were dummy coded with the control group as the reference group; 95% confidence intervals for parameter estimates in **boldface** do not include zero.

Table 4
Effects of primes and time on life satisfaction.

Predictor	<i>b</i>	95% Confidence interval	
		Lower bound	Upper bound
Intercept	-0.03	-0.29	0.23
Month	-0.04	-0.09	0.01
Security Prime	0.23	-0.13	0.60
Anxiety Prime	0.07	-0.32	0.46
Month × Security Prime	0.01	-0.07	0.09
Month × Anxiety Prime	-0.02	-0.11	0.06
Trait Anxiety	-0.14	-0.20	-0.07
Trait Avoidance	-0.13	-0.20	-0.06

Note: All attachment and well-being variables were standardized before being entered into the model; time was scaled in terms of months; the primes were dummy coded with the control group as the reference group; 95% confidence intervals for parameter estimates in **boldface** do not include zero.

decrease positive affect—and, if anything, it trended toward increasing positive affect across all waves, $b_{anxiety\ prime} = 0.18$, 95% CI [-0.18, 0.55] (cf. Carnelley et al., 2016).

Finally, we examined whether participants' mean levels of attachment anxiety and avoidance moderated the impact of the primes on well-being. Neither participants' anxiety nor avoidance significantly moderated the effect of either prime on any well-being variable, parameter estimates ranged from $b = -0.20$, 95% CI [-0.48, 0.07] (avoidance × security prime, predicting positive affect) to $b = 0.15$, 95% CI [-0.06, 0.36] (anxiety × security prime,

Table 5
Effects of primes and time on positive affect.

Predictor	<i>b</i>	95% Confidence interval	
		Lower bound	Upper bound
Intercept	-0.02	-0.26	0.22
Month	-0.08	-0.16	-0.001
Security Prime	0.50	0.16	0.84
Anxiety Prime	0.18	-0.18	0.55
Month × Security Prime	-0.03	-0.15	0.08
Month × Anxiety Prime	-0.05	-0.18	0.08
Trait Anxiety	-0.12	-0.21	-0.04
Trait Avoidance	-0.05	-0.18	0.08

Note: All attachment and well-being variables were standardized before being entered into the model; time was scaled in terms of months; the primes were dummy coded with the control group as the reference group; 95% confidence intervals for parameter estimates in **boldface** do not include zero.

Table 6
Effects of primes and time on negative affect.

Predictor	<i>b</i>	95% Confidence interval	
		Lower bound	Upper bound
Intercept	0.12	-0.13	0.38
Month	-0.06	-0.14	0.01
Security Prime	-0.14	-0.51	0.23
Anxiety Prime	-0.01	-0.41	0.38
Month × Security Prime	0.03	-0.08	0.14
Month × Anxiety Prime	0.07	-0.02	0.16
Trait Anxiety	0.19	0.10	0.27
Trait Avoidance	0.07	-0.02	0.16

Note: All attachment and well-being variables were standardized before being entered into the model; time was scaled in terms of months; the primes were dummy coded with the control group as the reference group; 95% confidence intervals for parameter estimates in **boldface** do not include zero.

predicting life satisfaction). The only exception was that mean avoidance interacted with the anxiety prime to predict an immediate reduction in negative affect ($b_{avoidance \times anxiety\ prime} = -0.28$, 95% CI [-0.56, -0.004])—but not growing reductions in negative affect over time ($b_{avoidance \times month \times anxiety\ prime} = 0.11$, 95% CI [-0.01, 0.23]).

4. Discussion

Previous research suggests that priming attachment security can lead to numerous—albeit potentially ephemeral (Becker

Table 7
Effects of primes and time on emotional stability.

Predictor	<i>b</i>	95% Confidence interval	
		Lower bound	Upper bound
Intercept	−0.09	−0.35	0.18
Month	0.05	0.01	0.10
Security Prime	0.09	−0.28	0.47
Anxiety Prime	−0.17	−0.57	0.23
Month × Security Prime	−0.01	−0.08	0.06
Month × Anxiety Prime	0.06	−0.08	0.06
Trait Anxiety	−0.15	−0.21	−0.09
Trait Avoidance	−0.05	−0.11	0.01

Note: All attachment and well-being variables were standardized before being entered into the model; time was scaled in terms of months; the primes were dummy coded with the control group as the reference group; 95% confidence intervals for parameter estimates in **boldface** do not include zero.

