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Faculty of Social and Human Sciences

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Attachment Security Priming: Testing a New Intervention for Children and Young People with Social, Emotional and Mental Health Difficulties

By

Emily Rebecca Gold

Thesis for the degree of Doctorate in Educational Psychology

June 2019

University of Southampton

ABSTRACT

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The first chapter presents a systematic review of the literature exploring the effectiveness of attachment security priming in improving positive affect and reducing negative affect within children and adults. The review searched four electronic databases for peer reviewed journal articles. Thirty empirical studies met inclusion criteria including 28 adult samples and two children and adolescent samples. The findings demonstrated that overall attachment security priming was significantly more effective in improving positive affect and reducing negative affect in participants compared to control primes. Half of the studies found that global attachment style moderated the impact of the prime, and repeated priming seemed to improve the effectiveness of the prime over time. Based on these findings, I concluded that a combined priming approach (subliminal and supraliminal priming) and a repeated priming methodology would be advantageous in future research. Additionally, more research is needed which explores the use of attachment security priming as a possible intervention to improve emotional wellbeing, especially with younger participants in real-life settings.

The empirical paper examined the effectiveness of attachment security priming in reducing anxious and depressed mood in children and young people with social, emotional and mental health difficulties aged 11 – 19 ($N=100$). Two prime groups completed a mental imagery and written task; the experimental group visualised a security-inducing attachment figure, whilst the control group visualised a shopping trip. Participants completed measures of anxious and depressed mood and felt security. The experimental group reported greater felt security compared to the control group following the prime, however, no significant differences were found between the prime groups on anxious and depressed mood. The findings extend the evidence base in the fields of attachment security priming and affective mood states in children and young people.

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Research Thesis: Declaration of Authorship

Print name:	Emily Rebecca Gold
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Title of thesis:	Attachment security priming: Testing a new intervention for children and young people with social, emotional and mental health difficulties
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I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission

Signature:		Date:	
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Abbreviations

ANOVA: Analysis of Variance

ANCOVA: Analysis of Covariance

ASP: Attachment Security Priming

CAMHS: Child Adolescent and Mental Health Service

DV: Dependent Variable

ECR: Experience in Close Relationships Questionnaire

EHCP: Educational, Health and Care Plan

ERGO: Ethics and Research Governance Online

EP: Educational Psychologist

fMRI: Functional Magnetic Resonance Imaging

IWM: Internal Working Model

IV: Independent Variable

LIWC: Linguistic Inquiry and Word Count

M: Mean

Mdn: Median

N: Number

POMS: Profile of Mood States

SEMH: Social Emotional and Mental Health

SENCo: Special Educational Needs Coordinator

SD: Standard Deviation

Chapter 1 Systematic Literature Review

1.1 Introduction

Attachment theory states that the relationship experiences that individuals encounter in their early childhood influence the development of their global attachment patterns (Ainsworth, Blehar, Waters, & Wall, 1978). A number of individuals may go on to develop insecure attachment styles, such as avoidant and anxious-resistant, due to early adverse relationship experiences (Bowlby, 1969). Insecure attachment styles have been associated with a variety of negative outcomes including interpersonal difficulties and poor psychological adjustment (e.g., Cooper, Shaver, & Collins, 1998; Muris, Meesters, van Melick, & Zwambag, 2001). In contrast, individuals with secure attachment styles report higher levels of emotional regulation, positive mental health and adjustment (Cooper et al., 1998; Mikulincer & Shaver, 2016). Securely-attached individuals possess a secure base schema, a set of expectations of others' availability and responsiveness in times of need (Waters, Rodrigues, & Ridgeway, 1998). Whilst the sense of having a secure base may be relatively stable, meaningful interactions with other attachment figures (e.g., romantic partners, close friends) might affect beliefs about availability and supportiveness of others (Mikulincer & Arad, 1999). Moreover, the sense of having a secure base may be contextually activated by real or imagined encounters with supportive attachment figures (Baldwin, 1992). Studies have manipulated the contextual activation of the secure base schema through priming techniques and assessed its effect on positive and negative affect (Mikulincer, Hirschberger, Nachmias, & Gillath, 2001a). This systematic review will explore the effectiveness of attachment security priming (ASP) in reducing negative affect and increasing positive affect in children and adults.

1.1.1 Internal Working Models and Attachment Styles

Attachment theory postulates that human beings are predisposed to create strong affectional bonds with particular others (Bowlby, 1977). Bowlby affirmed that the attachment system evolved so infants maintained proximity to their caregivers under conditions of danger and threat. In Figure 1, Bretherton (1985) depicts how the attachment system functions using a simplified model of the control system for the regulation of proximity and contact with an attachment figure. Information is initially received through the sensory systems (e.g., clues to danger, availability of attachment figure) and depending on the type of information it receives the attachment system may become activated due to perceived danger or deactivated due to perceived safety. For example, when a child perceives the environment as non-threatening

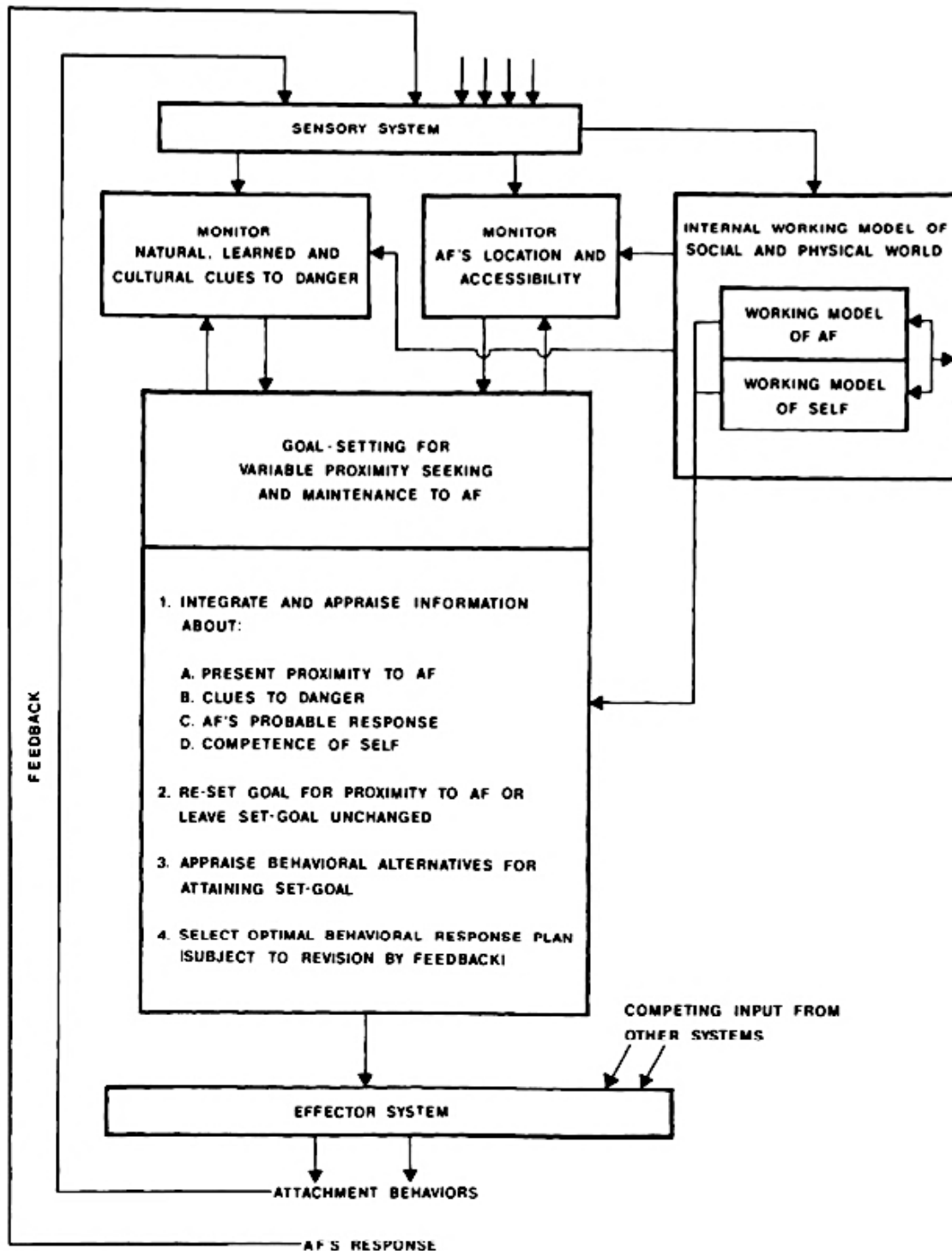


Figure 1. The attachment system model (Bretherton, 1985). AF = attachment figure; Effector System = executive functioning and self-regulation.

and feels secure, the need for proximity to the attachment figure weakens, although there are limits to how far away from the attachment figure the child is willing to go. If the child perceives the environment as mildly threatening, the system's set-goal of attachment figure proximity will change, drawing the child closer to their attachment figure. If the environment is appraised as highly threatening, mere proximity to the attachment figure is no longer enough for the child. If

the attachment figure does not perceive the situation as dangerous then they can comfort the child and attempt to teach them coping strategies. If the attachment figure does perceive the situation to be stressful, the child and attachment figure can leave the situation together.

