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UNIVERSITY OF SOUTHAMPTON

FACULTY OF SOCIAL AND HUMAN SCIENCES

EXPLORING THE EFFECTS OF ATTACHMENT SECURITY PRIMING ON DEPRESSED AND ANXIOUS MOOD

By

Lorna Jane Otway

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<u>ABSTRACT</u>

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On the basis of correlational evidence linking attachment insecurity to depression and anxiety (Reis & Greyner, 2004; Eng et al., 2001) my first aim in Study 1 ($N = 144$) was to uncover causal relationships between attachment patterns and depression and anxiety. Anxious-primed participants reported higher depressed mood than secure-primed participants. Furthermore, avoidant-primed and anxious-primed participants reported higher anxious mood compared to secure-primed participants, suggesting a causal relationship between attachment anxiety and depression and that attachment anxiety and attachment avoidance cause anxious mood. The beneficial effects of repeated security priming can last for several days (e.g., Carnelley & Rowe, 2007). My second aim, in Study 2 ($N = 50$) and Study 3 ($N = 81$) was to test the effectiveness of repeated security priming via text messages. Participants completed secure (versus neutral) primes in the laboratory followed by text message primes for 3 days. In both experiments, secure- (versus neutral)-primed participants reported higher felt security immediately after the laboratory prime, after the last text prime and 1 day after the last text prime. This is a promising development for researchers interested in exploring the long-term effects of repeated attachment security priming. My third aim was to test the effectiveness of repeated secure versus neutral priming (in the laboratory and via texts) on depressed and anxious mood. In Study 3, secure-primed participants reported less anxious mood compared to neutral-primed participants. Furthermore, results suggested that over time repeated security priming is likely to reduce depressed mood. In Study 4 ($N = 12$) secure-primed clinically-depressed outpatients did not show differences in depressed or anxious mood compared to neutral-primed participants. Further research is necessary with an adequate sample size. These findings make a novel contribution to understanding the role of attachment patterns in mood disorders. Moreover, the clinical implications of these results are that in the future, security priming might be included in the treatment of anxiety and depression.

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Author's Declaration

I, Lorna Otway, declare that this thesis entitled EXPLORING THE EFFECTS OF ATTACHMENT SECURITY PRIMING ON DEPRESSED AND ANXIOUS MOOD and the work presented in this thesis are my own and have been generated by me as a result of my own original research. I confirm that:

This work was done wholly while in candidature for a research degree at this university. This thesis is entirely my own.

Parts of this work have been presented and published as conference posters and journal publications:

Otway, L. J. Carnelley, K. B., & Rowe, A. C. (in press). Texting boots felt security. *Attachment and Human Development*.

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Otway, L. J., Carnelley, K. B., & Rowe, A. C. (June, 2012). *Exploring the effects of attachment security priming on depressed mood.* Poster session presented at the psychology postgraduate conference at the University of Southampton.

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Acknowledgements

1. CHAPTER ONE

Attachment Security Priming and Depression and Anxiety: An Introduction

Attachment theory (Bowlby, 1998) holds that children who experience sensitive and responsive caregivers are likely to develop along a healthy pathway, towards resilience and psychological wellbeing. By contrast, children who experience insensitive, neglectful or rejecting parents or caregivers are left vulnerable to mental health problems, when faced with adverse experiences in adulthood (Bowlby, 1988). Support for Bowlby's (1988) proposition comes from evidence linking attachment insecurity with both depression and anxiety (e.g., Williams & Riskind, 2004). 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). Priming attachment security is symbolically equivalent to exposing a person to an attachment figure and produces effects similar to those of dispositional attachment security (e.g., Carnelley & Rowe, 2010; Rowe & Carnelley, 2003). Furthermore, the beneficial effects of repeated attachment security priming can be observed a number of days after the last priming session (e.g., Carnelley & Rowe, 2007).

The first aim of this thesis is to explore causal relationships between attachment security priming and depression and anxiety using attachment style primes, a novel avenue of research. The second aim of this thesis is to further develop and extend the repeated security priming methodology developed by Carnelley and Rowe (2007), with the use of text messages. In this chapter I begin by reviewing theory and evidence relating to attachment patterns in childhood and adulthood and the measurement of adult attachment. I then review evidence concerning when changes in attachment security might occur and the mechanisms by which such changes may occur. Next, I review evidence concerning attachment patterns and emotion regulation and the links between attachment insecurity and mood disorders. Finally, evidence documenting the effects of attachment security priming is reviewed and novel hypotheses developed concerning the effects of attachment style primes on depressed and anxious mood. Methodological limitations of repeated security priming methods are discussed and a novel method of delivering security primes proposed, in an attempt to address these limitations.

Attachment Theory and Early Research

Attachment theory provides a framework for understanding both attachment behaviour and the enduring attachment bonds that children and adults make with others (Bowlby, 1988). Attachment theory developed from observational studies of young children who were separated from their mothers[1] whilst in hospital or residential nurseries. Robertson and Bowlby (1952, as cited in Bretherton, 1992) identified a predictable sequence of behaviour in children who are separated from their primary caregivers: (a) protest (also described as *separation anxiety*), (b) despair (similar to mourning); and (c) detachment (thought to be associated with defensive processes, such as repression). Bowlby (1959, as cited in Bretherton, 1992) argued that excessive separation anxiety is due to adverse early experiences, such as threats of abandonment or rejection from caregivers. Interestingly, Bowlby also observed that some children do not show signs of separation anxiety, which (deceptively) leads adults to perceive these children as mature and independent, when in fact they have repressed their unmet attachment needs. By contrast, children who are well-loved are likely to show signs of separation anxiety and will become more independent and self-reliant as they move towards adulthood.

Attachment Theory: Normative Processes

Bowlby (1969) argued that the biological function of the attachment system is to protect a child from danger by making sure that the he or she maintains proximity to attachment figures, especially in threatening situations (for example, a child might 'cling' to his or her attachment figure in a noisy, crowded environment). The attachment behavioural system is triggered by environmental dangers that threaten a child's survival. But when no danger is present, it is no longer beneficial for the child to seek care from attachment figures (Bowlby, 1969). The goal of the attachment system is "felt security", a term coined by Sroufe and Waters (1969). When a child feels secure, the attachment system is deactivated and the child can return to other, non-attachment related tasks, such as exploration. In this sense, attachment system activation operates in a cycle of an infant or child experiencing distress or feeling threatened and then seeking comfort from an attachment figure. Once felt security is achieved through receiving comfort and support from the attachment figure, the child can then return to other interests and activities, until the next time a threat activates the attachment system (Bowlby, 1969).

Attachment theory (Ainsworth 1991; Bowlby, 1969) proposes that attachment figures serve four functions. Firstly, the attachment figure is a target for

proximity-seeking behaviour. According to Bowlby (1969) proximity seeking is one of the most fundamental strategies of the attachment behavioural system, triggered when an infant needs comfort or support from caregivers. This strategy consists of various behaviours that are aimed at establishing and maintaining proximity to a supportive attachment figure. During infancy, proximity-seeking strategies such as crying or reaching out to a caregiver are mostly used. Following and clinging behaviours are often observed as an infant gets older. Secondly, an attachment figure serves as a *safe haven* for the child in times of need (he or she consistently provides protection, comfort and reassurance). Thirdly, the attachment figure represents a *secure base* from which the child can confidently explore his or her environment (Bowlby, 1969). While a child is in the presence or in easy reach of their primary attachment figure, he or she feels secure and able to explore the environment (Bowlby, 1969). In a study of infants in the Ganda tribe in Uganda, Ainsworth (1967) noted that once infants are able to crawl, they often start to use their mother as a *secure base* from which they can explore their surroundings. However, Ainsworth observed that infants will at times return from exploration to their mothers, seemingly as means of reassuring themselves that she is still available to them. Infants' exploration often ended abruptly if they became frightened or hurt or if the mother moved away from them. This pattern of behaviour allows the child or adolescent to develop a sense of competence and self-reliance as they explore their environments, while knowing that their attachment figure is available to provide comfort and reassurance if necessary (Ainsworth, 1967). Finally, Bowlby (1969) proposed that separation from a child and their attachment figure evokes emotional distress, otherwise referred to as *separation anxiety* (described earlier in this chapter).

During infancy and early childhood, primary caregivers are likely to be the child's attachment figures. In later childhood, adolescence and adulthood, a broader variety of relational partners can serve as attachment figures, such as siblings, close friends and romantic partners. These individuals form part of what Bowlby (1969) referred to as an individual's hierarchy of attachment figures. Bowlby (1988) argued that in the absence of a child's preferred attachment figure, in times of distress the child will show a clear preference for certain individuals, particularly those known well, over others.

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Individual Differences in Childhood and Adult Attachment Patterns

Bowlby (1973) proposed that early relationships with caregivers lead to generalized expectations about the self, others and the world, or "working models" of attachment. Interactions with available and responsive caregivers promote attachment security, which in turn leads to positive expectations about other's availability in times of distress or threat and positive views of the self as supported and valued. Conversely, interactions with unresponsive caregivers trigger doubts about the reliability and availability of close others and eventually the development of negative models of the self and others (Bowlby, 1973).

Ainsworth, Blehar, Waters and Wall (1978) identified three patterns of infant attachment: secure, avoidant, and anxious/ambivalent. The mothers of secure infants were sensitive and responsive to their infant's needs and served as a secure base from which these infants were able to confidently explore their environments (Ainsworth et al., 1978). By contrast, the mothers of anxious-ambivalent infants were inconsistent in their responsiveness to the infant's needs. This inconsistency resulted in anxious-ambivalent infants being preoccupied with their mother's availability and thus less inclined to explore their environments. Avoidant infants' mothers tended to reject their infant's attempts at proximity (Ainsworth et al., 1978).

Avoidant infants appeared to have learnt not to seek comfort from their mothers but rather attend to their environment, apparently as means of distraction from and suppression of attachment-related behaviours and emotions. The mothers of these infants appear to reject the infants' attempts at proximity-seeking (Ainsworth et al., 1978). Furthermore, Main and Weston (1982) suggest that avoidant infants' exploration appears half-hearted during reunion episodes. The apparent indifference shown by infants who defensively avoid their mothers during reunion episodes is often contradicted by cues or slips in the infant's behaviour (Main & Weston, 1982). Moreover, Sroufe and Waters (1977) demonstrated that infants who feigned indifference towards their mothers upon reunion (after a separation in a laboratory setting) showed similar levels of heart rate acceleration compared with infants who appeared extremely distressed at the separation from their mother and sought her out for comfort upon her return. Furthermore, the infants who avoided contact with their mothers upon her return exhibited a different pattern of heart rate than that observed when the same infants were playing, prior to the separation from their mother.

Main and Solomon (1990) later added a fourth category of childhood attachment, the *disorganised* type, where infants exhibited odd behaviour and strange fluctuations between anxious and avoidant attachment behaviours. This category of childhood attachment differs from the *organised* attachment strategies of infants who are categorised as secure, anxious and avoidant in their attachment behaviour (Mikulincer & Shaver, 2007a). For infants categorised as secure, their mothers are a source of comfort and security, which leads to reinforcement of the *primary attachment strategy,* whereby the infant seeks comfort and proximity to the mother when it is needed. Infants who are avoidant in their attachment classification appear to hold accessible working models relating to attachment system *deactivation*. As discussed earlier, they tend to show little distress upon separation from their mother and often avoid her when she does return. By contrast, infants who are categorised as anxious in their attachment style appear to hold accessible working models of attachment linked to attachment-system *hyperactivation*. They are very distressed by separation from their mother and show ambivalent responses to their mothers during reunions. Mothers of avoidant and anxiously attached infants seem to impede attachment security attainment in their infants, therefore facilitating their infants' adoption of *secondary attachment strategies* (namely hyperactivation and deactivation of the attachment system, concepts that are discussed in more detail in the section on adult attachment and emotion regulation). Conversely, infants who are disorganised in their attachment pattern demonstrate a breakdown of the organised strategies discussed above. These infants fluctuate between the strategies described above or at times exhibit bizarre behaviours, such as lying face down on the floor when their mother appears after a separation (Main & Solomon, 1990). The attachment figures of these infants often exhibit unpredictable behaviour (sometimes due to their own unresolved attachment losses or traumas) towards their infants (e.g., looking frightened when their infants seeks proximity to them), which in turn leads the infant to adopt whatever strategy seems most likely to reduce discomfort in that moment (Main & Hesse, 1990).

Hazan and Shaver (1987) argued that the principles of attachment theory could be applied to the study of individual differences in adult romantic relationships. The researchers developed a categorical measure of adult attachment containing three short descriptions of feeling and behaviour in romantic relationships. These three descriptions corresponded to the three attachment categories created by

Ainsworth et al. (1978) and are classified as follows: (a) Secure: "I find it relatively easy to get close to others and am comfortable depending on them and having them depend on me. I don't often worry about being abandoned or about someone getting too close to me." (b) Avoidant: "I am somewhat uncomfortable being close to others; I find it difficult to trust them completely, difficult to allow myself to depend on them. I am nervous when anyone gets too close, and often, love partners want me to be more intimate than I feel comfortable being." (c) Anxious/Ambivalent: "I find that others are reluctant to get as close as I would like. I often worry that my partner doesn't really love me or won't want to stay with me. I want to merge completely with another person, and this desire sometimes scares people away."

Measurement of Attachment: Issues

Since Hazan and Shaver (1987) first proposed the idea of adult attachment styles within romantic relationships, many different measures of adult attachment have been developed (e.g., Bartholomew, 1990, Brennan, Clark, & Shaver, 1998). I will discuss some of the most influential measures in this section. Bartholomew (1990) interpreted the dimensions of attachment anxiety and avoidance (discussed in more detail in the next paragraph) in terms of Bowlby's (1969) proposals about internal working models of self and others. According to Bartholomew, attachment anxiety corresponds to a model of self (either positive or negative) and attachment avoidance can be thought of as a model of others (again, either positive or negative). Bartholomew (1990) argued that individuals with a positive model of self and others are *secure* with respect to attachment; people with positive models of others and a negative model of self are *preoccupied*, those with a negative model of others and a negative model of self are *fearful* and finally, those people who maintain a negative view of others and a positive view of the self are *dismissing (*see Figure 1 for an illustration of how the four attachment types map on to the two attachment dimensions.) The Relationship Style Questionnaire (RSQ) developed by Griffin and Bartholomew (1994) measures the four attachment styles described above.

A few years later, Brennan et al. (1998) conducted a factor analysis of all of the self-report measures of adult attachment available at the time. The results of the factor analysis suggested that there are two dimensions underlying attachment insecurity; *anxiety* concerning abandonment and *avoidance* of intimacy. 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. By contrast,

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individuals high in attachment avoidance distrust relationship partners and strive to maintain emotional distance and independence from others. Securely attached individuals are low in both attachment anxiety and avoidance and possess a positive view of the self and others, developed through early interpersonal interactions and strengthened later in life through working models of attachment (Brennan et al., 1998; Mikulincer & Shaver, 2007a). The Experiences in Close Relationships (ECR) self-report scale developed by Brennan et al. (1998) taps the adult attachment dimensions of attachment anxiety and attachment avoidance.

Research (e.g., Fraley & Waller, 1998) suggests that there is no evidence for the validity of categorical models of adult attachment, as individual differences in attachment are likely to be reflective of the degree to which individuals score high or low on attachment anxiety or avoidance, rather than the type of attachment style that they possess. By using categorical measures of attachment, researchers lose precision in their measurements of adult attachment (Fraley & Waller, 1998). Despite the limitations of categorical measures, categorical self-report measures are still occasionally used in adult attachment research (e.g., Williams & Riskind, 2004). Consensus among researchers concerning the measurement of adult romantic attachment has important implications for the interpretation and generalisation of research findings. As both continuous and categorical self-report measures of adult attachment were often used in adult attachment research through the 1990's and into the early 2000's, comparing results across studies can be challenging, as dimensional measures of attachment are more precise than typological measures. However, today categorical measures are rarely used in social psychological adult attachment research as researchers tend to prefer dimensional measures, for the reasons stated above.

Finally, a third measure of adult attachment is the Attachment Interview (AAI; George, Kaplan, & Main, 1996). The AAI is a semi-structured interview designed to assess a person's current state of mind about past parent–child experiences. Scoring of the AAI is based on an individual's ability to give a coherent, integrated and authentic account of their experiences. These scores are thought to indicate a person's current state of mind regarding attachment (Main, Kaplan, & Cassidy, 1985). A coder judges the general coherence of the transcript and assigns the participant to one of four attachment categories: *secure, dismissing*, *preoccupied* or *unresolved*.

There is division among attachment researchers as to whether self-reports or interviews are the best means of assessing adult attachment. Social psychologists tend to use self-report measures of attachment, probably because these researchers are interested social cognition, feelings and behaviour, as opposed to the intergenerational transmission of attachment that the AAI explores (Mikulincer & Shaver, 2007a). Social psychologists may argue that the complex scoring process of the AAI is unnecessary for exploring key adult attachment constructs and they may also question the validity of using a categorical measure (Fraley & Waller, 1998; Mikulincer & Shaver, 2007a). By contrast, AAI researchers may argue that self-report measures are limited in that they are likely to only tap conscious mental processes (Jacobvitz, Curran, & Moller, 2002). There are obvious differences in method between the two approaches (comprehensive interview transcripts compared to brief self-reports). Moreover, The AAI is related to parent-child relationships whereas self-report measures generally target adult romantic relationships. Some researchers have suggested that while both the AAI and self-reports measure attachment-related constructs, the AAI is likely to be more of a measure of caregiving rather than attachment patterns (Shaver, Belsky, & Brennan, 2000). Finally, the analytic focus of the two approaches differs, with interviews focusing on the coherence and integration of accounts of attachment experiences and self-report measures tapping conscious thoughts and feelings regarding close relationships (Mikulincer & Shaver, 2007a). While different measures of attachment do not all approach the measurement of attachment in the same way or at the same level of analysis, all appear to be coherently related to the principles of attachment theory (Mikulincer & Shaver, 2007a).

Stability of Attachment Security

Bowlby (1973) proposed that at any point over an individual's life, changes in the quality of interactions with significant attachment figures can produce discontinuities (for better or worse) in attachment representations. Discontinuities might be caused by changes in a primary attachment figure's responsiveness or due to discrepancies between the responsiveness of earlier attachment figures and new attachment figures (e.g., close friends and romantic partners). An increase in a person's attachment security might result from entering into a romantic relationship with a supportive partner or undertaking psychotherapy (Mikulincer & Shaver, 2007a). While Bowlby (1988) noted that attachment security is less sensitive to

environmental factors later in life than it is in childhood, he maintained the view that changes in attachment security are possible in adulthood.

Following on from Bowlby's propositions, some attachment researchers have put forward the prototype hypothesis (e.g., Fraley, 2002), which accounts for both stability and change in attachment representations. Fraley (2002) defines an attachment prototype as a system "of nonlinguistic representations, procedural "rules" of information processing, and behavioral strategies…that serves as an adaptation to the individual's early caregiving environment." (Fraley, 2002, p.126). The prototype approach assumes that working models of attachment are revised as individuals encounter new events but suggests that the representations developed in infancy are stable and continue to shape relationship experiences throughout the life span. By contrast, the revisionist model of attachment representations proposes that attachment representations are fairly malleable and change if an individual's experiences do not correspond to their expectations (Fraley, 2002). For example, if a person expected attachment figures to be insensitive to his or her needs based on early experiences but then later experiences with new relational figures contradicted these expectations, then that person's expectations would be revised in light of these new experiences (Fraley, 2002).

Fraley (2002) conducted a meta-analysis of the evidence relating to attachment stability from childhood to adulthood and the results suggested that attachment security is moderately stable through the first 19 years of a person's life and that changes in attachment security are best attributed to the prototype model of attachment.

Furthermore, a more recent study by Fraley, Vicary, Brumbaugh and Roisman (2011) examined changes in adult attachment to parents and romantic partners using two different samples (in one sample participant's attachment representations were assessed daily over a period of 30 days and in the other sample attachment representations were assessed on a weekly basis for a year). The analyses suggested that adult attachment stability is best represented by the prototype model. In addition, attachment to parents was found to be more stable than attachment to romantic partners.

In line with the findings of Fraley's (2002) meta-analysis, a recent meta-analysis of research on attachment stability towards parents from infancy up until early adulthood, showed moderate levels of stability ($r = .39$) from infancy to

adulthood (Pinquart, Feuner, & Ahnert, 2013). However, contrary to Fraley's (2002) findings, the evidence from Pinquart et al. (2013) suggests that the stability of secure attachments drops substantially when the time intervals between attachment measurement is more than 5 years and drops even more dramatically when the interval is more than 15 years (at which point no significant correlations were found in stability between time points). The lack of evidence for long-term attachment stability found in this meta-analysis supports the revisionist model of attachment stability, as opposed to the prototype model. If the prototype model were correct, we would expect attachment security to parents to remain relatively stable into adulthood. More long-term studies are necessary before any conclusions can be reached however, especially as imperfect retest-reliability may lead to reductions in the correlations between measures over time.

Overall, evidence for and against the prototype and revisionist models of attachment stability appears to be mixed. In the following sections of the literature review I will discuss evidence relating to how changes in attachment security in childhood and adulthood might occur.

Changes in Attachment Security in Childhood

Evidence suggests that one of the fundamental causes of discontinuity in attachment security during childhood is a mother's stress or distress, which can interfere with the delivery of sensitive and responsive care giving to their child. Longitudinal studies in which attachment classification was assessed at 6 months and 18 months of age suggest that children whose attachment style changed from secure to insecure were more likely to have mothers who had reported stressful life events during that period of time (e.g., Egeland & Farber, 1984; Vaugn, Egeland, Sroufe & Waters, 1979). More recently, Bar-Haim, Sutton, Fox and Marvin (2000) found that the mothers of children who moved from security to insecurity in their attachment patterns reported more negative and fewer positive life events (relating to work, personal life and household) during the period of time measured than those mothers whose children remained secure in their attachment.

Maternal vulnerabilities might also be responsible for changes in a child's attachment security. For example, Vondra, Hommerding and Shaw (1999) found that the mothers of infants who moved from a secure to insecure attachment categorisation between 6 and 18 months were likely to report higher levels of depression, anxiety and anger as well as negative views about their marital

relationship. Mothers of infants who changed from a secure to a disorganised attachment category at 18 months reported high levels of disruptive life events. This evidence suggests that maternal vulnerabilities are likely to lead to less sensitive caregiving which in turn might trigger a change in a child's attachment security.

Attachment Stability from Childhood to Adulthood

In support of Bowlby's (1988) predictions, evidence from longitudinal studies indicates that attachment security is relatively stable from infancy to early adulthood and that changes in attachment security are meaningfully related to changes in an individual's environment (e.g. , Hamilton, 2000; Waters, Merrick, Treboux, Crowell, & Albersheim, 2000; Weinfield, Sroufe, & Egeland, 2000). For example, Waters et al. (2000) found that attachment-relevant stressful life events, such as parental divorce or death or life threatening illness of an attachment figure, were related to the likelihood of a secure attached infant becoming insecurely attached in early adulthood. Moreover, Weinfield et al. (2000) found evidence for "lawful discontinuity" in attachment orientation from childhood to adulthood. Changes in attachment security were meaningfully related to the occurrence of attachment-relevant stressful life events, such as child maltreatment, maternal depression and family functioning during adolescence.

Recent findings from a study by Zayas, Mischel, Shoda and Aber (2011) suggest that early maternal sensitivity (assessed through observation of mothers and their 18 month old infants interacting in a laboratory setting) predicted attachment security in these infants twenty years later. Individuals who had received the most sensitive care from their mothers at 18 months reported more attachment security to friends and romantic partners in early adulthood. These findings provide support for the prototype hypothesis, suggesting that parents play a crucial role in shaping individuals' expectations and behaviour in close relationships in adulthood. However, given the small sample size, we should interpret these findings with caution.

Moreover, Carlson, Sroufe and Egeland (2004) used structural equation modelling to explore the relations among caregiving experience in infancy and relationship representations and socio-emotional functioning in early childhood, middle childhood, and early adolescence and attachment rating at age 19. While the attachment classifications in infancy were not directly related to attachment classification in early adulthood, the results suggest that the link between early

experience and adult attachment classification is indirect. Infant attachment influences attachment representations in childhood and adolescence and these then contribute to later representations, socio-emotional functioning and attachment security in adulthood. Carlson et al. (2004) argue that the findings indicate that continuity in attachment styles from infancy to adulthood is the result of a dynamic interaction between the individual and the environment across the lifespan, in line with the prototype hypothesis. Adult attachment security (or insecurity) can thus be viewed as not simply state or trait, but a combination of the person's early attachment experiences, combined with subsequent experience and contextual factors.

Attachment Stability in Adulthood

A number of studies have examined the stability of adult attachment, using various measures of attachment security. Many of these studies assessed attachment stability over short periods of time of a few months to a year. For example, Baldwin and Fehr (1995) found that 30% of participants experienced changes in attachment style over a relatively short time period (ranging from one week to several months). However, Scharfe and Bartholomew (1994) found moderate to high stability in adult attachment measured over an 8 month period of time and Pierce and Lydon (2001) also found moderate stability in attachment styles over a four month period of time. Moreover, Zhang and Labouvie-Vief (2004) measured adult attachment stability over a 6 year period and found that attachment security was relatively stable over time, with fluctuations in adult attachment being correlated with fluctuations in self-reported well-being and coping strategies.

Research findings indicate that adults possess relationship-specific attachment styles in addition to possess a dispositional (or global) attachment style that influences the accessibility of specific relational attachment styles (Baldwin et al., 1996). The concepts of dispositional and relationship-specific attachment styles are discussed in more detail later in this chapter. Mikulincer and Shaver (2007a) summarise findings concerning adult attachment stability (using measures tapping attachment to parents, romantic partners and global attachment style) and overall the findings suggest that there is moderate to high stability in adult attachment security ranging over periods of one week to twenty-five years. Mikulincer and Shaver (2007a) propose that adult attachment styles tend to be well-built personality structures that remain relatively stable across time and relationships. However, the

average test-retest correlation across the studies reviewed was .56, indicating that attachment security is by no means unaffected by changes in an individual's attachment relationships and experiences.

A few studies have examined whether attachment-relevant life experiences can be used to explain changes in adult attachment style. It seems possible that people might move from an insecure attachment to a secure attachment, for example, by entering a supportive and stable romantic relationship. Indeed, Davila, Karney and Bradbury (1999) found that newlyweds were likely to become more secure in their romantic attachments over a 2 year period of time, suggesting that a stable romantic relationship might help to increase attachment security. Similarly, Crowell, Treboux and Waters (2002) explored the stability of attachment security across the transition to marriage and found that within the participants who had changed in attachment security over the 18 month period, the predominant change was towards increased security.

By contrast, experiences of rejection, betrayal by a close relational partner or relationship dissolution might trigger changes towards increased insecurity in one's attachment. Indeed, Kirkpatrick and Hazan (1994) found that over a 4 year longitudinal study, those originally secure in their dispositional attachment style were likely to become insecure in their dispositional attachment style following the break-up of a romantic relationship. These findings suggest that negative relationship experiences or relationship dissolution can weaken or lower a person's sense of attachment security. Taken together, the evidence indicates that positive or negative relationship experiences can trigger changes in attachment security, towards increased security or increased security, respectively.

In contrast to the findings described above, some evidence suggests that interpersonal events are not related to changes in attachment security. For example, Baldwin and Fehr (1995) did not find evidence for a link between changes in romantic status and changes in attachment security. Finally, Davila, Burge and Hammen (1997) failed to find a link between attachment-relevant stressors and change in romantic attachment style over a two year period.

The findings described above may be inconsistent because of the variety of different measures of adult attachment utilised in the different studies (including dimensional, categorical and interview measures). The time period between

measurements of attachment security may also differ between studies, which may
have contributed to inconsistencies in the results.

   Another possible explanation for the inconsistent findings reported above
might be that previous experiments (e.g., Baldwin & Fehr, 1995; Davila et al., 1997)
were not focusing on participant's subjective perceptions of interpersonal events or
experiences. For example in the Davila et al. (1997) study, life events listed by
participants were rated for negative impact by a team of 'objective researchers' and
participants affective responses to events were omitted. By contrast, Davila and
Sargent (2003) explored participant's subjective experiences of interpersonal
experiences and found that perceptions of negative interpersonal life events were
associated with greater attachment insecurity on a day-to-day basis, after controlling
for the objective features of events and for mood and trait level security. These
findings suggest that negative life interpersonal events (as defined by the individual
experiencing such events) are likely to lead to decreases in attachment security.

   However, Scharfe and Bartholomew (1994) examined the stability of
romantic and peer adult attachment representations (over eight months) and found
that changes in participants' attachment stability were not consistently related to
interpersonal life events, even when participants perception of the impact of
(positive or negative) interpersonal events was controlled for. However, the research
sample consisted of young couples in established romantic relationships and the
majority had not experienced any of the major interpersonal life events (such as
divorce, the birth of a child, or the death of a parent) that we might expect to trigger
changes in attachment security. These factors limit the generalizability of these
findings.

   Research exploring whether negative or interpersonal events are associated
with changes in attachment security has produced mixed results. Some evidence
suggests that positive interpersonal events, such as entering a supportive romantic
relationship, are likely to lead to increases in attachment security in chronically
insecure individuals (e.g., Crowell et al., 2002). Similarly, negative relationship
experiences, such as relationship dissolution, may lead to decreases in attachment
security (e.g., Kirkpatrick & Hazan, 1994). By contrast, some research has failed to
find a link between interpersonal events and changes in attachment security (e.g.,
Baldwin & Fehr, 1995; Davila et al., 1997). However, these studies were limited in
that they did not take into account participants' subjective experiences of

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interpersonal events. Evidence suggests that when researchers control for the personal meaning participants attribute to events (i.e., whether the participant views an interpersonal experience as positive or negative) a link can be seen between interpersonal experiences and changes in attachment stability (Davila & Sargent, 2003).

Attachment Representations and Changes in Attachment Security

Collins and Read (1994) proposed that adult representations of attachment are organised in a hierarchical cognitive structure (see Figure 2) containing attachment-related memories, attachment-related beliefs, attitudes and expectations and general declarative knowledge about attachment relationships. At the top of the hierarchy are general representations about others and the self, built from a history of relationship experiences with caregivers and peers. At the second level down in the hierarchy are models that correspond to either parents or peers. At the third level down in the hierarchy, there are attachment models that resemble particular types of attachment relationship. For example the parent model might be split into models for mother and father and the model for peers might be split into models for friends and lovers. Finally, at the lowest level in hierarchical network are attachment models of specific relationships (e.g., referring to specific relational figures). Knowledge about the self and others is organised within units or schemas (Collins & Read, 1994). On a similar note, Baldwin (1992) argued that cognitive representations of relationships are organised into *relational schemas* that are defined as "cognitive structures representing regularities in patterns of interpersonal relatedness" (p.461). Relational schemas include images of the self and others and an interpersonal script for an expected pattern of interaction. Interpersonal scripts are created through generalisation from repeated similar interpersonal interactions (Baldwin, 1992).

Collins and Read (1994) argue that there are likely to be individual differences in the complexity of an individual's attachment network structure. Adults are predicted to have larger and more complex and elaborate networks than children. Relational models of significant attachment figures (e.g., spouse or parent) are predicted to have a central place in the hierarchy. Furthermore, models of parent-child relationships are likely to be central and dominant in the network structure due to their prolonged history and importance.

Moreover, Collins and Read (1994) propose that the attachment network is interdependent. There is constant exchange between the general, more abstract

models in the hierarchy and the more specific models lower down in the hierarchy. In infancy, working models of attachment are representations of a child's primary attachment figures or caregivers. By adulthood, these working models have transformed into more abstract and general working models of the self and others (Bowlby, 1973), which then influence the development of more specific attachment working models formed later. Existing expectations are therefore predicted to influence the construction of all future models of attachment. However, Collins and Read (1994) also propose that new relationship-specific models provide opportunities to revise more general working models of attachment.

There is evidential support for the cognitive representations of attachment put forward by Collins and Read (1994). Although people may exhibit typical patterns of thinking and behaving in close relationships, people may change strategies or exhibit inconsistent attachment-related beliefs across time or across relationships (Cobb & Davila, 2009). Young adults have been found, on average, to have 5 attachment figures, including family members, romantic partners and friends (Trinke & Bartholomew, 1997). Multiple working models of attachment may be inconsistent with each other (Collins, Guichard, Ford, & Feeney, 2004; Mikulincer & Shaver, 2004), reflecting the varying levels of attachment security that can be seen across a person's relationships. Furthermore, Mehta, Cowan and Cowan (2009) found that the correlation between global adult attachment and couple attachment was .31, indicating that adults have multiple working models of attachment with different close others in their lives and that these models may not be consistent with one another. Moreover, security in a person's current romantic relationship was related to emotional behaviour between partners, but security based on one's early experiences with caregivers was not. These findings suggest that new relationship experiences with trusted others may help to compensate for the effects of an insecure attachment based on a person's early experiences with caregivers. New relationship-specific working models of attachment may provide opportunities for the updating of more general or global working models of attachment, in line with Collins and Read's (1994) propositions.

There is evidence to suggest that adults possess different attachment styles in specific relationships but that people also possess a general or dispositional attachment style that influences the accessibility of specific relational attachment styles (Baldwin et al., 1996). For example, people with a secure dispositional

attachment style can recall examples of secure attachment relational figures more easily and those with insecure dispositional attachment styles can bring to mind insecure relational figures more easily (Baldwin et al., 1996). These findings could be interpreted as support for Collins and Read's (1994) predictions concerning the interdependent nature of the attachment hierarchy, at least with regard to top-down processing. However, it is also possible that chronically insecure individuals have simply experienced more rejection and insecurity in previous relationships and hence recall more insecure attachment relationships. The opposite can be argued for chronically secure individuals.

