**Abstract**

Attachment security can be induced in laboratory settings (e.g., Rowe & Carnelley, 2003) and the beneficial effects of repeated security priming can last for a number of days (e.g., Carnelley & Rowe, 2007). The priming process, however, can be costly in terms of time. We explored the effectiveness of security priming via text message. Participants completed a visualisation task (a secure attachment experience or neutral experience) in the laboratory. On three consecutive days following the laboratory task, participants received (secure or neutral) text message visualisation tasks. Participants in the secure condition reported significantly higher felt security than those in the neutral condition, immediately after the laboratory prime, after the last text message prime and 1 day after the last text prime. These findings suggest that security priming via text messages is an innovative methodological advancement that effectively induces felt security, representing a potential direction forward for security priming research.

Texting “Boosts” Felt Security

 “At no time of life is a person invulnerable to every possible adversity and also…at no time in life is a person impermeable to favourable influence” (Bowlby, 1988, p.154). This statement implies that a shift either towards increased attachment security or conversely towards insecurity, is possible. Evidence shows that attachment security can be induced in experimental settings through the activation of representations of security (e.g., Baldwin, Keelan, Fehr, Enns, & Koh-Rangarajoo, 1996). Moreover, the beneficial effects of repeated security priming can be observed a number of days after the last priming session (e.g., Carnelley & Rowe, 2007). Although security priming has shown promising results, it is predominantly laboratory-based and rather time-consuming; it would be useful to develop a priming method that could be easily used beyond the laboratory. Our aim in this study was to explore the effectiveness of repeated security priming via text messages, an innovative method.

**Attachment Theory**

Bowlby (1973) argued that early relationships with caregivers lead to generalized expectations about the self, others and the world, or “working models” of attachment. The goal of the attachment system is to achieve a sense of protection, otherwise known as felt security(Sroufe & Waters, 1977). Adult attachment can be conceptualised along two orthogonal dimensions; avoidance of intimacy and anxiety regarding abandonment (Brennan, Clark & Shaver, 1998). People high in *attachment avoidance* distrust relationship partners and strive to maintain emotional distance and independence from others. People high in *attachment anxiety* worry that relationship partners will not be available in times of need and struggle to maintain proximity to attachment figures (Brennan, Clark, & Shaver 1998).

By contrast, *securely attached* individuals are low in both attachment anxiety and avoidance, and possess a positive view of the self and of others (Bartholomew & Horowitz, 1991). Attachment security is associated with an enhanced capacity to cope with stress and negative emotions (Lopez & Brennan, 2000). Moreover, attachment security is associated with good relationship functioning and mental health, whilst attachment insecurity is associated with poor relationship functioning and psychopathology (e.g., Carnelley, Pietromonaco, & Jaffe, 1994; Mickelson, Kessler, & Shaver, 1997).

According to Collins and Read (1994), adult representations of attachment are organised in a hierarchical cognitive structure. At the top of the hierarchy are global representations about others and the self, built from a history of relationship experiences with various attachment figures. Lower in the hierarchy are relationship-specific representations, based on patterns of interaction with specific attachment figures (e.g., romantic partners). Relationship-specific attachment styles may or not be consistent with a person’s global attachment style (e.g., Baldwin et al., 1996).

**Attachment Security Priming**

Given the benefits associated with attachment security, it is unsurprising that in recent years psychologists have focused on developing methods designed to enhance people’s attachment security*.* Security priming methods include exposing participants to attachment security-related words or pictures, or to the names of others to whom they are securely attached and asking people to recall memories of being loved and supported by attachment figures (Gillath, Selcuk, & Shaver, 2008). Recently, some researchers have collected security priming data from online community samples (e.g., Luke, Carnelley, & Sedikides, 2012).

Security priming has been found to increase compassion, altruism and willingness to interact with out-group members (Mikulincer & Shaver, 2001; Mikulincer, Shaver, Gillath, & Nitzberg, 2005). Moreover, people primed with security recall more positive attachment words, show lower endorsement of negative interpersonal expectations and more positive interpersonal expectations than those primed with insecure attachment styles (Rowe & Carnelley, 2003). Primed security has also been found to protect individuals from post-traumatic stress disorder (Mikulincer, Shaver, & Horesh, 2006).