Further formulations conceptualised that the purpose of the attachment system was to provide infants and children with a sense of 'felt security' (Bartholomew & Horowitz, 1991). Felt security enables children to use their caregiver as a secure base from which they can safely explore their environment (Sroufe & Waters, 1977). The quality of early attachment relationships stems from the degree to which the infant has come to rely on their attachment figure as a source of security (Ainsworth, Blehar, Waters, & Wall, 1978).

1.1.2 Attachment Styles in Infancy

Ainsworth et al. (1978) identified three distinct patterns of attachment based on a laboratory study called the 'Strange Situation' in which infants' responses to separation and reunion were closely studied. The attachment patterns observed included secure, anxious-resistant and avoidant (Bartholomew & Horowitz, 1991). Securely attached infants welcomed their caregiver upon return, sought proximity when distressed and were readily comforted. Mothers of these infants were emotionally available in times of need and responsive to their child's proximity-seeking behaviour (Ainsworth et al., 1978). Anxious-resistant infants showed ambivalent behaviour towards their caregivers and were unable to be comforted upon reunion. Their mothers lacked consistent responsiveness and the interactions between the mother and infant were characterised by a lack of harmony (Ainsworth et al., 1978). Avoidant infants showed no distress when their caregiver left and evaded proximity and interaction when their caregiver returned. Mothers of these infants tended to be emotional rigid as well as angry and rejecting of their infant's proximity-seeking behaviours (Ainsworth et al., 1978).

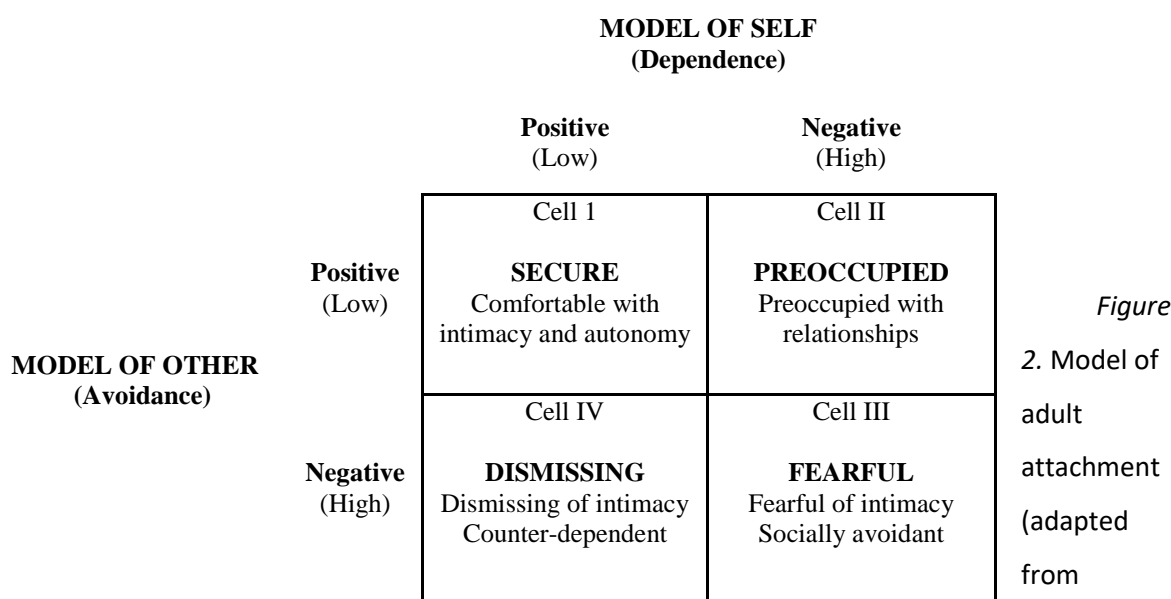
According to Bowlby's (1973) theory of working models, children internalise their early experiences with their caregivers which then forms a prototype for later relationships. Internal Working Models (IWMs) affect how individuals perceive and respond to others, as well as how they perceive themselves. A basic principle of attachment theory is that attachment relationships will continue to influence people's personality and behaviour throughout their lifespan (Ainsworth, 1982; Bowlby, 1977).

1.1.3 Attachment Styles in Adulthood

In the 1980s, researchers began to explore the relationship between IWMs of attachment and social and emotional adaption in adults (e.g., Kobak & Sceery, 1988; Main & Goldwyn, 1998).

Hazan and Shaver (1987) conceptualised romantic love as an attachment model and developed a self-report procedure which classified adults into three categories congruent with Ainsworth's three attachment styles. Their results demonstrated that the insecurely-attached individuals reported more negative experiences, shorter romantic relationships and held less favourable views about childhood compared to their secure counterparts. Specifically, avoidant individuals reported fear of closeness in relationships, saw themselves as independent and self-sufficient, and described their mothers as cold and rejecting (Hazan & Shaver, 1987). Anxious-ambivalent individuals characterised their relationships by jealousy and emotional turbulence, possessed mental models which contained self-doubts and under appreciation, and described relationships with parents as less warm (Hazan & Shaver, 1987).

In 1991, Bartholomew and Horowitz proposed a model of adult attachment which consisted of four attachment styles instead of three. It focused on two underlying dimensions, the persons' internal model of the self and their internal model of others. The attachment categories included secure, preoccupied (congruent to anxious-resistant) and two different avoidant styles; fearful and dismissing (see Figure 2, taken from Bartholomew & Horowitz, 1991, p.227). Fearful individuals avoided close relationships due to their fear of rejection, whereas dismissing individuals emphasised the importance of independence and self-reliance over close-relationships. Bartholomew and Horowitz (1991) noted that the participants did not fit neatly into any attachment category, and most reported a combination of attachment styles across time and within different relationships.



Bartholomew & Horowitz, 1991)

In the early 1990s a “type versus dimensions” debate began (e.g., Collins & Read, 1990; Fraley & Waller, 1998; Griffin & Bartholomew, 1994) due to concerns around the validity of the categorical model of attachment (e.g., Levy & Davis, 1988). Fraley and Waller (1998) used taxometric techniques to distinguish latent types from latent dimensions; their analysis indicated that categorical models were inappropriate for studying variation within romantic relationships and that the data was more consistent with a dimensional model of individual differences. Thus, there has since been a move in the field with many researchers favouring the use of dimensions over types to measure attachment.

1.1.4 Attachment and Affect Regulation

Research has found that insecurely-attached individuals experience less positive affect and greater levels of negative affect in their lives (Simpson, 1990; Torquati & Raffaelli, 2004). In contrast, individuals with a secure attachment orientation generally hold positive views of the self and maintain positive mental health and effective functioning in times of stress (Collins & Read, 1994; Mikulincer & Florian, 1998). Different attachment dimensions are associated with distinct affect regulation strategies (Bowlby, 1973; Kobak & Sceery, 1988). Individuals with an anxious-attachment style engage in hyperactivation of the attachment system and are hypervigilant for signs of rejection. Individuals with an avoidant-attachment style engage in the deactivation of the attachment system to defend themselves from pain of rejection. In contrast, securely-attached individuals can regulate negative affect so that when their attachment system is activated in times of stress, it can be downregulated when comfort and security is provided. The individual differences in strategies employed within different attachment orientations reflect IWMs of the self (e.g., worthy, self-concept) and of others (e.g., dependable and trustworthy; Cozzarelli, Karafa, Collins, & Tagler, 2003).

1.1.5 Stability in Attachment

Previous literature has described attachment styles as a relatively stable trait or disposition (e.g., Bretherton, 1985; Cooper et al., 1998). Fraley (2002) carried out a meta-analysis to determine whether a prototype perspective or a revisionist perspective better explained attachment stability from infancy to adulthood. The prototype perspective is the belief that representations of early experiences are retained over time and play an influential role on attachment behaviours. In contrast, the revisionist perspective is the belief that early representations are subject to modification based on new experiences and may not reflect later attachment patterns. The meta-analysis findings indicated that attachment security was

moderately stable across the first 19 years of life and that patterns of stability were more accurately determined by prototype dynamics.