More compelling empirical support for the hierarchical model proposed by Collins and Read (1994) comes from a study by Overall, Fletcher and Friesen (2003). In this study, participants completed self-report measures of attachment for 3 particular relationships within three domains; family, friends and romantic partners. The researchers explored (using confirmatory factor analysis) the best way to conceptualise the cognitive organisation of attachment. A hierarchical model of specific and global attachment models (with specific relational models nested under relationship domain models that are in turn nested under a global working model of attachment) was the best fit for the data, compared to a single working model of attachment (summarising attachment across specific relationships and domains) or a model consisting of three independent models of attachment (family, friendship and romantic relationship domains). These findings suggest that the hierarchical model of attachment is a useful way of conceptualising attachment representations.

Activation of a particular model in the attachment network is likely to depend on two factors: the strength of the model (based on the amount of times the model has been activated in the past and the amount of experience the model is based upon) and the extent to which a particular attachment model fits with a particular situational context (Collins & Read, 1994). As mentioned above, models of parents are likely to be dominant and stronger in the network and are therefore likely to be highly accessible (Collins & Read, 1994). The nature of the relationship is likely to influence which model is activated too. For example, when forming a new friendship, a model for peers is more likely to be activated than a model for parents. Finally, Collins and Read argue that more relationship specific models will be desired over more abstract, general models of attachment. Abstract models are only

likely to be applied in ambiguous situations, for example in the early stages of a relationship.

Collins and Read (1994) argue that change in a person's general (abstract, high in the attachment hierarchy) attachment style is possible, but such change is only likely to occur in response to relatively powerful relationship experiences. Such experience would need to disconfirm current models of self and others. Collins and Read (1994) propose that betrayal by a partner or an emotionally distressing divorce might result in a dramatic change in a secure person's positive model of self and others. Indeed, the findings of Kirkpatrick and Hazan (1994) suggest that the breakdown of a romantic relationship is likely to lead to changes towards increased attachment insecurity. Moreover, in line with Bowlby's (1988) predictions, Collins and Read (1994) suggest that change towards increased attachment security is also possible. Indeed, evidence indicates that a supportive romantic relationship (e.g., Davila et al., 1999) can lead to increases in attachment security over time.

Adult Attachment Patterns and Emotion Regulation

Attachment theory suggests that the ability to depend on external or internal attachment figures is the most important consequence of attachment security, allowing for the development of affect regulation, social and interpersonal skills and autonomy (Bowlby, 1988). Moreover, attachment theory provides a model of successful emotion regulation and regulation of interpersonal closeness (Cassidy, 1994; Mikulincer & Shaver, 2007a).

Securely attached people have the ability to adopt a constructive approach to emotion regulation, based on their previous experiences with sensitive and responsive attachment figures. Securely attached individuals have learned that support seeking results in protection and comfort and believe that turning to others for support is an effective way of coping with stress, threats and challenges (Bowlby, 1988). Furthermore, in adulthood, compared to in infancy and early childhood, the primary attachment strategy does not necessitate actual proximity-seeking behaviour. Instead, it can include activation of mental representations of attachment figures that consistently provided care and protection in the past. These representations can create a sense of safety and security for the individual, which in turn helps a person to deal with threats or challenges effectively (Mikulincer & Shaver, 2007a).

Moreover, secure individuals have learned that through their own actions they are often able to reduce distress and overcome challenges (Mikulincer, Shaver,

& Pereg, 2003). This *secure base script* enables a person to regulate his or her own negative emotions (Waters, Rodriguez, & Ridgeway, 1988). As a secure individual has a variety of security-inducing memories to draw from with attachment figures, the roles of these security enhancing attachment figures become internalised and part of the individual's own strength and resilience (Mikulincer et al., 2003). When regulating their own emotions, securely attached people can divert most of their attention to changing the emotion triggering event (for example, through conflict resolution in a relationship) or reappraising it in a constructive way. Using such methods enables securely attached people to manage distress effectively (Mikulincer & Shaver, 2007a). Indeed, there is evidence that people high in attachment security function effectively and maintain their mental health in times of stress (See Mikulincer & Florian, 1998, for a review). Securely attached individuals are more likely to seek emotional and practical support from friends, parents and romantic partners, in comparison to insecurely attached individuals (Florian, Mikulincer, & Bucholtz, 1995).

Conversely, people high in attachment anxiety are likely to employ *hyperactivating strategies* in an attempt to regulate their emotions (Cassidy & Kobak, 1988). Hyperactivation is characterised by attempts to minimise distance with attachment figures and an anxious preoccupation with attachment relationships. Hyperactivation is also indicated by an intensification of negative emotions and thoughts and an inability to detach from emotional distress (Shaver & Mikulincer, 2002). Methods of negative emotion intensification employed by those high in attachment anxiety include making catastrophic appraisals, maintaining pessimistic beliefs about one's own ability to cope with distress and rumination (Mikulincer & Florian, 1998). As a result attachment anxious people are likely to experience many negative emotions (Mikulincer & Shaver, 2007a). People high in attachment anxiety are likely to take an ambivalent approach towards support seeking; on one hand they strongly desire support and closeness with relational partners, but on the other hand their doubts about the availability of support make them reluctant to seek it out (Vogel & Wei, 2005).

By contrast, people high in attachment avoidance have learnt that attachment figures are unavailable and that proximity seeking is not an effective strategy for dealing with emotional distress. Therefore, as adults they are more likely to employ *deactivating strategies* (Cassidy & Kobak, 1988) because their primary goal is to

keep the attachment system deactivated, in order to avoid further distress caused by attachment figure unavailability (Mikulincer et al., 2003; Shaver & Mikulincer, 2002). Deactivating strategies involve the suppression of negative emotions, such as sadness, anger and anxiety. Avoidant individuals are motivated to suppress these emotions as they are triggered by threats and thus can potentially activate the attachment system (Main & Weston, 1982). Evidence suggests that people high in attachment avoidance, along with securely attached people, are able to suppress thoughts concerning a relationship break-up, in contrast to anxiously attached individuals, who are unable to suppress such thoughts (Fraley & Shaver, 1997). However, experiments have shown that when a cognitive load is added, people high in attachment avoidance are less effective at suppressing separation-related thoughts after thinking about a relationship break-up. By contrast, a cognitive load did not interfere with securely attached individuals' ability to suppress separation-related thoughts (Mikulincer, Dolev, & Shaver, 2004). These findings suggest that while people high in attachment avoidance are generally able to suppress negative interpersonal thoughts and attachment-related insecurities, their defences may collapse in stressful situations, exposing their unresolved attachment needs and vulnerabilities (Mikulincer et al., 2004).

In addition, people high in attachment avoidance are likely to attempt to minimize closeness and interdependence on others (Cassidy, 1994). Indeed, evidence suggests that those high in attachment avoidance tend not to go to others for support (e.g., Collins & Feeney, 2000; Fraley & Shaver, 1998) and are less motivated to seek professional counselling for interpersonal or psychological concerns compared to anxious and securely attached individuals (Shaffer, Vogel, & Wei, 2006).

Attachment and Depression

Depression is a common mental health problem, affecting nearly 1 in every 6 individuals in the UK (National Institute for health and Clinical Excellence [NICE], 2009). The main symptoms of depression are persistent sadness or low mood and/or a marked loss in interests of pleasure. A person with depression may also experience the following symptoms: disturbed sleep, changes in appetite, fatigue, agitation or slowing of movements, poor concentration or indecisiveness and suicidal thoughts or acts. Furthermore, people suffering from depression tend to have lots of negative thoughts and feelings of worthlessness and guilt (NICE, 2009).

Attachment theory (Bowlby, 1969) provides a framework for understanding how some individuals might be more vulnerable to experiencing depression than others. People who have experienced warm and loving caregiving from attachment figures in childhood are more likely to develop a positive model of the self as lovable. These individuals are also likely to develop positive models of others as reliable and consistent. By contrast, those who have experienced inconsistent or rejecting caregiving from their parents are likely to have developed negative models of the self as unlovable and negative models of others as unreliable or cold. As discussed earlier, negative models of self are associated with attachment anxiety and negative models of others are associated with attachment avoidance (Bartholomew & Horowitz, 1991).

Bowlby (1980) argued that the loss of attachment security during infancy could give rise to the development of depression later in life. As mentioned above, attachment theory also suggests that those initially insecure in their attachment to caregivers are more vulnerable to depression. Moreover, Beck (1976) proposed that traumatic events, such as the loss of a caregiver, could predispose a person to the dysfunctional cognitions involved in depression.

In line with these predictions, research findings from non-clinical samples suggests that both attachment anxiety and attachment avoidance are linked with depressive symptoms (e.g., Carnelley, Pietromonaco, & Jaffe, 1994; Davila, 2001; Hammen et al., 1995; Torquati & Vazsonyi, 1999; Whiffen, Kallos-Lilly, & Macdonald, 2001; Williams & Riskind, 2004). However, a slightly smaller pool of evidence indicates that attachment anxiety is associated with depressive symptoms, but that attachment avoidance is not (e.g., Besser & Priel, 2005; Shaver, Schachner, & Mikulincer, 2005; Wei, Russell, & Zakalik, 2005). Due to the limitations of categorical measures of adult attachment and the vast amount of correlational research on adult attachment and depression with non-clinical samples, I have selected only research using ratings or dimensional measures of attachment in this thesis, for the purposes of ease of comparison across studies and precision of measurement. See Mikulincer and Shaver (2007a) for a complete review of correlational research (using both categorical and dimensional measures) relating to attachment and depression in non-clinical samples.

Research with samples of clinically depressed patients further illuminates the relationship between attachment insecurities and depression. A combination of

high avoidance and high anxiety is positively associated with more severe depressive symptoms in people diagnosed with depression (e.g., Carnelley et al., 1994; Reinecke & Rogers, 2001; Reis & Greyner, 2004). However, it is possible that the self-report measures used in correlational research studies lack construct validity when participants are high in attachment avoidance; people high in attachment avoidance may be less willing to admit to experiencing negative emotions (such as sadness), compared to people high in attachment anxiety, even if they do experience such emotions. They also may be less consciously aware that they experience such emotions (due to the deactivating strategies that they employ) in comparison to people who are high in attachment anxiety. Therefore it is possible that the relationship between attachment avoidance and depression symptoms is stronger than the findings from correlational studies would lead us to believe.

In addition, these research findings are correlational and thus it is not possible to ascertain whether attachment insecurities cause depression or whether depression erodes attachment security. It is possible that the negative mood state associated with depression might lead people to view themselves and their relationship styles negatively (Haaga et al., 2002). However, evidence has shown that inducing depressed mood (versus elated mood) in non-depressed adults, using a musical mood induction procedure, does not negatively affect resulting reports of attachment insecurity (Haaga et al., 2002). These findings support the conclusion that insecure attachment patterns are a vulnerability factor for depression, rather than reports of attachment insecurity being a product of negative mood-state (Haaga et al., 2002).

Overall it would appear that attachment anxiety is more consistently associated with depression than attachment avoidance is, at least in non-clinical samples. Attachment anxious individuals hold a negative view of the self and tend to worry about being abandoned by others (Bartholomew & Horowitz, 1991) which may leave them more vulnerable to feelings of low self-worth and hence depression. By contrast, attachment avoidance is based upon negative views of others (Bartholomew & Horowitz, 1991) which may be less likely to trigger feelings of low self-worth. However, any type of attachment insecurity is likely to leave people more vulnerable to experiencing depression, in comparison to people who are secure in their attachment patterns.

Attachment and Anxiety

Anxiety disorders cause a sense of fearfulness and uncertainty (National Institute of Mental Health [NIMH], 2009). Unlike the relatively mild, brief anxiety caused by a stressful event (such as giving a speech), anxiety disorders last at least 6 months and can get worse if they are not treated. Anxiety disorders include generalised anxiety disorder (GAD), obsessive compulsive disorder (OCD), post-traumatic stress disorder (PTSD), social anxiety disorder (SAD), specific phobias and panic disorder (NIMH, 2009). Anxiety disorders commonly occur along with other mental or physical illnesses, which may mask anxiety symptoms or make them worse (NIMH, 2009). Mood disorders such as depression and anxiety commonly occur together. Indeed, nearly 1 in 6 (15.1%) of adults aged 16 or over in England meet diagnostic criteria for anxiety or depression. Over 50% of those meeting this criteria present with a mix of anxiety and depression (NHS Advice Centre, 2009).

Bowlby (1973) argued that attachment insecurity could trigger the development of anxiety disorders, as the attachment system has failed to achieve its protective function and the child (and later, adult) therefore feels unsafe when exploring the world and entering new situations. Furthermore, insecurely attached individuals, particularly those high in attachment anxiety, tend to doubt their own ability to cope with stressful events and challenges. These feelings of inadequacy combined with fearful reactions to challenges are likely to leave insecurely attached individuals vulnerable to experiencing anxiety disorders.

In support of Bowlby's (1973) argument, evidence indicates that adverse experiences in childhood and adolescence (involving parental indifference and sexual and physical abuse) raises the risk of both depression and anxiety conditions (excluding mild agoraphobia and simple phobia) in adult life (Brown & Harris, 1993). However, limitations of this research are the lack of attachment measures included in the study and the reliance on participants' retrospective reports of their childhood, which may be inaccurate.

In one study directly examining attachment representations and memories of childhood, participants with clinically severe GAD reported less maternal love in childhood, greater maternal rejection/neglect, and more maternal role-reversal/enmeshment, compared to control participants (Cassidy, Lichtenstein-Phelps, Sibrava, Thomas, & Borkovec, 2009). These findings provide support for a

link between attachment insecurity in childhood and the development of anxiety disorders.

Furthermore, correlational research from non-clinical populations provides evidence for a link between attachment insecurity and anxiety. Once again, the studies from non-clinical samples cited here are those based on ratings or dimensions of attachment, for ease of comparison and the benefit such research holds for precision of measurement. Many of these correlational studies show that both attachment avoidance and attachment anxiety are positively correlated with anxiety symptoms in non-clinical samples (e.g., Doi & Thelan, 1993; Hankin, Kassel, & Abela, 2005; Irons & Gilbert, 2005; Williams & Riskind, 2004). However, a (slightly) smaller group of studies have found a positive relationship between attachment anxiety and anxiety symptoms and no link between attachment avoidance and anxiety symptoms (e.g., Strodl & Noller, 2003; Sonnby-Borgstrom, & Jonsson, 2004). Overall, evidence from non-clinical samples indicates that attachment anxiety is more consistently associated with anxiety symptoms. See Mikulincer and Shaver (2007a) for a complete review of the correlational evidence relating to adult attachment and anxiety in non-clinical samples.

Only a small number of studies have explored the associations between adult attachment patterns and anxiety in clinical samples. There is evidence showing that people diagnosed with social anxiety report higher levels of attachment anxiety and attachment avoidance (Eng, Heimberg, Hart, Schneier, & Liebowitz, 2001). Moreover, research has shown that adolescents with a diagnosed anxiety disorder are more likely to be categorised as insecure (either dismissing or preoccupied) using the AAI, compared to adolescents without a diagnosed anxiety disorder (Brumario, Obsuth, & Lyons-Ruth, 2013). In addition, evidence suggests that people diagnosed with OCD report higher levels of attachment anxiety, compared with a community control group and interestingly, people diagnosed with other anxiety disorders. No association was found between attachment avoidance and OCD (Doron et al., 2012). It is important to note that individual anxiety disorders may be uniquely related to attachment anxiety and avoidance (for example, it is possible that people with social anxiety are generally higher in attachment avoidance and anxiety but that people with OCD are generally only high in attachment anxiety).

Taken together, these findings suggest that there is a link between attachment insecurity and anxiety disorders. The link between attachment anxiety and anxiety

disorders appears to be more well-established than the link between attachment avoidance and anxiety disorders, according to findings from non-clinical samples and (limited) findings from clinical research. However, as mentioned in the section on attachment security and depression, people high in attachment avoidance may be less willing to admit (or even less conscious of) experiencing anxiety, compared to people high in attachment anxiety. It is therefore possible that the link between attachment avoidance and anxiety symptoms is stronger than reported by correlational measures. Moreover, as the research documenting an association between attachment insecurity and anxiety is cross-sectional, we are unable to confirm a causal relationship between attachment security and anxiety disorders on the basis of the evidence reported above. Further research is necessary in order to explore causal processes between these variables.

Attachment Patterns, Perceptions of Social Support and Mood Disorders

Social support is related to the absence of psychological distress and positively related to well-being (see Kessler & McLeod, 1985, for a review). Individual differences in working models of attachment have clear implications for the perception of social support in one's environment. From an attachment theory perspective, we would expect people high in attachment security to perceive greater availability of social support in their environment (due to their positive models of self and others), and therefore have lower levels of both depression and anxiety, compared to people high in attachment anxiety and avoidance, which are associated with negative models of self and others (Bartholomew & Horowitz, 1991).

Indeed, evidence suggests that insecurely attached people report having more negative expectations of others compared to securely attached people (Hazan & Shaver, 1987). Furthermore, Anders and Tucker (2000) found that people who were insecurely attached reported having smaller and less satisfying social support networks than those who were securely attached. Moreover, Priel and Shamai (1995) found that securely attached participants reported less depression and more social support and satisfaction with social support, compared to insecurely attached participants. Similarly, Mallinckrodt and Wei (2005) found that attachment anxiety and avoidance were positively related to psychological distress and negatively related to perceived social support.

Furthermore, evidence suggests that insecurely attached people are more likely to interpret their partner's ambiguous behaviour in a less supportive light,

compared to securely attached people (Collins & Feeney, 2004). Insecurely attached participants who received messages that were low in support (which they were led to believe were from their partner) during a stressful task rated the message and their partners as being less supportive compared to securely attached participants who received the same low support message. In a second study, using authentic notes from participants' partners, Collins and Feeney (2004) found that insecure participants interpreted their partners' messages as less supportive, even after controlling for independent ratings of the supportiveness of the notes. Thus, the evidence from both of these studies suggests that insecurely attached people are likely to judge the supportiveness of relational partners in a way that is consistent with their global working models of attachment insecurity (and doubts about the supportiveness and reliability of close others).

The above evidence suggests that people high in attachment anxiety or avoidance are prone to cognitive distortions when it comes to perceiving social support; they are less likely (compared to securely attachment individuals) to perceive attachment figures as being supportive, even after controlling for the "objective" supportiveness the attachment figure is providing. A lack of perceived social support is in turn likely to increase psychological distress and vulnerability to mood disorders, such as anxiety and depression.

However, it is important to consider whether people with insecure patterns perceive less social support in their environment because objectively, they do not have access to the same level of social support as securely attached individuals. Although it is likely that their negative models of others play a role in insecure individuals' perception of social support, it is also possible that due to their negative past interactions with attachment figures and the interpersonal strategies they employ, insecurely attached people actually find it more difficult to form and maintain close, supportive relationships and thus objectively report less social support.

Indeed, evidence suggests that dyadic factors play a role in perceptions of perceived support and depression among romantic couples. Perceived partner support moderated the relationship between wives' attachment anxiety and depression, in one study looking at the transition to parenthood in married couples (Rholes et al., 2011). Women high in attachment anxiety reported higher levels of depression throughout the transition if they perceived less partner support.

Moreover, men married to anxiously attached women actually reported being less supportive towards their wives, compared to men who were married to less anxiously attached women.

The direction of the relationship here is unclear and future research might examine whether women's attachment anxiety precipitates less supportive behaviour from partners or whether having a less supportive partner results in increased attachment anxiety (or perhaps attachment anxiety might precipitate both). Finally, it is also possible that women high in attachment anxiety are attracted to less supportive partners, perhaps because they reinforce their expectations of relationship based on their past experiences with unsupportive attachment figures. In any case, taken together, the above evidence suggests that people high in attachment anxiety and avoidance are likely to perceive less social support in their environment, which in turn increases their risk of anxiety and depression.

Excessive Reassurance Seeking as a Mediator between Attachment Insecurity and Mood Disorders

People high in attachment anxiety are prone to hyperactivation of the attachment system, which in turn leads to extreme dependence on close others and a lack of autonomy which may foster the development of depression (Mikulincer & Shaver, 2007a). Self-criticism is characteristic of people with high attachment anxiety and research suggests it is a strong depressive vulnerability (Murphy & Bates, 1997). Furthermore, individuals high in attachment anxiety rely on feedback from others to determine their self-worth (Carnelley, Israel, & Brennan, 2007; Hepper & Carnelley, 2010). Moreover, anxiously attached individuals are likely to disregard positive feedback from relationship partners and eventually evoke the type of negative partner feedback that may precipitate depression (Brennan & Carnelley, 1999).

Research findings suggest that people high in attachment anxiety are prone to excessive reassurance seeking (ERS), the tendency to seek assurances that one is worthy and lovable even when this reassurance has already been provided (Joiner, Metalsky, Katz, & Beach 1999; Shaver, Schachner, & Mikulincer, 2005). People high in attachment anxiety appear to be stuck in a cycle of seeking support from what they perceive to be neglectful attachment figures, which in turn may lead to self-devaluation and ultimately depression. Indeed, evidence suggests that ERS

mediates the relationship between attachment anxiety and depression (Shaver et al., 2005).

It seems likely that ERS may also mediate the relationship between attachment anxiety and the symptoms of anxiety disorders, although to my knowledge this hypothesis has not been directly tested. ERS is thought to be a key factor in the maintenance of anxiety within current approaches to formulation and treatment of anxiety disorders (Rector, Kamkar, Cassin, Ayearst, & Laposa, 2011). ERS has been shown to immediately reduce anxiety, but this temporary relief from anxiety is usually followed by an increase in anxiety and a motivation to seek further reassurance, which in turn leads to more frequent reassurance-seeking over time (Abramowitz, Schwartz, & Whiteside, 2002; Salkovskis & Warwick, 1986). Furthermore, Rachman (2002) found that ERS is functionally equivalent to checking behaviours in OCD. ERS is also thought to play an important role in the maintenance of other anxiety disorders, including GAD (Woody & Rachman, 1994), social phobia (Heerey & Kring, 2007) and panic disorder (Onur, Alkin, & Tural, 2007). Moreover, Bowlby (1998) suggested that agoraphobia can be understood as a condition related to attachment anxiety. Indeed, people with agoraphobia often find that their anxiety reduces when they are accompanied by a reassuring, familiar person (Carter, Hollon, Carson, & Shelton, 1995). Taken together, these findings suggest that ERS is likely to play a role in the development of mood disorders in people who are high in attachment anxiety.

In contrast to the hyperactivating strategies observed in people high in attachment anxiety, the deactivating strategies employed by those high in attachment avoidance make them less likely to engage in emotional disclosure (e.g., Wei et al., 2005) or emotional support seeking (Shaver & Mikulincer, 2002), which may leave them vulnerable to experiencing mood disorders. Emotional disclosure is associated with decreased levels of depression (Frattaroli, 2006) and the tendency to conceal information is associated with psychological distress (Kelly & Yip, 2006). Moreover, evidence suggests that people suffering from depression are less likely to emotionally disclose after experiencing more intensely negative events, and that attachment avoidance plays a large role in reducing emotional disclosure (Garrison, Kahn, Sauer, & Florczak, 2011). These findings indicate that the deactivating strategies people high in avoidance employ in order to protect themselves may

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actually backfire on them, leaving them more vulnerable to psychological distress, such as depression and anxiety symptoms.

A further potential vulnerability to depression for those high in attachment avoidance, is their overly demanding self-standards. Avoidant individuals are likely to be driven towards perfectionism as means of self-enhancement and self-reliance (Mikulincer & Shaver, 2007a). Attachment avoidance is therefore likely to be associated with overly critical self-standards rather than interpersonal triggers of depression, such as ERS. Evidence suggests that people high in attachment avoidance tend to derive their self-esteem from external sources of validation (Carvello & Gabriel, 2006) and attachment insecurity in general is associated with maladaptive perfectionism (Andersson & Perris, 2000; Rice, Lopez, & Vegara, 2005; Wei, Heppner, Russell, & Young, 2006). Attachment theory predicts that if an avoidant person receives external feedback suggesting that he or she is weak or somehow flawed, this is likely to result in self-criticism and possibly depression (Mikulincer & Shaver, 2007a).

It would seem that avoidant individuals are less likely to experience interpersonal vulnerabilities to mood disorders, such as ERS (Shaver et al., 2005), because of the deactivating strategies they employ, causing them to distance themselves from their emotions and avoid reliance on others (Mikulincer & Shaver, 2007a). However, perfectionism (e.g., Wei et al., 2006) may be a vulnerability factor for depression in those high in attachment avoidance.

Cognitive Vulnerabilities as Mediators between Attachment Insecurity and Depression and Anxiety

Cognitive vulnerability models assume that individuals' cognitive styles (i.e., their typical manner of thinking about past events and/or anticipating future events) may give rise to emotional disorders when triggered by conditions of appropriate threat (Williams & Riskind, 2004). An impressive amount of research indicates that possession of a pessimistic explanatory style (PES) increases an individual's risk for depressive symptoms (see Alloy, 2001, for a review of this evidence). PES leads individuals to attribute negative past events to internal, stable, and global causes (e.g., Abramson, Metalsky, & Alloy 1989; Alloy, Just, & Panzarella, 1997). Less research has been conducted concerning cognitive vulnerabilities for anxiety; however, Riskind (1997) proposed that a looming maladaptive style (LMS), where a person

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formulates rapid and excessive mental representations concerning threats or danger is a cognitive vulnerability for anxiety disorders.

Williams and Riskind (2004) examined the pattern of relationships between adult attachment, cognitive vulnerabilities to depression and anxiety and symptoms of depression and anxiety. Attachment avoidance related to cognitive vulnerability to anxiety (LMS) and anxious symptoms but not to cognitive vulnerability to depression (PES) or depressive symptoms. Attachment anxiety was significantly correlated with both forms of cognitive vulnerability and anxiety and depressive symptoms. PES partially mediated the relationship between attachment anxiety and depressive symptoms. LMS partially mediated the relationship between attachment anxiety and anxiety symptoms. LMS partially mediated the relationship between attachment avoidance and anxiety. These findings provide evidence that attachment insecurity is likely to trigger cognitive vulnerabilities to mood disorders. Interestingly, the results from this study show that cognitive vulnerabilities only partially mediate the relationship between attachment insecurity and mood disorders, which suggests that attachment insecurity (particularly attachment anxiety and negative models of self) may play a role in the development of anxiety and depression, beyond that accounted for by cognitive vulnerabilities to depression and anxiety. One limitation of this research was its correlational nature and thus we cannot infer cause and effect. From the perspective of attachment theory it seems likely that attachment style antedates cognitive vulnerability to depression. It would be useful in future studies to examine the models of partial mediation using a prospective design to examine if attachment styles do indeed antedate cognitive vulnerabilities. One further limitation is the undergraduate sample in this study. Future studies with clinical populations are necessary in order to ensure generalizability of the results.

Further evidence for the role of attachment insecurity, cognitive vulnerabilities and depression comes from a study by Roberts, Gotlib and Kassel (1996). The researchers found that attachment insecurity is associated with dysfunctional attitudes (beliefs that are thought to lead to depression), which in turn predispose individuals to lower self-esteem levels. Self-esteem deficits in turn relate to an increase in depressive symptoms over time (Roberts, Gotlib, & Kassel, 1996). Overall, it would appear that attachment insecurities trigger dysfunctional

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cognitions, which in turn increase insecurely attached individuals' risk of mood disorders.

Therapy and Changes in Attachment Security

There is some evidence that therapists might serve as secure attachment figures for their clients and that over time, therapy (and the security-enhancing therapeutic relationship) might lead to changes towards increased dispositional attachment security. Travis, Bliwise, Binder and Horne-Moyer (2001) measured changes in peer and romantic adult attachment styles in a group of patients undertaking outpatient treatment for clinical disorders (anxiety, depression and/or personality disorders). The results showed that a significant number of clients undertaking psychotherapy (over 25 sessions) changed from an insecure to a secure attachment style from pre-treatment to post-treatment. In addition, clients who showed an increase in attachment security demonstrated more benefit from psychotherapy, in terms of their clinical symptoms.

In addition, Lawson, Barnes, Madkins and Francois-Lamonte (2006) examined romantic attachment pattern change in partner violent men over the course of 17 weeks of cognitive-behavioural/psychodynamic group treatment and found that a significant number of men changed from insecure to secure attachment style from pre to post-treatment. In addition, men who changed from insecure to secure in attachment style reported lower anxiety, depression and partner violence, compared to men who remained insecure in their attachment style.

Similarly, Tasca, Balfour, Ritchie, and Bissada (2007) measured changes in attachment from pre to post-treatment among inpatients with binge-eating disorder. Ninety-five patients were allocated to either group cognitive-behavioural therapy or group psychodynamic-interpersonal therapy. The results indicated increased attachment security in both treatment groups. Moreover, Tasca et al. (2007) found that decreases in attachment anxiety after group psychodynamic-interpersonal therapy were associated with decreases in depression.

Moreover, Muller and Rosenkranz (2009) assessed changes in attachment orientation in individuals diagnosed with PTSD over the course of 8 weeks treatment with inpatient psychotherapy and six months after treatment. In comparison to a control group (those on waiting list), those in the treatment program showed significant increases in attachment security over the course of therapy. In addition, this change was maintained 6 months after discharge from the program.

Furthermore, changes towards increased attachment security were associated with symptom reduction during treatment and remission of symptoms after discharge.

However, in contrast to the findings reported above, Strauss, Mestel, and Kirchmann (2011) found that a 7 week course of inpatient psychodynamic therapy did not increase the attachment security of 40 women diagnosed with borderline personality disorder (BPD) or avoidant personality disorder (APD). Instead, clients in both sub-groups showed changes towards increased attachment avoidance from pre-treatment to post-treatment. While the therapy was successful in terms of therapeutic outcomes across both sub-groups, better outcomes were associated with decreased attachment anxiety/ambivalence in the sub-group of women with BPD. While these findings appear to contrast with those from other studies exploring changes in attachment orientation and therapeutic outcomes, these findings may be specific to individuals with personality disorders. In addition, these findings are similar to those described earlier in that they suggest that changes in attachment patterns are important predictors of successful treatment outcome in therapy. The evidence from this study suggests that a move towards a more deactivated (avoidant) attachment orientation is more adaptive and beneficial than an attachment anxious orientation, for people diagnosed with BPD.

Together, these findings are promising and suggest that therapists might serve as secure attachment figures for their clients and help move them towards attachment security during their treatment, even over short time periods and when the therapy does not include a specific attachment-focused intervention. Moreover, beneficial therapeutic outcomes were associated with increased attachment security over the course of therapy. These findings suggest that increasing attachment security may help to treat the symptoms of depression, anxiety and other mental health problems, which has important clinical implications for the development of attachment-focused interventions for such disorders. In addition, such research lends support for the view that there is a causal relationship between attachment insecurity and mental health problems such as anxiety and depression.

However, the small sample sizes, brief duration of therapy and the absence of control groups limit the generalizability of the findings from many of the studies described above. The absence of a control groups is especially limiting, as without a control group we are unable to confidently attribute any changes in attachment security to the interventions employed in the research. Further controlled research

exploring the long-term effects of therapy on clients attachment patterns and the impact of any such changes on therapy outcomes is necessary (Mikulincer, Shaver, & Berant, 2012).

Priming Attachment Security

From a social-cognitive perspective, temporary changes in attachment security are the outcome of interpersonal situations which increase the availability of one specific working model of attachment over others (Baldwin & Fehr, 1995; Baldwin et al., 1996). In this sense, changes in attachment security are viewed as the cognitive retrieval of specific attachment styles at different times, depending on the person's state of mind and other contextual factors (Baldwin et al., 1996; Collins & Read, 1994).

More recently, experiments designed to create temporary changes in people's sense of attachment security have been tested. These 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). Moreover, subliminal techniques have also been used to prime secure base schemas (see Mikulincer & Shaver, 2007b, for a review) where participants are exposed to words or pictures relating to secure attachment (e.g., "love" and "support").

Evidence suggests that priming attachment security is symbolically equivalent to exposing a person to an attachment figure and produces effects similar to those of dispositional attachment security (Carnelley & Rowe, 2010). For example, attachment security priming has been found to influence attraction to romantic partners, with participants primed with security showing more attraction to securely attached potential partners than those primed with insecure attachment styles (Baldwin et al., 1996). Furthermore, security priming has been shown to increase willingness to interact with out group members (Mikulincer & Shaver, 2001), and increase compassion and altruism (Mikulincer, Shaver, Gillath, & Nitzberg, 2005). Moreover, people primed with a secure attachment style recall more positive attachment words and show more positive interpersonal expectations and lower endorsement of negative interpersonal expectations than those primed with insecure attachment styles (Rowe & Carnelley, 2003). In addition, attachment security priming has been found to increase honesty (by reducing the tendency to lie

or cheat) compared to positive mood priming (Gillath, Sesko, Shaver, & Chun, 2010).

Attachment security priming has been found to increase positive affect comparative to neutral primes (Mikulincer, Hirschberger, Nachmias, & Gillath, 2001). Furthermore, Carnelley and Rowe (2010) analysed the written scripts produced by participants who had been primed with thoughts of a neutral relationship, a secure relationship, an insecure relationship or a positive affect prime. Participants primed with attachment security used more positive emotion words and fewer negative emotion words than those primed with attachment anxiety or avoidance. In addition, participants primed with attachment security used more positive emotion words and fewer negative emotion words than those in the positive affect condition, but did not differ from those in the neutral condition. The interpersonal aspects of both the secure and neutral primes may have boosted participants' mood, comparative to the positive affect condition.

In addition, Miterany (2004) explored whether global representations of attachment or primed attachment security had an effect on the PTSD symptoms of participants who had been (directly or indirectly) exposed to terrorist attacks on Israeli cities (cited in Mikulincer, Shaver, & Horesh, 2006). On the basis of PTSD symptoms, participants were categorised into a non-PTSD or a PTSD group. A few weeks later, all participants completed a computerised Stroop task, where they were exposed to terror words, emotionally neutral words and negatively valenced words (in random order). The (secure) prime word "love" was presented (for 20 milliseconds) before the target word on a third of the trials, the (positive affect) prime word "success" was presented on another third, and the (neutral) prime word "hat" was presented on the remaining third of the trials. These primes were presented in randomly ordered blocks of trials across participants. Longer response times for colour-naming of the terror-related words suggested that trauma-related words were interfering with cognitive performance (a symptom of PTSD). Participants in the PTSD group took longer to name the colour of the terror words, compared to participants in the non-PTSD group, as expected. However, this effect was not seen in participants who were subliminally primed with attachment security. These results suggest that security priming might help to protect individuals from the symptoms of PTSD. However it is important to note that the sample consisted of undergraduate

participants and thus the findings may not generalise to individuals with clinically diagnosed PTSD.