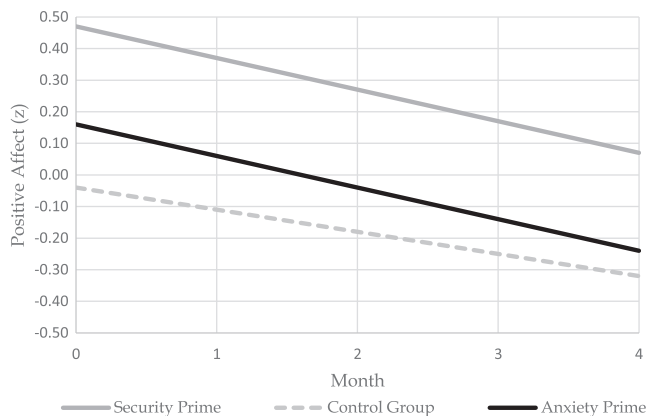


Fig. 3. Main effects of the security and anxiety primes on growth in positive affect.

et al., 1997)—psychological benefits (e.g., Gillath & Hart, 2010; Luke et al., 2012). Several studies have suggested that repeatedly priming security over the course of several weeks may elicit more enduring benefits (Carnelley & Rowe, 2007; Gillath et al., 2008). One of the primary goals of the present study was to examine whether repeatedly priming security over a much longer period of time—four months—could sustain changes in participants' attachment styles, or whether participants might habituate to the primes and revert to their baseline security (potentially producing net zero growth over time). To that end, our findings indicated that repeatedly priming attachment security led to significant reductions in attachment anxiety over time, as compared with an unprimed control group. Indeed, participants primed with attachment security each week for four months dropped, on average, nearly one half standard deviation in attachment anxiety over the course of the study. This lends credence to the idea that security priming can sculpt people's dispositional attachment styles (Carnelley & Rowe, 2007; Gillath et al., 2008)—and that these changes can be maintained over periods of time as long as four months. Notably, however, participants' levels of attachment avoidance were unaffected by both the security and anxiety primes (see Crowell et al., 2016).

In contrast to its efficacy in reducing anxiety, the attachment security prime did not appear to improve participants' subjective well-being over time—in terms of life satisfaction, positive affect, negative affect, or emotional stability. The only exception was that participants in the security prime condition reported much higher positive affect than did participants in any other condition, from the first measurement occasion onward. This may suggest that the security prime had an immediate impact in increasing positive emotions—and that repeatedly priming security sustained those

gains in positive affect across the duration of the study. Alternatively, this may represent an artifact of sampling error, such that our experimental groups were not equivalent in terms of positive affect at the beginning of the study. Unfortunately, we were not able to disentangle these possibilities, as participants' positive affect was measured for the first time a week after they were first exposed to the security prime. Nevertheless, the security prime did not predict *growth* in positive affect over the course of the study.

To summarize, our results replicate previous research suggesting that repeated security priming can move people toward greater attachment security over time (Carnelley & Rowe, 2007; Gillath et al., 2008). Moreover, this growth can be sustained over a period of time as long as even four months—a full college semester. This is consistent with the notion that if state-level changes, such as those induced by security priming, can be maintained for a long enough period of time, they may coalesce into more enduring, trait-like changes (Hudson & Fraley, 2015; Magidson et al., 2012; Roberts & Jackson, 2008). In contrast, our study provided less robust evidence for the idea that repeated attachment priming can increase subjective well-being. On the one hand, the security prime may have spurred immediate—but not growing—increases in positive affect (e.g., Gillath et al., 2008). On the other hand, the security prime was unrelated to changes in negative affect, emotional stability, or life satisfaction. Thus, it may be the case that security priming does not robustly increase well-being. Alternatively, it may be the case that security priming only increases specific types of well-being, which were not measured in the present study (e.g., self-esteem, relational well-being; Carnelley & Rowe, 2007).

4.1. Insecurity priming

The second major goal of the present study was to investigate the effects of repeatedly priming insecurity—namely, attachment anxiety. In our study, repeatedly priming participants with attachment anxiety had positive effects that were nearly indistinguishable from the effects of the security prime (though the effect for the anxiety prime fell just short of statistical significance when compared to the control group). Specifically, participants primed with anxiety each week were predicted to decrease nearly a half standard deviation in attachment anxiety over the course of study's duration. Moreover, the beneficial effects of the anxiety prime were especially pronounced for the most anxiously attached individuals in the sample—who were predicted to drop nearly three-quarters of a standard deviation in attachment anxiety over four months.