Researchers have challenged these assumptions by demonstrating that individuals can change their attachment styles across relatively short periods of time (Cozzarelli et al., 2003). For instance, research has shown that children will generally possess a relatively stable attachment style although their attachment style may shift due to changes in maternal and familial circumstances (Lewis, Feiring, & Rosenthal, 2000; Waters, Merrick, Treboux, Crowell, & Albersheim, 2003). Additionally, adult attachment research has demonstrated that approximately a third of adults will change their self-reported attachment orientation when re-assessed later in life (Scharfe, 2003), due to factors such as romantic relationships (Ruvolo, Fabian, & Ruvolo, 2001). Moreover, a more recent meta-analysis by Pinguart, Feußner and Ahnert (2013) found that the stability of secure attachment drops considerably over a period of more than five years, and no significant stability was found in time intervals larger than 15 years. Congruent with these findings is Bowlby's (1973) belief that in order for IWMs to function they need to be able to assimilate new information about the self and others in relation to changing life circumstances. Thus, whilst stability in IWMs is fundamental to understanding personality development and individual differences, it is important to acknowledge that IWMs of attachment are fluid and may change (Cozzarelli et al., 2003).

1.1.6 Attachment Hierarchy

By adulthood, individuals will possess multiple relationship-specific mental representations of attachment alongside their chronically-activated dispositional model (Carnelley, Otway, & Rowe, 2016). Individuals develop relationship-specific attachment orientations based on the different long-term relationships they share with others (Collins & Read, 1990). These different attachment relationships become organised into a hierarchical model (see Figure 3).

At the top is a general (global) model which represents a history of relationship experiences with attachment figures. The general model is the most chronically accessible, and it can be applied when interacting with new people. The next level represents particular types of relationships (e.g., parent-child relationships, romantic relationships). Parental representations are split between mother and father, and peer representations are split between friendship and romantic. The bottom level of the hierarchy represents the most specific models which correspond to particular relationships with significant others such as close friends or romantic partners. These relationship-specific attachment dimensions contain repeated patterns of

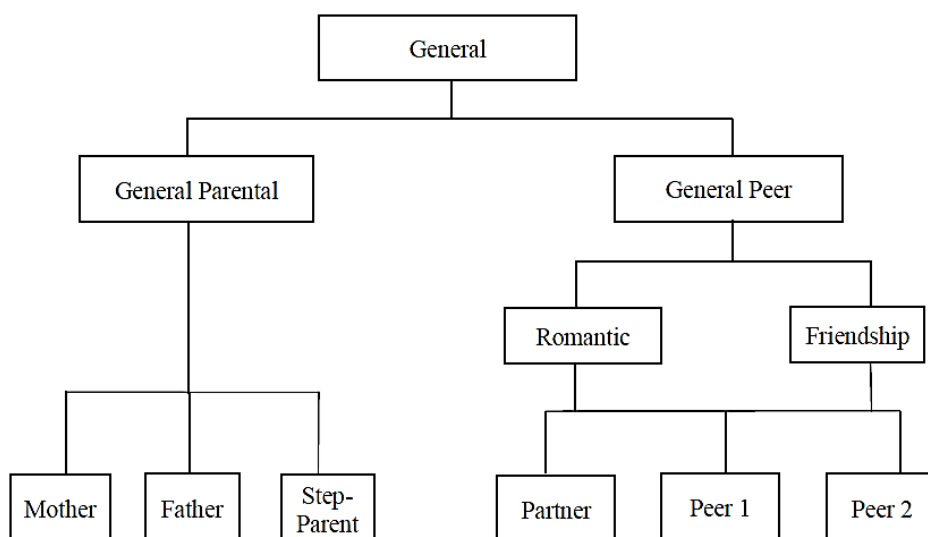


Figure 3. Hierarchical network of attachment orientations (Adapted from Collins & Read, 1994)

interaction with attachment figures in particular domains of trust, dependency and closeness, which become internalised and stored into relational schemas (Baldwin, 1992).

1.1.7 Schemas and Mental Representations

Research has shown that attachment style activation is directed by cognitive processes related to schema availability and accessibility (Collins & Read, 1994; Mikulincer & Arad, 1999). To put more simply, the presence of mental representations of attachment relationships in an individual's mind and the ease of which they come to mind. These cognitive processes affect each other, thus the more often a schema is available, the more often it will become activated (Baldwin, Keelan, Fehr, Enns, & Koh-Rangarajoo, 1996). As a result these particular schemas will become activated in response to environmental cues, which serve to guide a range of cognitive processes including attention, encoding, storage retrieval, emotions and behaviour (Bargh, 2006). By exposing individuals to schema-relevant stimuli, researchers can activate or 'prime' these mental representations that shape how people respond to environmental cues.

1.1.8 Attachment Security Priming

ASP is a technique which involves temporarily activating a mental representation of a secure attachment figure (Baldwin et al., 1996). Security priming makes attachment security cues more readily available for mental processes thereby affecting an individuals' cognitions, emotions and behaviour (Canterberry & Gillath, 2012a). It does this by exposing individuals to primes designed to activate a sense of comfort, security and love (Gillath & Karantzas, 2015). This technique leads individuals to think, feel and behave in a similar way to securely-attached

individuals, albeit temporarily (Mikulincer & Shaver, 2007). Two types of priming methods have been identified in the literature including supraliminal and subliminal.

Supraliminal priming techniques present stimuli at or above a persons' conscious awareness (Greenwald, Draine, & Abrams, 1996). Supraliminal priming can be carried out by asking participants to focus on schema-relevant information by recollecting, imagining, reading or writing about an event. This enables individuals to clearly visualise a secure attachment figure in their mind. In contrast, subliminal priming occurs when participants are exposed to security-related stimuli below their conscious threshold (Greenwald et al., 1996). For instance, priming stimuli (e.g., attachment words on a computer screen) may be presented too quickly for individuals to perceive consciously. An advantage of subliminal priming is that it is less likely to result in demand characteristics as participants are not aware of the priming manipulation taking place (Gillath, Selcuk, & Shaver, 2008).

The notion behind both subliminal and supraliminal priming techniques is that stimuli associated with a sense of security enters a semantic network and instigates a process of 'spreading activation' (Bargh, 1996; Förster & Liberman, 2007). The spread of activation model assumes that knowledge is organised in memory through 'nodes' (connections between isolated bits of information). When contextual cues trigger a memory, associated nodes in the network become activated and a spread of activation occurs, with regards to ASP this generates a sense of security similar to what may be evoked by a secure attachment figure (Gillath et al., 2008).

Researchers use ASP to test causal processes by means of manipulating attachment dimensions. As a result, researchers have demonstrated that ASP can benefit participants in a number of ways such as increasing self-esteem (Carnelley & Rowe, 2007), improving prosocial values (Mikulincer & Shaver, 2007), and raising compassion and altruism (Gillath, Shaver, & Mikulincer, 2005). Moreover, a considerable amount of priming studies have focused on reducing negative affect and increasing positive affect within individuals (e.g., Liao, Wang, Zhang, Zhou, & Liu, 2017; Mikulincer et al., 2001b; Rowe & Carnelley, 2003).

1.1.9 Affect

Subjective wellbeing has been of wide-spread interest to researchers and psychologists for decades (Diener & Emmons, 1984). The subjective wellbeing literature endeavours to understand why some people experience high levels of happiness in their lives and how this relates to their cognitive judgments and affective reactions (Diener, 1984). Affect has been conceptualised as existing on two dimensions; one describing positive versus negative (e.g., happy vs sad), and one describing activation levels (e.g., aroused vs unaroused; Posner, Russell, & Peterson, 2005). In this

review I will refer to affect as two separate constructs (positive vs negative) as this is the dominant approach taken within the studies reviewed in the current paper¹. Positive affect has been described as feelings of pleasurable engagement with the environment such as happiness, excitement and contentment (Pressman & Cohen, 2005). Whilst negative affect has been defined as feelings of distress, unpleasurable engagement and absence of feelings (Crawford & Henry, 2004).

Studies have used ASP to influence affect enabling individuals with insecure global attachment models to experience the same positive benefits of securely-attached individuals (e.g., Mikulinceret al., 2001a; Rowe & Carnelley, 2003). This is important as insecure attachment dimensions have been associated with a range of negative outcomes (e.g., poor psychological adjustment; Muris et al., 2001), thus manipulating attachment security may help guide individuals with insecure attachments to a more positive trajectory. This systematic review will critically evaluate the results and quality of current empirical literature which uses ASP techniques to reduce negative affect and improve positive affect in children and adults. This will help us to conclude the strengths and limitations of the literature as well as recommend future directions in the field.