Moreover, more recent research suggests that attachment security priming can enhance emotion regulation after thinking about upsetting memories. Participants who were primed with attachment security (by being exposed to their romantic partner's photograph) immediately after thinking about an upsetting memory, showed lower post-prime negative affect, compared to participants in a control condition (these participants were exposed to a photograph of an unknown other). In addition, participants in the secure prime condition showed less negative thinking in a post-prime stream of consciousness task. Furthermore, those participants who experienced less negative affect after the secure prime reported fewer physical and psychological health problems 1-3 months after the task (Selcuk, Zayas, Günaydin, Hazan, & Kross, 2012).

Taken together, the experimental findings described above indicate that attachment security priming produces beneficial effects on mood, emotion regulation, pro-social behaviour and interpersonal expectations, compared to both neutral and insecure primes. In addition, evidence suggests that attachment security priming may be useful for protecting individuals from mental health problems such as PTSD. However, further research is necessary, with clinical samples, to explore whether this is the case.

Repeated Security Priming: Implications for Increasing Attachment Security

The effects of security priming were initially measured immediately after the priming manipulation in the laboratory (e.g., Baldwin et al., 1996). However, Carnelley and Rowe (2007) hypothesised that through repeated attachment security priming, the secure relational schema could become more chronically accessible. To test this hypothesis, the researchers primed participants on three occasions over three days with either a secure or neutral prime. As predicted, two days later, 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. Moreover, Gillath and Shaver (2007) found that participants primed with attachment security showed higher self-esteem scores and higher positive mood scores one week after their repeated security priming sessions, compared to those in a control group. It would appear that repeatedly activating cognitive representations

of attachment security has relatively long-lasting beneficial effects (cited in Gillath et al., 2008).

The implications of repeated security priming findings are important, suggesting that self-views and relationship-views can be changed positively. By use of a relatively simple manipulation repeated three times, individuals can be induced to think more positively about themselves up to two days later (Carnelley & Rowe, 2007). Furthermore, 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, 1992; Carnelley & Rowe, 2007; Rowe & Carnelley, 2003, Mikulincer et al., 2001). These findings suggest that repeated security priming can be utilised in interventions to increase global attachment security in individuals who have insecure global patterns of attachment.

Furthermore, evidence suggests that increases in attachment security can occur naturally in real life situations, for example, where having a supportive relational partner gradually leads to increased global attachment security (e.g., Davila et al., 1999). Moreover, evidence from clinical studies examining the effects of therapy on participant's attachment security have shown promising results, with participants demonstrating increases in dispositional attachment security from pre-therapy to post-therapy (e.g., Travis et al., 2001). In this sense, exposure to a secure attachment figure (the therapist) is seen to increase a chronically insecure person's sense of global attachment security, even over relatively short periods of time. This evidence provides indirect support for the role that security priming might play in increasing chronically insecure individuals' sense of attachment security.

If we refer back to Collin and Read's (1994) hierarchical structure of attachment representations, attachment security priming can be viewed as the spreading activation of a secure relational schema via a bottom up processing of attachment-related information. If we repeatedly prime chronically insecure participants with a secure attachment figure, it is likely that the secure relational schema will become more chronically accessible over time. In this sense, repeatedly priming participants with secure relational schemas at low, relationship specific levels of the attachment hierarchy, will eventually, through spreading activation upwards through the hierarchy, result in a change towards attachment security in the general attachment schema, at the top of the hierarchy. Eventually, with attention and time, activation of a secure relational schema may become as automatic as the

old, insecure schema was. However, it is likely that the old model will still exist in memory and thus have the potential to be activated (e.g., in times of stress).

Attachment Security Priming and Depression and Anxiety

Priming attachment styles and exploring the effects of doing so on depressed and anxious mood would be a useful way of exploring causal relationships between attachment patterns and depression and anxiety. On the basis of the findings described earlier, we would expect people primed with attachment security to report lower depressed and anxious mood compared to people primed with insecure attachment styles. We might also expect people primed with attachment anxiety to report higher levels of depressed and anxious mood compared to people primed with attachment avoidance, because evidence more consistently points to a relationship between attachment anxiety and depression and anxiety than for attachment avoidance (e.g., Besser & Priel, 2005; Doron et al., 2012).

In addition, as attachment security priming has been demonstrated to produce effects similar to those found with dispositional attachment security, it seems possible that by increasing peoples' sense of attachment security, we can in turn improve his or her emotion regulation. It would be useful to explore the effects of security priming (compared to a control condition) on depressed and anxious mood in both non-clinical and clinical samples.

Moreover, research demonstrating that attachment security is associated with increased positive affect and lower recall for negative emotion words (Carnelley & Rowe, 2010; Gillath & Shaver, 2007) indicates that attachment security within relationships is closely related to participants' emotional state. This evidence, combined with correlational evidence linking attachment insecurity and depression and evidence suggesting that secure relational figures or therapists can increase an individual's attachment security (e.g. Travis et al., 2001) as well as reduce depression symptoms (Tasca et al., 2007), indicates that attachment security priming is likely to strengthen positive emotions and reduce depressed and anxious mood.

Limitations of Repeated Security Priming Methods

In previous repeated security priming experiments, participants attended a number of security-priming sessions in the laboratory (e.g., Carnelley & Rowe, 2007), which was time-consuming and not particularly convenient for participants. Recently, some researchers have collected security priming data from online community samples (e.g., Luke, Carnelley, & Sedikides, 2012). 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 and so far there have been no attempts to repeatedly prime participants with security using online methods.

Texting and Attachment Security Priming

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 (Agyapong, Aherm, McLoughlin, & Farren, 2012), the effectiveness of a supportive text messaging intervention was tested in patients with major depression and comorbid alcohol use disorder. Participants in the intervention group received text messages twice daily for 3 months, encouraging them to cope effectively with stress (e.g., 'Stress cannot be avoided; learn to cope better by adopting new strategies'), maintain good mental well-being (e.g., 'Monitor changes in your mood; develop a list of personal warning signs'), abstain from alcohol (e.g., 'Make a list of 5 people you can call if you are craving. Make sure you carry their numbers with you all the time') and take their medication correctly (e.g., 'Stick to your treatment plan; take your medication as prescribed and keep your appointments'). Text messages were also designed to provide general encouragement and support (e.g., 'To change the outside world all you have to do is change the way you think and feel'). Participants in the control group received messages once every two weeks (for 3 months) thanking them for taking part in the study. Participants in the intervention group reported lower depression at the end of the trial, compared to participants in the control group, after controlling for baseline depression (Agyapong et al., 2012).

The above evidence suggests that supportive text messages benefit patients suffering from depression and alcohol dependence (Agyapong et al., 2012). In addition, attachment security priming has been shown to have beneficial effects on mood (Carnelley & Rowe, 2010). On the basis of this evidence, it seems likely that text messaging is a suitable medium for repeated security priming and that text security priming may have beneficial effects on depression symptoms. The benefits of delivering primes via text message are convenience and time-efficiency.

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Moreover, the location-independent nature of text messages means that security priming could be easily integrated into participants' daily lives.

Future Directions

Future research should extend and advance the current research literature on adult attachment and depression and anxiety, by exploring causal processes between attachment and depressed and anxious mood using attachment security priming. Evidence suggests that priming avoidant or anxious attachment styles is likely to lead to increased depressed and anxious mood, compared to priming attachment security. If causal relationships are established between attachment patterns and depressed and anxious mood, these findings will have important clinical implications for the potential effectiveness of attachment-focused interventions for people suffering from anxiety and depression. Such research could be the stepping stone towards the development of attachment-focused therapies or interventions for adults with insecure attachment patterns and depression and/or anxiety symptoms.

Moreover, research should aim to enhance and further develop and extend the repeated security priming methodology developed by Carnelley and Rowe (2007), with the use of text messages primes. Text messages are a location-independent and practical method of delivering security primes that can potentially be easily integrated within participants' daily routines. Evidence suggests that text messages are likely to be a suitable medium for delivering security primes and that participants who receive a secure prime by text message are likely to report higher felt security, compared to participants who receive a text prime regarding a neutral topic. If text message primes were successful in inducing a sense of felt security in participants, then this would open up further possibilities for the implementation of longer term research studies exploring the effects of repeated text security priming on attachment security, mood and mental health.

MODEL OF SELF
(Dependence)

	Positive (Low)	Negative (High)
Positive (Low)	**CELL I** **SECURE** Comfortable with intimacy and autonomy	**CELL II** **PREOCCUPIED** Preoccupied with relationships
Negative (High)	**CELL IV** **DISMISSING** Dismissing of intimacy Counter-dependent	**CELL III** **FEARFUL** Fearful of intimacy Socially avoidant

MODEL OF OTHER
(Avoidance)

Figure 1. Model of Self and Model of Other.

Adapted from "Attachment Styles Among Young Adults," by K. Bartholomew, and L. M. Horowitz, 1991, *Journal of Personality and Social Psychology, 61*, p. 227. Copyright 1991 by the American Psychological Association**.**
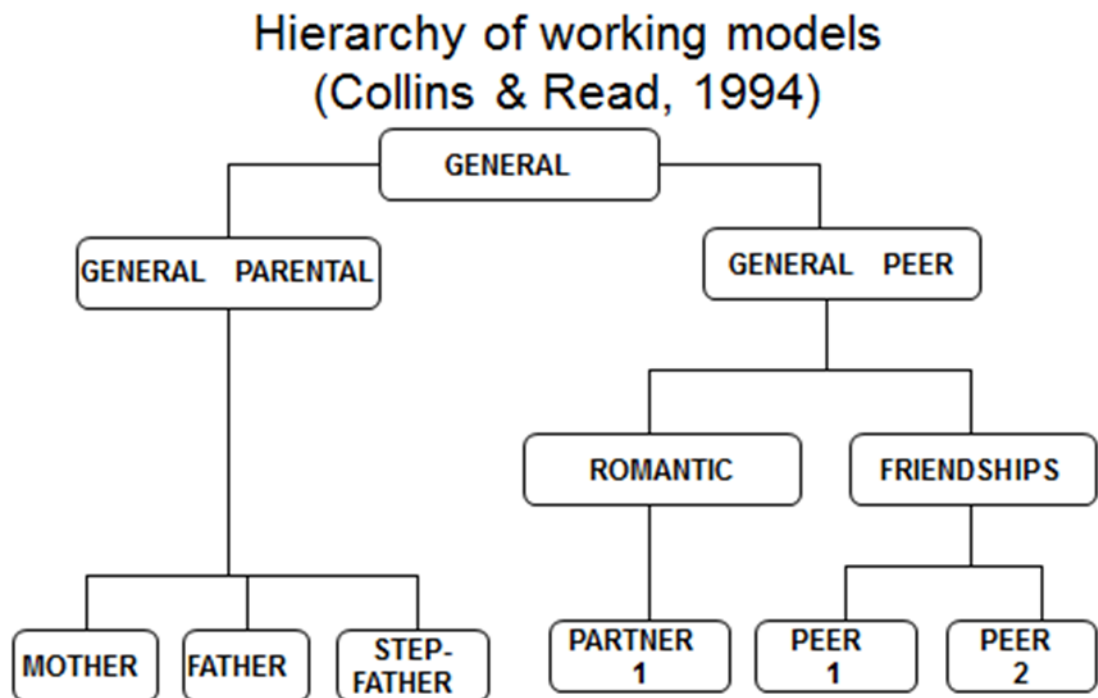
Figure 2. Hierarchy of Working Models.

Adapted from "Cognitive Representations of Attachment: The structure and function of working models," by N. L. Collins, and S. J. Read, 1994, *Advances in Personal Relationships, 5*, p. 58. Copyright 1994 by Jessica Kingsley Publishers Ltd.

2. CHAPTER TWO

Exploring the Effects of Attachment Style Priming on Felt Security, Depressed Mood and Anxious Mood

According to attachment theory (Bowlby, 1988), the ability to depend on external or internal representations of attachment figures is the most important outcome of attachment security, allowing for the development of affect regulation, social and interpersonal skills and autonomy. 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 et al., 1994; Mickelson, Kessler, & Shaver, 1997).

Evidence indicates that both attachment anxiety and attachment avoidance are linked with depressive symptoms in non-clinical populations (e.g., Davila, 2001; Whiffen et al., 2001; Williams & Riskind, 2004). However, some research from non-clinical samples suggests that attachment anxiety is associated with depressive symptoms, but attachment avoidance is not (e.g., Besser & Priel, 2005; Shaver et al., 2005). By contrast, research from clinical samples suggests that both high attachment anxiety and high attachment avoidance are related to depression symptoms (e.g., Carnelley et al., 1994; Reinecke & Rogers, 2001; Reis & Greyner, 2004).

Correlational evidence from non-clinical samples indicates that both attachment avoidance and attachment anxiety are positively related to anxiety (e.g., Doi & Thelan, 1993; Hankin et al., 2005; Irons & Gilbert). However, some research from non-clinical samples has found a positive relationship between attachment anxiety and anxiety symptoms but no association between attachment avoidance and anxiety symptoms (e.g., Sonnby-Borgstrom & Jonsson, 2004; Strodl & Noller, 2003). Furthermore, evidence from clinical samples suggests that social anxiety disorder is associated with both attachment dimensions (Eng et al., 2001) and adolescents with a diagnosed anxiety disorder are more likely to be categorised as insecure in attachment, compared to adolescents without anxiety disorders (Brumario et al., 2013). Moreover, evidence suggests that OCD is associated with high levels of attachment anxiety but not attachment avoidance (Doron et al., 2012).

Taken together, these findings suggest that attachment insecurity in general is associated with depression and anxiety. However, there does appear to be more consistent evidence for a link between attachment anxiety and anxiety and

depression symptoms than for attachment avoidance and anxiety and depression symptoms. See Chapter 1 (and Mikulincer & Shaver, 2007a) for a more comprehensive review of the literature relating to attachment patterns and depression and anxiety.

It is possible that evidence suggesting that attachment anxiety is more strongly associated with depression and anxiety (than attachment avoidance is) may reflect differences in anxious and avoidant individuals' tendency to admit to experiencing negative emotions such as anxiety and sadness, rather than differences in the actual prevalence of such disorders (see Chapter 1). Research exploring causal relationships between attachment patterns and mood disorders is necessary in order to shed further light on the relationship between these variables.

Evidence suggests that it is possible to induce a sense of attachment security in experimental settings through the activation of representations of attachment security (e.g., Baldwin et al., 1996; Carnelley & Rowe, 2003; Mikulincer & Shaver 2001) and that attachment security priming has beneficial effects similar to those found in people with dispositional attachment security (e.g., Carnelley & Rowe, 2007; Mikulincer & Shaver, 2001). Moreover, security priming has been found to produce energising (e.g., Luke et al., 2012) and positive affect inducing (e.g., Mikulincer et al., 2001) effects, in comparison to neutral primes. The aim of this experiment was to explore causal processes between attachment insecurity and depression and anxiety, an area that, to my knowledge, has not been directly tested by other researchers. More specifically, the aim of the current experiment was to explore whether priming participants with secure, anxious, avoidant attachment styles or a neutral (control) prime leads to differences in post-prime self-reported felt security, depressed mood and anxious mood.

Hypotheses

Felt security was measured in the study to ensure the validity of the priming techniques utilised in the experiment. I predicted higher levels of post-prime felt security to be reported by participants in the secure attachment prime condition, compared to those in the anxious and avoidant attachment prime conditions and the control (neutral prime) condition. Furthermore, I predicted higher levels of felt security to be reported by those in the neutral condition, compared to those in the anxious and avoidant conditions. Finally, I expected participants in the anxious and avoidant prime conditions to report similar levels of post-prime felt security.

Moreover, I predicted lower levels of post-prime depressed mood to be reported by participants in the secure condition, compared to those in the anxious, avoidant or neutral conditions. Furthermore, I predicted higher levels of post-prime depressed mood to be reported by those in the anxious condition, compared to those in the avoidant condition, in line with research findings documenting a more consistent link between attachment anxiety and depression. In addition, I predicted that those in the neutral condition would report less depressed mood than those in the anxious and avoidant conditions.

I predicted lower levels of post-prime anxious mood to be reported by participants in the secure condition, compared to those in the anxious, avoidant or neutral conditions. Furthermore, I predicted higher levels of post-prime anxious mood to be reported by those in the anxious condition, compared to those in the avoidant condition, in line with research findings documenting a more consistent link between attachment anxiety and anxiety. In addition, I predicted that those in the neutral condition would report less anxious mood than those in the anxious and avoidant conditions.

The attachment primes should temporarily override an individual's dispositional level of attachment security, as has been found in previous security priming research (e.g., Carnelley & Rowe, 2007). I therefore predicted that dispositional attachment anxiety and avoidance would not affect felt security or depressed and anxious mood, for those in the secure, anxious or avoidant conditions. However, I did expect the dispositional attachment dimensions to affect felt security and depressed and anxious mood for those in the neutral (control) condition, with those higher in attachment anxiety and avoidance reporting less felt security and more depressed and anxious mood post-prime, compared to those low in dispositional attachment anxiety and avoidance.

I also wished to explore whether baseline depression or baseline anxiety would interact with the effects of the primes on post-prime depressed mood and post-prime anxious mood, respectively. I predicted that baseline depression would interact with the neutral prime on depressed mood, with those higher in baseline depression reporting higher depressed mood post-prime, compared to those lower in baseline depression. Furthermore, I predicted that baseline anxiety would interact with the neutral prime on anxious mood, with those higher in baseline anxiety reported higher anxious mood post-prime, compared to those lower in baseline

anxiety. However, I did not predict baseline anxiety or baseline depression to interact with the secure, anxious or avoidant primes on depressed mood or anxious mood. I expected the attachment style primes to (temporarily) override a person's baseline level of anxiety or depression.

Method

Participants

This experiment was granted ethical approval by the Ethics Committee, School of Psychology, at the University of Southampton. One hundred and fifty-four undergraduates (135 female, 19 male), from a British university, participated in the study in exchange for course credits. Eight participants' data were excluded due to an iSurvey error resulting in large amounts of missing data for these participants. Two further participants' data were excluded from the analyses as these participants were unable to complete the visualisation task in the anxious prime condition; both participants stated that they had never experienced the type of relationship described in the task. One hundred and forty-four participants' data were included in the subsequent analyses (127 female, 17 male). Participants ranged in age from 18-50 years ($M = 20.1$ years). One hundred and twenty-five participants described themselves as Caucasian, 12 as Asian, 3 as Indian, 2 did not state their ethnicity, 1 participant described themselves as African, and 1 participant selected 'Other' for their ethnicity.

In order to detect a small effect, in an Analysis of Variance (ANOVA) with 4 groups ($f = .25$), where all significance tests are performed at $p = .05$, a sample size of 1096 is necessary (Cohen, 1992). In order to detect a medium effect, a sample size of 180 is necessary and to detect a large effect, a sample size of 72 is necessary (Cohen, 1992). The final sample size in the experiment was 144 participants, somewhat below the recommended sample size for detection of a medium effect.

Procedure

Participants signed up to the study online. Immediately after booking a slot they were sent an email with a link to the first (online) part of the study, with instructions to complete the online part immediately and to ensure they completed it before attending their lab session (normally a few days to a week later). Once they clicked on this link, they were re-directed to the website to complete the initial Time 1 questionnaire. After reading an online informed consent form and ticking a box agreeing to participate in the study, participants completed demographics followed

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by measures of dispositional attachment security and baseline depression and anxiety symptoms (over the last week).

For the second part of the experiment, participants attended the laboratory in groups of 1 to 6 and were seated in separate cubicles at a computer. Prior to taking part in the experiment, participants completed online measures of dispositional attachment security and baseline depression and baseline anxiety symptoms. Participants then attended the experiment (usually a few days to a week later). Participants attended the laboratory in groups of 1 to 6 and were seated in separate cubicles at a computer. Participants were randomly allocated (by iSurvey) to either a secure ($N = 38$), anxious ($N = 35$), avoidant ($N = 33$) or neutral ($N = 38$) priming condition. Immediately after completing the priming task, participants completed measures of felt security, depressed mood and a mood repair task, before being debriefed and thanked for their time.

Materials

Adult attachment. The two dimensions of adult attachment (avoidance and anxiety) were measured using the Experiences in Close Relationships Inventory (ECR: Brennan et al., 1998), which consists of 36 items, 18 for each dimension. An example avoidance item is "I prefer not to show others how I feel deep down". An example anxiety item is "I worry about being rejected or abandoned". Participants responded to each item using a 7-point Likert scale (1 = *strongly disagree,* 7 = *strongly agree*). The ECR has been used in hundreds of studies and shows high reliability, with alpha coefficients always close to or above .90 and test-retest reliability ranging between .50 and .75 (Mikulincer & Shaver, 2007a). In the current study, scale reliability was high for both attachment anxiety ($\alpha = .92$) and attachment avoidance ($\alpha = .95$). The scales were weakly correlated (see Table 1).

Baseline depression. Baseline depression was measured using the depression-dejection items from the Profile of Mood States (POMS: McNair, Lorr, & Droppleman, 1992). Participants use a 5-point Likert scale (0 = *not at all*, 4 = *extremely*) to rate the extent to which they are experiencing various mood states. Participants were asked to rate each item based on how they had been feeling over the last week, including the day they completed the questionnaire. An example depression-dejection item is 'miserable'. Scale reliability for the baseline depression items was high ($\alpha = .93$).

Baseline anxiety. Baseline anxiety was measured using the tension-anxiety items from the POMS (McNair et al., 1992). Participants were asked to rate each item based on how they had been feeling over the last week, including the day that they completed the questionnaire. An example tension-anxiety item from the POMS is 'shaky'. Scale reliability for the baseline anxiety items was high (α = .81).

Experimental Manipulation

The attachment style priming method used in this experiment was an adaptation of the method employed by Bartz and Lydon (2004). The neutral prime used in this experiment was identical to the one used by Carnelley and Rowe (2003), which was adapted from Mikulincer and Shaver (2001). Participants allocated to the secure, anxious and avoidant conditions were shown the following instructions: "The researchers are interested in people's ability to visualise their significant others. You will be given a description of a relationship and asked to think about someone with whom you have experienced that kind of relationship. You will be asked some questions about that relationship". Participants were then presented with one of the 4 primes described below (secure, anxious, avoidant or neutral) and given the following instructions:

Neutral prime. "We now want you to complete a visualisation task. We would like you to write for 10 minutes about a supermarket scenario. Try to think of a particular time that you visited a supermarket to do a large or weekly shop and give information about the sequence of events that you completed as you moved around the store. For example, you may have selected a trolley and walked down the first aisle, picking up items as you went. Please try to give as much detail as possible about what you picked up or looked at, i.e., did you have to weigh an item or did you have to reach up to a top shelf?"

Secure attachment prime. "Please think about a relationship you have had in which you found that it was relatively easy to get close to the other person and you felt comfortable depending on the other person. In this relationship you didn't often worry about being abandoned by the other person and you didn't worry about the other person getting too close to you."

Anxious attachment prime. "Please think about a relationship you have had in which you have felt like the other person was reluctant to get as close as you would have liked. In this relationship you worried that the other person didn't really

like you, or love you, and you worried that they wouldn't want to stay with you. In this relationship you wanted to get very close to the other person but you worried this would scare the other person away."

Avoidant attachment prime. "Please think about a relationship you have had in which you have found that you were somewhat uncomfortable being too close to the other person. In this relationship you found it was difficult to trust the other person completely and it was difficult to allow yourself to depend on the other person. In this relationship you felt yourself getting nervous when the other person tried to get too close to you and you felt that the other person wanted to be more intimate than you felt comfortable being."

Those in the attachment prime conditions were then given the following instructions: Now take a moment and try and get a visual image in your mind of this person. What does this person look like? What is it like being with this person? You may want to remember a time when you were actually with this person. What would he or she say to you? What would you say in return? How do you feel when you are with this person? How would you feel if they were here with you now? Please type your thoughts in the space provided. You will have 10 minutes to complete this task. The timer will let you know when the 10 minutes are up. If you finish before the 10 minutes are up, please continue to think about the relationship and write down anything else that comes to mind about the relationship." Those allocated to the neutral condition were then given the following instructions: "Please type your thoughts in the space provided. You will have 10 minutes to complete this task. The timer will let you know when the 10 minutes are up. If you finish before the ten minutes are up, please continue to think about the scenario and write down anything else that comes to mind."

Post Prime Materials

Felt security. To find out whether the experimental manipulation was successful, participants completed a 10-item measure of Felt Security (Luke et al., 2012). This scale consists of ten words relating to feelings of security, comfort and safety (e.g., loved, protected). Participants rate the extent to which the person or scenario in the visualisation task made them feel secure, by rating each item using a 6-point Likert scale (1 = *not at all*, 6 = *very much*). Scale reliability for the felt security items was high ($\alpha = .96$).

Depressed mood. Depressed mood was measured using the POMS depression-dejection items (McNair et al., 1992). At this time point, participants were asked to rate each item based on how they were feeling "right now". Scale reliability for the depressed mood items was high ($\alpha = .92$).

Anxious mood. Anxious mood was measured using the POMS (McNair et al., 1992) tension-anxiety items. At this time point, participants were asked to rate each item based on how they were feeling "right now". Scale reliability for the anxious mood items was high ($\alpha = .85$).

Mood repair. At the end of the experiment, participants completed the Five Best Things task, where they were given space to write about the 5 best things or times in their life by listing them and writing a couple of lines about each. This task was included in order to counteract any negative affect participants in the anxious or avoidant prime conditions may have experienced when thinking about a relationship that made them feel insecure. Any discomfort participants experienced in the avoidant or anxious priming conditions was expected to be mild and at a stress level that is not unusual in the course of everyday life.

Results

Preliminary Analyses

There were no missing values on the felt security, baseline depression, baseline anxiety or post-prime depressed mood or baseline anxiety variables. There was 1 missing value on the attachment avoidance subscale of the ECR. Little's (1988) Missing Completely At Random (MCAR) test indicated that the missing data were MCAR, $\chi^2(147, N = 144) = 150.35$, $p = .41$. There was 1 missing value on the attachment anxiety subscale of the ECR. Little's (1988) MCAR test suggested that the missing values were not MCAR, $\chi^2(144, N = 146) = 176.20$, $p < .05$. Upon further examination of the data it appeared that some participants may have forgotten to complete all items before moving on to the next page in the study. However, it is also possible that participants may have not answered certain items on the subscale due to their levels of attachment anxiety. I therefore treated the data as Missing at Random (MAR). I cannot be certain that the data are Not Missing Completely at Random (NMAR). Moreover, evidence suggests that maximum likelihood methods of dealing with missing data are often unbiased with NMAR data even though such methods assume the data are MAR (Schafer & Graham, 2002). Such methods are

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still favourable compared to ad hoc techniques of case deletion and single imputation. Missing data were thus dealt with using Expectation-Maximization in SPSS.

One univariate outlier (with a z-score greater than 3.29) was found in the post-prime depressed mood variable and two outliers were found in the post-prime anxious mood variable. The outliers were replaced with the mean plus two standard deviations for the variable to which they belonged, as recommended by Field (2005). No outliers were found on the felt security, depressed mood, anxious mood, baseline depression or baseline anxiety variables.

Felt Security Analyses

My aim was to test the hypothesis that people in the secure prime condition reported higher post-prime felt security, compared to participants in the other prime conditions. Firstly, I explored which potential covariate variables (attachment anxiety, attachment avoidance, baseline anxiety and baseline depression), met the assumptions necessary to be included as covariates in an Analysis of Covariance (ANCOVA), following the guidelines provided by Field (2005). Felt security was not significantly correlated with any of the potential covariates (see Table 1) and thus these variables could not be entered as covariates in the model.

I carried out an ANOVA, with prime condition (4 levels: secure, anxious, avoidant and neutral) as the independent variable and post-prime felt security as the dependent variable. Figure 3 displays the means and standard errors for felt security in each experimental condition. Levene's test indicated equal variances across experimental groups ($F = .88$, $p = .46$). The effect of condition on felt security was significant, $F(3, 140) = 35.13$, $p < .001$. Tukey-Kramer post hoc analyses revealed that participants in the secure condition ($M = 4.77$, $SE = .17$) reported significantly more felt security compared to those in the anxious ($M = 2.85$, $SE = .18$), $p < .001$, avoidant ($M = 2.42$, $SE = .18$), $p < .001$, and neutral ($M = 3.05$, $SE = .17$) conditions, $p < .001$, in support of hypotheses. In line with predictions, there were no significant differences between the avoidant and anxious condition, $p = .34$. In contrast to hypotheses, those in the neutral condition did not report significantly higher felt security compared to those in the anxious condition, $p = .34$. The difference between the neutral and avoidant conditions was marginally significant and in the expected direction, with participants in the avoidant condition reporting lower felt security compared to those in the neutral condition, $p = .06$. The effect size was calculated

using η^2 and experimental condition accounted for 43% of the variance in felt security scores.

In order to test whether the dispositional attachment dimensions moderated the effects of the experimental conditions on post-prime felt security, I created three dummy attachment prime variables (secure, anxious and avoidant). The neutral condition was the comparison (excluded) condition, coded 0. I regressed post-prime felt security on the secure, anxious and avoidant dummy variables and centred values of attachment anxiety and avoidance (Step 1), and the interactions between each of the 3 dummy variables and each (centred) attachment dimension (Step 2) in a hierarchical regression (see Table 2). Step 1 of the regression model was significant, $R^2 = .44$, $F(5, 138) = 21.49$, $p < .001$. Step 2 of the regression model was significant, $R^2 = .50$, $F(11, 132) = 11.94$, $p < .001$. Moreover, the change in R^2 from Step 1 to Step 2 was significant, R^2 change $= .06$, $p < .05$. The interaction between attachment avoidance and the anxious dummy variable was significant, indicating that the effect of attachment avoidance on felt security differs between the neutral and anxious prime conditions. The interaction between attachment avoidance and the secure dummy variable was significant, indicating that the effect of attachment avoidance on felt security differs between the neutral and secure conditions (see Table 2).

I attempted to follow up the significant interaction effects with simple slopes analyses, using PROCESS, an SPSS macro developed by Hayes (2013a) that estimates effects of a predictor at low (1 standard deviation below the mean), average (mean) and high (1 standard deviation above the mean) values of a continuous moderator variable and specified (user coded in SPSS) values of a dichotomous moderator variable. Unfortunately, I was unable to follow up either of the significant interactions identified above, as PROCESS generated an error (code #12417). After learning more about the error code generated by PROCESS on the Hayes (2013b) website, I discovered that this error 'is usually a fatal error. Do not interpret output if you see this. This error typically occurs when one or more of the predictor variables in a model is constant or is a perfect linear combination of the other predictors. This error frequently occurs when bootstrapping a small dataset with one or more dichotomous predictors that heavily favors one category or another'. Upon further exploration of the regression model, I discovered that the average VIF of the predictor values in the regression model described above was

2.54. Bowerman and O'Connell (1990) argue that an average VIF higher than 1 indicates that multicollinearity may be biasing the regression model. It seems likely that this fatal error was due to the multicollinearity of the predictors in the model, combined with my relatively low sample size.[2]

Depressed Mood: Preliminary Analyses

Baseline depression, baseline anxiety and attachment avoidance are all significantly correlated with post-prime depressed mood (see Table 1) and are thus all potential covariate variables for an ANCOVA analysis, where depressed mood is the DV, provided that they meet the assumptions for ANCOVA, as described by Field (2005). Attachment anxiety was not significantly correlated with post-prime depressed mood, meaning that this variable is unsuitable to be included as a covariate.

One of the assumptions of ANCOVA is that the covariate variables must be independent from the experimental effect (e.g., Field, 2005). Baseline depression did not differ significantly between the prime conditions, $F(3, 140) = .30$, $p = .83$. Baseline anxiety did not differ significantly between the prime conditions, $F(3, 140) = .45$, $p = .72$. Attachment avoidance did not differ significantly between the prime conditions, $F(3, 149) = .52$, $p = .67$. All three potential covariates met this assumption.

Next, I customised the ANCOVA model in SPSS to examine whether the assumption of homogeneity of regression slopes had been met. Depressed mood was the dependent variable. Condition, attachment avoidance, baseline anxiety and baseline depression were entered as between-subjects variables, as were the interaction terms between each of the potential covariates and condition. The interaction between baseline depression and condition on depressed mood was significant, $F(47,57) = 2.32$, $p < .01$, indicating that the assumption of homogeneity of regression slopes had been violated for this variable. The interaction between baseline anxiety and condition on depressed mood was not significant, $F(42, 69) = .59$, $p = .57$. The interaction between attachment avoidance and condition on depressed mood was not significant $F(48, 20) = .37$, $p = .10$. The homogeneity of regression slopes assumption was met for baseline anxiety and attachment avoidance, meaning that these variables could be included as covariates in the model. Baseline depression was excluded.

By saving the standardised residuals from the depressed mood ANCOVA model, with baseline anxiety and attachment avoidance included as covariates, I was able to examine the normality of distribution across the error scores. The standardised residuals for the ANCOVA model were significantly non-normal in distribution, $D(144) = .09$, $p < .01$. Levene's test was significant, $F(3, 140) = 7.21$, $p < .001$, indicating that the error variance was not equal across experimental conditions. I transformed the depressed mood variable using log transformation and ran the analyses again. The standardised residuals for the ANCOVA model were normal in distribution, $D(144) = .07$, $p = .06$. Levene's test was not significant, $F(3, 140) = .03$, $p = .99$, indicating that the error variance was equal across experimental conditions. The transformation was therefore a success and the results from the ANCOVA reported below use the transformed post-prime depressed mood variable.