These findings seem to align with the idea that certain anxiety primes—such as the one used in the present study—share substantial similarities with “writing cure” therapies, which have numerous well-documented physical and emotional benefits (Burton & King, 2004, 2008; King, 2002). Although the precise mechanisms underlying such therapies are not well-understood, asking participants to reflect upon—and specifically write about—negative experiences (such as anxiety-provoking relational memories) may help them to process their emotions in a healthy, structured, and therapeutic manner (unstructured rumination, in contrast, may lead to worse well-being; Harrington & Loffredo, 2010). Moreover, merely reflecting upon close relationships—even ones that are less-than-ideal—may promote psychological health (Fredrickson et al., 2008). Thus, repeatedly priming participants with anxiety may have helped them “work through” some of their negative beliefs and expectations regarding close relationships (e.g., Bartholomew & Horowitz, 1991)—ultimately leading to gains in attachment security over time. Notably, previous research suggests that journaling therapies produce physiological and psychological benefits in as few as two extremely brief (two-minute) writing sessions (Burton & King, 2008). Therefore, the benefits of insecurity primes

may similarly manifest even in a much shorter timespans than that used by the present study. That said, without much future research into the properties of insecurity primes, we would caution against the interpretation that insecurity primes are a *desirable* method of moving participants toward greater security—especially in light of existing studies suggesting that security primes are associated with more positive outcomes than are insecurity primes (Carnelley & Rowe, 2010; Chugh et al., 2014; Gillath et al., 2010).

In short, our study seems to cast doubt on the notion that priming attachment anxiety actually *induces* participants to feel high levels of anxiety. Thus, barring future investigations into the construct validity of the kinds of insecurity primes used here, researchers should use caution to avoid potentially conflating the effects of *insecurity* primes as representing the effects of state-level attachment anxiety or avoidance. That being said, it remains possible that the time course of insecurity priming matters, such that, with short durations between the prime and the outcome, insecurity priming might have detrimental effects. Insecurity priming might, for example, make accessible temporarily memories of abandonment, feelings of self-doubt, and so on (e.g., Carnelley et al., 2016). But, as people reflect upon the memories and describe them, they may come to see the positive aspects of those experiences: how they contribute to growth and how relationships endure despite temporary setbacks (e.g., Boals, 2012). Thus, one potentially useful direction for future research would be to determine whether insecurity primes temporarily make negative concepts more active, but that they also bring online positive concepts and affects that, ultimately, come to dominate as the main response.

Along these lines, anxiety primes may also manipulate *mechanisms* that link attachment anxiety to various consequential outcomes. For example, highly anxious individuals experience more numerous false memories, as compared with their more secure peers (Hudson & Fraley, 2018). This effect is thought to occur because relational concerns are chronically accessible in highly anxious persons' minds. Thus, in this case, an anxiety prime may target the purported mechanism linking anxiety to false memories (i.e., accessible relational concerns), despite potentially not manipulating state-level anxiety *per se*. Clearly, much future research is needed to understand the validity—and thus research utility—of insecurity primes.

4.2. Implications, limitations, and future directions

One implication of the present study is that repeatedly priming attachment security—and anxiety—can lead to lasting gains in attachment security over time (Carnelley & Rowe, 2007; Gillath et al., 2008). This supports personality development theory suggesting that state-level changes (e.g., those produced by security priming) that are maintained for an extended period of time have the potential to coalesce into enduring trait-level changes (Hudson & Fraley, 2015, 2016; Magidson et al., 2012; Roberts & Jackson, 2008). Although the present study examined this phenomenon over a substantially longer period of time than previous research—four months vs. three weeks—it remains possible that the beneficial effects of attachment priming might wane, or even revert, over longer periods of time. Thus, future research should continue to explore whether attachment priming can educe more permanent changes to participants' attachment styles, even over the course of many years.

A second implication of our study is that security and anxiety primes appear to operate similarly to one another. Indeed, this phenomenon has been observed in several previous studies, as well (Gillath et al., 2010; Hudson & Fraley, 2018; Rowe et al., 2012). Thus, we would encourage researchers to always design studies to compare the effects of security and insecurity primes

to true, unprimed controls. Comparing security and insecurity primes only to each other may mask or otherwise obscure their effects. That being said, it is unclear *why* anxiety and security primes appear to at least sometimes have similar effects. On one hand, both may operate via similar mechanisms. For example, meditating upon close relationships—even relatively insecure ones—may facilitate a sense of state-level security (Fredrickson et al., 2008), which if maintained over a long enough period of time, can coalesce into enduring gains in trait-level security (Roberts & Jackson, 2008). Alternatively, it is possible that security and anxiety primes operate via different pathways and only coincidentally produce similar effects. For example, security primes may foster security by causing adults to reflect upon their attachment figures (Bowlby, 1969; Fraley & Shaver, 2000; Mikulincer & Shaver, 2016); whereas anxiety primes may operate by helping people process and “work through” negative emotions, similar to “writing cure” therapies (Burton & King, 2004, 2008). Thus, it is crucial that future research explore the precise mechanisms via which security and insecurity primes affect people's levels of felt security.