1.2 Method

1.2.1 Literature Search

I used four electronic databases for the literature search: PsychINFO, Web of Science, MEDLINE and Scopus. These databases were selected because they contain a comprehensive amount of peer-reviewed literature related to the subject area. PsycINFO and MEDLINE focus specifically on psychology and clinical science literature, whilst Web of Science and Scopus cover a range of subject areas and deliver a comprehensive overview of the world's research output in fields such as social science. Search terms were generated and used within each database (see Appendix A). An initial search was carried out in all databases which retrieved a total of 355 results² (101 PsychINFO, 66 Web of Science, 132 MEDLINE, 56 Scopus; see Appendix B). Additional records were identified through backward and forward chaining techniques including looking through reference lists and citations in three key studies (i.e., Carnelley et al., 2016; Otway,

¹ Defining affect in this way will help to ensure the current systematic review is kept consistent, reliable and valid. Using different models of affect (e.g., circumplex model of affect; Posner et al., 2005) would make it more difficult to critically evaluate and compare the findings between studies.

² It should be noted that some of the results were duplicates so the number of unique papers were smaller than this number.

Carnelley, & Rowe, 2014; Stupica, Brett, Woodhouse, & Cassidy, 2017). The search was limited to these three studies because they were most closely related to my systematic review question in terms of the population, prime task and overall methodology. These additional searches yielded a further 196 papers, resulting in 507 results to review.

Searches were conducted using the following terms which addressed different conceptualisations of (a) ASP, (b) affect, and (c) children and adults. The search terms for ASP included prime*, priming and attach* or secur*. Search terms relevant to affect included affect* or effect*³ or anxi* or depress* or positive mood or negative mood. Finally, the search terms for children, young people and adults included child*, young person, adolescen*, teen*, young adult*, adult*. The terms utilised in the database searches were broad in order to capture the various conceptualisations and database indexing of ASP, affect, children and adults.

1.2.2 Screening Process

A two-step screening processing was carried out to select the final papers that would be included in the systematic review. Step 1: Abstract and Method sections were screened to determine whether the studies were relevant to the subject area. Step 2: full texts were screened to determine whether the studies were specifically related to the systematic review question including using ASP to influence affect and using a suitable population.

1.2.3 Inclusion and Exclusion Criteria

Inclusion criteria included those published in English and peer-reviewed journals. Exclusion criteria included animals, unpublished work (e.g., dissertations and conference papers) and review articles. Further papers were excluded if they were not related to the present research, not priming attachment models to measure their influence on affect or wellbeing, duplications from other databases, unsuitable populations, or if it was not possible to obtain a full text. This resulted in 469 papers being removed. A further set of exclusion criteria were implemented for the remaining 38 papers. Papers were excluded if they did not specifically measure the impact of ASP on affect or wellbeing and if they were not in peer-reviewed journals. Additionally, qualitative study designs were also excluded because the review was specifically looking at experimental studies where ASP was the independent variable and affect the dependent variable. Using one type of study design would allow me to effectively compare and contrast the chosen studies using

³ Using the word 'effect' in relation to affect was to allow for any mistakes that may have occurred in the publishing process.

the same quality assessment checklist. Once this criterion had been applied, a further 23 papers were removed and a final set of 15 papers remained for review (see Appendix B; Table 1).

1.2.4 Structure and Framework of Review

The studies eligible for inclusion within the review were quality assessed using a modified version of Downs and Black's (1998) checklist (see Appendix C). This framework served as a useful guide to assess the quality of the studies included in this review. The framework consists of 27 questions which are sub-divided into five categories: reporting, external validity, internal validity bias, internal validity (selection bias), and power. Within this review, I used the checklist as a framework to provide a summary of strengths and weaknesses of the studies included within the review.

Table 1. Summary of Studies included in the Systematic Review

Authors & Date	Country	Population	Design & Prime Type	ASP Intervention	Main Affect Findings	Interaction with Attachment
1. Bryant & Chan (2017)	UK	75 university students Age: $M=19.25$ 56 females, 19 males	Experimental, Between-subject Supraliminal priming Attachment security prime vs control (positive prime)	Mental imagery task 3 minute duration	Participants with low avoidant attachment style who received the secure prime reported less distress than those who received the control prime. This pattern was not found for participants with a high avoidant attachment style.	Attachment style moderated the effects of the prime as the findings showed that individuals with a high avoidant attachment style were not impacted by the prime.
2. Carnelley & Rowe (2007)	UK	64 university students Age: 18-55 ($M=21.18$) 46 females, 18 males	Experimental, Between-subject Supraliminal priming Attachment security prime vs control (neutral prime)	Mental imagery and written task 10 minute duration Primed on 3 occasions across 3 days	Repeated priming of attachment security resulted in more positive self-views and less attachment anxiety at Time 5 compared to Time 1. Those primed with neutral primes showed no change with time.	Attachment dimensions did not moderate the effects of the prime for self-views.
3. Carnelley, Otway & Rowe (2016)	UK	144 university students Age: 18-50 ($M=20.1$) 127 females, 17 males	Experimental, Between-subject Supraliminal priming Attachment security prime vs anxious prime; avoidant prime; control (neutral prime)	Mental imagery and written task 10 minute duration	Anxious-primed participants reported higher depressed mood than secure-primed participants. Avoidant-primed and anxious-primed participants reported high anxious mood compared to secure-primed participants. Secure-primed participants did not report significantly less anxious or depressed mood than neutral-primed participants.	Attachment dimensions did not moderate the effects of the prime.
(a) Study 1						

Authors & Date	Country	Population	Design & Prime Type	ASP Intervention	Main Affect Findings	Interaction with Attachment
3. Carnelley, Otway & Rowe (2016) (b) Study 2	UK	81 university students Age: 18-33 (<i>M</i> =20.32) 70 females, 11 males	Experimental, Between-subject Supraliminal priming Attachment security prime vs control (neutral prime)	Mental imagery and written task 10 minute duration for initial prime 3 minute duration for 3 subsequent primes	Secure primed participants reported less anxious mood post-prime and one day later compared with neutral-primed participants. Secured-primed participants reported marginally less depressed mood post-prime and one day later compared to neutral-primed participants.	Attachment dimensions did not moderate the effects of the prime.
4. Mcguire, Gillath, Jackson & Ingram (2018) (a) Study 1	US	125 college students Age: 18-47 (<i>M</i> =19.6) 71 females, 54 males	Experimental, Between-subject Supraliminal and Subliminal priming Attachment security prime vs control (neutral prime)	1. Computerised lexical decision task which included rapid subliminal presentation of prime words. Primes presented for 22 milliseconds 2. Mental imagery and written task 5 minute duration	Participants exposed to the security primes reported a greater decrease in depressive symptoms compared to participants exposed to neutral primes.	Attachment dimensions did not moderate the effects of the prime, although attachment anxiety was significantly associated with depressive symptoms.
4. Mcguire, Gillath, Jackson & Ingram (2018) (b) Study 2	US	69 adolescents from high school/ youth centre. Age: 13-19 (<i>M</i> =15.6) 39 females, 30 males	Experimental, Between-subject Supraliminal priming Attachment security prime vs control (neutral prime)	1. Mental imagery and written task (5 minute) 2. Word search task 3. Mental imagery task (3 minute) 4. Picture writing task (2 minute) 5. Sentence memorisation task (3 minute)	Adolescents who were repeatedly exposed over two weeks to security primes showed lower depression symptoms than participants exposed to neutral primes.	Attachment dimensions did not moderate the effects of the prime, although attachment anxiety was significantly associated with depressive symptoms.