Depressed Mood: Main Analyses

I carried out an Analysis of Covariance (ANCOVA), with prime condition (4 levels: secure, anxious, avoidance and neutral) as the independent variable and depressed mood as the dependent variable. Attachment avoidance and baseline anxiety were entered as covariates. Figure 4 displays the estimated marginal means for depressed mood in each prime condition. Higher levels of baseline anxiety, $F(1, 138) = 20.87$, $p < .001$, $B = .02$, predicted higher levels of post-prime depressed mood. Higher levels of attachment avoidance, $F(1, 138) = 9.60$, $p < .01$, $B = .10$, predicted higher levels of post-prime depressed mood. The effect of prime condition, $F(3, 138) = 4.88$, $p < .001$, was significant. Post hoc analyses (pairwise comparisons of the estimated marginal means, with a Bonferroni correction), revealed that participants in the secure condition ($M = .54$, $SE = .06$) reported less depressed mood than those in the anxious ($M = .99$, $SE = .06$) condition, $p < .001$, in line with my hypotheses. However, those in the secure condition did not report significantly less depressed mood compared to those in the neutral ($M = .53$, $SE = .06$) prime condition, $p = 1.00$. The difference between the secure and avoidant ($M = .77$, $SE = .07$) prime conditions was marginally significant and in the expected direction, $p = .08$. In support of hypotheses, those in the neutral condition reported significantly less depressed mood than those in the anxious condition, $p < .001$. The difference between the neutral and avoidant conditions was marginally significant and in the expected direction, with those in the neutral condition reporting lower depressed mood, $p = .07$. Those in the anxious prime condition did not report significantly

more depressed mood than those in the avoidant prime condition, $p = .14$, inconsistent with hypotheses. Partial η^2 calculations showed that attachment avoidance accounted for 7% of the variance in post-prime depressed mood. Baseline anxiety accounted for 13% of the variance in post-prime depressed mood and experimental condition accounted for 20% of the variance in post-prime depressed mood.

In order to explore whether baseline depression moderated the effects of prime condition on depressed mood, I created three dummy attachment prime variables (secure, anxious and avoidant). The neutral condition was the comparison (excluded) condition, coded 0. I regressed post-prime depressed mood on the secure, anxious and avoidant dummy variables, attachment avoidance, baseline anxiety and centred baseline depression (Step 1), and the interactions between each of the 3 dummy variables and baseline depression (Step 2) in a hierarchical regression (see Table 3). Attachment avoidance was entered at Step 1 as this variable was a covariate in the depressed mood ANCOVA. Step 1 of the regression model was significant, $R^2 = .37$, $F(6, 136) = 13.20$, $p < .001$. Step 2 of the regression model was significant, $R^2 = .39$, $F(9, 133) = 9.50$, $p < .001$. However, the change in R^2 from Step 1 to Step 2 was not significant, R^2 change $= .02$, $p = .17$. None of the interactions between the dummy prime variables and baseline depression were significant, thus no further analyses were conducted. Baseline depression did not moderate the effects of the attachment style primes or neutral prime on depressed mood.[3]

Anxious Mood: Preliminary Analyses

Baseline depression, baseline anxiety and attachment avoidance were all significantly correlated with post-prime anxious mood (see Table 1) and are thus all potential covariate variables for an ANCOVA analysis, where anxious mood is the DV. Attachment anxiety was not significantly correlated with post-prime anxious mood, meaning that this variable was not suitable to be included as a covariate.

One of the assumptions of ANCOVA is that the covariate variables must be independent from the experimental effect (e.g., Field, 2005). As described in the preliminary anxious mood analyses, all three potential covariates met this assumption.

I customised the ANCOVA model in SPSS in order to explore the assumption of homogeneity of the regression slopes. Anxious mood was the dependent variable. Condition, baseline depression, baseline anxiety and attachment avoidance were entered as between-subjects variables, as were 3 interaction terms, made up of each of the potential covariates and condition. The interaction between baseline anxiety and condition on anxious mood was not significant, $F(42,144) = .83$, $p = .74$. The interaction between baseline depression and condition on anxious mood was not significant, $F(47, 144) = 1.40$, $p = .11$. The interaction between attachment avoidance and condition on anxious mood was not significant $F(48, 144) = .71$, $p = .83$. The homogeneity of regression slopes assumption was met for baseline anxiety, baseline depression and avoidance, meaning that these variables could be included as covariates in the model.

By saving the standardised residuals from a full factorial anxious mood ANCOVA model, with baseline anxiety, baseline depression and attachment avoidance included as covariates, I was able to examine the normality of distribution across the error scores. The standardised residuals for the ANCOVA model were significantly non-normal in distribution, $D(144) = .10$, $p < .01$. Levene's test was significant, $F(3, 140) = 3.85$, $p < .05$, indicating that the error variance was not equal across experimental conditions. I transformed the anxious mood variable using square root transformation and ran the same analyses again. The standardised residuals for the ANCOVA model were normal in distribution, $D(144) = .06$, $p = .20$. Levene's test was not significant, $F(3, 140) = .90$, $p = .44$, indicating that the error variance was equal across experimental conditions. The transformation was therefore a success and the results from the ANCOVA reported below use the transformed post-prime anxious mood variable.

Anxious Mood: Main Analyses

I carried out an ANCOVA, with prime condition (4 levels: secure, anxious, avoidance and neutral) as the independent variable and anxious mood as the dependent variable. Attachment avoidance, baseline depression and baseline anxiety were entered as covariates. Figure 5 displays the estimated marginal means for anxious mood in each prime condition. Higher levels of baseline anxiety, $F(1, 137) = 4.42$, $p < .05$, $B = .04$, predicted higher levels of post-prime anxious mood. Baseline depression, $F(1, 137) = .11$, $p = .75$, $B = -.00$, did not significantly predict post-prime anxious mood. Higher levels of attachment avoidance predicted higher levels of

post-prime anxious mood, $F(1,137) = 11.58$, $p < .01$, $B = .23$. The effect of prime condition, $F(3, 137) = 12.78$, $p < .001$, was significant. Post hoc analyses (pairwise comparisons of the estimated marginal means, with a Bonferroni correction), revealed that participants in the secure condition ($M = 1.74$, $SE = .13$) reported less anxious mood than those in the anxious ($M = 2.71$, $SE = .14$) condition, $p < .001$, and avoidant ($M = 2.64$, $SE = .24$) conditions, $p < .001$, in line with predictions. However, those in the secure condition did not report significantly less anxious mood compared to those in the neutral ($M = 2.02$, $SE = .13$) prime condition, $p = .83$, contrary to my predictions. In support of hypotheses, those in the neutral condition reported significantly less anxious mood than those in the anxious and avoidant conditions, $p < .01$. Those in the anxious prime condition did not report significantly more anxious mood than those in the avoidant prime condition, $p = 1.00$, inconsistent with hypotheses. Partial η^2 calculations showed that attachment avoidance accounted for 8% of the variance in post-prime anxious mood. Baseline anxiety accounted for 3% of the variance in post-prime anxious mood and experimental condition accounted for 22% of the variance in post-prime anxious mood.

In order to explore whether baseline anxiety moderated the effects of prime condition on depressed mood, I created three dummy attachment prime variables (secure, anxious and avoidant). The neutral condition was the comparison (excluded) condition, coded 0. I regressed post-prime anxious mood on the secure, anxious and avoidant dummy variables, attachment avoidance, baseline depression and centred baseline anxiety (Step 1), and the interactions between each of the 3 dummy variables and baseline anxiety (Step 2) in a hierarchical regression (see Table 4). Attachment avoidance and baseline depression were included at Step 1 because these variables were covariates in the anxious mood ANCOVA. Step 1 of the regression model was significant, $R^2 = .58$, $F(6, 136) = 11.35$, $p < .001$. Step 2 of the regression model was significant, $R^2 = .59$, $F(9, 133) = 7.77$, $p < .001$. However, the change in R^2 from Step 1 to Step 2 was not significant, R^2 change $= .01$, $p = .53$. None of the interactions between the dummy prime variables and baseline anxiety were significant, thus no further analyses were conducted. Baseline anxiety did not moderate the effects of the attachment style primes or the neutral prime on anxious mood.[4]

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Linguistic and Word Count Analyses

I hypothesised that those in the secure condition would report higher felt security than those in the neutral condition, which was supported. However, I also predicted that those in the secure condition would report less depressed mood post-prime compared to those in the neutral condition, which was not supported by my findings. I noticed while reading through participants' saved text files from the prime task, that many of the participants in the neutral condition wrote about grocery shopping with family members or friends and I wondered whether this affiliation could be boosting their mood post-prime or leading the prime to be less "neutral" than intended. Using the Linguistic Inquiry and Word Count (LIWC) program (Pennebaker et al., 2007), I explored word count differences (using t-tests) between the secure and neutral conditions in social, 'we', family and friend words. I also looked at differences in the word count for positive and negative emotions between the conditions. Participants in the secure condition ($M = 13.06$, $SE = .47$) used significantly more social words than those in the neutral ($M = 5.01$, $SE = 5.01$) condition, $t(78) = 10.85$, $p < .001$. However, there were no significant differences in the number of family words used between the secure ($M = .20$, $SE = .51$) or neutral ($M = .32$, $SE = .69$) conditions, $t(78) = -.92$, $p = .36$, or in the number of friend words used in the secure ($M = .47$, $SE = .09$) and neutral ($M = .32$, $SE = .32$) conditions, $t(78) = 1.31$, $p = .20$. Furthermore, there were no significant differences in the number of "we" words used by participants in the secure ($M = 2.22$, $SE = .26$) and neutral ($M = 1.98$, $SE = .38$) conditions, $t(70.69) = .47$, $p = .64$. These findings show that the secure and neutral conditions triggered similar levels of reference to close others (friends and family members) in participants.

I also noticed while reading participants' saved text that some of the participants in the secure condition seemed to be sad about no longer having the secure attachment figure they had visualised in their life (e.g., when a participant wrote about a person they are no longer in a romantic relationship with but who served as a secure attachment figure in the past) and so I decided to explore differences in use of negative emotion words between the secure and neutral conditions. Participants in the secure condition ($M = 1.20$, $SE = .15$) used more negative emotion words than those in the neutral ($M = .29$, $SE = .06$) condition, $t(51) = 5.79$, $p < .001$. However, those in the secure condition ($M = 5.16$, $SE = .27$) also used significantly more positive emotion words than those in the neutral ($M = 1.11$,

$SE = .11$) condition, $t(51.50) = 14.02$, $p < .001$. These findings indicate that the secure prime condition triggers both negative and positive emotions, as opposed to just positive emotions, as we might have expected. Furthermore, the results show that the neutral condition triggers relatively low levels of both negative and positive emotions, as we might have expected of a neutral task.

Discussion

The felt security results from this experiment suggest that the attachment security and attachment insecurity primes successfully induced a sense of secure and insecure relational schemas, respectively. In line with hypotheses, participants in the secure prime condition reported higher post-prime felt security compared to participants in the avoidant and anxious prime conditions. Participants in the anxious and avoidant conditions reported similar amounts of felt security post-prime, also in line with hypotheses. In support of hypotheses, participants in the secure condition reported higher felt security compared to those in the neutral condition. However, contrary to hypotheses, those in the anxious and avoidant conditions did not report less felt security compared to those in the neutral condition, although the difference between the avoidant and neutral conditions was marginally significant in the expected direction. These findings suggest that the secure prime was more successful at inducing security than the anxious prime was at inducing a sense of attachment insecurity. These results make sense in light of previous findings suggesting that an anxious attachment style is associated with ambivalent views of others (Mikulincer, Shaver, Bar-On, & Ein-Dor, 2010). When participants are primed with an anxious relational schema, they are encouraged to think about a relationship that, whilst being negative in many respects, meets some of the individual's attachment needs, which may explain the higher than expected felt security scores for participants in the anxious condition.

My results suggest that participants' levels of attachment avoidance affected levels of felt security in either the secure or the neutral prime condition. I did not expect participants' levels of attachment avoidance to affect the felt security levels of those in the secure condition. However I did expect participants' levels of attachment avoidance to lead to differences in felt security for participants in the neutral condition (I expected participants with higher levels of attachment avoidance to report lower levels of felt security, compared to those low in attachment avoidance). Unfortunately, due to the PROCESS (Hayes, 2013a) error, I was unable

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to determine in which condition participants' levels of attachment avoidance affected their levels of post-prime felt security.

In addition, my results suggest that participants' levels of attachment avoidance affected participants' levels of felt security in either the anxious or neutral prime condition. I did not expect participants' dispositional levels of attachment avoidance to affect the felt security of those in the anxious prime condition. However, I did predict that participants' levels of attachment avoidance would affect their felt security in the neutral condition (with participants with higher dispositional attachment avoidance reporting lower levels of felt security compared to those low in attachment avoidance). Unfortunately, due to the PROCESS (Hayes, 2013a) error described above, I was unable to determine in which condition out of the two attachment avoidance affected participants' levels of felt security. A replication of this research with a larger sample is necessary in order to test my hypotheses relating to attachment avoidance.

My results suggest that attachment anxiety did not affect levels of felt security in the secure or the neutral prime conditions. I did not expect participants' levels of attachment anxiety to alter the effectiveness of the secure prime on felt security. This hypothesis was supported. These results suggest that the secure prime had an equal effect on felt security, regardless of participants' dispositional levels of attachment anxiety. However, I did expect participants' levels of attachment anxiety to lead to differences in felt security for participants in the neutral prime condition. This hypothesis was not supported. However, this experiment had a relatively small sample size and so it is possible that I did not obtain enough statistical power to detect significant interactions.

Consistent with hypotheses, participants in the secure condition reported less depressed mood than those in the anxious condition. These findings indicate that there is a causal relationship between attachment anxiety and depression. In addition, these findings are promising in that they suggest that attachment security priming is likely to reduce levels of depression. No differences were found between the depressed mood reported post-prime by those in secure and avoidant conditions, although the difference were approaching significance. These findings are consistent with previous correlational findings reporting a relationship between attachment anxiety and depression, but not between attachment avoidance and depression (e.g., Besser & Priel, 2005; Wei et al., 2005). In contrast to hypotheses, participants in the

anxious condition did not report more depressed mood than those in the avoidant condition. Taken together with the marginally significant difference in depressed mood between the secure and avoidant conditions, these findings suggest the possibility of a causal relationship between attachment avoidance and depression. The slightly under-powered sample size in this experiment may account for the lack of significant differences between the secure and avoidant conditions in depressed mood. In line with hypotheses, participants in the anxious prime condition reported more depressed mood post-prime, compared to those in the neutral prime condition. The difference in depressed mood between the avoidant and neutral conditions was marginally significant, with participants in the avoidant condition reported higher depressed mood.

In support of hypotheses, participants in the secure condition reported less anxious mood post-prime compared to participants in the anxious and avoidant conditions. This finding is encouraging as it suggests that security priming is likely to reduce the symptoms of anxiety. Moreover, these findings suggest a causal relationship between attachment anxiety and anxiety and between attachment avoidance and anxiety. This finding is consistent with previous research demonstrating a link between both dimensions of attachment insecurity and anxiety symptoms (e.g., Eng et al., 2004) and is inconsistent with research only showing a relationship between attachment anxiety and anxiety and not avoidance (e.g., Doron et al., 2012). Contrary to hypotheses, there were no differences in anxious mood between the anxious and avoidant conditions. In line with predictions, participants in the anxious and avoidant conditions reported more anxious mood in comparison to the neutral condition.

In support of hypotheses, baseline depression or baseline anxiety did not interact with the attachment style primes on depressed mood or anxious mood, respectively. It seems that the attachment style primes temporarily supersede the effects of a person's baseline depression and anxiety levels. This is promising and suggests that security priming interventions may be effective at reducing depression and anxiety. Future research should explore whether repeated security priming can lead to longer-lasting changes in a person's depression or anxiety symptoms. Interestingly and in contrast to hypotheses, neither baseline depression nor baseline anxiety interacted with the neutral primes on depressed or anxious mood. Perhaps

the neutral prime temporarily distracted participants from any depression or anxiety they were experiencing at baseline.

Participants in the secure prime condition did not differ from the neutral prime in depressed or anxious mood post-prime. However, participants in the anxious prime condition reported higher depressed and anxious mood post-prime, compared to those in the neutral condition. Furthermore, participants in the avoidant prime condition reported marginally higher levels of depressed mood and higher levels of anxious mood compared to those in the neutral condition. These findings might imply that it is possible to increase depression and anxiety by priming attachment insecurity (which for ethical reasons researchers would not wish to do) but that it is not possible to decrease depression or anxiety by priming attachment security.

Nonetheless, my finding that no differences were observed in the depressed or anxious mood reported by participants in the neutral and secure prime conditions is inconsistent with previous research documenting the energising (Luke et al., 2012) and positive affect inducing (Mikulincer et al., 2001) effect of secure primes comparative to neutral primes. It might be that the use of an alternative neutral prime would produce different results to the ones obtained in this experiment. The linguistic analyses reported above demonstrate that participants in the secure and neutral conditions used similar amounts of reference to family and friends. Perhaps neutral visualisation tasks that were less likely to involve a person's attachment figures (e.g., doing laundry) might have produced different results between the secure and neutral conditions in depressed and anxious mood. Furthermore, it is possible that due to the slightly low sample size, I lacked the statistical power necessary to detect differences between the neutral and secure conditions. Future research is necessary with larger samples to explore whether there are differences in the post-prime reports of depressed and anxious mood of participants primed with secure attachment or neutral stimuli.

The linguistic analyses indicate that the secure prime induced high levels of both positive and negative emotions in participants, compared to the neutral condition which evoked lower levels of both positive and negative emotions. It is possible that participants choose to write about relational figures who were no longer in their lives (e.g., ex romantic partners) or those who they might miss due to seeing them infrequently. Given that these students are undergraduates, it is likely that

many have moved away from their family home and their long term friends relatively recently and if these types of relational figures were focused on during the secure prime task, the task may have evoked negative emotions such as homesickness. These limitations may help to explain why no significant differences in depressed or anxious mood were observed between the secure and neutral prime conditions. Future security priming studies should control for the quality of the relational figure selected (e.g., by asking participants to list their closest others, characterise them by attachment style and indicate the frequency of their contact with that person).

However, the finding that participants in the secure prime condition used more positive emotions words and more negative emotion words than those in the neutral condition may not be as unexpected as it initially appears. Zayas and Shoda (2011) provide evidence that suggests that mental representations of attachment figures simultaneously trigger both positive and negative automatic reactions. Participants in an experimental condition were primed with the names of significant others that they liked or disliked and those in a control condition were primed with the names of significant objects that they liked or disliked. The extent to which the different primes facilitated the processing of positively or negatively valenced target words was assessed. The results showed that the object primes had a univalent priming effect; liked object primes facilitated the classification of positively valenced targets (and inhibited the classification of negative targets) and disliked object primes facilitated the classification of negative targets (and inhibited the classification of positive targets). By contrast, the significant other primes had a bivalent-priming effect; these primes facilitated the classification of both positive and negative targets, suggesting that the simultaneous facilitation of both positive and negative evaluations in response to significant other stimuli may be a normative response. Furthermore, participants were not consciously aware of possessing both positive and negative responses to a significant other. Participants were asked to select significant others that were most liked in this experiment, yet these close others still triggered both positive and negative automatic reactions (Zayas & Shoda, 2011). Therefore, my finding that the secure prime triggered both positive and negative emotions may be an expected, even normative reaction by participants in the secure prime condition.

Nonetheless, one major limitation of the experiment was that I did not have a means of ensuring that participants in the secure condition were visualising and writing about relational figures who met the criteria of a secure attachment figure (e.g., a relational figure participants felt comfortable depending on and being close to). However, I did have a manipulation check in the form of the felt security scale, which suggested that the secure prime successfully induced felt security. In addition, I did not control for whether the attachment figures selected by those in the secure condition were individuals with whom the participants were currently in contract with.

In addition, I considered whether the sample in this experiment were low in depression or anxiety to begin with, which could have explained why differences were not found between the neutral and secure conditions in depressed and anxious mood. I compared the baseline depression and anxiety scores observed in this experiment with the ones obtained in the standardisation sample obtained by Nyenhuis, Yamamoto, Luchetta, Terrien, and Parmentier (1999). The baseline depression mean in our study (see Table 1) was lower than the mean baseline depression score (13.0) observed in the college sample in Yamamoto et al.'s study. However the baseline anxiety mean in this experiment (see Table 1) was similar to the baseline anxiety mean (10.8) observed in Yamomoto et al.'s study. Furthermore, the baseline depression and anxiety means observed in this experiment were higher than the community sample means for baseline depression (7.0) and baseline anxiety (7.1) in the Nyenhuis et al. (1999) study. Baseline depression and anxiety thus did not appear to be particularly low in this sample and it therefore seems unlikely that low levels of baseline depression and anxiety could account for the similar depressed and anxious mood scores in the neutral and secure prime conditions.

Conclusion

Overall, the results of attachment security priming on depressed and anxious mood in this experiment were encouraging; participants in the secure prime condition reported less depressed mood than those in the anxious prime condition, consistent with predictions. Furthermore, participants in the secure prime condition reported less anxious mood compared to those in the anxious and avoidant conditions. Moreover, the results suggest a causal relationship between attachment anxiety and depression and a causal relationship between both dimensions of attachment insecurity and anxiety. Future research should explore the effects of

repeated attachment security priming on levels of depression and anxiety in both non-clinical and clinical samples. It is possible that over longer periods of time, attachment security priming could be used as part of the treatment of clinical depression and anxiety.

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Table 1

Study 1: Descriptive statistics and Correlations between all variables.

	Mean	SD	ANX	AVO	BD	BA	DM	AM	FS
ANX	3.97	1.00	-	.15	.40*	.44*	.13*	.05	.12
AVO	3.04	1.05		-	.35*	.33*	.30*	.33*	-.02
BD	11.17	9.73			-	.80*	.41*	.26*	.11
BA	10.66	7.78				-	.40*	.32	.10
DM	7.32	7.95					-	.73*	.25*
AM	6.00	4.50						-	.32*
FS	3.31	1.38							-

Note. N = 144. *$p <$. 001. ANX = Attachment anxiety. AVO = Attachment avoidance. BD = Baseline Depression. BA = Baseline Anxiety. DM = Depressed Mood. AM = Anxious Mood. FS = Felt Security. The mean figures in this table were calculated using the original, untransformed data.

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Table 2

Study 1: Hierarchical Regression Analyses Predicting Felt Security.

		Felt Security		
Step 1		*B*	*SE B*	B
	Secure	1.74**	.17	.56
	Avoidant	-.58*	.25	-.18
	Anxious	-.18	.25	-.06
	ANX	.12	.09	.09
	AVOID	-.06	.09	-.05
Step 2	Secure*ANX	-.26	.23	-.10
	Anxious*ANX	.26	.27	.08
	Avoidant*ANX	-.16	.25	-.05
	Secure*AVOID	-.63*	.25	-.26
	Anxious*AVOID	-.59*	.26	-.23
	Avoidant*AVOID	-.09	.26	-.04

Notes. $N = 144$. * $p < .05$ ** $p < .001$. *B* Unstandardised B values, *SE* Standard Error, β Standardised beta values. Secure = Secure dummy variable. Anxious = Anxious dummy variable. Avoidant = Avoidant dummy variable. ANX = Attachment anxiety. AVOID = Attachment avoidance.

Table 3

Study 1: Hierarchical Regression Analyses Predicting Depressed Mood.

		Depressed Mood		
Step 1		*B*	*SE B*	B
	Secure	-.33	2.33	-.02
	Avoidant	3.74*	1.50	.20
	Anxious	7.55***	1.54	.41
	BLANX	.18	.14	.15
	BLDEP	.19*	.09	.24
	AVOID	1.08	.57	.15
Step 2	Secure*BLDEP	.12	.17	.07
	Anxious*BLDEP	-.07	.17	-.04
	Avoidant*BLDEP	.25	.16	.17

Notes. $N = 144$. * $p < .05$ ** $p < .001$. *B* Unstandardised B values, *SE* Standard Error, β Standardised beta values. Secure = Secure dummy variable. Anxious = Anxious dummy variable. Avoidant = Avoidant dummy variable. BLANX = Baseline Anxiety. BLDEP = Baseline depression. AVOID = Attachment avoidance.

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Table 4

Study 1: Hierarchical Regression Analyses Predicting Anxious Mood.

		Anxious Mood		
Step 1		*B*	*SE B*	B
	Secure	-1.01	.87	-.10
	Avoidant	2.95***	.91	.28
	Anxious	3.46***	.89	.33
	BLANX	.18*	.08	.27
	BLDEP	-.02	.06	-.04
	AVOID	1.01**	.32	.23
Step 2	Secure*BLANX	.16	.13	.12
	Anxious*BLANX	-.02	.14	-.01
	Avoidant*BLANX	.10	.13	.07

Notes. $N = 144$. * $p < .05$ ** $p < .01$. *** $p < .001$. *B* Unstandardised B values, *SE* Standard Error, β Standardised beta values. Secure = Secure dummy variable. Anxious = Anxious dummy variable. Avoidant = Avoidant dummy variable. BLANX = Baseline Anxiety. BLDEP = Baseline depression. AVOID = Attachment avoidance.
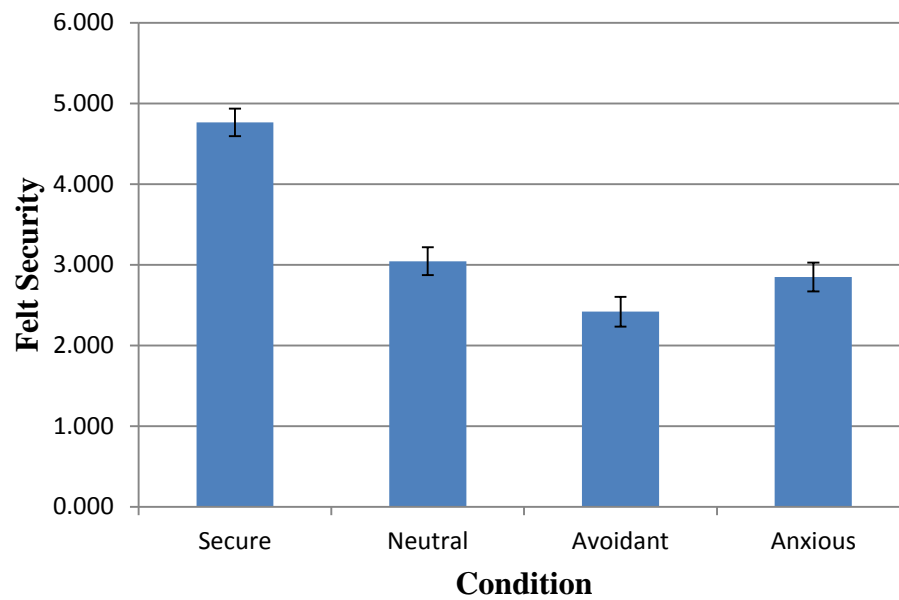
Figure 3. Estimated marginal means for felt security in each experimental condition in Study 1.
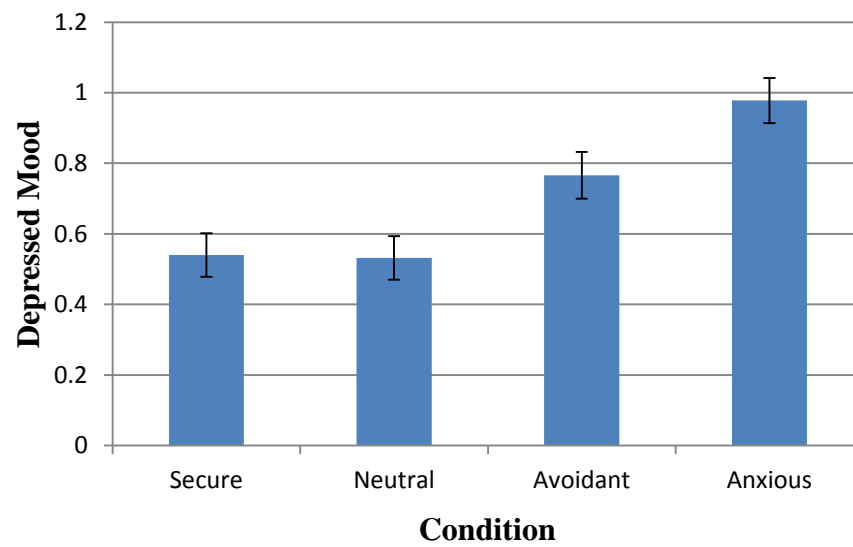
Figure 4. Estimated marginal means for depressed mood in each experimental condition in Study 1.
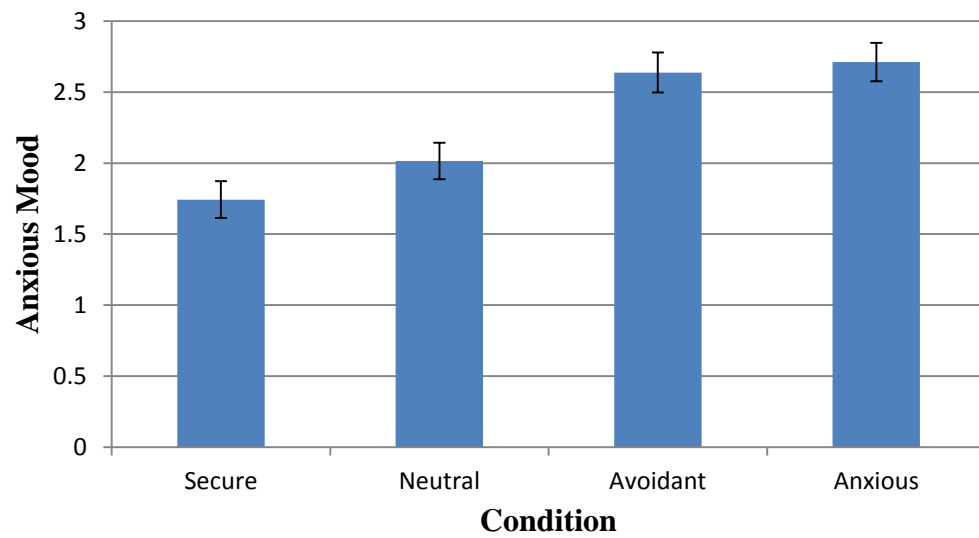
Figure 5. Estimated marginal means for anxious mood in each experimental condition in Study 1.

3. CHAPTER THREE

Texting "Boosts" Felt Security: Exploring the effects of Text Message Primes on Felt Security and Depressed and Anxious Mood

"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, et al., 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.

The Benefits of Attachment Security

Adult attachment can be conceptualised along two orthogonal dimensions; avoidance of intimacy and anxiety regarding abandonment. 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 et al., 1994; Mickelson, Kessler, & Shaver, 1997).

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 et al., 2008). Security priming research was originally conducted in the laboratory (e.g., Baldwin et al., 1996; Rowe & Carnelley 2003). However, more recently, some researchers have

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collected security priming data from online community samples (e.g., Luke et al., 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 a security recall more positive attachment words, lower endorsement of negative interpersonal expectations and show more positive interpersonal expectations than those primed with insecure attachment styles (Rowe & Carnelley, 2003). Primed security has 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 priming with either a secure or neutral prime, two days later, 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. 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 findings from Study 1 showed that participants primed with attachment security reported less post-prime anxious mood, compared to participants primed with attachment anxiety and avoidance. In addition, participants primed with attachment security reported less post-prime depressed mood compared to

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participants primed with attachment anxiety. These findings suggest a causal relationship between attachment insecurity and depressed and anxious mood and thus indicate that security priming could be useful in reducing depression and anxiety. However, in order to develop a security-priming intervention, experiments are necessary to establish whether security priming has an effect on depressed and anxious mood compared to neutral (control) primes, in both non-clinical and clinical samples.

Attachment Patterns and Anxiety and Depression

Research from a number of non-clinical samples suggests that both attachment anxiety and attachment avoidance are linked with depressive symptoms (e.g., Davila, 2001; Whiffen et al., 2001; Williams & Riskind, 2004). However, some research from non-clinical samples suggests that attachment anxiety is associated with depressive symptoms, but attachment avoidance is not (e.g., Besser & Priel, 2005; Shaver et al., 2005). Research from clinical samples suggests that both high attachment anxiety and high attachment avoidance are related to depression symptoms (e.g., Carnelley et al., 1994; Reinecke & Rogers, 2001; Reis & Greyner, 2004).

Many correlational studies from non-clinical samples show that both attachment avoidance and attachment anxiety are positively associated with anxiety (e.g., Doi & Thelan, 1993; Hankin et al., 2005; Irons & Gilbert). However, some research from non-clinical samples has found a positive relationship between attachment anxiety and anxiety symptoms but no link between attachment avoidance and anxiety symptoms (e.g., Strodl & Noller, 2003; Sonnby-Borgstrom & Jonsson, 2004). In addition, evidence from clinical samples suggests that social anxiety disorder is associated with both attachment dimensions (Eng et al., 2001) and adolescents with a diagnosed anxiety disorder are more likely to be categorised as insecure in attachment, compared to adolescents without anxiety disorders (Brumario et al., 2013). Moreover, evidence suggests that OCD is associated with high levels of attachment anxiety but not attachment avoidance (Doron et al., 2012).

Taken together, these findings suggest that attachment insecurity in general is associated with depression and anxiety. However, there does appear to be more consistent evidence for a link between attachment anxiety and anxiety and depression symptoms than for attachment avoidance and anxiety and depression symptoms (see Chapter 1 and Mikulincer & Shaver, 2007a, for a more

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comprehensive review of the literature relating to attachment patterns and depression and anxiety).

The Present Research

My first aim in this study was to explore the effectiveness of repeated security priming via text messages, an innovative method. My second aim in this study was to explore whether repeated security priming via text message leads to differences in depressed and anxious mood reported by participants in a secure and control condition. Motivated by the efficacy of the repeated security priming manipulation developed by Carnelley and Rowe (2007), and the clinical implications of increasing attachment security for reducing anxiety and depression, my aim was to improve and extend current repeated security priming methodology. In past repeated security-priming experiments, participants the laboratory on a number of occasions (e.g., Carnelley & Rowe, 2007), which was time-consuming and not especially convenient for participants. 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. My aim was to develop and test the effectiveness of a flexible and location-independent method of delivering security primes, through 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; participants could receive text messages virtually anywhere.