Relatedly, in the present study, we used only one specific, albeit relatively commonly used, type of anxiety prime—asking participants to reflect upon a negative, anxiety-provoking relational memory (Baldwin et al., 1996). There are multiple other methods that can be used to prime attachment anxiety—such as showing participants security- vs. insecurity-related words or asking participants to recall *entire relationships* that were generally characterized by secure or insecure attachment bonds (e.g., Mikulincer, Gillath, & Shaver, 2002). It may be the case that only structured, reflection-based insecurity primes (as used in the present study; Baldwin et al., 1996; Gillath et al., 2010; Rowe et al., 2012) have beneficial effects due to their similarity to journaling and meditation therapies (Burton & King, 2004, 2008; Fredrickson et al., 2008). This idea can be explicitly tested in future research by comparing the effects of reflection/memory primes with semantic (potentially even subconscious) primes. Such a design would elucidate whether merely priming anxiety has beneficial effects—or whether such effects are artifacts of the priming *method* (e.g., structured reflection).

Also related to priming methodology, we compared the results of our primes to a true, unprimed control group. As in any study, decisions regarding the tasks that control participants complete entail methodological tradeoffs. One significant strength of our study design is that we were able to compare the effects of the primes to the *naturalistic* growth control-group participants reported across the course of the study. Moreover, as we elaborate below, we were able to avoid potential pitfalls associated with attempting to create a “maximal equivalence control group.” That said, no experimental design is perfect and any single control task will leave open critical potential confounds. For example, our study cannot rule out the possibility that regular writing about *any arbitrary topic* might produce equivalent decreases in attachment anxiety, as compared with writing-based attachment primes. However, even a “neutral writing” control group would have failed to address critical potential confounds: perhaps writing about *autobiographical memories* is critical; or *valenced memories*; or perhaps *relational memories*, irrespective of valence. Each of these possibilities would require separate studies with different control tasks to rule out—and may serve as fodder for future research. Such designs are not without challenges, however. For example, it seems likely that secure bonds with others characterize many people's most accessible positive episodic memories. Thus, it may not be feasible to separate an attachment security prime from a “relationally-neutral positive memory” prime (without ironically priming attachment security by instructing participants to not think of moments involving felt attachment security).

Table A1
Internal consistency estimates at even time points.

Variable	α at time							
	2	4	6	8	10	12	14	16
Attachment anxiety	0.68	0.69	0.69	0.69	0.75	0.76	0.75	0.79
Attachment avoidance	0.82	0.81	0.84	0.77	0.75	0.82	0.86	0.83
Life satisfaction	0.82	0.89	0.89	0.88	0.93	0.92	0.92	0.93
Positive affect	0.85	0.85	0.87	0.87	0.87	0.89	0.87	0.86
Negative affect	0.86	0.88	0.88	0.91	0.90	0.90	0.90	0.90

One final limitation of the present study was that we did not prime attachment avoidance. Neither the security prime nor anxiety prime reduced participants' avoidance over time. However, it remains possible that an avoidance prime might be particularly effective in reducing attachment avoidance over time (cf. Crowell et al., 2016). Indeed, in the present research, the anxiety prime produced the most dramatic gains in security for the most highly anxious persons in the sample. In terms of mechanisms, to the extent that reflection/memory-based primes help people process and work through negative emotions in a healthy manner (Burton & King, 2004, 2008), an avoidance prime may help mitigate the negative relational beliefs that characterize high avoidance (Bartholomew & Horowitz, 1991). Thus, future research should first carefully gauge participants' reactions to a single-session avoidance prime. To the extent that such primes are received positively, the effects of repeatedly priming avoidance should be tested.

5. Conclusion

Attachment security is associated with a huge gamut of consequential life outcomes. Our study suggests that repeatedly priming attachment security can produce lasting reductions in attachment anxiety over time. Moreover, our study also suggests that priming attachment anxiety can lead to *drops* in anxiety over time, as well. This points to a substantial need for future research to investigate the construct validity of security and insecurity primes—as well as the mechanisms via which they operate. Nevertheless, our study provides an optimistic prognosis for interventions designed to increase people's trait attachment security over time via repeatedly altering their psychological states.

Appendix A

See Table A1.

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