 The effects of security priming are typically measured immediately after the priming manipulation in the lab. However, Carnelley and Rowe (2007) hypothesised that through repeated attachment security priming, the secure relational schema could become more chronically accessible. Participants were primed on three occasions over three days with either a secure or neutral prime. As predicted, after three days of being primed with either a secure or neutral prime, those in the secure prime condition reported more positive relationship expectations, more positive self-views and less attachment anxiety than those in the neutral prime condition up to two days after the last prime. Moreover, Gillath and Shaver (2007) found that participants primed with attachment security showed higher self-esteem and positive mood scores one week after their repeated security priming sessions, compared to a control group. It would appear that repeatedly activating cognitive representations of attachment security has relatively long-lasting beneficial effects.

The clinical implications of these findings are important, suggesting that self-views and relationship-views can be changed positively and that security priming might be utilised in interventions to increase global attachment security in individuals who have insecure global models of attachment. Indeed, evidence from many security priming studies suggests that primed attachment security has an effect even when baseline (pre-prime) attachment security is taken into account (e.g., Baldwin, 1994; Rowe & Carnelley, 2003).

**The Present Research**

Inspired by the efficacy of the repeated security priming manipulation developed by Carnelley and Rowe (2007), and the clinical implications of increasing attachment security, our aim was to enhance current repeated security priming methodology. In previous experiments, participants attended a number of security-priming sessions in the laboratory (e.g., Carnelley & Rowe, 2007), which was time-consuming. The advantage of online methods of security priming is the potential to recruit large and diverse samples of participants in a short amount of time. However, online studies are still dependent on the participant having access to a computer. Our aim was to develop and test the effectiveness of a flexible and location-independent method of delivering repeated attachment security primes, through the use of mobile phone text messages. The benefits of delivering primes via text message are convenience and time-efficiency. Moreover, the location-independent nature of text messages means that security priming could be easily integrated into participants’ daily lives.

Text messaging is increasingly popular, with over 5.9 trillion text messages sent from mobile phones in 201l, according to Informa (Clark-Dickson, 2011). Furthermore, evidence suggests that text messaging technology is useful for improving various health-related outcomes (see Agyapong, Farren, & McLoughlin, 2011, for a review), such as smoking cessation (Free et al., 2011) and motivation to reduce cannabis abuse (Laursen, 2010). Recently, a supportive text messaging intervention was found to decrease depression and improve global functioning in patients with major depression and comorbid alcohol use disorder (Agyapong, Ahern, McLoughlin, & Farren, 2012). On the basis of this evidence, we propose that text messaging is a suitable medium for repeated security priming.

Our aim was to explore whether security priming via text message could boost participants’ self-reported felt security over a number of days, after an initial security priming session in the laboratory. We hypothesized that participants primed with attachment security in the lab and via text (compared to those in a neutral condition) would report higher levels of felt security at 3 time points; immediately after the laboratory prime, directly after the third text message prime and 1 day after the third text message prime.

**Method**

**Participants**

Participants (*n*=50, 32 female) from a British university participated in the research in exchange for course credits or money (£7). Participants ranged in age from 18 to 42 (*M*=22.43); Caucasian=36, Asian=5, Mixed=2, Indian=5, and African=2.

**Procedure**

Participants were randomly assigned to either a secure (*N*=25) or neutral (*N*=25) priming condition before they met with the experimenter (individually) at Time 1. During the Time 1 meeting, participants completed demographic information before writing for 10 minutes about either a security-inducing attachment figure or a supermarket shopping trip on a computer. Participants then completed felt security questions1. At Time 2 (1 day later) participants received a text containing a 3 minute visualisation task; they were asked to text “Done” to the experimenter once they had completed the task. Twenty-four hours later (Time 3), participants received another 3-minute visualisation task and the same procedure as at Time 2 was followed. Finally, 24 hours later (Time 4), participants received another 3-minute visualisation task. After sending their “done” response to the experimenter, participants were instructed (by text message) to complete the next online part of the study immediately and were provided with a website address and password. Participants completed the felt security measure online. Twenty-four hours later (Time 5), participants received a text instructing them to complete the final online part of the study immediately and they completed the final measure of felt security.