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 et al., 2011, for a review), such as smoking cessation (Free et al., 2011) and motivation to reduce cannabis abuse (Laursen, 2010). Recently, the effectiveness of a supportive text messaging intervention was tested in patients with major depression and comorbid alcohol use disorder. Participants in the intervention group received text messages twice daily for 3 months, aimed to help them cope with stress, maintain good mental well-being, abstain from alcohol, take their medication correctly and provide general support (See Chapter 1 for further details of the text message content in this research). Participants in the control group received messages once every two weeks (for 3

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months) thanking them for taking part in the study. Participants in the intervention group reported lower depression at the end of the trial, compared to participants in the control group, after controlling for baseline depression (Agyapong et al., 2012). On the basis of this evidence, I propose that text messaging is a suitable medium for repeated security priming.

Hypotheses

My 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. I 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 and lower levels of depressed and anxious mood 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 ($M = 22.43$). Thirty-six of the participants reported that they were Caucasian, 5 reported they were Asian, 2 reported they were Mixed Race, 5 reported that they were Indian and 2 participants reported that they were African.

In order to detect a small effect, in an ANOVA analysis with 2 groups ($f = .25$), where all significance tests are performed at $p = .05$, a sample size of 786 is necessary (Cohen, 1992). In order to detect a medium effect, a sample size of 128 is necessary and to detect a large effect, a sample size of 52 is necessary (Cohen, 1992). The sample size in the experiment was 50 participants, meaning that it is likely that I had enough power to detect a large effect, but not a small or medium effect.

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 questions, followed by measures of depressed and anxious mood. 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. Twenty-four 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. Finally, 24 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 measures of felt security, depressed mood and anxious mood.

Materials

The secure laboratory prime was identical to the one used in Study 1 (adapted from Bartz & Lydon, 2004). The neutral prime used in this experiment was identical to the one used by Carnelley and Rowe (2003) and in Study 1 (see Chapter 2), which was adapted from Mikulincer & Shaver, (2001). Please refer to the method section in Chapter 2 for the secure and neutral laboratory primes.

The text primes (see Appendix A) 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, et al. (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 $\alpha = .97$, Time 4 $\alpha = .98$, Time 5 $\alpha = .99$.

Depressed mood. Depressed mood was measured using the depression-dejection items from the POMS (McNair et al., 1992). At Time 1, Time 4 and Time 5, participants were asked to rate each item based on how they were feeling "right now". Alpha reliabilities were high: Time 1 $\alpha = .88$, Time 4 $\alpha = .93$, Time 5 $\alpha = .95$.

Anxious mood. Anxious mood was measured using the tension-anxiety items from the POMS (McNair et al., 1992). At Time 1, Time 4 and Time 5,

participants were asked to rate each item based on how they were feeling "right now". Alpha reliabilities were high: Time 1 α = .80, Time 4 α = .87, Time 5 α = .87.

Results

Preliminary Analyses

See Table 5 for the means and standard deviations for each variable and for correlations between all variables. There were 6 missing values altogether on the Time 4 and Time 5 felt security variables. Little's (1988) Missing Completely At Random (MCAR) test indicated that the missing data were MCAR, $\chi^2(4, N = 50)$ = 5.25, p = .26. There were 8 missing values altogether on the Time 1, Time 4 and Time 5 depressed mood variables. Little's test indicated that the data were MCAR , $\chi^2(4, N = 50)$ = 1.25, p = .87. There were 5 missing values altogether on the Time 4 and Time 5 anxious mood variables. Little's test indicated that the missing data were MCAR $\chi^2(4, N = 50)$ = .29, p = .99. Missing data were dealt with using Expectation-Maximization in SPSS.

One univariate outlier (with a z-score greater than 3.29) was found on the Time 1 depressed mood variable and 1 on the Time 4 depressed mood variable. One outlier was found on the Time 5 anxious mood variable. No outliers were found on any other variables. Outliers were replaced with the mean plus two standard deviations for the variable to which they belonged, as recommended by Field (2005).

The Kolmogorov-Smirnov (K-S) test indicated that felt security was normally distributed at each time-point, in both the secure and neutral conditions. The K-S test indicated that the depressed data from Time 1, $D(25)$ = .27, p < .001, and Time 4, $D(25)$ = .29, p < .001, were significantly non-normal in the neutral condition. The Time 5 depressed mood data was significantly non-normal in the secure, $D(25)$ = .25, p < .001, and neutral, $D(25)$ = .18, p < .05, conditions. The anxious mood data from Time 1, $D(25)$ = .26, p < .001, Time 4, $D(25)$ = .21, p < .01, and Time 5, $D(25)$ = .18, p < .05, were non-normal in the neutral condition. The Time 5 anxious mood data were non-normal in the secure condition, $D(25)$ = .20, p < .05. Square root transformation rectified the problems with the non-normal data across all depressed and anxious mood variables across both conditions, except for the Time 1 anxious mood variable for the neutral condition, $D(25)$ = .19, p < .05. However, the transformation did improve the normality of distribution for this

variable. All subsequent reported analyses use the transformed depressed and anxious mood variables.

Felt Security Results

I conducted a mixed-design ANOVA, with time as the within-subjects factor and condition as the between-subjects factor with felt security as the dependent variable (See Figure 6 for means). The effect of prime condition was significant, $F(1,48) = 31.61$, $p < .001$. Those in the secure condition ($M = 4.55$, $SE = .20$) reported significantly more felt security overall, compared to those in the neutral condition ($M = 2.93$, $SE = .20$). Using ηp^2 (partial eta squared) to measure the effect size, I 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, $\chi^2(2) = 20.98$, $p < .001$, therefore degrees of freedom were corrected using the Greenhouse-Geisser estimates of sphericity ($\varepsilon = .64$). The effect of time on felt security was significant, $F(1.47, 70.58) = 4.55$, $p < .05$. Pairwise comparisons (with a Bonferroni correction) revealed that Time 1 ($M = 3.87$, $SE = .16$) and Time 4 ($M = 3.84$, $SE = .16$), $p = 1.00$, and Time 1 and Time 5 ($M = 3.52$, $SE = .17$), $p = .08$, 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, $F(1.47, 70.58) = .68$, $p = .47$.

Depressed Mood Results

I conducted a mixed-design ANOVA, with time as the within-subjects factor and condition as the between-subjects factor with depressed mood as the dependent variable (see Figure 7 for means). The effect of prime condition was significant, $F(1,48) = 5.40$, $p < .05$. Those in the secure ($M = 2.37$, $SE = .22$) condition reported significantly more depressed mood compared to those in the neutral ($M = 1.64$, $SE = .25$) condition, counter to predictions. The effect of time on depressed mood was not significant, $F(2, 96) = .43$, $p = .65$. The interaction between condition and time on depressed mood was marginally significant, $F(2, 96) = 2.42$, $p = .06$. Simple effects tests revealed that there was a significant difference in depressed mood reported by participants in the secure and neutral conditions at Time 1, $F(1,48) = 10.42$, $p < .01$, and at Time 4, $F(1, 48) = 4.51$, $p < .05$. However, significant

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differences were not observed between the experimental conditions at Time 5, $F(1, 48) = .38$, $p = .54$.

Anxious Mood Results

I conducted a mixed-design ANOVA, with time as the within-subjects factor and condition as the between-subjects factor with anxious mood as the dependent variable (see Figure 8 for means). Inconsistent with predictions, the effect of prime condition was not significant, $F(1,48) = 1.70$, $p = .20$. There was no difference in anxious mood between the secure ($M = 2.28$, $SE = .17$) and neutral ($M = 1.98$, $SE = .17$) conditions. The effect of time on anxious mood was not significant, $F(2, 96) = .09$, $p = .91$. The interaction between condition and time on anxious mood was not significant, $F(2, 96) = 1.38$, $p = .26$.

Linguistic Analyses

I decided to further explore the text participants had typed during the Time 1 priming session, with an aim to further understand why the secure and neutral primes produced unexpected results on depressed and anxious mood. Using LIWC (Pennebaker et al., 2007), I explored word count differences between the secure and neutral conditions in negative emotions. Participants in the secure ($M = 1.62$, $SE = .28$) condition used significantly more negative emotion words, compared to those in the neutral ($M = .39$, $SE = .42$) condition, $t(48) = 17.65$, $p < .001$. In addition, participants in the secure ($M = 7.75$, $SE = .77$) condition used significantly more positive emotion words, compared to those in the neutral ($M = 1.78$, $SE = .19$) condition, $t(48) = 56.91$, $p < .001$. Participants in the neutral condition used more positive emotion words than negative emotion words, $t(24) = 7.64$, $p < .001$. Finally, participants in the secure prime condition used significantly more positive emotion words, than negative emotion words, $t(24) = 7.15$, $p < .001$. The implications of these findings will be discussed in the next section.

Discussion

These results suggest that security priming (in comparison to the neutral condition) increased participants' felt security immediately after the laboratory prime, consistent with my hypotheses and with past research findings (e.g., Luke et al., 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 my hypotheses. Time did not moderate the effects of prime on felt security. 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, contrary to my predictions. However, it seems logical that felt security might decrease once participants were no longer completing the secure primes. Nonetheless, participants in the secure prime condition were still reporting significantly higher felt security compared to participants in the neutral condition, even 24 hours after the last text prime. These results are promising and indicate that text messages are a suitable medium for attachment security priming.

Moreover, these findings have important implications for the development of interventions for vulnerable adults with chronic insecure attachment pattern. My results demonstrate 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 in clinical samples.

Participants in the secure condition reported more depressed mood than participants in the neutral condition, in contrast to my hypotheses. One possible explanation for these findings is that the relational figures participants were focusing on in the secure prime condition were not necessarily relational figures that the participants were currently in contact with. I noticed when reading through participants' writing during the task that some participants wrote about people who they had not seen for a long time or were not likely to see again in the near future, if ever. It is possible that in this experiment, writing about attachment figures that were no longer in the participants' lives (i.e., ex-romantic partners or those they are separated from by distance) automatically evoked mixed emotions in participants (e.g., positive memories but also some negative emotions regarding no longer seeing that person), evidenced by the high levels of negative emotions and positive emotion words used by participants in the secure laboratory prime task, compared to participants in the neutral condition.

However, as discussed in Chapter 1, it is more likely that these results are indicative of a normative response in participants to the secure attachment figure stimuli. Previous research findings suggest that attachment figure priming evokes both positive and negative automatic reactions in participants, even when they are

only consciously aware of feeling positively towards a significant other (Zayas & Shoda, 2011).

The difference in depressed mood between the secure and neutral conditions decreased over time, although this effect was only marginal in significance. This may have been because the secure text primes did not prompt negative emotions in the way that the secure laboratory prime did. During the secure laboratory priming session, participants were encouraged to think about whatever came to mind regarding their secure attachment figure whereas during the secure text primes, participants were asked to focus on specific security-inducing experiences with that person (i.e., a time when they felt loved). Perhaps during these shorter, more specific text prime tasks, participants were more focused on the specific, security-inducing memory and were therefore less likely to dwell on the negatives of that relationship (e.g., missing that person) during the shorter text prime tasks.

No significant differences in anxious mood were observed between the secure and neutral conditions, contrary to hypotheses. The main limitation of the experiment was that I did not have a means of ensuring that participants in the secure condition were visualising and writing about relational figures who met the criteria of a secure attachment figure (e.g., a significant other that participants felt comfortable depending on and being close to). In addition, I did not control for whether the attachment figures selected by those in the secure condition were individuals with whom the participants were currently in contract with. In Study 3 (see Chapter 4) I controlled for the quality of the relational figure selected by participants in the secure condition (by asking participants to list their closest others, classify the type of attachment style they feel they have with that person and indicate the frequency of their contact with that person). This way, I could ensure that participants were focusing on secure attachment figures that they had current relationships with and who they contacted fairly regularly. This may be especially important when collecting data from undergraduate samples; many undergraduate participants are likely to have moved away from their family home and friends in recent years and may therefore select attachment figures that they currently miss and are sad to be separated from.

A further limitation of this research is that I did not take into account participants' baseline levels of attachment anxiety and avoidance, which may have influenced my 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). In addition, I did not control for participants baseline levels of depression or anxiety, which may have influenced the results obtained. Future research should measure participants' baseline levels of depression and anxiety before the laboratory primes in the lab, to ensure that initial levels of anxiety and depression are not influencing the effects of the primes on depressed or anxious mood.

Another possible limitation is the lack of supervision of participants whilst they were completing the text prime tasks. I did not assess 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 a reply after they had completed the text primes, I hoped to have increased participant compliance to instructions. My results suggest that participants were focused on the tasks. Finally, this study was lacking in statistical power due to the small sample size, which may affect the generalizability of the results.

Conclusion

Security priming did not have the positive effect on depressed and anxious mood that I expected in this study. However, I have identified potential limitations in this experiment that may account for this. Taking steps to ensure that participants in the secure prime condition are focusing on secure attachment figures and that the attachment figures are people that participants are in contact with on a regular basis was a priority in the next experiment. I also recruited a larger sample of participants and included measures of (baseline) attachment dimensions, depression and anxiety.

Moreover, the felt security findings from this experiment are promising and demonstrate that text messaging is an effective, practical and low-cost method of delivering security primes. 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.

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Future work might also 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. This experiment is a starting point for further research into the exciting and promising domain of security priming via text messaging.

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Table 5

Study 2: Descriptive statistics and Correlations between all variables.

	Mean	SD	F1	F4	F5	D1	D4	D5	A1	A4	A5
F1	3.87	1.42	-	.75**	.73**	-.06	-.04	-.19	-.09	.09	-.20
F4	3.84	1.31		-	.92**	-.03	-.17	-.24	-.07	.01	-.20
F5	3.53	1.45			-	-.06	-.15	-.28*	-.12	-.04	-.17
D1	5.29	5.35				-	.68**	.42**	.50**	.27	.21
D4	6.46	7.09					-	.56**	.47**	.64**	.50**
D5	5.98	6.21						-	.31*	.27	.68**
A1	5.26	4.41							-	.50**	.39**
A4	6.04	5.61								-	.46**
A5	5.62	4.58									-

Notes. $N = 50$. * $p < .05$ ** $p < .01$. F1 = Time 1 Felt Security. F4 = Time 4 Felt Security. F5 = Time 5 Felt Security. D1 = Time 1 Depressed Mood. D4 = Time 4 Depressed Mood. D5 = Time 5 Depressed Mood. A1 = Time 1 Anxious Mood. A4 = Time 4 Anxious Mood. A5 = Time 5 Anxious Mood. The mean figures in this table were calculated using the original, untransformed data.
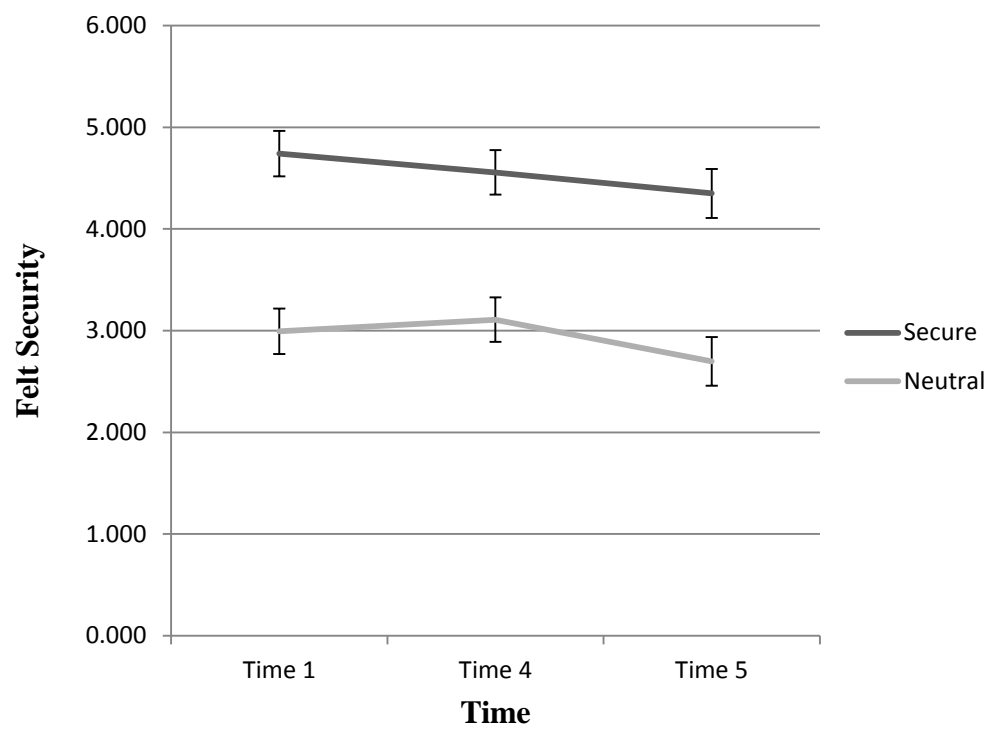
Figure 6. Means for felt security in each of the prime conditions in Study 2.
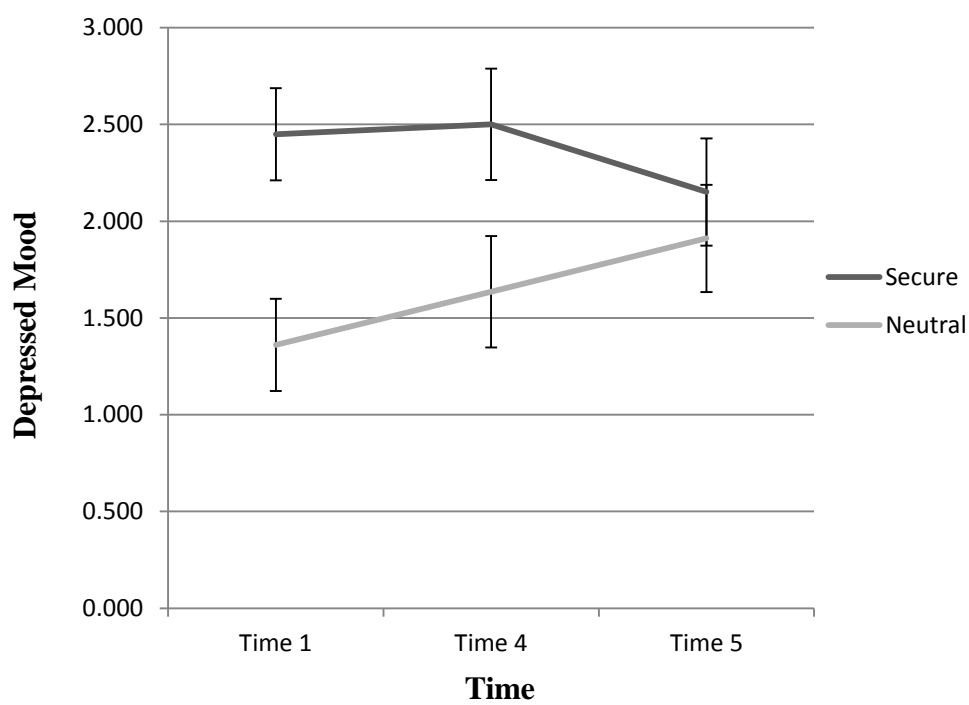
Figure 7. Means for depressed mood in each of the prime conditions in Study 2.
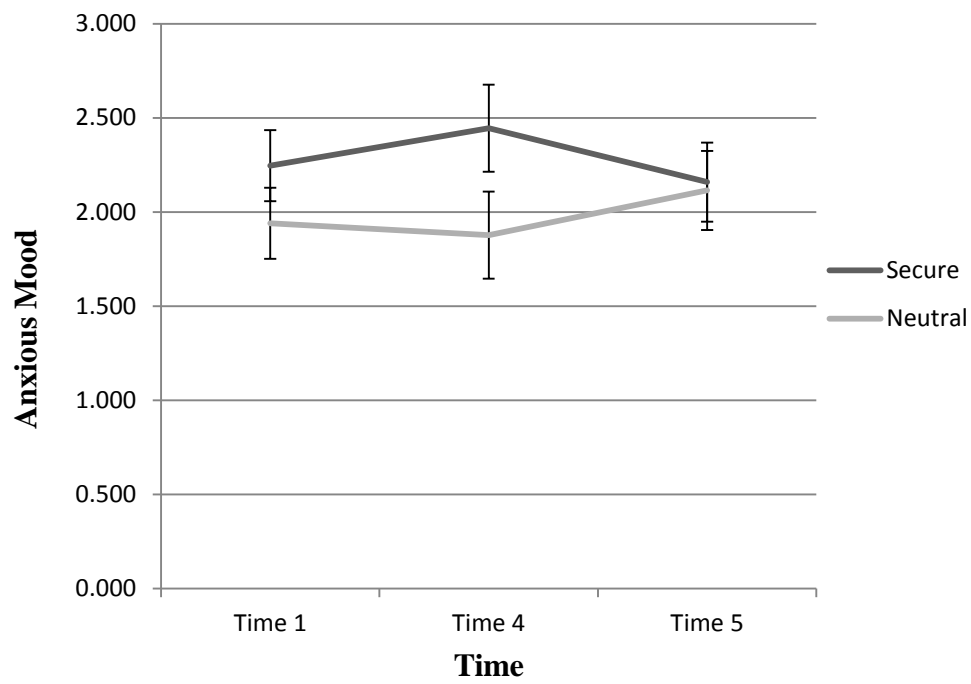
Figure 8. Means for anxious mood in each of the prime conditions in Study 2.

4. CHAPTER FOUR

Exploring the Effects of Text Message Primes on Felt Security and Depressed and Anxious Mood: A Replication of Study 2

Evidence suggests that when participants are repeatedly primed with security in the laboratory, the beneficial effects can be relatively long-lasting (e.g., Carnelley & Rowe, 2007; Gillath & Shaver, 2007). These findings have important clinical implications, given that 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 et al., 1994; Mickelson et al., 1997). In Study 2 (see Chapter 3) I explored the effectiveness of repeated security priming via text message on felt security, depressed mood and anxious mood. The felt security results were promising and suggest that text messaging is an effective means of delivering security primes. While the felt security results were encouraging, security priming did not lead to less depressed or anxious mood comparative to a neutral condition, as I had predicted. A number of limitations were identified with Study 2 (see Discussion in Chapter 3) and the aim of the current experiment is to replicate Study 2 whilst simultaneously addressing many of the methodological limitations identified, in order to clarify what effect repeated security priming, using both lab and text message primes, has on depressed and anxious mood.

Findings and Limitations of Study 1 and Study 2

The findings from Study 1 showed that participants primed with attachment security reported less post-prime anxious mood, compared to participants primed with attachment anxiety and avoidance. Furthermore, participants primed with attachment security reported less post-prime depressed mood compared to participants primed with attachment anxiety. These findings suggest that a causal relationship between attachment insecurity and depressed and anxious mood and thus indicate that security priming could be useful in reducing depression and anxiety. However, in order to develop a security-priming intervention, experiments are necessary to establish whether security priming has an effect on depressed and anxious mood compared to neutral (control) primes, in both non-clinical and clinical samples. While Study 1 was useful for exploring causal relationships between attachment styles and depressed and anxious mood, differences were not observed between the secure and neutral conditions in post-prime depressed and anxious

mood, contrary to hypotheses. However, participants in the secure condition did report higher levels of felt security post-prime, compared to those in the neutral condition.

Both Study 1 and Study 2 shared the limitation that I did not control for the quality of the attachment figures participants chose to write about (e.g., whether these individuals were people who the participant would seek comfort or reassurance from). In addition, I did not control for the frequency of contact participants had with their attachment figures. Data collection for Study 1 and Study 2 was undertaken simultaneously, which unfortunately meant that I was unable to analyse the data from Study 1 and thus identify potential limitations of the research, before designing and commencing data collection for Study 2. In addition, Study 2 was limited by the lack of baseline measures of dispositional attachment anxiety and avoidance and baseline levels of anxiety and depression, as initial levels of these variables may have affected the results reported in Study 2.

Hypotheses

The aim of the current research was to replicate and extend the Study 2 experiment, by addressing the limitations described above by asking participants to complete baseline measures of attachment anxiety and avoidance, baseline depression and anxiety and asking them to complete information regarding their 10 closest relational figures (including family, friends and romantic partners) in order for the experimenter to select secure attachment figures that met the criteria of a secure attachment figure and with whom participants were currently in contact. I hypothesised that participants in the secure prime condition would report higher levels of felt security and lower levels of depressed and anxious mood, at all Time points in the study, compared to participants in the neutral condition. I predicted that felt security would decrease between the felt security level reported by participants immediately after their last secure text prime and the final felt security measure 24 hours later.

Method

Participants

The research was granted ethical approval by the Ethics Committee at the University of Southampton. Participants ($n = 81$, 70 female, 11 male) from a British university participated in the research in exchange for course credits. Participants ranged in age from 18 to 33 ($M = 20.32$); 65 of the participants reported themselves

as Caucasian, 6 as Asian, 3 as Indian, 3 as Mixed, 2 as African and 2 participants described themselves as Other Ethnicity. In order to detect a small effect, in an ANOVA analysis with 2 groups ($f = .25$), where all significance tests are performed at $p = .05$, a sample size of 786 is necessary (Cohen, 1992). In order to detect a medium effect, a sample size of 128 is necessary and to detect a large effect, a sample size of 52 is necessary (Cohen, 1992). The sample size in the experiment was 81 participants, meaning that it is likely that I had enough power to detect a large effect, but not a small or medium effect.

Procedure

Participants signed up to a study entitled "Memory and Imagination" online and were informed that the research aimed to look at people's ability to use their imagination and memory recall skills during and after visualisation tasks. Participants were informed that they would receive some of the tasks by text message. At an introductory session one week before the experiment, participants met with the experimenter and completed baseline measures of attachment anxiety and avoidance items, information about secure attachment figures, baseline depression and anxiety items and lastly some filler items (relating to creativity, to match the cover story for the experiment). Participants were also given an information sheet to take away with them (see Appendix B).

One week later, participants attended a session in the laboratory. Participants had been randomly allocated ahead of time to either a secure ($N = 43$) or neutral ($N = 38$) priming condition. During the Time 1 meeting, participants wrote for 10 minutes about either a security-inducing attachment figure (selected ahead of time by the experimenter and the name of which was provided to the participant on a folded piece of paper) or a supermarket shopping trip on a computer. Participants then completed measures of felt security, depressed and anxious mood and finally the filler items. 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, along with any words concerning their thoughts and feelings during 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. Twenty-four 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

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study immediately and were provided with a website address and password. Participants completed the felt security, depressed and anxious mood and filler items online. Finally, 24 hours later (Time 5), participants received a text instructing them to complete the online part of the study immediately and they completed the final measures of felt security, depressed and anxious mood and the filler items on creativity.

Materials

Attachment figure information. I used an adaptation of the materials and procedure developed by Carnelley and Rowe (2007) to obtain information about participants' attachment relationships and select secure attachment figures for participants in the secure condition (see Appendix C). At baseline, I asked participants to indicate the names of up to 10 of their ''closest significant others''. Next, I provided them with Bartholomew and Horowitz's (1991) single paragraph descriptions of four attachment categories (secure, preoccupied, dismissing, and fearful) and asked them to select which relationship description best described their feelings in each relationship; participants could indicate ''none of the above'' if none described the relationship. Participants rated from 1 (*not very representative*) to 5 (*very representative*) the extent to which the description chosen was representative of how they felt in that relationship. Participants indicated how frequently they had contact with each person listed and the length of time they had known each person. Secure attachment figures were selected out of those relationships which the participants had categorised as secure. If more than one relationship was listed as secure, I then selected attachment figures based on how representative the attachment figures were, followed by frequency of contact and the length of time known. All participants were able to list at least one secure attachment figure.

Attachment avoidance and anxiety. Attachment anxiety and avoidance were measured using the Experiences in Close Relationships Short form (ECR-S) developed by Wei, Russell, Mallinckrodt and Vogel (2007). The ECR-S consists of 12 items and evidence suggests that the scale retains psychometric properties similar to the original ECR (Wei et al., 2007). An example avoidance item is "I try to avoid getting too close to my partner". An example anxiety item is "My desire to be very close sometimes scares people away". Participants responded to each item using a 7-point Likert scale (1=*disagree strongly,* 7=*agree strongly*). In the current study,

scale reliability was good for attachment anxiety (α = .83) and attachment avoidance (α = .79). The scales were moderately correlated (r = .29, p < .01).

Baseline depression. Baseline depression was measured using the depression-dejection items from the POMS (McNair, et al., 1992). Participants used a 5-point Likert scale (0 = *Not at all*, 4 = *Extremely*) to rate the extent to which they are experiencing various mood states. Participants rated each item based on how they had been feeling over the last week, including the day they completed the questionnaire. Scale reliability for the baseline depression items was excellent (α = .94).

Baseline anxiety. Baseline anxiety was measured using the tension-anxiety items from the POMS (McNair et al., 1992). Participants used a 5-point Likert scale (0 = *Not at all*, 4 = *Extremely*) to rate the extent to which they are experiencing various mood states. Participants rated each item based on how they had been feeling over the last week, including the day they completed the questionnaire. Scale reliability for the baseline anxiety items was excellent (α = .90).

Filler items. Participants completed 13 filler items to fit in with the cover story for the experiment (memory and imagination). Participants used a 5-point Likert scale (0 = *Not at all*, 4 = *Extremely*) to rate each item based on how they had been feeling over the last week. Example items were "imaginative" and "artistic".

Primes. The security laboratory priming method used at Time 1 in this experiment is the same secure prime as I used in Study 1 and Study 2 (see Chapter 2 for a complete description). The neutral prime used in this experiment was identical to the one used by Carnelley and Rowe (2003), which was adapted from Mikulincer and Shaver (2001). See Chapter 2 for further information and a complete description of the laboratory primes. The text primes (see Appendix D) used in this experiment were developed by the researcher. 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". The text primes used in this experiment were almost identical to those used in Study 2 (see Appendix A) however in this experiment I changed the instructions slightly. Rather than just being instructed to send a response text with the content 'Done' once they had completed the text primes, in this experiment participants were asked to reply

'Done' along with any words or thought that came to mind during the task. This was to encourage participants to focus on the tasks and help them to avoid any temptation to send a 'Done' response without completing the task.

Post-Prime Measures

Felt security. Felt security was measured using the 16-item scale developed by Luke et al. (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 excellent: Time 1 α = .98, Time 4 α = .98, Time 5 α = .98.

Depressed mood. Depressed mood was measured using the depression-dejection items from the POMS (McNair et al., 1992). At Time 1, 4 and 5 participants were asked to rate each item based on how they were feeling "right now". Scale reliability for the depressed mood items was excellent: Time 1 α = .96, Time 4 α = .94, Time 5 α = .95.

Anxious mood. Anxious mood was measured using the tension-anxiety items from the POMS (McNair et al., 1992). At Time 1, 4 and 5 participants were asked to rate each item based on how they were feeling "right now". Scale reliability for the anxious mood items was excellent at Time 1 (α = .90), and good at Time 4 (α = .87) and Time 5 (α = .88).

Filler items. Participants completed the same filler items as at baseline but post-prime they were asked to rate items based on how they feel "right now".

Results

Preliminary Analyses

There were no missing values on the attachment anxiety and attachment avoidance variables. There were no missing values on the Time 1 felt security variable. However, there were 9 missing values on the Time 4 and 11 missing values on the Time 5 felt security variables. Little's (1988) MCAR test indicated that the data were not MCAR, $\chi^2(5, N = 81) = 11.44$, $p < .05$. There were no missing values on the baseline depression or time 1 depressed mood scales. However, there were 9 missing values on the time 4 depressed mood scale and 10 missing values on the Time 5 depressed mood scale. Little's MCAR test revealed the data were not MCAR, $\chi^2(8, N = 81) = 34.47$, $p < .001$. There were no missing values on the baseline

anxiety or Time 1 anxious mood scales. There were 9 missing values on the Time 4 anxious mood scale and 10 missing values on the Time 5 anxious mood scale. Little's MCAR test revealed the data were not MCAR, $\chi^2(8, N = 81) = 21.33, p < .01$. Missing data were dealt with using Expectation-Maximization in SPSS.

One univariate outlier (with a z-score greater than 3.29) was found on the baseline depression variable and one on the baseline anxiety variable. No outliers were found on the attachment anxiety or avoidance variables. No outliers were found on the felt security variables. One outlier was found on the Time 1 anxious mood variable, but none on the Time 4 or Time 5 anxious mood variables. Two outliers were found on the Time 1 depressed mood variable. One outlier was found on the Time 4 depressed mood variable. Three outliers were found on the Time 5 depressed mood scale. Outliers were replaced with the mean plus two standard deviations for the variable to which they belonged, as recommended by Field (2005).

Felt Security: Preliminary Analyses

Attachment avoidance was significantly correlated with post-prime felt security at Time 1 and Time 4 (see Table 6) and was thus a potential covariate variable for an ANCOVA analysis, where felt security was the DV, provided that when this variable was included, the assumptions for ANCOVA (as described by Field, 2005) are met. None of the other potential covariates (attachment anxiety, baseline depression and baseline anxiety) were significantly correlated with felt security and were thus not considered as potential covariates for this analysis (see Table 6).

One of the assumptions of ANCOVA is that the covariate variables must be independent from the experimental effect (e.g., Field, 2005). Attachment avoidance did not differ significantly between the prime conditions, $F(1, 79) = 2.90, p = .09$ and thus met this assumption. The ANCOVA assumption of homogeneity of regression slopes was tested next. I customised the ANCOVA model in SPSS in order to explore the assumption of homogeneity of the regression slopes. Felt security at each time point was the within-subjects variable. Condition and attachment avoidance were entered as between-subjects variables, as was the interaction term consisting of condition and attachment avoidance. The interaction between attachment avoidance and condition on felt security was not significant, $F(1, 77) = .25, p = .62$, indicating that the assumption of homogeneity of regression

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slopes was met for attachment avoidance. Based on the analyses above, I decided that attachment avoidance was a suitable covariate variable.