Authors & Date	Country	Population	Design & Prime Type	ASP Intervention	Main Affect Findings	Interaction with Attachment
5. Stupica, Woodhouse, Brett & Cassidy (2017)	US	90 school children Age: 6-7 (<i>M</i> =6.95) 42 females, 48 males	Experimental, Between-subject Subliminal priming Attachment security prime vs controls (happy prime; neutral prime)	Computer picture presentation which included subliminal picture priming Primes presented for 24 milliseconds	Secure priming decreased physiological responses (electrodermal activity, vagal augmentation, fearful facial expressions) to threat compared to control conditions. There were no priming effects associated with children's self-reported fear.	Attachment dimensions did not moderate the effects of the prime, although securely attached children had lower physiological responses to fear. There were no attachment effects associated with children's self-reported fear.
6. Rowe & Carnelley (2003)	UK	160 university students Age: 17-42 (<i>M</i> =20.5) 121 females, 39 males	Experimental, Between-subject Supraliminal priming Attachment security prime vs avoidant prime; anxious prime	Mental imagery and written task 10 minute duration	Primed secures reported more positive affect and less negative affect compared to the other primed attachment style groups	Attachment dimensions did not moderate the effects of the prime.
7. Mikulincer, Gillath, Halevy, Avihou, Avidan & Eshkoli (2001)	Israel	69 university students. Age: 20-40 (<i>Mdn</i> =24) 44 females, 25 females	Experimental, Between-subject Supraliminal priming Attachment security prime vs controls (positive-affect prime; neutral prime)	Reading an interpersonal script related to attachment security Duration unspecified	Priming attachment security and positive-affect led to lower ratings of personal distress compared to the neutral priming. There was not a significant difference in personal distress between secure prime group and positive-affect group.	Attachment anxiety had a significant unique effect on personal distress; the higher the attachment anxiety the higher the reported distress. Main effect of avoidance and all the interactions were not significant.
(a) Study 1						

Authors & Date	Country	Population	Design & Prime Type	ASP Intervention	Main Affect Findings	Interaction with Attachment
7. Mikulincer, Gillath, Halevy, Avihou, Avidan & Eshkoli (2001)	Israel	60 university students Age: 17-39 (<i>Mdn</i> =24) 31 females, 29 males	Experimental, Between-subject Supraliminal and Subliminal priming Attachment security prime vs controls (positive-affect prime; neutral prime)	1. Subliminal exposure of prime images. Duration unspecified 2. Reading a distressing interpersonal script. Duration unspecified	Attachment security priming and positive-affect priming led to lower passive identification (sorrow-related emotions) ratings compared to neutral priming. There was not a significant difference in personal distress between secure prime group and positive-affect group.	Attachment anxiety had a significant unique effect on personal distress; the higher the attachment anxiety the higher the reported distress. Main effect of avoidance and all the interactions were not significant.
(b) Study 2						
7. Mikulincer, Gillath, Halevy, Avihou, Avidan & Eshkoli (2001)	Israel	60 university students Age: 19-30 (<i>Mdn</i> =23) 34 females, 26 males	Experimental, Between-subject Subliminal priming Attachment security prime vs controls (positive-affect prime; neutral prime)	Computerised lexical decision task which included rapid subliminal presentation of prime words. Prime presented for 20 seconds	Attachment security priming led to lower ratings of personal distress compared to neutral priming. Security priming also led to lower personal distress than positive-affect priming.	Attachment anxiety had a significant unique effect on personal distress; the higher the attachment anxiety the higher the reported distress. Main effect of avoidance and all the interactions were not significant.
(c) Study 3						
7. Mikulincer, Gillath, Halevy, Avihou, Avidan & Eshkoli (2001)	Israel	72 university students Age: 20-37 (<i>Mdn</i> = 24) 37 females, 35 males	Experimental, Between-subject Subliminal priming Attachment security prime vs controls (positive-affect prime; neutral prime)	Computerised autobiographical memory task which included subliminal picture priming. Duration unspecified.	There was not a significant difference in accessibility to personal distress memories between secure prime, positive-affect prime and neutral prime groups.	Attachment anxiety had a significant unique effect on personal distress; the higher the attachment anxiety, the higher the accessibility of personal distress memories. Main effect of avoidance and all the interactions were not significant.
(d) Study 4						

Authors & Date	Country	Population	Design & Prime Type	ASP Intervention	Main Affect Findings	Interaction with Attachment
7. Mikulincer, Gillath, Halevy, Avihou, Avidan & Eshkoli (2001)	Israel	150 university students Age: 18-27 (<i>Mdn</i> =23) 66 females, 84 males	Experimental, Between-subject Supraliminal priming Attachment security prime vs controls (positive-affect prime; neutral prime)	Two mental imagery tasks 2 minute durations	The priming of attachment security led to lower personal distress than the priming of attachment anxiety. Priming attachment anxiety led to higher personal distress than the priming of avoidance.	Attachment anxiety had a significant unique effect on personal distress; the higher the attachment anxiety the higher the reported distress. Main effect of avoidance and all the interactions were not significant.
(e) Study 5						
8. Liao, Wang, Zhang, Zhou, Xiangping (2017)	China	105 university students Age: 17-27 (<i>M</i> =20.3) 70 females, 35 males	Quasi-experimental, Between-subject Supraliminal priming Attachment security prime (no control)	Mental imagery and written task 10 minute duration Primed once	Individuals with dependent depression experienced greater positive affect after priming. There was no significant change in positive affect after priming for individuals with self-critical depression.	Not tested
9. Carnelley, Bejinaru, Otway & Baldwin (2018)	UK	48 adults with depressive disorder Age: 18-76 (<i>M</i> =50.9) 29 females, 19 males	Experimental, Between-subject Supraliminal priming Attachment security prime vs control (neutral prime)	Mental imagery task and written task 10 minute duration for initial prime 3 minute duration for subsequent primes on 3 consecutive days	Secure priming had a greater impact on reducing symptoms of anxiety and depression in comparison to the control prime, though the differences were only significant at Time 4 (third and last text prime).	Not tested on anxiety and depression.

Authors & Date	Country	Population	Design & Prime Type	ASP Intervention	Main Affect Findings	Interaction with Attachment
10. Cassidy, Shaver, Mikulincer & Lavy (2009)	US	70 university students 17-25 (<i>Mdn</i> =19) 51 females, 19 males	Experimental, Between-subject Subliminal priming Attachment security prime vs control (neutral prime)	Computerised cognitive categorization task which included subliminal priming of words. Prime presented for 22 milliseconds	Attachment security priming influenced the participants responses to psychological pain (operationalised in terms of hurt feelings) in different ways depending on their global attachment style (see interaction with attachment). Overall, security priming was able to reduce some maladaptive responses to psychological pain (e.g., over-engagement and under-engagement with negative emotions) within insecurely-attached individuals.	Avoidant attachment was associated with a tendency to dismiss hurtful events, inhibit expressions of distress and react hostilely in the neutral prime condition, and it was associated with greater openness to pain in the security prime condition. Attachment anxiety was associated with more intense feelings of rejection, more crying and more negative emotions in the neutral prime condition, but interactions were generally non-significant within the security prime condition.
11. Selcuk, Zayas, Günaydin, Hazan & Kross (2012) (a) Study 1	US	123 university students Age: <i>M</i> =20 105 females, 18 males	Experimental, Mixed design Supraliminal priming Attachment security prime vs control (acquaintance prime)	Mental imagery task 20 seconds at a time	Priming participants with attachment security after recalling an upsetting memory led to significantly lower negative affect in comparison to neutral priming (recovery hypothesis). Priming participants before an upsetting memory recall did not result in significant differences between the security prime and neutral prime conditions (buffering hypothesis).	Individuals high on attachment avoidance showed less affective recovery as a result of priming the mental representation of an attachment figure. Higher attachment anxiety towards one's mother was associated with smaller recovery effects (although not statistically significant).

Authors & Date	Country	Population	Design & Prime Type	ASP Intervention	Main Affect Findings	Interaction with Attachment
11. Selcuk, Zayas, Günaydin, Hazan & Kross (2012) (b) Study 2	US	139 university students Age: $M=20$ 105 females, 34 males	Experimental, Mixed design Supraliminal priming Attachment security prime vs control (stranger prime)	Exposure to photograph of mother 90 seconds at a time	Priming participants with attachment security after recalling an upsetting memory led to significantly lower negative affect in comparison to neutral priming (recovery hypothesis). Priming participants before an upsetting memory recall did not result in significant differences between the security prime and neutral prime conditions (stranger; buffering hypothesis).	Individuals high on attachment avoidance showed less affective recovery as a result of priming the attachment figure. Higher attachment anxiety towards one's mother was associated with smaller recovery effects (although not statistically significant).
11. Selcuk, Zayas, Günaydin, Hazan & Kross (2012) (c) Study 3	US	57 males and females in a romantic heterosexual relationship Age: $M=21$	Experimental, Within-subject Supraliminal priming Attachment security prime vs control (stranger prime)	Exposure to photograph of romantic partner 90 seconds at a time	Priming participants with attachment security after recalling an upsetting memory led to significantly lower negative affect in comparison to neutral priming (recovery hypothesis). After recalling the upsetting memory, participants in the secure prime condition showed lower negative thinking compared to control condition.	Individuals high on attachment avoidance showed less affective recovery as a result of priming the attachment figure.
12. Hudson & Fraley (2018)	US	133 university students Age: $M=20.15$ 92 females, 41 males	Experimental. Between-subject Supraliminal priming Attachment security prime vs anxious prime; control (no prime)	Mental imagery and written tasks Duration unspecified Primed once a week for over 16 weeks	There was no significant improvement in emotional wellbeing over the course of 4 months for either the security prime condition or the attachment anxiety prime condition.	Attachment dimensions did not moderate the effect of the prime on wellbeing.