**Materials**

The priming method used at Time 1 is adapted from Bartz and Lydon’s (2004) method. The text primes (see Appendix) were developed by the researchers. An example secure text was: “Please spend 3 minutes thinking about the person you visualised and how they make you feel safe, secure and comforted”. An example neutral text was: “Please spend 3 minutes thinking about the route you take from your home to the supermarket”.

**Felt Security**

Felt security was measured using the 16-item scale developed by Luke, Sedikides and Carnelley (2012), which assesses feeling secure and safe (e.g., “loved”). Participants indicated the extent to which thinking about the person or scenario in the visualisation task made them feel secure, by rating each item using a 6-point scale (1=*not at all*, 6=*very much*). Alpha reliabilities were high: Time 1 α = .97, Time 4 α = .98, Time 5 α = .99.

**Results**

**Preliminary Analyses**

There were three missing values for Time 4 and Time 5 felt security variables. Little’s (1988) Missing Completely At Random (MCAR) test indicated that the data were MCAR, (16, *N* = 50) = 10.23, *p* = .86. Missing data were dealt with using Expectation-Maximization in SPSS. There were no outliers for felt security. The Kolmogorov-Smirnov test indicated that felt security was normally distributed at each time-point, in both the secure and neutral conditions.

We conducted a mixed-design Analysis of Variance (ANOVA), with time as the within-subjects factor and condition as the between-subjects factor with felt security as the dependent variable (See Figure 1 for means). The effect of prime condition was significant, *F*(1,48) = 31.48, *p* < .001. Those in the secure condition (*M*=4.55, *SE*=.20) reported significantly more felt security overall, compared to those in the neutral condition (*M*=2.94, *SE*=.20). Using η*p*partial eta squared) to measure the effect size, we found that experimental condition accounted for 39% of the variance in felt security.

Mauchly’s test indicated that the assumption of sphericity had been violated, (2) = 21.49, *p* < .001, therefore degrees of freedom were corrected using the Greenhouse-Geisser estimates of sphericity (The effect of time on felt security was significant, *F*(1.46, 70.23) = 4.42, *p* < .05. Pairwise comparisons (with a Bonferroni correction) revealed that Time 1 (*M*=3.87, *SE*=0.16) and Time 4 (*M*=3.84, *SE*=0.16), *p* = 1.00 and Time 1 and Time 5 (*M*=3.53, *SE*=0.17), *p* = 0.09 did not significantly differ, but Time 4 felt-security was higher than at Time 5 *p* < 0.01. The interaction between condition and time on felt security was not significant, *F*(1.46, 70.23) = 0.64, *p* = 0.48.

**Discussion**

The results suggest that security priming (in comparison to the neutral condition) increased participants’ felt security immediately after the laboratory prime, consistent with our hypotheses and with past research findings (e.g., Luke, Carnelley, & Sedikides, 2012). Moreover, security priming (compared to the neutral condition) led to increased felt security after 3 days of text priming and 1 day after the last text prime, consistent with our hypotheses. Time did not moderate the effects of prime. These findings indicate that the secure text primes kept the initial sense of felt security induced in the participants in the secure condition active for a number of days. In this sense the text messages can be viewed as “security booster” primes.

Overall, participants’ felt security decreased between receiving their last text message and the final felt security measure, 24 hours later. It is logical that felt security would decrease once participants were no longer being exposed to the secure primes. However, it is important to note that there was still a significant difference between the secure and neutral conditions, even 24 hours after the last text prime. This is an encouraging finding and shows that text messages are a suitable medium for security priming. A limitation of our experiment was that we only assessed felt security, as opposed to a construct different from our manipulation. Nonetheless, we believe that the results of our experiment are promising, especially as we have opened up avenues for further research on security priming beyond the laboratory. Future research should explore the effectiveness of text security priming on dependent variables that represent constructs that are theoretically different from (although influenced by) a sense of attachment security (e.g., well-being, self-esteem, and interpersonal expectations).