By saving the standardised residuals from a (full factorial) felt security ANCOVA model, with attachment avoidance included as a covariate, I was able to examine the normality of distribution across the error scores. The standardised residuals for the Time 1 Felt Security variable were normal in distribution, $D(81)$ = .08, p = .20. Levene's test was significant for this variable, $F(1, 79) = 4.52$, $p < .05$, indicating that the error variance was unequal across experimental conditions. The standardised residuals for the Time 4 felt security variable were non-normal in distribution, $D(81) = .11$, $p < .05$. Levene's test was not significant, $F(1, 79) = 2.21$, $p = .14$, indicating that the error variance was equal across experimental conditions. The standardised residuals for the Time 5 felt security variable were normal in distribution, $D(81) = .08$, $p = .20$. Levene's test was not significant, $F(1, 79) = .29$, p = .59, indicating that the error variance was equal across experimental conditions. Various methods of transforming the data failed to rectify the problems with the non-normal data and the subsequent analyses reported below were performed on the original, non-transformed data.

Felt Security: Main Analyses

I conducted a mixed-design ANCOVA with time as the within-subjects factor (3 levels: Time 1, 4 and 5) and condition (2 levels: secure versus neutral) as the between-subjects factor. Felt security was the dependent variable. Attachment avoidance was entered as a covariate. The effect of prime condition was significant, $F(1, 78) = 109.14$, $p < .001$. The estimated marginal mean for the secure condition was 4.97, $SE = .13$. The estimated marginal mean for the neutral condition was 2.97, $SE = .14$. Those in the secure prime condition reported significantly higher felt security than those in the neutral prime condition, as hypothesised. Using ηp^2 (partial eta squared) to measure the effect size, I found that experimental condition accounted for 58% of the variance in felt security. See Figure 9 for a display of the estimated marginal means. Attachment avoidance did not have a significant effect on felt security, $F(1, 78) = 2.60$, $p = .11$.

Mauchly's test indicated that the assumption of sphericity was violated, $\chi^2(2)$ = 28.92, $p < .001$, therefore degrees of freedom were corrected using the Greenhouse-Geisser estimates of sphericity ($\varepsilon = .76$). The effect of time was

significant, $F(1.52, 118.81) = 3.79$, $p < .05$, $\eta p^2 = .06$. There were not significant differences between felt security at Time 1 ($M = 4.08$, $SE = .10$) and Time 4 ($M = 4.02$, $SE = .10$), $p = 1.00$. However, felt security decreased between Time 4 and Time 5 ($M = 3.90$, $SE = .11$) and this effect was marginally significant, $p = .06$. There were no significant differences between felt security at Time 1 and Time 5, $p = .08$. The interaction between condition and time on felt security was not significant, $F(1.52, 118.81) = .49$, $p = .56$.[5, 6]

Depressed Mood: Preliminary Analyses

Attachment anxiety was significantly correlated with depressed mood at all Time points (see Table 6) and was thus a potential covariate for an ANCOVA analysis when depressed mood is the DV. Baseline anxiety and baseline depression were both significantly correlated with depressed mood at each time point and were thus potential covariates. Attachment avoidance was not significantly correlated with depressed mood and was thus not a potential covariate.

Attachment anxiety did not differ significantly between the prime conditions, $F(1, 79) = .89$, $p = .35$ and thus met the assumption that covariates must be independent from the experimental effect. Baseline anxiety did not differ significantly between the prime conditions, $F(1, 79) = .23$, $p = .63$, also meeting this assumption. Finally, baseline depression did not differ significantly between the prime conditions, $F(1, 79) = .13$, $p = .72$, meaning that this variable also met the necessary assumption.

I customised the ANCOVA model in SPSS in order to explore whether the homogeneity of regression slopes assumption was met for the potential covariate variables. Depressed mood at each time point was entered as the within-subjects factor. Condition, baseline depression, baseline anxiety, attachment anxiety and the interactions between each of the potential covariates and condition were entered as between-subjects variables. The interaction between attachment anxiety and condition on depressed mood was significant, $F(2, 73) = .3.46$, $p < .05$, indicating that the assumption of homogeneity of regression slopes was violated for this variable. The interaction between baseline anxiety and condition on depressed mood was not significant $F(2, 73) = .62$, $p = .54$, indicated that homogeneity of regression slopes was met for this variable. The interaction between baseline depression and condition on depressed mood was significant, $F(2, 73) = 4.02$, $p < .05$. On the basis

of these findings, attachment anxiety and baseline depression were excluded as potential covariates and baseline anxiety was included as a covariate.

I then saved the standardised residuals from a mixed-design ANCOVA, with time (3 levels: Time 1, 4 and 5) entered as the within-subjects factor, condition (2 levels: secure versus neutral) entered as the between-subjects factor. Depressed mood was the DV. Baseline anxiety was included as a covariate. I examined the normality of distribution across the error scores. The standardised residuals for the Time 1 depressed mood variable were non-normal in distribution, $D(81) = .14$, $p < .001$. Levene's test was not significant for this variable, $F(1, 79) = .10$, $p = .75$, indicating that the error variance was equal across experimental conditions. The standardised residuals for the Time 4 depressed mood variable were non-normal in distribution, $D(81) = .14$, $p < .001$. Levene's test was not significant, $F(1, 79) = .11$, $p = .74$, indicating that the error variance was equal across experimental conditions. The standardised residuals for the Time 5 depressed mood variable were non-normal in distribution, $D(81) = .14$, $p < .001$. Levene's test was not significant, $F(1, 79) = .04$, $p = .84$, indicating that the error variance was equal across experimental conditions.

I used square root transformation to transform the depressed mood variables and ran the ANCOVA analysis again, saving the standardised residuals from this model. The standardised residuals for the Time 1 depressed mood variable were normal in distribution, $D(81) = .09$, $p = .13$. Levene's test was not significant, $F(1, 79) = .18$, $p = .68$, indicating that the error variance was equal across conditions. The standardised residuals for the Time 4 depressed mood variable were normal in distribution, $D(81) = .06$, $p = .20$. Levene's test was not significant, $F(1, 79) = 2.29$, $p = .13$, indicating that the error variance was equal across conditions. The standardised residuals for the Time 5 depressed mood variable were normal in distribution, $D(81) = .06$, $p = .20$. Levene's test was not significant, $F(1, 79) = .70$, $p = .41$, indicating the error variance was equal across conditions. As the transformation fixed the non-normal distribution of the depressed mood variables, the ANCOVA results reported below used the transformed variables.

Depressed Mood: Main analysis

I conducted a mixed-design ANCOVA with time (3 levels: Time 1, 4 and 5) as the within-subjects factor and condition (2 levels: secure versus neutral) as the between-subjects factor. Depressed mood was the dependent variable. Baseline

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anxiety was entered as a covariate. The effect of prime condition was not significant, $F(1, 78) = 2.38$, $p = .13$. See Figure 10 for a display of the estimated marginal means. Baseline anxiety did have a significant effect on depressed mood, $F(1, 78) = 18.41$, $p < .001$. Higher levels of baseline anxiety predicted higher levels of depressed mood at Time 1, $B = .08$, $t(1, 78) = 3.60$, $p < .001$, Time 4, $B = .08$, $t(1, 78) = .42$, $p < .001$, and Time 5, $B = .09$, $t(1, 78) = 4.32$, $p < .001$.

The effect of time on depressed mood was not significant, $F(2, 156) = .38$, $p = .69$, $\eta p^2 = .005$. The interaction between condition and time on depressed mood was not significant, $F(1.52, 118.81) = 2.38$, $p = .10$. Although the interaction was not significant, simple effects test revealed that difference in depressed mood between the secure and neutral conditions became more pronounced over time. At Time 1, simple effects tests revealed that there were no significant differences between the secure *(M = 2.70, SE = .21)* and neutral *(M = 2.72, SE = .22)* conditions, $F(1, 78) = .01$, $p = .95$. However at Time 4, simple effects tests showed that the differences between the secure (*M = 2.52, SE = .23*) and neutral (*M = 3.14, SE = .25*) conditions were marginally significant, $F(1, 78) = 3.36$, $p = .07$, with secure-primed participants showing lower levels of depressed mood, compared to neutral-primed participants. Furthermore, simple effects tests demonstrated that the differences between the secure (*M = 2.46, SE = .22*) and neutral (*M = 3.06, SE = .25*) conditions at Time 5 were marginally significant, $F(1, 78) = 3.62$, $p = .06$, with secure-primed participants showing less depressed mood than neutral-primed participants.[7,8]

Anxious Mood: Preliminary Analyses

Baseline depression and baseline anxiety were both significantly correlated with anxious mood at each time point (see Table 6) and were thus potential covariates in an ANCOVA analysis when anxious mood is the DV. Attachment anxiety and attachment avoidance were not significantly correlated with anxious mood (at any time point) and are thus not potential covariates. As described in the depressed mood preliminary analyses section, baseline depression and baseline anxiety did not differ between prime conditions, indicating that the covariates are independent from the experimental effect and thus meet this ANCOVA assumption.

I customised an ANCOVA model in SPSS to examine whether the homogeneity of regression slopes assumption has been met for each of the potential covariates. Anxious mood at each time point was entered as the within-subjects

factor. Condition, baseline anxiety, baseline depression and the interaction between each of the potential covariates and condition were entered as between-subjects variables. The interaction between baseline anxiety and condition on anxious mood was significant, $F(2, 75) = .5.03, p < .01$, indicating that the assumption of homogeneity of regression slopes was violated for this variable. The interaction between baseline depression and condition on anxious mood was not significant $F(2, 75) = .86, p = .43$, indicated that homogeneity of regression slopes was met for this variable. On the basis of these findings, baseline anxiety was excluded as potential covariate and baseline depression was included as a covariate.

By saving the standardised residuals from a (full factorial) mixed-design ANCOVA, with time as within-subjects factor (3 levels: Time 1, 4 and 5) and condition as the between-subjects factor (2 levels: secure versus neutral). Anxious mood was the DV and baseline depression was included as a covariate. I examined the normality of distribution across the error scores. The standardised residuals for the Time 1 anxious mood variable were non-normal in distribution, $D(81) = .17, p < .001$. Levene's test was not significant for this variable, $F(1, 79) = .39, p = .53$, indicating that the error variance was equal across experimental conditions. The standardised residuals for the Time 4 anxious mood variable were non-normal in distribution, $D(81) = .15, p < .001$. Levene's test was not significant, $F(1, 79) = 2.11, p = .15$, indicating that the error variance was equal across experimental conditions. The standardised residuals for the Time 5 anxious mood variable were non-normal in distribution, $D(81) = .14, p < .001$. Levene's test was significant, $F(1, 79) = 5.24, p < .05$, indicating that the error variance was not equal across experimental conditions.

I used square root transformation to transform the anxious mood variables and ran the ANCOVA analysis again, saving the standardised residuals from this model. The standardised residuals for the Time 1 anxious mood variable were normal in distribution, $D(81) = .08, p = .20$. Levene's test was not significant, $F(1, 79) = .75, p = .39$, indicating that the error variance was equal across conditions. The standardised residuals for the Time 4 anxious mood variable were normal in distribution, $D(81) = .09, p = .20$. Levene's test was not significant, $F(1, 79) = .00, p = .97$, indicating that the error variance was equal across conditions. The standardised residuals for the Time 5 anxious mood variable were normal in distribution, $D(81) = .08, p = .20$. Levene's test was not significant, $F(1, 79) = .77, p = .39$, indicating the error variance was equal across conditions. As the

transformation fixed the non-normality of distribution in the anxious mood variables, the ANCOVA results reported below were those using the transformed variables.

Anxious Mood: Main Analyses

I conducted a mixed-design ANCOVA with time (3 levels: Time 1, 4 and 5) as the within-subjects factor and condition (2 levels: secure versus neutral) as the between-subjects factor. Anxious mood was the dependent variable. Baseline depression was entered as a covariate. The effect of prime condition was significant, $F(1, 78) = 10.11$, $p = .01$. Participants in the secure condition ($M = 1.94$, $SE = .12$) reported significantly less anxious mood than participants in the neutral condition ($M = 2.52$, $SE = .13$). Using ηp^2 (partial eta squared) to measure the effect size, I found that experimental condition accounted for 11% of the variance in anxious mood. See Figure 11 for a display of the estimated marginal means. Baseline depression had a significant effect on anxious mood, $F(1, 78) = 20.03$, $p < .001$. Higher levels of baseline depression predicted higher levels of anxious mood at Time 1, $B = .04$, $t(1, 78) = 3.22$, $p < .01$, Time 4, $B = .04$, $t(1, 78) = 4.07$, $p < .001$, and Time 5, $B = .03$, $t(1, 78) = 3.58$, $p < .001$.

Mauchly's test indicated that the assumption of sphericity was violated, $\chi^2(2) = 15.83$, $p < .001$, therefore degrees of freedom were corrected using the Greenhouse-Geisser estimates of sphericity ($\varepsilon = .84$). The effect of time on anxious mood was not significant, $F(1.69\ 131.55) = 2.67$, $p = .08$, $\eta p^2 = .03$. However, the effect of time on anxious mood was approaching significance, with a trend showing that participants were reporting increased anxious mood over time (from Time 1 to Time 5). The interaction between condition and time on anxious mood was not significant, $F(1.69, 131.55) = .35$, $p = .67$.[9, 10]

Linguistic Analyses

I decided to further explore the text participants had typed during the Time 1 priming session, with an aim to further understanding the results for depressed and anxious mood in this experiment. As in Study 1 and Study 2, I used LIWC (Pennebaker et al., 2007) to explore word count differences between the secure and neutral conditions in negative and positive emotions. In this experiment, participants in the secure ($M = 1.53$, $SE = .29$) condition used significantly more negative emotion words, compared to those in the neutral ($M = .34$, $SE = .06$) condition, $t(80) = 3.67$, $p < .001$. In addition, participants in the secure ($M = 6.35$, $SE = .52$)

condition used significantly more positive emotion words, compared to those in the neutral ($M = 1.54$, $SE = .17$) condition, $t(80) = 8.33$, $p < .001$. Participants in the neutral condition used more positive emotion words than negative emotion words, $t(34) = 7.71$, $p < .001$. Finally, participants in the secure prime condition used significantly more positive emotion words, than negative emotion words, $t(43) = 7.24$, $p < .001$. The implications of these findings will be discussed in the next section.

Discussion

The felt security results from this experiment are promising. As in Study 2 (see Chapter 3), the results suggest that security priming (in comparison to the neutral condition) increased participants' felt security immediately after the laboratory prime. Furthermore, 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 my hypotheses. Time moderated the effects of prime condition. These findings replicated those found in Study 2 and indicate that the secure text primes kept the initial sense of felt security induced in the participants in the secure condition active for several days.

The effect of time on felt security observed in Study 2 was replicated in this experiment. In line with hypotheses, participants' felt security decreased between receiving their last text message and the final felt security measure, 24 hours later.. Nonetheless, there was still a significant difference between the secure and neutral conditions, with secure-primed participants reporting higher levels of felt security, even 24 hours after the last text prime. These results once again demonstrate that text messages are effective at inducing felt security and a suitable medium for security priming.

The decrease in felt security between the last text message prime and the final felt security measures, 24 hours later, was only marginally significant. However, these results suggest that secure text primes may need to be delivered over a longer time period, for any long-lasting changes in felt security to be observed. This is unsurprising given the evidence suggesting that people's levels of attachment security are relatively stable and tend to endure over time (e.g., Zhang & Labouvie-Vief, 2004).

My hypothesis that participants in the secure condition would report less depressed mood at each time point in the experiment, compared to participants in the

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neutral condition, was not supported. There were no differences in depressed mood between the secure and neutral conditions. Time did not interact with the primes on depressed mood. There was no main effect for time. However, the means for depressed mood were in the expected direction, with a trend towards participants in the secure condition reporting less depressed mood compared to those in the neutral condition. Moreover, although no differences were observed between the secure and neutral conditions immediately after the laboratory primes, participants in the secure condition reported less depressed mood immediately after the last text prime and 24 hours after the last text prime, compared to participants in the neutral condition. However, the differences between the conditions at these time points were only marginally significant and should therefore be interpreted with caution. Nonetheless, these findings suggest although one single laboratory prime does not result in a significant shift in depressed mood (a finding also evident in Study 1), repeated security priming is likely to be effective in decreasing depressed mood. This research should be replicated in a larger sample and an additional number of secure prime text messages (over a longer time period) to examine whether this is the case.

The results for anxious mood supported my hypotheses. Participants in the secure prime condition reported lower levels of anxious mood post-prime, compared to participants in the neutral condition. Time did not moderate the effects of the primes. These results indicate that the secure laboratory primes led to low levels of anxious mood and that the secure text primes extended the anxiety-reducing effect of the secure lab prime for a number of days. These findings represent a potential way forward for attachment-focused interventions to be developed for use in clinical samples of people suffering from anxiety disorders. There was no effect of time on anxious mood, suggesting that the both the secure laboratory prime and the secure text primes were effective at reducing anxious mood and this effect was maintained even 24 hours after the last secure text prime.

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). These

findings represent a potential way forward for attachment-focused interventions to be developed for use in clinical samples of people with anxiety disorders, perhaps by combining text security priming with other forms of psychological interventions, such as CBT.

It is interesting that the secure primes led to a reduction in anxious mood (compared to the neutral condition) but not a reduction in depressed mood. These findings raise the possibility that security priming may be more effective for those suffering from anxiety disorders, than those suffering from depression. Bowlby (1988) argued that insecurely attached individuals, particularly those high in attachment anxiety, tend to doubt their own ability to cope with stressful events and challenges. Avoidance of events that provoke anxiety seems to be a key feature of many anxiety disorders (e.g., Dymond & Roche, 1999). Williams and Riskind (2004) argue that a looming maladaptive style (LMS) is a cognitive vulnerability for anxiety that leads a person to formulate rapid and excessive mental representations concerning threats or danger. Moreover, Williams and Riskind (2004) found that LMS partially mediates the relationship between attachment insecurity and anxiety symptoms (see Chapter 1 for a complete discussion).

Perhaps security priming is particularly effective for reducing anxiety as it bolsters the individuals' belief in their ability to cope with stressful situations, thus reducing anxiety and potentially avoidance behaviours. It is possible that in the same way that proximity to an attachment figure can reduce a child's anxiety concerning threats in his or her environment (e.g., Ainsworth, 1967) activating secure attachment representations in adults can reduce an adult's sense of anxiety regarding current threats. Such threats may be psychological rather than physical in nature (e.g., financial worries, work pressures or relationship difficulties). In this sense, attachment security priming could be seen as reducing the looming maladaptive style (LMS) that partially mediates the relationship between attachment insecurity and anxiety (Williams & Riskind, 2004).

It is possible that a pessimistic explanatory style (PES), the cognitive vulnerability that has been found to partially mediate the relationship between attachment insecurity and depression (Williams & Riskind, 2004), is more resistant to change through security priming. PES leads individuals to attribute negative past events to internal, stable, and global causes (e.g., Abramson et al., 1989; Alloy et al., 1997). Depression does not seem to be related to fear, but instead to negative views

of oneself and the environment and the future. These negative views may not be so easily reduced or revised through attachment security priming, compared to the feelings of fear associated with anxiety. However, my results are promising in that they suggest that over time, security priming is likely to reduce depressed mood.

In the discussion sections of Study 1 and Study 2 (see Chapter 2 and 3) I put forward the possibility that secure-primed participants used more positive and negative emotion words in the laboratory priming session (compared to neutral-primed participants) because they were focusing on attachment figures that they were no longer in contact with or who did not meet the criteria of a secure attachment figure. I proposed that thinking about these relational figures could have triggered sadness in participants, which may also have explained why participants in the secure condition did not report less depressed or anxious mood compared to those in the neutral condition in Study 1 and 2. In this experiment I obtained information concerning participants close others to enable me to select attachment figures for participants in the secure condition who met the criteria of a secure attachment figure and who they were likely to be in contact with regularly.

However, in the discussion section of Study 1 (see Chapter 2) I also put forward the alternative possibility that the triggering of negative and positive emotions may be a normative response to thinking about any significant other (even one who the participant is only conscious of feeling positively about), in line with research by Zayas and Shoda (2011).

The findings from this experiment support the hypothesis that the triggering of both positive and negative emotions while thinking about attachment figures is a normative response. The effects of secure versus neutral priming on depressed and anxious mood were promising in this experiment, compared to those in Study 1 and Study 2, with participants in the secure condition in this experiment reporting less anxious mood compared to participants in the neutral condition (and participants in the secure condition reporting marginally less depressed mood immediately after the last text prime and 24 hours after the last text prime). However, the linguistic analysis results in this experiment were similar to those from Study 1 and Study 2. In studies 1 and 2 and in the current experiment, participants in the secure condition used more negative and positive emotions during the laboratory priming tasks, compared to participants in the neutral condition. These results suggest that even after controlling for the quality of secure attachment figures and participant's

frequency of contact with these individuals, the secure laboratory prime still triggered both positive and negative emotions during the prime task, compared to the neutral prime.

It seems likely that thinking about attachment figures triggers both positive and negative automatic reactions during the priming task, as all interpersonal relationships are likely to have good and bad qualities, even secure ones. However, security priming is likely to lead to a reduction in anxious mood post-prime, as the participant feels secure after visualising their secure attachment figure (similar to how an infant is likely to feel secure after being comforted by an attachment figure). In addition, my results suggest that security priming is likely to reduce depressed mood, if security priming sessions are repeated over time.

A limitation of this research was the lack of statistical power. This experiment should be replicated with a larger sample, in order to determine whether security priming via laboratory primes and secure text primes has a beneficial effect on depressed mood (compared to a neutral condition). In addition, the majority of participants in this experiment were female, which may limit the generalizability of the results.

Moreover, I may have obtained different results in this experiment had the participants been from a clinical sample of depressed or anxious patients. Undergraduate students are likely to be higher in depression and anxiety than those in community samples but lower than those in clinical samples (e.g., Nyenhuis et al. 1999). The participants in the current experiment showed similar levels of baseline depression and baseline anxiety to those reported in the college sample, and higher levels of depression and anxiety compared to those in the community sample, in the study by Nyenhuis et al. (1999). However, it seems unlikely that many participants would have met the criteria for clinical depression or anxiety disorders. This experiment should be replicated in a clinical sample in order to explore what effect secure (laboratory and text) primes have on clinical levels of anxious and depressed mood.

Conclusion

The felt security results from this experiment replicated those found in Study 2, further suggesting that text messages are a practical, location-independent, cost effective and effective method of delivering attachment security primes to

participants. Future research should explore whether security text priming can influence participants' sense of attachment security on a longer-term basis.

This experiment successfully addressed many of the limitations of Study 2. By taking steps to ensure that participants in the secure prime condition were focusing on secure attachment figures and including baseline measures of the attachment dimensions and depression and anxiety, I was able to better explore the effect of secure versus neutral priming on depressed and anxious mood.

I did not find a difference between the secure and neutral conditions in depressed mood. However, as the data showed a trend in the expected direction (with participants in the secure condition reported slightly lower levels of depressed mood), it is possible that this was because of the lack of statistical power in the experiment. Future research with larger samples is necessary in order to determine whether secure (versus neutral) priming has a beneficial effect on depressed mood.

The results from this experiment demonstrate that security priming, via laboratory prime and via text message, decreases anxious mood, compared to neutral priming. These findings are extremely promising and suggest that exploring the effects of attachment security priming on anxious mood in clinical samples is a fruitful avenue for future research. The clinical implications of these findings are important and suggest that in the future, attachment security priming might be combined with more well-established interventions for treating anxiety, such as CBT.

Table 6

Study 3: Descriptive Statistics and Correlations between all Variables

	Mean	SD	ANX	AVO	FT1	FT4	FT5	BD	DT1	DT4	DT5	BA	AT1	AT4	AT5
ANX	3.41	1.22	-	.29**	-.09	-.06	-.03	.42**	.28*	.34**	.33**	.26*	.19	.17	.17
AVO	2.68	1.07		-	-.31**	-.23*	-.21	.25*	-.09	.02	.07	.29**	.09	.08	-.04
FT1	4.14	1.37			-	.88*	.86**	-.07	.02	-.06	-.11	.05	-.26*	-.31**	-.27*
FT4	4.07	1.38				-	.96*	-.12	-.02	-.12	-.15	.03	-.23*	-.31**	-.27*
FT5	3.96	1.42					-	-.05	-.02	-.10	-.14	.10	-.22*	-.25*	-.23*
BD	12.48	12.43						-	.36**	.46**	.62**	.69**	.32**	.37**	.33**
DT1	5.56	8.83							-	.70**	.61**	.41**	.74**	.43**	.41**
DT4	6.11	8.65								-	.79**	.39**	.51**	.66**	.50**
DT5	5.96	8.48									-	.46**	.50**	.58**	.66**
BA	11.22	7.57										-	.49**	.40**	.33**
AT1	5.74	5.68											-	.49**	.50**
AT4	5.87	5.13												-	.75**
AT5	6.96	5.63													-

Note. $N = 81$. *$p <. 05$. **$p < .01$ ANX = Attachment anxiety. AVO = Attachment avoidance. FT1 = Felt Security at Time 1. FT4= Felt Security at Time 4. FT5 = Felt Security at Time 5. T5 = Time 5. BD = Baseline Depression. DT1 = Depressed Mood at Time 1. DT4 = Depressed Mood at Tim4. DT5 = Depressed Mood at Time 5. BA = Baseline Anxiety. AT1 = Anxious Mood at Time 1. AT4 = Anxious Mood at Time 4. AT5 = Anxious Mood at Time 5. The mean figures in this table were calculated using the original, untransformed data.
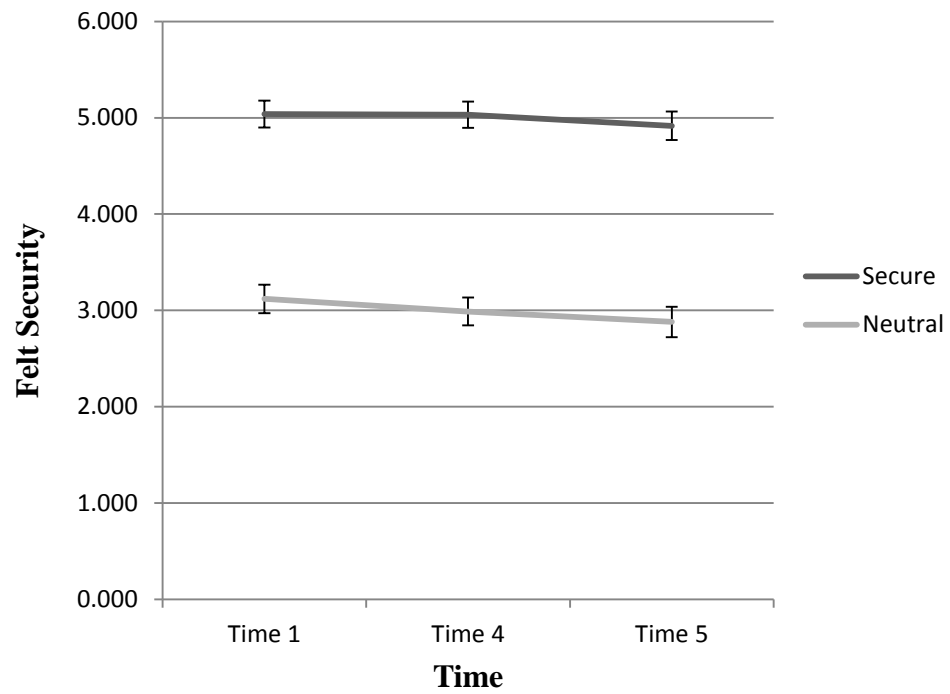
Figure 9. Means for felt security in each of the prime conditions in Study 3.

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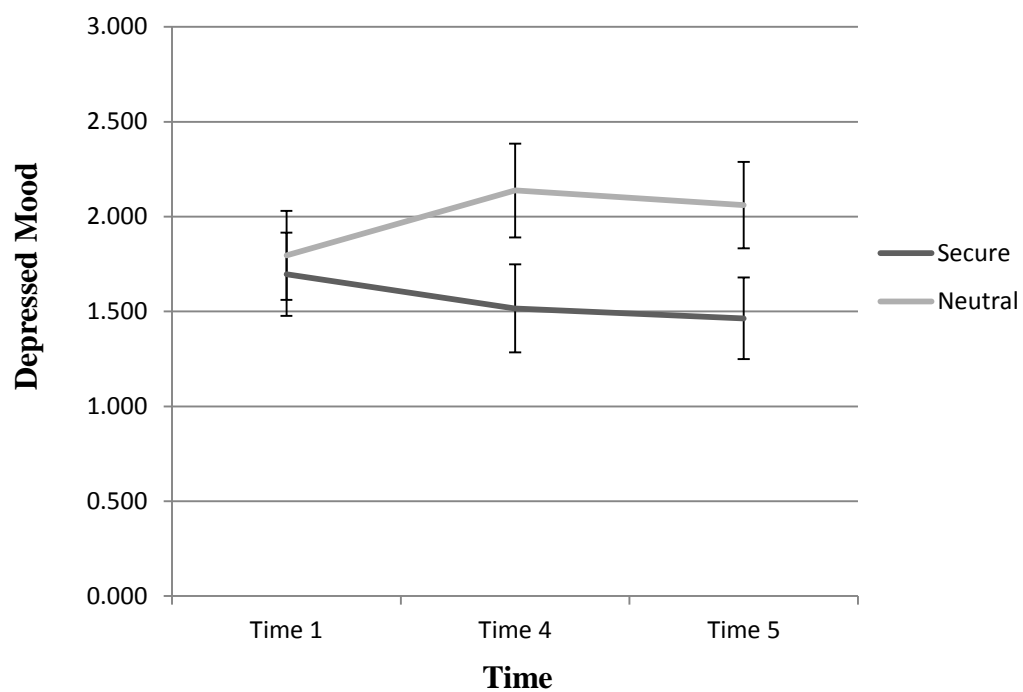*Figure 10.* Means for depressed mood in each of the prime conditions in Study 3.
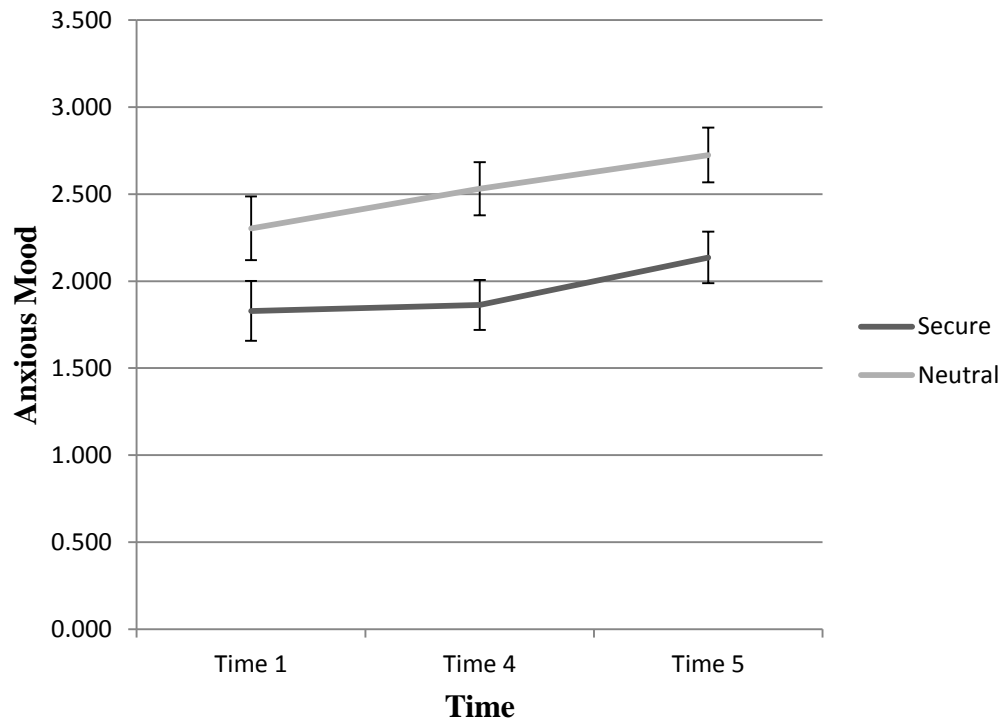
Figure 11. Means for anxious mood in each of the prime conditions in Study 3.

5. CHAPTER FIVE

Exploring the Effects of Text Message Primes on Felt Security and Depressed and Anxious Mood on Participants with Depression

There is a well-established link between attachment insecurity and depression (e.g., Carnelley et al., 1994; Reis & Greyner, 2004) and attachment insecurity and anxiety symptoms (e.g., Doi & Thelan, 1993; Eng et al., 2001). See Chapter 1 for a complete discussion of the evidence linking attachment anxiety and attachment avoidance to depression and anxiety symptoms. Moreover, in Study 1, I explored whether temporarily inducing a sense of attachment security versus attachment insecurity in the laboratory results in differences in depressed or anxious mood. In line with hypotheses, participants primed with attachment anxiety reported higher levels of depressed mood post-prime, compared to participants in the secure prime condition, indicating a causal relationship between attachment anxiety and depression. No causal relationship was established between attachment avoidance and depression.

In addition, successful therapeutic outcomes in clients with anxiety, depression and eating disorders are associated with increases in attachment security from pre-to post-therapy (e.g., Muller & Rosenkranz, 2009; Tasca et al., 2007; Travis et al., 2001). These research findings indicate that therapists might serve as secure attachment figures for their clients and in addition, these findings raise the possibility that helping individuals with mental health problems towards increased attachment security may actually help to alleviate their symptoms and aid in their recovery. These findings are particularly interesting as they show that during successful therapy clients often move towards increase attachment security, even when the therapy does not include an attachment-focused intervention. Moreover, research shows that activating representations of attachment security though attachment security has many beneficial effects, such as increasing positive affect (Carnelley & Rowe, 2010; Mikulincer et al., 2001) and increasing endorsement of positive interpersonal expectations and recall of positive attachment words (Rowe & Carnelley, 2003). Furthermore, evidence shows that repeatedly priming participants with attachment security over a number of days can beneficial effects on self-views, self-esteem, and positive mood that last from a few days to a week after the last security priming session (Carnelley & Rowe, 2007; Gillath & Shaver, 2007).