Authors & Date	Country	Population	Design & Prime Type	ASP Intervention	Main Affect Findings	Interaction with Attachment
13. Canterbury & Gillath (2012)	US	30 men and women Age: 18-24 (M=21.4) 15 females, 15 males	Experimental, Within-subject Supraliminal and Subliminal priming Attachment security prime vs insecure attachment prime vs control (neutral prime)	Event-related computerised priming task which included being primed with words. Implicit prime presented for 2 milliseconds Explicit prime presented for 500 milliseconds	Supraliminal security priming led to higher liking ratings for the images compared to insecurity or neutral primes. No significant differences were found for subliminal priming. Attachment security priming activated unique brain areas related to affect.	Attachment dimensions did not moderate the effects of the prime.
14. Dutton, Lane, Koren & Bartholomew (2016) (a) Study 1	Canada	686 university students Age: 18-59 (M=20.4) 505 females, 181 males	Experimental, Between-subject Subliminal priming Attachment security prime vs controls (distraction prime; no prime)	Exposure to prime images after listening to audio recordings of interpersonal conflict. Duration unspecified	The attachment security priming group reported significantly lower anger and anxiety scores compared to the control groups.	Not tested
14. Dutton, Lane, Koren & Bartholomew (2016) (b) Study 2	US	278 internet sample Age: 18-16 (M=34.6) 163 females, 115 males	Experimental, Between-subject Subliminal priming Attachment security prime vs controls (smiling man; cold mother; no prime)	Exposure to prime images after listening to audio recordings of interpersonal conflict, with two additional controls. Duration unspecified	The attachment security priming group reported significantly lower anger and anxiety scores compared to the control groups.	Not tested.

Authors & Date	Country	Population	Design & Prime Type	ASP Intervention	Main Affect Findings	Interaction with Attachment
15. Mikuliner, Hirschberger, Nachmias & Gillath (2001) (a) Study 1	Israel	106 university students Age: 21-31 (<i>Mdn</i> =24) 79 females, 27 males	Experimental, Between-subject Subliminal and Supraliminal priming Attachment security prime (baby and mother) vs controls (positive affect prime; neutral prime; control prime)	Rated Chinese ideographs whilst being primed by pictures. Supraliminal prime presented for 500 milliseconds Subliminal prime presented for 10 milliseconds	In the subliminal trials, attachment security priming and positive-affect primes led to higher liking ratings compared to neutral or no primes. No significant difference was found between security primes and positive-affect primes. There were no significant differences between prime groups in the supraliminal trials.	Attachment dimensions did not moderate the effect of the primes.
15. Mikuliner, Hirschberger, Nachmias & Gillath (2001) (b) Study 2	Israel	45 university students Age: 19-32 (<i>Mdn</i> =22) 33 females, 12 males	Experimental, Within-subject Subliminal priming Attachment security primes (baby and mother; baby prime; mother prime) vs controls (positive-affect prime; neutral prime)	Rated Chinese ideographs whilst being subliminally primed by pictures. Subliminal prime presented for 10 milliseconds	'Baby and mother' security primes and positive affect primes led to higher liking ratings compared to neutral primes, baby primes and mother primes.	Attachment dimensions did not moderate the effect of the primes.
15. Mikuliner, Hirschberger, Nachmias & Gillath (2001) (c) Study 3	Israel	40 university students Age: 20-32 (<i>Mdn</i> = 23) 29 females, 11 males	Experimental, Within-subject Subliminal priming Attachment security prime (baby and mother; young couple prime; old couple) vs controls (positive prime; neutral prime)	Rated Chinese ideographs whilst being subliminally primed by pictures. Subliminal prime presented for 10 milliseconds	All security primes and positive affect prime led to higher liking ratings compared to neutral prime. No significant differences were found between any of the attachment security primes.	Attachment dimensions did not moderate the effect of the primes.

Authors & Date	Country	Population	Design & Prime Type	ASP Intervention	Main Affect Findings	Interaction with Attachment
15. Mikuliner, Hirschberger, Nachmias & Gillath (2001) (d) Study 4	Israel	42 university students Age: 19-35 (<i>Mdn</i> = 22) 31 females, 11 males	Experimental, Within-subject Subliminal priming Attachment security prime (attachment figure) vs controls (close person; known person; unknown person)	Rated Chinese ideographs whilst being subliminally primed by names. Subliminal prime presented for 10 milliseconds	Attachment security priming led to higher liking ratings compared to all control primes. No significant difference was found between control primes.	Attachment dimensions did not moderate the effect of the primes.
15. Mikuliner, Hirschberger, Nachmias & Gillath (2001) (e) Study 5	Israel	150 university students Age: 20-39 (<i>Mdn</i> =24) 94 females, 56 males	Experimental, Between-subject Subliminal priming Attachment security prime vs controls (positive affect; neutral; no prime)	Rated Chinese ideographs whilst being subliminally primed by words and picture. Two different contexts were induced: neutral and threat conditions. Subliminal prime presented for 10 milliseconds	In the neutral context, attachment security primes and positive affect primes led to higher liking ratings than neutral primes or no primes. In the threat context, attachment security priming led to higher liking ratings than all control primes (including positive-affect).	Attachment dimensions did not moderate the effect of the primes.

Authors & Date	Country	Population	Design & Prime Type	ASP Intervention	Main Affect Findings	Interaction with Attachment
15. Mikuliner, Hirschberger, Nachmias & Gillath (2001) (f) Study 6	Israel	88 university students Age: 20-35 (<i>Mdn</i> = 24) 53 females, 35 males	Experimental, Between-subject Subliminal priming Attachment security prime vs controls (positive affect; neutral; no prime)	Rated Chinese ideographs after the subliminal presentation of picture primes. Two different contexts were induced: no feedback condition and failure condition. Subliminal prime presented for 10 milliseconds	In the no feedback condition, attachment security and positive affect primes led to higher liking ratings than neutral and no picture primes. In the failure condition, attachment security priming led to higher liking ratings compared to all the control primes (including positive-affect).	There was a significant main effect for attachment anxiety; individuals with high levels of attachment anxiety reported lower liking ratings than individuals who scored low in attachment anxiety. The main effect for avoidance and the remaining interactions were not significant.

Authors & Date	Country	Population	Design & Prime Type	ASP Intervention	Main Affect Findings	Interaction with Attachment
15. Mikuliner, Hirschberger, Nachmias & Gillath (2001) (g) Study 7	Israel	100 university students Age: 20-35 (Mdn=24) 72 females, 28 males	Experimental, Between-subject Subliminal priming Attachment security prime vs controls (positive affect; neutral; no prime)	Rated Chinese ideographs after the subliminal presentation of picture primes. Two different contexts were induced: neutral and visualisation of a separation. 1. Mental imagery and written task 3 minute duration 2. Rated Chinese ideographs after the subliminal presentation of picture primes Subliminal prime presented for 10 milliseconds	In the neutral condition, attachment security prime and positive affect prime led to higher liking ratings than neutral or no picture primes. In the separation episode, attachment security priming led to higher liking ratings compared to all control primes (including positive-affect).	Attachment dimensions moderated the effect of the prime following the visualisation of a separation episode. Attachment dimensions did not moderate the effects of the prime in the neutral context.

1.3 Results

The systematic search helped me to gather evidence to review the research exploring the effectiveness of ASP on reducing negative affect and increasing positive affect in children and adults. Of particular interest in the current review was investigating how effective ASP was in comparison to experimental and passive controls (no prime) in improving emotional wellbeing, as well as considering what ASP techniques and methods were shown to be most successful.

1.3.1 Research Methodology

Participants. The 30 studies included in this review provided priming to 3459 participants. The samples in this review largely consisted of university and college student populations; the exceptions to this were two studies which included child and adolescent participants (4b,5), one study which used a clinical sample (9), and finally one study that assessed heterosexual romantic couples (11c). The majority of studies reported age ranges (excluding 1,11a,11b,11c,12); collectively the participants were aged between 6 to 76 years old. Of those studies which reported the mean age (1,2,3a,3b,4a,4b,5,6,8,9,11a,11b,11c,12,13,14a, 14b), the average age of the participants were 21.9 years old. The studies were administered in five different countries; twelve studies were carried out in Israel (7a,7b,7c,7d,7e,15a,15b,15c, 15d,15e,15f,15g), ten studies in the US (4a,4b,5,10,11a,11b,11c,12,13,14b), six studies in the UK (1,2,3a,3b,6,9), one study in China (8) and one study in Canada (14a). Across all studies, the average percentage of females in the samples was 64.3%. Only four studies reported baseline information on the participants' attachment style dimension findings (4a,4b,6,9). Studies inconsistently reported on socio-demographic status and ethnicity.