In addition, future research should directly explore the extent to which secure text primes “boost” the sense of attachment security originally primed in the laboratory. Our findings should be replicated with the inclusion of an additional experimental condition in which participants receive security priming in the laboratory but neutral priming through text messages after that. If secure text primes do indeed act as “booster” primes as we propose, the felt security scores (and other associated outcomes) in this additional condition should deteriorate after the laboratory session and not persist over time2.

Moreover, our findings have important implications for the development of interventions for vulnerable adults with chronic insecure attachment patterns and mental health problems. Our work demonstrates that security priming by text message can successfully induce a sense of felt security in an undergraduate sample. Future research should explore the effectiveness of text security priming on felt security (and other variables, such as mood) in clinical samples.

 Evidence suggests that patients receiving Cognitive Behavioural Therapy (CBT) for depression respond positively to text-messages inquiring about their mood, thoughts and activities; the majority of participants in a pilot study reported that the text messages made them feel closer to their therapist and increased their attendance to sessions (Aguilera & Munoz, 2011). Moreover, evidence suggests that text messages that encourage self-monitoring and provide supportive feedback may enhance the success of CBT for Bulimia Nervosa (Shapiro et al., 2009). Our findings represent a potential way forward for attachment-focused interventions to be developed for use in clinical samples, perhaps by combining text security priming with other forms of psychological interventions, such as CBT.

 A further limitation of this research is that we did not take into account participants’ baseline levels of attachment anxiety and avoidance, which may have influenced our results. However, previous research has demonstrated that attachment security priming is effective even after controlling for baseline attachment security (e.g., Baldwin, 1994; Carnelley & Rowe, 2007). Another possible limitation is the lack of supervision of participants whilst they were completing the text prime tasks. We did not have a means of assessing participants’ levels of engagement with the tasks or the amount of time they spent on the tasks (i.e., whether they focused for the whole 3 minutes or became distracted). However, by asking participants to text us a reply, we hope to have increased participant compliance to instructions. Our results suggest that participants were focused on the tasks.

**Conclusion**

Our findings are promising and demonstrate that text messaging is an effective, practical and low-cost method of delivering security primes. Moreover, text messages are location-independent; they can be received virtually anywhere. Text priming can be used to reach participants outside of laboratory settings and integrated into participants’ daily routines. This is an exciting development for researchers interested in exploring the long-term effects of repeated attachment security priming. Future research should explore whether security text priming can influence a person’s global attachment security in the long-term and increase positive relationship-views, self-views, mood and mental health.

Future work might explore methods of security priming via smartphones, as with today’s technology, priming via images, sound or other mobile phone software is possible. Furthermore, if participants could receive their secure primes and record their dependent variable data using a smartphone, security priming via text message would be easier for both participants and researchers. Our experiment is a starting point for further research into the exciting and promising domain of security priming via text messaging.



*Figure 1.* Means for felt security in each of the prime conditions.

**Appendix**

**Text Message Primes**

**Time 2 secure text**

Please spend 3 minutes thinking about the person you visualised and how they make you feel safe, secure and comforted.

**Time 2 neutral text**

Please spend 3 minutes thinking about the route you take from home to university.

**Time 3 secure text**

Please spend 3 minutes thinking about a time when the person you visualised made you feel loved and valued.

**Time 3 neutral text**

Please spend 3 minutes thinking about the route you take from your home to the supermarket.

**Time 4 secure text**

Please spend 3 minutes thinking about a time when the person you visualised made you feel supported and good about yourself.

**Time 4 neutral text**

Please spend 3 minutes thinking about the route you take from university to home.

All text messages finish with: When finished, please reply “done”.

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Footnotes

1Other variables were assessed immediately after the felt security measures but these are not the focus of this report and have therefore not been described here.

2We wish to thank an anonymous reviewer, for the suggestion of this additional experimental condition.