Together, these findings suggest that repeatedly priming participants with attachment security might have beneficial effects on depressed and anxious mood. I tested this hypothesis in Study 3, where undergraduate participants were primed with either a neutral or secure prime initially in the laboratory and then for the following 3 days they were primed via text message. Participants in the secure and neutral conditions did not differ in depressed mood post-prime, although the means were in the expected direction, with participants in the secure condition showing less depressed mood compared to participants in the neutral condition. It is likely that the lack of differences observed in depressed mood between conditions was due to lack of statistical power. Furthermore, participants in the secure condition reported less anxious mood compared to participants in the neutral condition. These findings are promising and represent a potential way forward for attachment-focused interventions to be developed for use in clinical samples of people diagnosed with anxiety disorders. However, it is first necessary to explore whether attachment security priming (in the laboratory and via text message) has a beneficial effect on depressed and anxious mood in clinical samples of patients. If attachment security priming has a beneficial effect, it is possible that security priming could be combined with other more well-established psychological interventions for depression and anxiety, such as CBT, as part of a treatment plan for individuals with mood disorders.

Hypotheses

The aim of this experiment was to explore whether priming (in the laboratory and via text messaging) depressed outpatients with a secure attachment style or a neutral prime leads to differences in felt security and depressed and anxious mood. I predicted that participants in the secure condition would report higher levels of felt security and lower levels of depressed and anxious mood, compared to those in the neutral prime condition. I did not predict a significant main effect of time, or a significant interaction between condition and time, for the felt security, depressed mood, or anxious mood variables.

Method

Participants

The research was granted ethical approval by the Ethics Committee at the University of Southampton and by the National Research Ethics Committee (NRES). Thirty-five patients receiving outpatient psychiatric treatment for chronic unipolar depression at a Community Mental Health Team (CMHT) in the United Kingdom

were invited (by letter) to take part in the research. Participants who accepted the invitation to take part ($n = 12$, 9 female, 3 male) ranged in age from 42 to 77 ($M = 20.32$). Eight participants defined their ethnic background as British, 2 as Indian, 1 participant defined their background as Irish and 1 participant did not disclose this information. All patients were currently taking medication (e.g., antidepressants) to treat their depression. Only one participant failed to complete all parts of the experiment.

In order to detect a small effect, in an ANOVA analysis with 2 groups ($f = .25$), where significance tests are performed at $p = .05$, a sample size of 786 is necessary (Cohen, 1992). In order to detect a medium effect, a sample size of 128 is necessary and to detect a large effect, a sample size of 52 is necessary (Cohen, 1992). The sample size in the experiment was 12 participants, meaning it was unlikely that I had enough statistical power to detect even a large effect. Unfortunately, although I collected data for 7 months in total, recruitment was slow for the study, with only 1 in 3 participants responding to the invitation to take part. It is important to note that due to the small sample size, this experiment should be viewed as a feasibility study and the findings interpreted as such. While inferential statistics are included in the report for completeness, these results should be interpreted with extreme caution due to the small sample size.

Procedure

Participants met with the experimenter for the first time immediately after their appointment with their psychiatrist (in the CMHT building) for an introductory session, where they completed demographic information, attachment anxiety and avoidance items, information about secure attachment figures and baseline depression and anxiety items. One week later (Time 1), participants met with the experimenter in the same location as before. Participants were randomly allocated ahead of time to either a secure ($N = 6$) or neutral ($N = 6$) priming condition. During the Time 1 session, participants wrote for 10 minutes about either a security-inducing attachment figure (selected ahead of time by the experimenter and the name of which was provided to the participant on a folded piece of paper) or a supermarket shopping trip on a computer. Participants then completed measures of felt security and depressed and anxious mood.

At Time 2 (1 day later) participants received a text containing a (secure or neutral) 3 minute visualisation task; they were asked to text "Done" to the

experimenter once they had completed the task, along with any words concerning their thoughts and feelings during 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 asked to check their email, where they were directed to an internet link to complete the next part of the study. Participants completed the felt security, depressed and anxious mood items. Twenty-four hours later (Time 5), participants received a text instructing them to check their email again, where they found a link to the final online part of the study (where they again completed the measures of felt security, depressed and anxious mood).

Materials

> **Attachment figure information.** I used an adaptation of the materials and procedure developed by Carnelley and Rowe (2007) to obtain information about participants' attachment relationships and select secure attachment figures for participants in the secure condition accordingly (see Appendix C). At baseline, I asked participants to indicate the names of up to 10 people who they regard as their ''closest significant others'' regardless of the quality of the relationship. Next, I provided them with Bartholomew and Horowitz's (1991) single paragraph descriptions of four attachment categories (secure, preoccupied, dismissing, and fearful) and asked them to select which relationship description best described their feelings in each relationship; participants could indicate ''none of the above'' if none described the relationship. Participants rated from 1 (*not very representative*) to 5 (*very representative*) the extent to which the description chosen was representative of how they felt in that relationship. I also asked participants to indicate how frequently they had contact with each person listed and the length of time they had known each person. Secure attachment figures were selected out of those relationships which the participants had categorised as secure. If more than one relationship was listed as secure, I then selected attachment figures based on how representative the attachment figures were, followed by frequency of contact and the length of time known. Only one participant was unable to list at least one secure attachment figure and was thus allocated to the alternative secure prime condition (see below).

Attachment avoidance and anxiety. Attachment anxiety and avoidance were measured using the Experiences in Close Relationships Short form (ECR-S) developed by Wei et al., (2007). The ECR-S consists of 12 items and evidence suggests that the scale retains psychometric properties similar to the original ECR (Wei et al., 2007). An example avoidance item is "I try to avoid getting too close to my partner". An example anxiety item is "My desire to be very close sometimes scares people away". Participants responded to each item using a 7-point Likert scale (1 = *disagree strongly,* 7 = *agree strongly*). In the current study, scale reliability was good for attachment anxiety (α = .78) and attachment avoidance (α = .82). The scales were uncorrelated (*r* = .10, *p* = .77).

Baseline depression. Baseline depression was measured using the depression-dejection items from the POMS (McNair et al., 1992). Participants used a 5-point Likert scale (0 = *Not at all*, 4 = *Extremely*) to rate the extent to which they are experiencing various mood states. Participants were asked to rate each item based on how they had been feeling over the last week, including the day they completed the questionnaire. Scale reliability for the baseline depression items was excellent (α = .97).

Baseline anxiety. Baseline anxiety was measured using the tension-anxiety items from the POMS (McNair et al., 1992). Participants used a 5-point Likert scale (0 = *Not at all*, 4 = *Extremely*) to rate the extent to which they are experiencing various mood states. Participants were asked to rate each item based on how they had been feeling over the last week, including the day they completed the questionnaire. Scale reliability for the baseline anxiety items was excellent (α = .89).

Laboratory primes. The secure prime used at Time 1 was adapted from Bartz and Lydon (2004) and the same secure prime as used in Study 1, 2 and 3. The neutral prime used at Time 1 in this experiment was identical to the one used by Carnelley and Rowe (2003), which was adapted from Mikulincer and Shaver (2001). This neutral prime was the same as the one used in the laboratory priming sessions in Study 1, 2, and 3. See Chapter 2 for further information and a complete description of the laboratory primes.

In addition, in this experiment I developed and included an 'alternative secure' prime (see Appendix E) task, to be used if participants allocated to the secure condition were unable to list a secure attachment figure. Participants in this condition

imagine what it would be like to experience a secure relationship (as opposed to writing about a real-life relationship). Participants who completed the alternative secure prime task then completed the same text primes as participants who completed the standard secure laboratory prime.

Text primes. The text primes (see Appendix F) were developed by the researchers. An example secure text was: "Please spend 3 minutes thinking about the relationship that you visualised in the previous tasks. Try and imagine that person making you feel loved and valued. What would they do or say? How would you feel?" An example neutral text was: "Please spend 3 minutes thinking about the route you take from the supermarket to home. Try and visualise the route you take and your surroundings." The text primes used in this similar were similar to the ones used in Study 3, except that the neutral themes were not tailored towards university students in this study, as none of the sample were university students. For example, rather than asking participants to think about their route to university, I asked them to think about a time they did some laundry. In addition, in this experiment I gave participants more direction as to the types of things they could focus on during the prime tasks. For example, the secure text primes encourage participants to think about what the attachment figure said or did (in the security-inducing memory) and how the participant felt. Furthermore, the neutral prime texts include instructions such as 'Try and visualise the route you take and your surroundings'. These instructions were added to help participants engage with the tasks.

Post-Prime Measures

Felt security. Felt security was measured using the 16-item scale developed by Luke et al. (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 excellent: Time 1 α = .96, Time 4 α = .97, Time 5 α = .97.

Depressed mood. Depressed mood was measured using the depression-dejection items from the POMS (McNair et al., 1992). At Time 1, 4 and 5, participants were asked to rate each item based on how they were feeling "right now". Scale reliability for the depressed mood items was excellent: Time 1 α = .97, Time 4 α = .90, Time 5 α = .96.

Anxious mood. Anxious mood was measured using the tension-anxiety items from the POMS (McNair et al., 1992). At Time 1, 4 and 5, participants were asked to rate each item based on how they were feeling "right now". Scale reliability for the anxious mood items was excellent at Time 1 (α = .93), and good at Time 4 (α = .93) and below satisfactory at Time 5 (α = .57).

Results

Preliminary Analyses

There were no missing values on the attachment anxiety, attachment avoidance or baseline anxiety and baseline depression variables. There was one missing value on the Time 1, Time 4 and Time 5 depressed mood variables. Little's (1988) MCAR test indicated that the data were MCAR, χ^2(2, N = 12) = 1.40, p = .50. In addition, there was 1 missing value on each of the Time 1, Time 4 and Time 5 anxious mood variable. Little's MCAR test revealed the data were MCAR, χ^2(2, N = 12) = 2.71, p = .26. There was 1 missing value on each of the Time 1, Time 4 and Time 5 felt security variables. Little's MCAR test revealed the data were MCAR, χ^2(2, N = 12) = 1.04, p = .31. Missing data were dealt with using Expectation-Maximization in SPSS. No outliers were found on any of the variables.

Felt Security: Preliminary Analyses

Attachment anxiety was significantly correlated with felt security at each time point (see Table 7) and was therefore suitable to be included as a covariate in an ANCOVA, when felt security is the DV and experimental condition is the IV, provided that when this covariate variable is included, the assumptions for ANCOVA are met. Attachment avoidance was not significantly correlated with felt security and was not considered as potential covariate for this analysis. Baseline depression was correlated with felt security at each time point and was thus considered a potential covariate. Baseline anxiety was correlated with felt security at each time point and was thus considered a potential covariate.

One of the assumptions of ANCOVA is that the covariate variables must be independent from the experimental effect (e.g., Field, 2005). Attachment anxiety did not differ significantly between the prime conditions, F(1, 10) = .00, p = .95 and thus met this assumption. Baseline anxiety, F(1, 10) = .20, p = .67, and baseline depression, F(1, 10) = .13, p = .73, also met this assumption.

I customised an ANCOVA model in order to explore whether the homogeneity of regression slopes assumption was met for each of the potential covariates. Time was entered as the within subjects variable and condition, attachment anxiety, baseline anxiety, baseline depression and each of the interactions between the potential covariates and condition were entered as between-subjects factors. The interaction between attachment anxiety and condition was not significant, $F(1, 4) = 4.20$, $p = .11$, indicating that the assumption of homogeneity of variance was met for attachment anxiety. The interaction between baseline depression and condition was not significant, $F(1, 4) = 2.97$, $p = .43$, indicating that this assumption was also met for baseline depression. However, there was a significant interaction between condition and baseline anxiety, $F(1, 4) = 2.96$, $p < .05$, indicating that the assumption of homogeneity of regression slopes was violated for baseline anxiety and that this variable was not suitable to be included as a covariate. On the basis of the analyses above I decided to include attachment anxiety and baseline depression as covariates.

I then examined the normality of the distribution across error scores, by saving the standardised residuals from the felt security ANCOVA model, with attachment anxiety and baseline depression included as covariates. The standardised residuals from the Time 1 felt security were normal in distribution, $D(12) = .12$, $p = .20$. Levene's test indicated that the error variance was equal across conditions, $F(1, 10) = .23$, $p = .65$. The Time 4 felt security variable standardised residuals were normal in distribution, $D(12) = .20$, $p = 1.00$. Levene's test indicated that error variance was equal across conditions, $F(1, 10) = .53$, $p = .48$. The standardised residuals for Time 5 felt security were normal in distribution, $D(12) = .20$, $p = .20$. Levene's test indicated that the error variance was equal across conditions, $F(12) = 1.56$, $p = .31$.

Felt Security: Main Analyses

I conducted a mixed-design ANCOVA with time (3 levels: Time 1, 4 and 5) as the within-subjects factor and condition (2 levels: secure versus neutral) as the between-subjects factor. Felt security was the dependent variable. Attachment anxiety and baseline depression were entered as covariates. The effect of prime condition was not significant, $F(1, 8) = .04$, $p = .86$. The estimated marginal mean for the secure condition was 3.18, $SE = .31$. The estimated marginal mean for the neutral condition was 3.09, $SE = .31$. See Figure 12 for a display of the estimated

marginal means at each Time point. Attachment anxiety did not have a significant effect on felt security, $F(1, 8) = .80$, $p = .34$. Baseline depression did not have a significant effect on felt security, although this effect was approaching significance, $F(1, 8) = 4.02$, $p = .08$. Lower levels of baseline depression predicted higher levels of felt security at Time 1, $B = -.06$, $t = -2.55$, $p < .05$. Baseline depression did not significantly predict felt security at Time 4 or Time 5.

The effect of time on felt security was not significant, $F(2, 16) = .29$, $p = .75$. The interaction between condition and time on felt security was not significant, $F(2, 16) = 1.72$, $p = .21$.

Depressed Mood: Preliminary Analyses

Baseline depression and baseline anxiety were significantly correlated with depressed mood at each time point (see Table 7) and were therefore suitable to be included as covariates in an ANCOVA, when depressed mood is the DV and experimental condition is the IV. Attachment anxiety and attachment avoidance were not correlated with depressed mood and were thus not considered as covariates. Both baseline anxiety and baseline depression were independent from the experimental effect, thus meeting this ANCOVA assumption (as described in the felt security preliminary analyses section).

I customised the ANCOVA model to explore whether the homogeneity of regression slopes assumption was met for each of the potential covariates. Depressed mood at each time point was entered as the within-subjects factor. Condition, baseline anxiety, baseline depression and the interaction between each of the potential covariates and condition were entered as between-subjects factors. The interaction between baseline anxiety and condition was not significant, $F(1, 4) = .02$, $p = .91$, indicating that the assumption of homogeneity of variance was met for baseline anxiety. The interaction between baseline depression and condition was not significant, $F(1, 4) = .05$, $p = .83$, indicating that this assumption was also met for baseline depression.

I then examined the normality of the distribution across error scores, by saving the standardised residuals from the felt security ANCOVA model, with baseline anxiety and baseline depression included as covariates. The standardised residuals for Time 1 depressed mood were normal in distribution, $D(12) = .21$, $p = .13$. Levene's test indicated that the error variance was equal across conditions,

$F(1, 10) = 1.94, p = .19$. The Time 4 depressed mood standardised residuals were normal in distribution, $D(12) = .21, p = .15$. Levene's test indicated that error variance was equal across conditions, $F(1, 10) = .00, p = .95$. The standardised residuals for Time 5 depressed mood were normal in distribution, $D(12) = .14, p = .15$. Levene's test indicated that the error variance was equal across conditions, $F(12) = .45, p = .52$.

Depressed Mood: Main Analyses

I conducted a mixed-design ANCOVA with time (3 levels: Time 1, 4 and 5) as the within-subjects factor and condition (2 levels: neutral versus secure) as the between-subjects factor. Depressed mood was the dependent variable. Baseline anxiety and baseline depression were entered as covariates. The effect of prime condition was not significant, $F(1, 8) = .05, p = .82$. The estimated marginal mean for the secure condition was 25.95, $SE = 4.20$. The estimated marginal mean for the neutral condition was 27.34, $SE = 4.20$. See Figure 13 for a display of the estimated marginal means at each time point. Baseline anxiety did not have a significant effect on depressed mood, $F(1, 8) = .00, p = .95$. Baseline depression had a marginally significant effect on depressed mood, $F(1, 8) = 4.26$, p = .07. Higher levels of baseline depression predicted higher levels of depressed mood at Time 4, $B = .89, t = 1.90, p = .08$, although this effect was only marginally significant. Baseline depression did not significantly predict depressed mood at Time 1 or Time 5.

The effect of time on depressed mood was not significant, $F(2, 16) = .47, p = .63$. The interaction between condition and time on depressed mood was not significant, $F(2, 16) = .52, p = .60$.

Anxious Mood: Preliminary Analyses

Baseline depression was significantly correlated with anxious mood at Time 1 and baseline anxiety was significantly correlated with anxious mood at Time 1 and Time 5 (see Table 7) and these variables were therefore suitable to be included as covariates in an ANCOVA, when anxious mood is the DV and experimental condition is the IV. Attachment anxiety and attachment avoidance were not correlated with anxious mood and were thus not considered as covariates. Both baseline anxiety and baseline depression were independent from the experimental effect, thus meeting this ANCOVA assumption (as described in the felt security preliminary analyses section).

I customised an ANCOVA model to examine whether the homogeneity of regression slopes assumption was met for each of the potential covariates. Anxious mood at each time point was entered as the within-subjects factor. Baseline anxiety, baseline depression, condition and the interaction between each of the potential covariates were entered as between-subjects factors. The interaction between baseline anxiety and condition was not significant, $F(1, 6) = .22$, $p = .66$, indicating that the assumption of homogeneity of variance was met for baseline anxiety. The interaction between baseline depression and condition was not significant, $F(1, 6) = .27$, $p = .62$, indicating that this assumption was also met for baseline depression.

I then examined the normality of the distribution across error scores, by saving the standardised residuals from the felt security ANCOVA model, with baseline anxiety and baseline depression included as covariates. The standardised residuals for Time 1 anxious mood were normal in distribution, $D(12) = .16$, $p = .20$. Levene's test indicated that the error variance was equal across conditions, $F(1, 10) = 3.53$, $p = .09$. The Time 4 anxious mood standardised residuals were normal in distribution, $D(12) = .22$, $p = .10$. Levene's test indicated that error variance was equal across conditions, $F(1, 10) = .00$, $p = .98$. The standardised residuals for Time 5 anxious mood were normal in distribution, $D(12) = .14$, $p = .20$. Levene's test indicated that the error variance was equal across conditions, $F(12) = .11$, $p = .74$.

Anxious Mood: Main analyses

I conducted a mixed-design ANCOVA with time (3 levels: Time 1, 4 and 5) as the within-subjects factor and condition (2 levels: secure versus neutral) as the between-subjects factor. Anxious mood was the DV. Baseline anxiety and baseline depression were entered as covariates. The effect of prime condition on anxious mood was not significant, $F(1, 8) = .11$, $p = .75$. The estimated marginal mean for the secure condition was 16.92, $SE = 2.90$. The estimated marginal mean for the neutral condition was 18.33, $SE = 2.98$. See Figure 14 for a display of the estimated marginal means at each time point. Baseline depression did not have a significant effect on anxious mood, $F(1, 8) = .23$, $p = .65$. Baseline anxiety had a marginally significant effect on anxious mood, $F(1, 8) = 4.96$, $p = .06$. Higher levels of baseline anxiety predicted higher levels of anxious mood at Time 5, $B = 1.97$, $t = 2.56$, $p < .05$. Baseline anxiety did not significantly predict anxious mood at Time 1 or Time 4. The effect of time on anxious mood was not significant, $F(2, 16) = .20$, $p = .82$.

The interaction between condition and time on depressed mood was not significant, $F(2, 16) = .96$, $p = .11$.

Discussion

In this experiment I aimed to explore the effects of attachment security priming, in the laboratory and subsequently by text message, on felt security and depressed and anxious mood in a sample of clinically depressed outpatients. Contrary to hypotheses, participants in the secure prime condition did not report higher felt security compared to those in the neutral condition. No differences were observed in felt security between prime conditions. However, the felt security means were in the predicted direction, with participants in the secure condition reporting slightly higher levels of felt security compared to participants in the neutral condition. My hypothesis that felt security would decrease between the final text prime and 24 hours later was not supported. There was no interaction between prime condition and time, in line with hypotheses.

Moreover, in contrast to hypotheses, participants in the secure prime condition did not report less depressed mood compared to participants in the neutral condition. The means were in the expected direction, however, with participants in the secure condition reporting lower levels of depressed mood compared to those in the neutral condition. In support of hypotheses, there was no main effect of time, or interaction between condition and time on depressed mood. The results for anxious mood were similar to those for depressed mood. Contrary to hypotheses, there were no differences in anxious mood between the secure and neutral conditions. However, the mean levels of anxious mood were in the expected direction, with participants reporting less anxious mood than those in the neutral condition. In support of hypotheses, there was no main effect of time, or interaction between condition and time on anxious mood.

The ultimate limitation of this experiment was the lack of statistical power. Recruiting eligible participants for this experiment proved to be challenging. Less than 1 in 3 patients who were invited to take part in the study agreed to do so. However, those who did agree to take part appeared to show enthusiasm for and commitment to the research and only 1 out of all 12 participants failed to complete all parts of the study. Furthermore, participants followed the instructions they were provided with and replied to text messages as requested. These findings are promising and suggest that if data collection for the study were to continue over an

increased length of time (I only had 7 months available to collect the data for this experiment), then it would be possible to recruit and retain enough participants for adequate statistical power to be obtained for the statistical analyses. If this experiment was replicated using a larger sample it is likely that more reliable conclusions could be drawn from the research. These findings are promising and suggest that security priming via text message may well be a suitable medium for text security priming in samples of people with clinical depression.

Conclusion

The means from the study were in the expected direction, with participants in the secure prime condition reporting higher levels of felt security and lower levels of depressed and anxious mood, compared to participants in the neutral condition. However, the results were not significant, which is likely to be due to the lack of statistical power obtained in this experiment. Thus, the conclusions that can be drawn from the research are limited. Taken together, these results suggest that text message primes may be suitable for use with people suffering from clinical depression. Further research should be conducted with larger samples to explore whether repeated security priming (in the lab and via text message) has a beneficial effect on the felt security and mood of people diagnosed with clinical depression.

EFFECTS OF SECURITY PRIMING ON DEPRESSED AND ANXIOUS MOOD

Table 7

Study 4: Descriptive Statistics and Correlations between all Variables.

	Mean	SD	ANX	AVO	FT1	FT4	FT5	BD	DT1	DT4	DT5	BA	AT1	AT4	AT5
ANX	4.25	1.53	-	.10	-.59	-.62**	-.70*	.70*	.29	.46	.44	.78**	.46	.48	.35
AVO	3.76	1.53		-	-.37	.04	-.16	.23	.45	.22	.17	.29	.41	.00	.30
FT1	3.06	1.16			-	.82**	.68*	-.81**	.70	-.56	-.54	-.70*	-.55	-.37*	-.27
FT4	3.31	1.22				-	.88*	-.70*	-.40	-.56	-.52	-.58	-.31	-.45	-.28
FT5	3.04	1.05					-	-.65*	-.28	-.51	-.53	-.66*	-.18	-.47	-.45
BD	31.67	15.48						-	.74**	.75**	.67*	.83*	.58*	.56	.40
DT1	27.75	16.19							-	.82**	.78**	.65*	.83*	.63*	.56
DT4	24.71	16.84								-	.89**	.59*	.61*	.88*	.63*
DT5	28.42	13.20									-	.64*	.67*	.87**	.65*
BA	19.58	8.13										-	.74*	.56	.68*
AT1	16.83	8.66											-	.64*	.65*
AT4	15.12	9.08												-	.68*
AT5	20.92	14.64													-

Note. $N = 12$. *$p <. 05$. **p $< .01$ ANX = Attachment anxiety. AVO = Attachment avoidance. FT1 = Felt Security at Time 1. FT4= Felt Security at Time 4. FT5 = Felt Security at Time 5. T5 = Time 5. BD = Baseline Depression. DT1 = Depressed Mood at Time 1. DT4 = Depressed Mood at Time 4. DT5 = Depressed Mood at Time 5. BA = Baseline Anxiety. AT1 = Anxious Mood at Time 1. AT4 = Anxious Mood at Time 4. AT5 = Anxious Mood at Time 5.
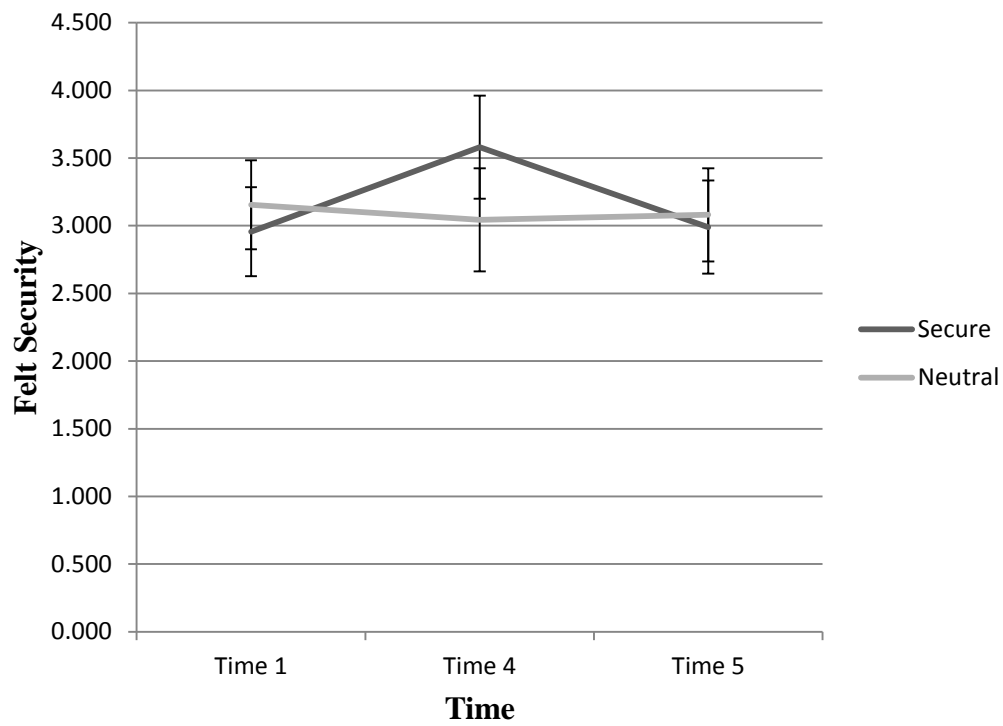
Figure 12. Means for felt security in each of the prime conditions in Study 4.
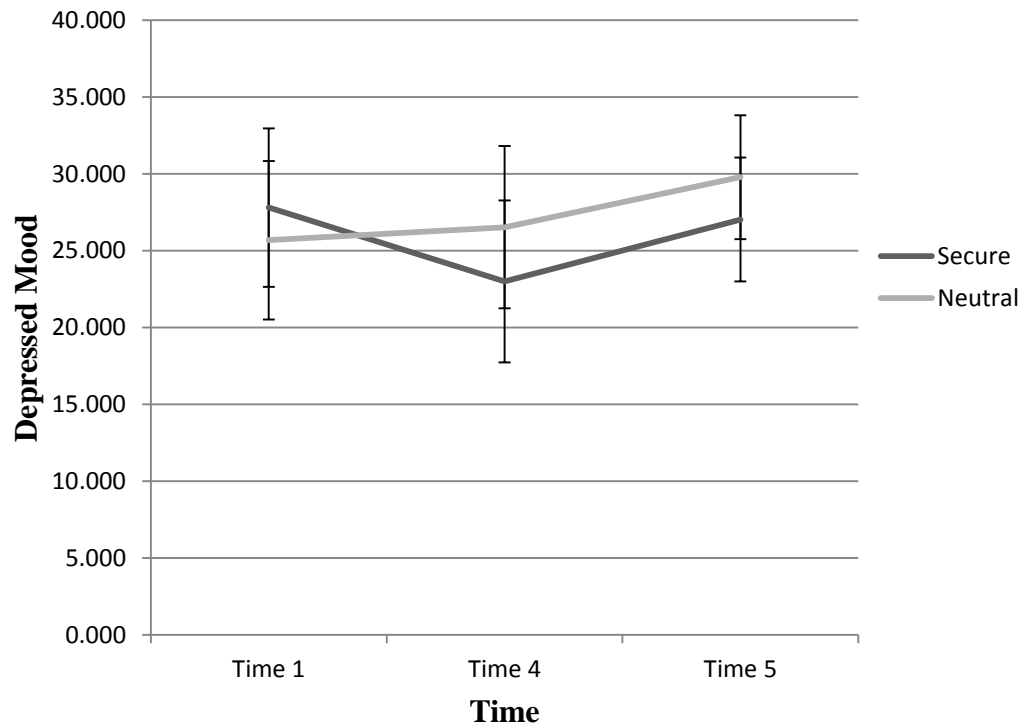
Figure 13. Means for depressed mood in each of the prime conditions in Study 4.

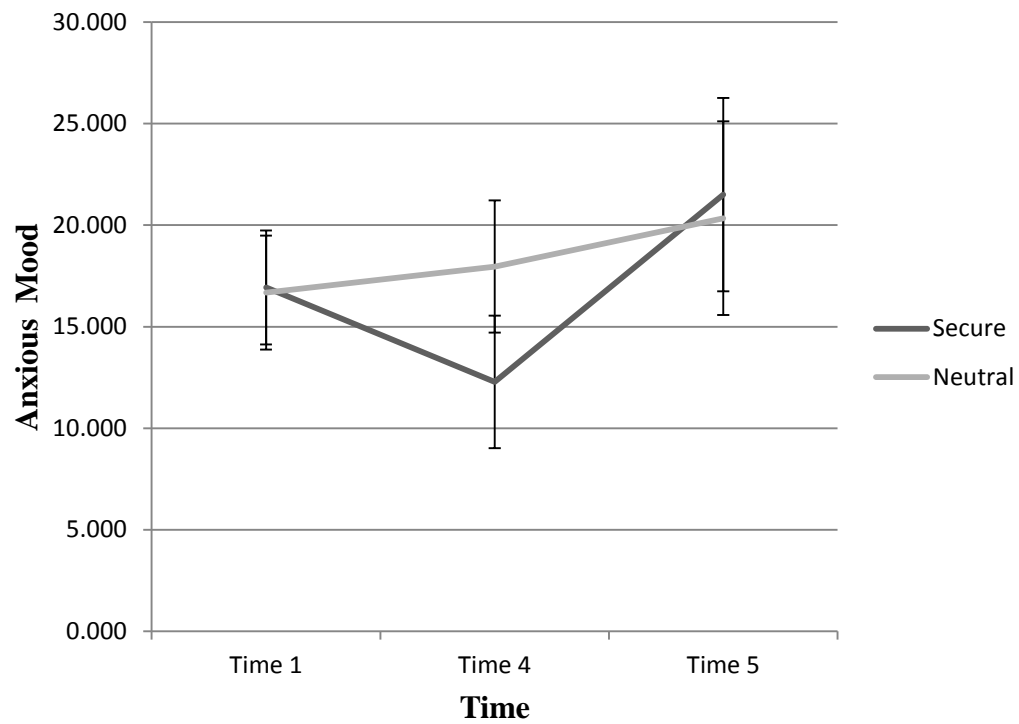*Figure 14*. Means for anxious mood in each of the prime conditions in Study 4.

6. CHAPTER SIX

General Discussion

As discussed in Chapter 1, attachment theory (e.g., Bowlby, 1988) suggests that the ability to depend on external or internal attachment figures is the most far-reaching consequence of attachment security, promoting the development of affect regulation, social and interpersonal skills and autonomy. Attachment theory provides a model of successful emotion regulation and control of interpersonal closeness (Cassidy, 1994; Mikulincer & Shaver, 2007a). Moreover, Bowlby (1980) argued that the loss of attachment security during infancy could leave an individual vulnerable to experiencing depression later in life, as the individual learns to see themselves as un-loveable and others as untrustworthy. In addition, Bowlby (1973) argued that attachment insecurity could trigger the development of anxiety disorders, as the attachment system has failed to achieve its protective function and the child (and later, adult) therefore feels unsafe when exploring the world and entering new situations.

Furthermore, people high in attachment anxiety tend to experience intensification of negative emotions and thoughts and an inability to detach from emotional distress (Shaver & Mikulincer, 2002). By contrast, individuals who are high in avoidance are likely to be able to suppress some negative emotions (e.g., Fraley & Shaver, 1997) and although these deactivating strategies may not always be effective (e.g., Mikulincer et al., 2004), they may provide some protection from anxiety and depression.

In support of attachment theory, research findings suggest that attachment insecurity is associated with both depression and anxiety. Research from a number of non-clinical samples suggests that both attachment anxiety and attachment avoidance are linked with depressive symptoms (e.g., Davila, 2001; Whiffen et al., 2001; Williams & Riskind, 2004). However, a smaller pool of research findings from non-clinical samples suggests that attachment anxiety is associated with depressive symptoms, but attachment avoidance is not (e.g., Besser & Priel, 2005; Shaver et al., 2005). Research from clinical samples suggests that both high attachment anxiety and high attachment avoidance are related to depression symptoms (e.g., Carnelley et al., 1994; Reinecke & Rogers, 2001; Reis & Greyner, 2004). Many correlational studies from non-clinical samples show that both attachment avoidance and attachment anxiety are positively correlated with anxiety symptoms (e.g., Doi &

Thelan, 1993; Hankin et al., 2005; Irons & Gilbert). However, a smaller group of studies have found a positive relationship between attachment anxiety and anxiety symptoms and no link between attachment avoidance and anxiety symptoms (e.g., Sonnby-Borgstrom & Jonsson, 2004; Strodl & Noller, 2003). In addition, evidence from clinical samples suggests that social anxiety disorder is associated with attachment anxiety and avoidance (Eng et al., 2001) and adolescents with a diagnosed anxiety disorder are more likely to be categorised as insecure in attachment, compared to adolescents without anxiety disorders (Brumario et al., 2013). Furthermore, evidence suggests that OCD is associated with high levels of attachment anxiety but not attachment avoidance (Doron et al., 2012).