Research design. Seventeen studies utilised a between-subject experimental design in their research (1,2,3a,3b,4b,5,6,7a,7b,7c,7d,7e,9,10,12,14a,14b), which included randomly allocating participants to an experimental or control condition. Five studies used a within-subject experimental design (11c,13,15b,15c,15d), which involved participants completing multiple trials of the subliminal priming tasks on experimental and control items. Seven studies used a mixed method design (4a,11a,11b,15a,15e,15f,15g), and one study adopted a quasi-experimental design which included experimental groups but no control group (8).

Measures. A range of measures were used within the 30 studies reviewed. All the studies utilised at least one self-report measure; the most popular was the Experiences in Close Relationships (ECR; Brennan, Clark, & Shaver, 1998), a self-report questionnaire which measures attachment along two dimensions of attachment avoidance and anxiety. The ECR questionnaire was used within 19 studies (1,2,3a,3b, 4a,4b,6,7a,7b,7c,7d,7e,9,10,11a,11b,11c,12,13) and the

identified global attachment dimensions (secure, anxious, avoidant) were used as either independent variables (IVs), dependent variables (DVs) or covariates. Alternative measures to determine attachment dimensions were used in a further two papers, including the attachment story completion task (Bretherton, Ridgeway, & Cassidy, 1990; 5) and attachment dimensions of anxiety and avoidance (Mikulincer, Florian, & Tolmacz, 1990; 15). All studies measured a form of affect; the most common measures were Profile of Mood States (McNair, Lorr, Droppleman, & Service., 1971; 3a,3b,9) and Implicit Positive and Negative Affect Test (Quirin, Kazén, & Kuhl, 2009; 1,11b,11c). Additional measures included interpersonal experience or expectation (1,2,6, 7a,7b,7c,7d,7e,10), felt security (2,3a,3b,9) and attachment figure information (6,9,15d). Two studies used additional measures that were not self-report, including electroactivity assessment, heart rate monitoring, facial expression coding (5), and functional magnetic resonance imaging (fMRI) brain scans (13).

Effect sizes. Effect sizes for group differences were reported in 23 studies. The type of effect sizes used included partial eta squared (η^2), eta-squared (η^2), Cohen's f^2 and Cohen's d . A table of the reported effects sizes for each study can be found in Appendix D. Effect sizes have been classified as small, medium or large (following guidelines by Kotrlik and Williams, 2003, and Miles and Shevlin, 2001), for ease of comparison across the different types of effect sizes reported in the current review.

Results by type of prime. Across the 30 studies two different types of priming methodologies were implemented, subliminal and supraliminal. The studies are grouped by the priming type they used to explore, compare and analyse the results.

1.3.2 Subliminal Priming

In the current review, sixteen studies employed a subliminal priming technique (4a,5,7b,7c,7d,10,13,14a, 14b,15a,15b,15c,15d,15e,15f,15g).

Picture primes. A stream of words or pictures are typically used to prime participants. In the current review, 11 studies used a subliminal picture priming task with their participants (5,7b,7d,14a,14b,15a,15b,15c,15e,15f,15g). In all 11 studies, attachment security primes and neutral primes were used. Attachment security primes consisted of pictures of a mother comforting her baby (5, 14a,14b,15a,15b,15c,15e,15f,15g), a young heterosexual couple embracing (7b,7d,7c,14a,14b) and an elderly couple sitting close and comfortably with each other (15c). Neutral primes varied between studies but were all unrelated to attachment (e.g., neutral objects such as a stapler or table). Neutral primes are used to rule out the possibility that effects of secure primes on DVs are simply due to increments in post mood.

Eight studies also chose to use a positive-affect picture prime unrelated to attachment security (7b,7d,14b,15b,15c,15e,15f,15g); the purpose of including a positive-affect prime was to delineate the unique effects of the attachment security prime by comparing the two conditions to see if participants reported differently on affect or related outcomes. Four studies used a passive control in which no picture was primed (15a,15e,15f,15g). Finally, three studies used additional experimental primes including a picture of a 'cold mother' (14b), baby (15b) and a mother with a pram (15b), in order to test ASP against other emotionally-induced pictures.

In all 11 studies which used a subliminal picture prime, ASP significantly reduced negative affect or increased positive affect in comparison to neutral and no picture primes. Effect sizes ranged from medium (15a) to large (5,15b,15c,15e,15f,15g). ASP also significantly reduced negative affect in comparison to other emotionally-induced picture primes (e.g., cold mother). The effectiveness of positive-affect priming varied; three studies found that ASP was statistically more effective than positive-affect priming (5,7b,7d), whilst three studies found that the results were comparable to ASP (15a,15b,15c). Four studies manipulated the context of the study by putting participants under stressful conditions, and they found that this caused ASP to be more effective than positive-affect priming (14b,15e,15f,15g). This suggests that ASP is more resilient to the detrimental effects of stressful contexts than positive-affect priming as attachment security schemas are associated with unique feelings of distress alleviation (Bowlby, 1988).

Word primes. Six studies used computerised subliminal word priming tasks (4a,7c,10,13,15d,15e). A variety of tasks were carried out including rating similarity or liking of specific images (4a,10,13,15d,15e) and a word association task (7c). Word primes that were used included: common words related to attachment security versus neutral words (4a,7c,10,13,15e), and names of the participants' self-reported attachment figures, close persons (no attachment), associates and unknown individuals (15d). Four studies found ASP to be effective in reducing negative affect and increasing accessibility to attachment security immediately after the prime (7c,10,15d,15e). The one study which recorded effect size, reported a large effect (15e). Two studies compared ASP against positive-affect priming (7c,15e); Mikulincer et al. (2001b) found ASP to be superior to positive-affect priming in reducing personal distress post prime (7c), whilst Mikulincer et al. (2001a) found that the ASP was superior to positive-affect priming only under threatening conditions (15e). In neutral conditions, Mikulincer et al. (2001a) demonstrated that the effects of ASP and positive-affect priming were comparable, specifically there was no significant difference between the two priming conditions on improving affect. Canterberry and Gillath (2012b) found no significant differences between ASP and the other prime types when participants were exposed to subliminal primes (13). Moreover, McGuire, Gillath, Jackson and Ingram (2018) found that ASP led to lower depressive symptoms in participants when re-assessed

one week later, although they only provided data on their combined subliminal and supraliminal findings thus it was not possible to determine the distinct contribution of the subliminal prime alone (4a).

Interaction with global attachment style. All of the subliminal priming studies in the current review tested the interaction between ASP and global attachment style. The purpose of this analysis is to examine whether the effect of the prime differs with levels of attachment anxiety or avoidance, and it also looks at whether the prime is equally effective for people with different attachment styles.

Ten subliminal studies demonstrated that global attachment style did not moderate the effects of ASP (4a,5,10,15a,15b,15c,15d,15e,15f,15g). Thus, security priming produced similar effects across the different conditions regardless of the participants' global attachment style.

In contrast, four studies found that anxious attachment styles moderated the effects of ASP (7b,7c,7d,13). Mikulincer et al. (2001b) found that attachment anxiety was found to be positively correlated to increased personal distress thereby limiting the positive effects of ASP (7b,7c,7d). Canterberry and Gillath (2012b) found that individuals with attachment anxiety showed unique activation in areas of the brain (i.e., cortical activation in the orbital frontal cortex and superior frontal) when presented with subliminal ASP, possibly indicating increased efforts at processing stimulus or difficulties regulating emotions evoked by the priming (13). Canterberry and Gillath (2012b) state these patterns of activation are consistent with the hypervigilant nature of individuals with attachment anxiety; individuals with attachment anxiety hold more negative internal models of the self and have a tendency to worry about rejection and abandonment. None of the four studies reported on the effect size of the interaction between ASP and anxious attachment style (7b,7c,7d,13).

Summary of subliminal priming studies. Sixteen studies utilising subliminal priming techniques were reviewed. All studies used subliminal ASP to reduce negative affect or increase positive affect, however, the composition of the security prime, tasks, comparison groups and the context the prime was carried out in varied substantially. Analysis across the studies suggests that the majority of the studies that used a subliminal ASP approach were effective in reducing negative affect or increasing positive affect, and the reported effect sizes ranged from medium to large. Positive-affect priming was shown to be as significant as the ASP in a number of studies (7a,7b,15a,15b,15c,15e). However, when the positive-affect priming was compared against ASP in threatening conditions, ASP was found to be superior in its effectiveness (14b,15e,15f,15g). Finally, the interaction with global attachment style varied across the 16 studies. Some studies found no interaction effect at all, thus ASP worked regardless of chronic attachment style. Whilst

other studies found that attachment anxiety moderated the effects of ASP. This unique interaction effect may be related to hyperactivation strategies embodied in anxiously-attached individuals, hyperactivation of the attachment system can negatively influence emotions and thoughts, and may make it difficult for individuals to detach from psychological pain (Mikulincer & Shaver, 2003).