Overall, evidence linking attachment patterns with depression and anxiety shows that attachment insecurity in general is associated with depression and anxiety. However, there appears to be more consistent evidence for a link between attachment anxiety and anxiety and depression symptoms than for attachment avoidance and anxiety and depression symptoms. See Chapter 1 (and Mikulincer & Shaver, 2007a) for a complete review of the literature relating to attachment patterns and depression and anxiety.

Previous research exploring the link between attachment dimensions and depression and anxiety has been correlational in nature and thus has not established causal relationships between the variables. However, there is some evidence suggesting that depressed mood states are unlikely to cause attachment insecurity (Haaga et al, 2002).

Further research exploring causal relationships between attachment patterns and mood disorders was necessary in order to shed further light on the relationship between attachment patterns and depression and anxiety. Given that depression or anxiety (or more commonly a combination of both) affects nearly 1 in 6 of the adult population in England (NHS Information Centre, 2009), establishing the cause of depression or anxiety has important implications for the treatment of these disorders. If researchers understand the cause of these mood disorders, then preventative measures can be put in place for individuals who may be vulnerable to experiencing anxiety or depression, or interventions can be developed to address the root cause of the mood disorder in those already experiencing symptoms. Thus, my first aim in this thesis was to explore causal relationships between attachment style and depression and anxiety through the use of attachment style (versus neutral) priming.

As discussed in Chapter 1, previous research has shown that attachment security can be induced in laboratory settings (e.g., Rowe & Carnelley, 2003) and that the beneficial effects of repeated security priming can last for a number of days (e.g., Carnelley & Rowe, 2007). Research findings have demonstrated that attachment security priming has many beneficial effects, such as increasing positive affect comparative to neutral primes (Mikulincer et al., 2001) and protecting individuals from PTSD (Mikulincer et al., 2006). In addition, evidence suggests that secure relational figures or therapists can increase an individual's attachment security (e.g. Travis et al., 2001) as well as reduce depression symptoms (e.g., Tasca et al., 2007). On the basis of these findings (see Chapter 1 for a complete discussion), my second aim in this thesis was to explore the effects of attachment security priming (versus neutral primes) on depressed and anxious mood states in participants from both non-clinical and clinical samples.

My final aim in this thesis was to further develop and extend the repeated security priming methodology developed by Carnelley and Rowe (2007), through testing the effectiveness of secure text message primes (on felt security and depressed and anxious mood states). Previous repeated security priming methods in the laboratory were time-consuming (see Chapter 1 for a discussion). By contrast, text messages are a location-independent and practical method of delivering security primes that can easily be integrated within participants' daily activities. If text message primes were successful in inducing a sense of felt security and lowering depressed and anxious mood in participants, then this would open up further possibilities for the implementation of longer term research studies exploring the effects of repeated text security priming on attachment security, mood and mental health.

Exploring Causal Relationships between Attachment Patterns and Depressed and Anxious Mood

My research findings from Study 1 extend previous correlational research on attachment patterns and depression and suggest that there is a causal relationship between attachment anxiety and depression. Participants primed with attachment security reported lower levels of depressed mood compared to participants primed with attachment anxiety (see Chapter 2). These findings are in line with correlational evidence documenting a link between attachment anxiety and depression but not attachment avoidance and depression (e.g., Besser & Priel, 2005). In addition, these

findings suggest that the negative model of self that is associated with attachment anxiety is more likely to trigger depression, compared to the negative model of others that is associated with attachment avoidance (e.g., Bartholomew & Horowitz, 1991).

Previous correlational findings have shown that both attachment anxiety and avoidance are correlated with depression (e.g., Williams & Riskind, 2004). Participants in the secure prime condition reported marginally less post-prime depressed mood compared with participants in the avoidant prime condition in Study 1. Further research is necessary to explore whether there is a causal relationship between attachment avoidance and depression.

Moreover, my findings extend previous correlational research and suggest that there is a causal relationship between attachment anxiety and anxiety and between attachment avoidance and anxiety. Participants primed with attachment security reported less anxious mood post-prime compared to participants in the anxious and avoidant attachment style prime conditions (see Chapter 2). These findings are consistent with previous correlational research documenting a link between both attachment dimensions and anxiety (e.g., Eng et al., 2004). However, these findings are inconsistent with correlational evidence showing that attachment avoidance is not related to anxiety (e.g., Doron et al, 2012).

It is possible that different types of anxiety disorder may have unique causes, which may account for the inconsistent research findings concerning which attachment dimensions are related to anxiety symptoms. For example, it might be that both attachment dimensions predict GAD, but only attachment anxiety predicts OCD. Doron et al.'s (2012) study examined correlational relationships between the attachment dimensions and OCD symptoms. By contrast, the measure of anxious mood state that I used in this thesis (POMS) seems to tap into a general state of anxiety or tension, rather than the specific symptoms of any one anxiety disorder (such as OCD, PTSD or Social Anxiety Disorder). Thus, it may be the case that the findings from Study 1 cannot be generalised to any specific anxiety disorder. Further research is necessary to explore whether attachment anxiety or avoidance have a causal effect on specific anxiety disorders.

The Efficacy of Security Priming via Text Message

The research findings presented in Study 2 were novel in that they explored the effects of repeated security priming via text message, an area that had not

previously been examined. Inspired by the efficacy of the repeated security priming manipulation developed by Carnelley and Rowe (2007), and the clinical implications of increasing attachment security, one of the aims of this thesis was to expand upon and 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. My aim was to develop and test the effectiveness of a flexible, low-cost and location-independent method of delivering repeated attachment security primes, through the use of mobile phone text messages. In Study 2 (see Chapter 3), I essentially wanted to explore whether security priming texts could keep the secure prime 'alive' outside of the laboratory, once participants were going about their daily activities. I predicted that participants primed with attachment security (compared to those in a neutral prime condition) would report higher levels of felt security at each time point in the study.

The results from Study 2 suggest that secure-priming (in comparison to neutral-priming) increased participants' felt security immediately after the laboratory prime, consistent with my predictions and with past research findings (e.g., Luke et al., 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 my 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 'alive' for a number of days. In this sense the text messages can be viewed as "security booster" primes. Overall, participants' felt security decreased between completing the felt security questionnaire after their last secure text prime and the final felt security measure, 24 hours later. It makes sense 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. The findings from Study 2 were replicated in Study 3 (see Chapter 4). These results are extremely promising and suggest that text messages are a suitable method for repeated security priming.

The Effects of Secure versus Neutral Priming on Depressed and Anxious Mood

In Studies 1, 2 and 3, I explored the effects of secure versus neutral priming on depressed and anxious mood in undergraduate samples, an area which, to my knowledge, has not been previously explored by other researchers. I predicted that

participants primed with security would report less depressed and anxious mood, compared to those in a neutral prime condition.

Contrary to my hypotheses, participants in the secure prime condition in Study 1 (see Chapter 2) did not report less post-prime depressed mood in comparison to those in the neutral prime condition. This finding was inconsistent with previous research documenting the energising (Luke et al., 2012) and positive affect-inducing (Mikulincer et al., 2001) effect of security priming (comparative to neutral priming). Furthermore, participants in the secure prime condition in Study 1 (see Chapter 2) did not report less anxious mood post-prime compared to those in the neutral condition. These findings were in contrast to evidence documenting that security priming can help protect individuals from experiencing PTSD, a type of anxiety disorder, after traumatic events (Mikulincer et al., 2006).

The findings from Study 1 were strange, as although the security primes seemed to induce a sense of felt security (with participants in the secure prime condition reporting higher levels of post-prime felt security compared to those in the neutral condition), the felt security induced did not lead to a reduction in depressed or anxious mood, compared to neutral priming. A similar pattern of results was observed in Study 2 (see Chapter 3). Participants primed with attachment security (first in the lab and then on 3 subsequent days via text message) reported higher post-prime felt security compared to those in the neutral prime condition. However, once again, participants in the secure condition did not report less depressed or anxious mood compared to those in the neutral condition.

A limitation of Study 1 and Study 2 was that I did not control for whether participants in the secure condition were visualising and writing about relational figures who met the criteria of a secure attachment figure (e.g., a relational figure participants felt comfortable depending on and being close to). In addition, I did not control for whether the attachment figures selected by those in the secure condition were individuals with whom the participants were currently in contract with. It is possible that the lack of control over the significant others selected may have impacted the results of the secure (versus neutral) priming on depressed and anxious mood. However, I did include a manipulation check in all 4 studies (the felt security measure) and in Studies 2, 3 and 4 the felt security results suggested that the secure primes were effective at inducing a sense of felt security, compared to neutral primes.

Nonetheless, I decided to control for the quality of the attachment figures participants selected in Study 3 (see Chapter 4) by collecting information concerning participants closest significant others and selecting the appropriate secure attachment figures for those allocated to the secure prime condition. This way I could increase the likelihood that participants were selecting attachment figures that were currently a part of their lives and met the criteria for a secure attachment figure.

The results from Study 3 were promising. As in Study 2, participants primed with attachment security (once in the laboratory and then for 3 days via text message) reported higher felt security compared to those in the neutral condition. Moreover, participants in the secure condition reported less anxious mood compared to those in the neutral condition. These findings extend previous research documenting the positive effects of security priming and suggest that attachment security priming is likely to reduce anxious mood (and potentially reduce the symptoms of anxiety disorders in clinical samples). In addition, time did not moderate the effect of the prime, suggesting that these 'security booster' text messages were able to sustain the reduction in anxious mood for several days following the laboratory prime and even 24 hours after the last text prime.

Participants in the secure condition did not report lower depressed mood compared to participants in the neutral condition. However, the results suggested that while security priming in the laboratory did not lead to less depressed mood immediately after the prime (compared to neutral priming), after 3 days of repeated security priming (and 24 hours after the last text message prime) participants in the secure condition were reporting (marginally significant) lower levels of depressed mood compared to those in the neutral condition. These findings should be interpreted with caution and need to be replicated with a larger sample before any generalisations can be made. However, they do provide preliminary evidence suggesting that over time, repeated security priming is likely to lead to a reduction in depressed mood (and potentially depression symptoms).

These findings suggest that attachment security priming may be more effective at reducing anxiety, rather than depression (at least on a short-term basis). It is possible that security priming is particularly effective for reducing anxiety as it boosts the person's belief in their ability to cope with stressful situations, thus reducing anxiety and fear. By contrast, depression does not seem to be related to fear, but instead to negative views of oneself and the environment and the future (e.g.,

Abramson et al., 1989; Williams & Riskind, 2004). These negative views may not be so easily reduced or revised through attachment security priming, compared to the feelings of fear associated with anxiety.

In Study 4 (see Chapter 5), I explored the effects of attachment security priming on depressed and anxious mood in a sample of clinically depressed outpatients. Participants were primed with a secure (versus neutral) prime in the laboratory and then for the following 3 days via text message. Although the means were in the expected direction, with participants in the secure condition reporting higher felt security and lower depressed and anxious mood, compared to participants in the neutral condition, no significant differences were found. Unfortunately, due to slow recruitment, I was unable to obtain adequate statistical power in this experiment. However, this research was promising in that those who did agree to take part demonstrated commitment to the research. All but one of the participants completed all parts of the study. In addition, participants adhered to the study instructions and replied to text messages as requested. These results suggest that security priming via text message may well be a suitable medium for text security priming in samples of people with clinically-diagnosed depression. Moreover, these findings are promising and suggest that if data collection for the study were to continue over a longer time period, then it would be possible to recruit and retain enough participants for adequate statistical power to be obtained and more reliable conclusions to be drawn from the research.

Directions for Future Research

The findings from Study 1 suggest that there is a causal relationship between attachment anxiety and depression, between attachment anxiety and anxiety, and between attachment avoidance and anxiety. These findings have clinical implications for the treatment of anxiety and depression. Evidence (Travis et al. 2001) suggests that during therapy for depression and anxiety, changes towards increased attachment security in clients are associated with better therapeutic outcomes. This may be because of the role of attachment insecurity in causing anxiety and depression. By increasing an individual's attachment security, therapists may also be treating the cause of depression or anxiety for some insecurely attached individuals. This implies that it is possible that people who are high in attachment anxiety and experiencing depression may particularly benefit from therapy. Future research should explore whether certain types of treatment (e.g., medication versus face-to-

face therapy) differ in effectiveness for people with different levels of attachment anxiety and attachment avoidance.

Moreover, the results from Study 3 suggest that security priming (in the laboratory and via text message) reduces anxious mood, compared to neutral priming. In order to explore whether these findings can be generalised to clinical populations, future research should replicate Study 3 (see Chapter 4) with larger samples of people diagnosed with anxiety disorders. It would be interesting to test the effects of security priming on anxiety symptoms in patients with different types of anxiety disorder (e.g., PTSD, GAD or SAD) to explore whether security priming is more or less effective at reducing anxiety symptoms depending on the type of anxiety disorder participants present with.

In addition, the finding that attachment security priming leads to less anxious mood compared to neutral priming represents a potential stepping stone for attachment-focused interventions to be developed for use in clinical samples of people with anxiety disorders, perhaps by combining repeated security priming with other forms of psychological therapy, such as CBT. One potential experimental design might be to split participants with clinically diagnosed anxiety into two experimental conditions. The control group would receive only their usual treatment (e.g., CBT) while the experimental group of participants would receive their usual treatment and in addition to this treatment they would receive repeated security priming (e.g., online and via text messaging). Attachment security and anxiety symptoms would be the outcome measures (controlling for dispositional levels of baseline anxiety and dispositional attachment security). The results from such an experiment would shed light on whether security priming enhances the effects of already well-established therapies for anxiety disorders.

The felt security findings from Study 2 and Study 3 are promising and demonstrate that text messaging is an effective 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.

Moreover, future research should directly explore the extent to which secure text primes "boost" the sense of attachment security originally primed in the

laboratory. Study 3 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 I propose, the felt security scores (and other associated outcomes) in this additional experimental condition should deteriorate after the laboratory session and not persist over time.

Strengths and Limitations

My research has a number of strengths. Firstly, my research is the first (to my knowledge) to explore causal relationships between primed attachment style and depressed and anxious mood, extending previous correlational research concerning the relationship between the attachment dimensions and depression and anxiety (see Chapter 1 and Mikulincer & Shaver, 2007a for a discussion of these findings). I use the term 'causal relationship' to discuss my findings because of the experimental design used in the studies reported in this thesis. Through manipulating the attachment style primes that participants completed, I was able to explore causal relationships between primed attachment style and depressed and anxious mood. However, this language should not be taken to imply that attachment patterns are the only or most important causal factor in anxiety and depression. A wide range of biological, psychological and social factors are likely to have a significant impact on the development and the course of depression and anxiety disorders. Nonetheless, my research is the first to uncover causal relationships between attachment anxiety and depressed mood and between both dimensions of attachment insecurity and anxious mood, implying that attachment insecurity is likely to play an important role in the cause or development of depression and anxiety disorders.

Moreover, this research extends the findings from previous research documenting the beneficial effects of attachment security priming (e.g., Rowe & Carnelley, 2003; Mikulincer et al., 2001) by providing evidence that attachment security priming (compared to neutral priming) reduces anxious mood in undergraduates. These findings open up possibilities for further research with clinical samples of people diagnosed with anxiety disorders. In addition, my work has important implications for the development of attachment-focused clinical interventions for people who are insecurely attached and diagnosed with an anxiety disorder.

Finally, this research successfully developed and established the effectiveness of an innovative method of delivering repeated attachment security primes, through the use of text messages. This research has extended the work of previous repeated security priming research (e.g., Carnelley & Rowe, 2007) which was undertaken in the laboratory. These findings represent a practical, effective and location-independent way forward for researchers to extend security priming research to real life settings.

However, my research is not without limitations. One of the limitations of this research was the lack of control over the quality of the attachment figures participants selected in Study 1 and Study 2. My research findings suggest that ensuring that the attachment figures that participants select in attachment security priming experiments are people that meet the criteria for a secure attachment figure and that they are in contact with is important.

Furthermore, the majority of the participants in Studies 1, 2 and 3 were undergraduate students with a mean age of approximately 21 years across studies. In addition, in both Study 1 and Study 3 the majority of the participants were female. Given that the samples consisted of mostly young, female undergraduate students, it is possible that these results do not generalise to a wider population. Finally, a major limitation of this research was the low number of participants recruited to Study 4. Unfortunately, due to the slow recruitment of outpatients with depression, I was unable to collect enough data to obtain adequate statistical power for my planned data analyses. Future research should explore the effects of repeated attachment security priming on the depressed mood of clinically depressed outpatients, with a larger sample of participants.

Conclusions

My research is the first to explore causal relationships between attachment patterns and depressed and anxious mood. The research in this thesis indicates that attachment anxiety causes an increase in depressed mood. In addition, this research suggests that attachment anxiety and avoidance both cause an increase in anxious mood. Moreover, the research in this thesis is the first to develop and establish the effectiveness of a novel, practical and location-independent method of delivering attachment security primes, through the use of text messages. Furthermore, my research is the first to demonstrate that repeated attachment security priming (in the laboratory and via text message) has a beneficial effect on anxious mood. To

conclude, the research findings in this thesis make a useful and novel contribution to understanding the role that attachment patterns play in anxiety and depression. Moreover, the evidence provided in this thesis has important implications for the development of attachment-focused interventions designed to reduce the symptoms of anxiety and depression.

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Footnotes

[1] Bowlby (1969) used the term 'mother-figure' to refer to a person who 'mothers' a child and to whom that child becomes attached to. The 'mother-figure' is not necessarily the child's biological mother; the person could be another family member or caregiver to whom the child is attached.

[2] In order to explore whether the effects of the primes on Time 1 felt security differed for people with different levels of baseline depression or anxiety, I ran a separate regression analysis. The three attachment dummy prime variables and baseline depression and baseline anxiety (both centred) were entered at Step 1. The interaction between each of the dummy prime variables and baseline depression and each of the dummy variables and baseline anxiety was entered at Step 2. No significant interactions were found between baseline anxiety and the dummy prime variables or baseline depression and the dummy prime variables on felt security, indicating that the effect of the primes was equally effective regardless of a person's baseline levels of anxiety or depression.

[3] In order to explore whether the effects of the primes on Time 1 depressed mood differed for people with different levels of attachment anxiety or avoidance, I conducted a separate regression analysis. The three attachment dummy prime variables, attachment anxiety, attachment avoidance (both centred) and baseline anxiety were entered at Step 1. Baseline anxiety was included at Step 1 as this variable was included as a covariate in the depressed mood ANCOVA. The interaction between each of the dummy prime variables and attachment avoidance and each of the dummy variables and attachment anxiety was entered at Step 2. No significant interactions were found between attachment anxiety and the dummy prime variables or attachment avoidance and the dummy prime variables on depressed mood, indicating that the primes were equally effective regardless of a person's dispositional levels of attachment anxiety or avoidance.

[4] In order to explore whether the effects of the primes on Time 1 anxious mood differed for people with different levels of attachment anxiety or avoidance, I conducted a separate regression analysis. The three attachment dummy prime variables, attachment anxiety, attachment avoidance (both centred), baseline anxiety and baseline depression were entered at Step 1. Baseline anxiety and baseline depression were included as they were covariates in the anxious mood ANCOVA. The interaction between each of the dummy prime variables and attachment

avoidance and each of the dummy variables and attachment anxiety was entered at Step 2. No significant interactions were found between attachment anxiety and the dummy prime variables or attachment avoidance and the dummy prime variables on anxious mood, indicating that the primes were equally effective, regardless of a person's dispositional level of attachment anxiety or avoidance.

[5] I examined whether the effect of prime on Time 1 felt security differed for people with different with different levels of dispositional attachment anxiety or avoidance, in a separate regression analysis. Attachment anxiety, attachment avoidance (both centred) and condition were entered at Step 1. The interactions between condition and attachment anxiety and condition and attachment avoidance were entered at Step 2. Neither interaction was significant. This suggests that the security prime was equally effective for participants, regardless of their levels of attachment anxiety or avoidance.

[6] I examined whether the effect of prime on Time 1 felt security differed for people with different levels of baseline anxiety or baseline depression, in a separate regression analysis. Baseline depression, baseline anxiety (centred), attachment avoidance and condition were entered at Step 1. Attachment avoidance was included at Step 1 because this variable was a covariate in the felt security ANCOVA. The interactions between condition and baseline anxiety and condition and baseline depression were entered at Step 2. Neither interaction was significant. These findings suggest that the security prime was equally effective for participants, regardless of their baseline levels of baseline anxiety or depression.

[7] I examined whether the effect of prime on Time 1 depressed mood differed for people with different levels of dispositional attachment anxiety or attachment avoidance, in a separate multiple regression analysis. Attachment anxiety and avoidance (both centred), baseline anxiety and condition were entered at Step 1. Baseline anxiety was included at Step 1 because this variable was a covariate in the depressed mood ANCOVA. The interaction terms between condition and attachment anxiety and condition and attachment avoidance were entered at Step 2. Neither interaction was significant, suggesting that a person's level of attachment anxiety or avoidance did not alter the effectiveness of the security primes.

[8] I examined whether the effect of the primes on Time 1 depressed mood differed for people with different levels of baseline anxiety or baseline depression, in a separate regression analysis. Baseline depression and baseline anxiety (both

centred), and condition were entered at Step 1. The interactions between condition and baseline anxiety and condition and baseline depression were entered at Step 2. Neither interaction was significant, suggesting that the secure prime was equally effective, regardless of a person's baseline level of anxiety or depression.

[9] I examined whether the effect of prime on Time 1 anxious mood differed in individuals with different levels of dispositional attachment anxiety or avoidance in a multiple regression analysis. Attachment anxiety and avoidance (both centred), baseline depression and condition were entered at Step 1. Baseline depression was included at Step 1 as this variable was included in the anxious mood ANCOVA. The interaction terms between condition and attachment anxiety and condition and attachment avoidance were entered at Step 2. Neither interaction was significant. These findings suggest that the secure prime was equally effective, regardless of participants' dispositional levels of attachment anxiety and avoidance.

[10]I examined whether the effect of prime on Time 1 anxious mood differed in people with differing levels of baseline anxiety or baseline depression in a separate regression analysis. Baseline depression, baseline anxiety (both centred) and condition were entered at Step 1. The interactions between condition and baseline anxiety and condition and baseline depression were entered at Step 2. Neither interaction was significant, suggesting that the secure prime was equally effective, regardless of participants' dispositional levels of baseline anxiety or baseline depression.

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Appendix A

Text primes used in Study 2

Time 2 Secure Condition Text Message:

Please spend three minutes thinking about the person you visualised and how they make you feel safe, secure and comforted. When finished please reply "Done".

Time 2 Neutral Condition Text Message:

Please spend three minutes thinking about the route you take from home to university. When finished please reply "Done".

Time 3 Secure Condition Text Message:

Please spend three minutes thinking about a time when the person you visualised made you feel loved and valued. When finished please reply "Done".

Time 3 Neutral Condition Text Message:

Please spend three minutes thinking about the route you take from your home to the supermarket. When finished please reply "Done".

Time 4 Secure Condition Text Message:

Please spend three minutes thinking about a time when the person you visualised made you feel supported and good about yourself. When finished please reply "Done" and then log in to iSurvey to complete the final part of the study.

Time 4 Neutral Condition Text Message:

Please spend three minutes thinking about the route you take from university to home. When finished please reply "Done" and then log in to iSurvey to complete the final part of the study.

Appendix B

Information Sheet given to participants in Study 3

Memory and Imagination Study: Introductory Session

Lead researcher: Ms Lorna Otway (PhD student)

- **What is the study about?**
  - o Looking at people's ability to use their imagination and memory recall skills on tasks they receive by text message during their everyday lives.
  - o We are testing a new method of data collection where you are asked to complete visualisation tasks in your everyday life. **In order for us to test how well this new method works we need to work together to make the study a success. It is important that you follow the instructions you are given by text and commit to the study.** In return, once you have completed all of your tasks you will receive 6 credits in return for your participation.

- **What's involved?**
  - o Thursday – initial meeting with Vicky and you complete a questionnaire.
  - o The following Monday morning – session in the lab where you will complete a computer task and fill out a questionnaire.
  - o On Tuesday, Wednesday, Thursday of that week you will receive texts at a mutually agreed time. Each text will contain a 3 minute visualisation task. **We ask that you fully concentrate on the task for the entire 3 minutes and then send a reply text once you have completed the visualisation task. The reply text should contain the word "done" along with *any words or sentences* regarding *the thoughts you had during the visualisation task.* It is very important that you send this reply text so that we can tell that you are participating in the study according to the rules.**
  - o **On Thursday**, once you have completed your 3 minute task and replied to the experimenter, **you will receive a text you asking you to check your university email account as soon as possible**. You will find a link to the next part of the study in your email. **Please complete this immediately**. **This part of the study is important.**
  - o **On Friday**, you will receive a final text asking you to **check your university email account where you will find a link to the last part of the study.**
  - o **It is important that you complete all parts of the study at the agreed times, including the online parts.**
  - o We understand that sometimes real life events might get in the way and perhaps you will receive our text at a bad time. If this happens, please contact me on Lorna.Otway@soton.ac.uk, as soon as possible to let me know why you haven't completed the task/why you have completed it late. Similarly, if you feel at any point that you are unable to continue with the study, please contact me and let me know.
  - o Please make sure your mobile is on and that you are in an area with phone reception at the time we have arranged for you to receive your texts. If you are unable to send a reply text from your phone for any

reason, it is also acceptable to email me your "done" response (Lorna.Otway@soton.ac.uk).

You will need this password to access all of the online questionnaires: **memory**

Appendix C

Information gathered on participants' attachment figures in Studies 3 and 4

Please follow the instructions below carefully:

I.   Please place the names of the 10 people you regard as your **closest significant others** in the first column of the table on the following page (A through to J). Please only include people who you currently have a relationship with. Please don't include people you are unlikely to speak to, see face to face or have contact with in the foreseeable future.

II.   In the second column please indicate **how this person is related to you (**e.g., parent, best friend, girlfriend).

III.   In the third column indicate **which of the 4 descriptions** on the following page **best describes how you feel in each of the ten important relationships you listed**. To do this, place a 1, 2, 3, or 4 (representing a relationship description) next to the letters A through J.

IV.   In the fourth column **please indicate the extent to which the description you have assigned to each relationship you listed is representative of how you feel in that relationship** by using the following scale: 1 = not very representative through 5 = very representative.

V.   Finally, in the last two columns please indicate the **frequency of contact** you have with each listed person and the length of time you have known them.

Relationship descriptions

1. It is easy for me to be emotionally close to this person. I am comfortable depending on this person and having her/him depend on me. I don't worry about being rejected or not accepted by this person.

2. I am comfortable without emotional closeness to this person. It is very important to me to feel independent and self-sufficient, and I prefer not to depend on this person or have her/him depend on me.

3. I want to be completely emotionally intimate with this person, but I often find that that this person is reluctant to get as close as I would like. I am uncomfortable being without closeness to this person, but I sometimes worry that she/he doesn't value me as much as I value him/her.

4. I am uncomfortable getting close to this person. I want to be emotionally close to him/her, but I find it difficult to trust her/him completely, or to depend on this person. I worry that I will be hurt if I allow myself to become too close to him/her.

Name/initials	How is she/ he related to you? (mum, dad, etc.)	Relationship description (1, 2, 3, 4, from above)	Representative? (1-5)	Frequency of contact 1 = almost daily 2 = at least once a week 3 = at least once a month 4 = 6-10 times per year 5 = 3-4 times per year 6 = twice a year 7 = once a year 8 = less than once a year	Length of time known (in years)
a.					
b.					
c.					
d.					
e.					
f.					
g.					
h.					
i.					
j.					

Appendix D

Text primes used in Study 3

Time 2 Text Message (Secure)

Please spend three minutes thinking about the person you visualised in the session on Monday and how they make you feel safe, secure and comforted. When finished please reply "Done" along with any words or thoughts that came to mind during the task.

Time 2 Text Message (Neutral)

Please spend three minutes thinking about the route you take from home to university. When finished please reply "Done" along with any words or thoughts that came to mind during the task.

Time 3 Text Message (Secure)

Please spend three minutes thinking about a time when the person you visualised made you feel loved and valued. When finished please reply "Done" along with any words or thoughts that came to mind during the task.

Time 3 Text Message (Neutral)

Please spend three minutes thinking about the route you take from your home to the supermarket. When finished please reply "Done" along with any words or thoughts that came to mind during the task.

Time 4 Text Message (Secure)

Please spend three minutes thinking about a time when the person you visualised made you feel supported and good about yourself. When finished please reply "Done" along with any words or thoughts that came to mind during the task. Immediately after you have replied by text please check your university email account (this is important), you will be directed to an online questionnaire which you should complete ASAP.

Time 4 Text Message (Neutral)

Please spend three minutes thinking about the route you take from university to home. When finished please reply "Done" along with any words or thoughts that came to mind during the task. Immediately after you have replied by text please

check your university email account (this is important), you will be directed to an online questionnaire which you should complete ASAP.

Time 5 Text Message (Secure and Neutral)

Please check your university email account ASAP. Here you will be directed to the final online part of the study.

Appendix E

Laboratory primes used in Study 4

Alternative Secure Attachment Prime (for participants who are unable to list a secure attachment figure)

The researchers are interested in people's ability to use their visualisation skills and imagination. You will be given a description of a relationship and asked to imagine being in this kind of relationship. You will be asked to type what you are thinking about during the task.

Please imagine a relationship where you find it relatively easy to get close to the other person and you feel comfortable depending on the other person. In this relationship you don't often worry about being abandoned by the other person and you don't worry about the other person getting too close to you. You may have experienced such a relationship, either currently or in your past, but if not, try to imagine what such a relationship might be like.

Now take a moment to imagine what it would be like to be in such a relationship. What would it be like to be with a person who makes you feel safe and secure? Imagine you are actually with this person. Try and get a visual image in your mind. What would he or she say to you? What would you say in return? How do you feel when you are with this person? How would you feel if they were here with you now?

Please type your thoughts in the space provided. You will have 10 minutes to complete this task. The computer timer will let you know when the 10 minutes are up. If you finish before the 10 minutes are up, please continue to think about the imagined relationship and write down anything else that comes to mind.

Secure Attachment Prime (original)

The researchers are interested in people's ability to use their visualisation skills and imagination. You will be given a description of a relationship and asked to think about someone with whom you have experienced that kind of relationship. You will be asked to type what you are thinking about during the task.

Please think about a relationship you have had in which you found that it was relatively easy to get close to the other person and you felt comfortable depending on the other person. In this relationship you didn't often worry about being abandoned by the other person and you didn't worry about the other person getting too close to you.

Now take a moment to think about what it is like being in this relationship. What is it like being with this person who makes you feel safe and secure? You may want to remember a time when you were actually with this person. Try and get a visual image in your mind. What would he or she say to you? What would you say in return?

How do you feel when you are with this person? How would you feel if they were here with you now?

Please type your thoughts in the space provided. You will have 10 minutes to complete this task. The computer timer will let you know when the 10 minutes are up. If you finish before the 10 minutes are up, please continue to think about the relationship and write down anything else that comes to mind about the relationship.

Neutral Prime

The researchers are interested in people's ability to visualise their past experiences. You will be given a scenario and asked to remember and visualise the last time you were in that situation. You will be asked to type what you are thinking about during the task.

We now want you to complete a visualisation task. We would like you to write for 10 minutes about a supermarket scenario. Try to think of a particular time that you visited a supermarket to do a large or weekly shop and give information about the sequence of events that you completed as you moved around the store. For example, you may have selected a trolley and walked down the first aisle, picking up items as you went. Please try to give as much detail as possible about what you picked up or looked at, i.e., did you have to weigh an item or did you have to reach up to a top shelf?

Please type your thoughts in the space provided. You will have 10 minutes to complete this task. The computer timer will let you know when the 10 minutes are up. If you finish before the ten minutes are up, please continue to think about the scenario and write down anything else that comes to mind.

EFFECTS OF SECURITY PRIMING ON DEPRESSED AND ANXIOUS MOOD

Appendix F

Text primes used in Study 4

Time 2 Text Message (Secure)

Please spend 3 minutes thinking about the relationship that you visualised in the session on Thursday. Try and imagine that person encouraging you to feel safe, secure and comforted. What would they say or do? How would you feel? When finished, please reply "Done", along with any words or thoughts that came to mind during the task.

Time 2 Text Message (Neutral)

Please spend 3 minutes thinking about the route you take from home to the supermarket. Try and visualise the route you take and your surroundings. When finished, please reply "Done", along with any words or thoughts that came to mind during the task.

Time 3 Text Message (Secure)

Please spend 3 minutes thinking about the relationship that you visualised in the previous tasks. Try and imagine that person making you feel loved and valued. What would they do or say? How would you feel? When finished, please reply "Done", along with any words or thoughts that came to mind during the task.

Time 3 Text Message (Neutral)

Please spend 3 minutes thinking about a time you did some laundry. For example, did you sort the clothes by colour? How did you dry the clothes? When finished please reply "Done" along with any words or thoughts that came to mind during the task.

Time 4 Text Message (Secure)

Please spend 3 minutes imagining the person you visualised yesterday making you feel supported and good about yourself. What would they say or do? How would you feel? When finished please reply "Done", along with any words or thoughts that came to mind during the task. Immediately after you have replied, please check your email account, you will be directed to an online questionnaire, which you should complete ASAP. *If participants have elected to fill out paper questionnaires they will be instructed to open and complete the appropriate questionnaire pack for that day, labelled "Sunday".*

EFFECTS OF SECURITY PRIMING ON DEPRESSED AND ANXIOUS MOOD

Time 4 Text Message (Neutral)

Please spend 3 minutes thinking about the route you take from the supermarket to home. Try and visualise the route you take and your surroundings. When finished please reply "Done" along with any words or thoughts that came to mind during the task. Immediately after you have replied, please check your email account, you will be directed to an online questionnaire, which you should complete ASAP. *If participants have elected to fill out paper questionnaires they will be instructed to open and complete the appropriate questionnaire pack for that day, labelled "Sunday".*

Time 5 Text Message (Secure and Neutral)

Please check your email account ASAP. Here you will be directed to the final online part of the study *(If participants have elected to fill out paper questionnaires they will instead be instructed to open the questionnaire pack labelled by the appropriate day of the week).*