1.3.3 Supraliminal Priming

Eighteen studies used a supraliminal priming technique within the current review (1,2,3a,3b,4a,4b,6,7a,7b,7e,8,9,11a,11b,11c,12,13,15a).

Mental imagery task. Fourteen studies used a mental imagery task as their supraliminal prime (1,2,3a,3b,4a,4b,6,7a,7b,7e,8,9,11a,12). Mental imagery tasks require participants to visualise a specific image in their head for a set period. Based on the papers reviewed; eleven studies provided participants with a script depicting the common traits and behaviours of a secure attachment figure (1,2,3a,3b,4a,4b,6,8,9,11a,12), and three studies used a vignette which described a problematic interpersonal experience to facilitate their thinking and mental imagery visualisations (2,7a,7b). Many of the supraliminal mental imagery priming studies found ASP to be effective in reducing negative affect or increasing positive affect (1,2,3a,3b,4a,4b,6,7a,7b,9, 11a); however, one of these studies was not statistically significant (4b) and three other studies only found this significant effect at one time point (9) or for one outcome variable (11a,12). Based on seven studies which reported effect sizes, effect sizes ranged from medium (1,3a,9) to large (2,3b,8,11a). One study found that the ASP group did not differ compared to the control prime groups (3a). Additionally, two studies found that ASP did not effectively reduce negative affect or increase wellbeing (3b,12) compared to the control condition.

Picture or word task. Five studies used supraliminal pictures or word primes to evoke attachment security in their participants (4b,11b,11c,13,15a). Two studies used a photograph of an attachment figure in the form of the participants' mothers (11b) or their romantic partner (11c). Additionally, two studies used explicit picture or word primes related to attachment security (13,15a). Finally, McGuire et al. (2018) used a variety of picture, written and visualisation tasks with their participants (4b). All supraliminal picture prime studies found that the ASP was effective in reducing negative affect or increasing positive affect compared to active and neutral controls, apart from Mikulincer et al.'s (2001a) study where there was no significant difference found between the supraliminal prime conditions (15a). The attachment security prime used in this study by Mikulincer et al. (2001a) was a Picasso sketch of a mother holding and looking at her baby (15a). Although the prime intended to activate schemas of attachment security, the authors

state that it may also have activated memories about Picasso's art or other art-related schemas. In contrast the other studies used less ambiguous stimuli for their ASP, such as photographs of loved ones and explicit attachment security related words, which may have helped to evoke attachment security more easily. Based on three studies which reported effect size, group differences between secure and control conditions were large (11b,11c,13).

Multiple supraliminal tasks. McGuire et al. (2018) compared the results of the multiple priming activities they included in their study and they found significant differences in the participants' self-reported attachment security (4b). Specifically, they found that the 'picture writing task' which required them to observe and write about a picture of a mother comforting a baby, evoked less attachment security compared to the 'writing task' and 'thought visualisation exercise task' which required participants to write or think about a time they felt secure with an attachment figure. This suggests that the mental imagery tasks were more effective than the picture priming tasks (in their study at least), possibly because the picture writing task involved writing about someone else whilst the other two imagery tasks were related to the self.

Insecurity primes. Across all supraliminal priming studies, five studies also primed relationship insecurity in the forms of anxious-ambivalent and avoidant types or both (3a,6,7e,12,13). The rationale for priming attachment insecurity was predominantly to explore the unique effects priming insecurity had on the outcome variables (e.g., affect, emotional regulation) and also as a means of comparison against secure priming conditions and controls. Three studies found that individuals primed with insecure attachment reported greater negative affect compared to individuals in the secure prime group (3a,6,7e). It was generally found that individuals primed with attachment avoidance did not report greater depressed mood (3a) or higher personal distress (7e), compared to the secure prime group. Hudson and Fraley (2018) found that priming anxious attachment led to small improvements in the participants' positive affect over time similar to ASP (12). Finally, Canterbury and Gillath (2012b) found that when the attachment system is activated in response to an insecurity prime, the focus is on the self and ones' own needs, resulting in an active search for security (13). None of the studies reported effect size.

Repeated priming. Priming techniques used within the literature have produced relatively short-lived effects as they have typically been carried out across one session in the laboratory (e.g., Bartz & Lydon, 2004; Mikulincer et al., 2001a; Rowe & Carnelley, 2003). Repeated presentation of the prime, however, influences the duration of the effect by keeping secure mental representations activated for longer (Carnelley & Rowe, 2007). Five studies in the current

review used a repeated priming methodology, which involved being primed on one or more subsequent occasions after the initial prime had been administered (2,3b,4b,9,12).

In all five studies, subsequent primes were carried out at least 24 hours after the participants completed the initial prime. Two studies carried out an initial prime in the laboratory and then subsequent primes were sent directly to participants via text message (3b,12). The remaining studies administered their initial and subsequent primes in the laboratory (2), in the participants' naturalistic setting (4b), and on a study website (12). Subsequent primes varied in length ranging from 3 minute (3b,9) to 10 minute visualisations (4b,2). The majority of the studies kept their repeated primes the same, except two studies which changed their priming activities across the subsequent primes (2,4b). The repeated priming studies generally found that repeated ASP was effective in maintaining attachment security over time. Some studies found a slight decline in the participants' reported attachment security and increases in their negative affect symptoms between the last prime administered and the follow-up measures carried out at least 24 hours later for anxiety (9,3b), depression and felt security (9). In contrast other studies found that the effects of repeated ASP improved past the last prime administered in regard to self-views (2) and attachment dimensions (2,12). McGuire et al. (2018) showed a non-linear pattern to the effects of repeated ASP (e.g., in day three participants reported significantly lower state attachment security compared to day two), although this was likely due to the different priming activities that were administered across the two weeks and how effective each one was (4b).

Long-term effects. Five studies in the current review measured the longer-term effects of ASP by carrying out post-measures at least one day after the last prime was completed (3,4a,9,11c,12).

Two studies carried out post-measures at least 24 hours after the last ASP was completed (3b,9). The findings revealed that the secure prime condition reported significantly higher felt security (3b,9) and reduced anxiety and depression (3b,9) compared to the neutral condition at the final post prime measure. This suggests that ASP may have a lasting effect at least a day later. However, in both studies the effect of ASP was less significant at the final post-measure compared to the previous time-points when the ASP was administered during the study. In other words, the positive effects of the prime decreased once participants were no longer exposed to the prime.

Two studies carried out post-measures with their participants over one week or more after the last ASP task was completed (4a,11c). McGuire et al. (2018) carried out post-measures one week later and found that self-reported depressed mood was significantly lower than baseline scores for both secure and neutral priming conditions, although the decrease in the secure group was almost twice as large compared to the neutral group (4a). Selcuk, Zayas, Günaydin, Hazan and

Kross (2012) carried out post-measures on the participants' emotional and physical health one month after the last prime was administered and found that the individuals who responded positively to the initial ASP (i.e. achieved regulatory benefits) experienced better emotional and physical health outcomes one month later (e.g., less physical pain and anxiety; 11c).

Finally, Hudson and Fraley (2018) carried out an intensive longitudinal experiment which involved repeated follow-up measures and priming approximately every week for four months (12). They found that participants in both the secure prime and anxiety prime groups reduced their self-reported attachment anxiety over time and this decline was significantly greater compared to the control group. However, the participants' level of attachment avoidance was unaffected, and the secure prime did not significantly improve subjective wellbeing (e.g., life satisfaction, positive affect, emotional stability). The only exception they found was that ASP reported higher positive affect than other control groups from the first measurement onwards, thus ASP may have had an immediate impact on increasing positive affect and then repeated priming maintained those effects across the duration of the study.

Interaction with global attachment style. Fifteen supraliminal priming studies in the current review measured the interaction between ASP and global attachment style (1,2,4a,4b,6,7a,7b,7e,9,11a,11b,11c,12,13,15a). Five studies in the review demonstrated that global attachment style did not moderate the effects of ASP (2,4a,4b,6,15a).

In contrast, three supraliminal studies found that anxious attachment style moderated the effects of ASP whilst attachment avoidance did not (7a,7b,7e). As previously mentioned, Mikulincer et al. (2001b) found that attachment anxiety was positively associated with the cognitive accessibility of personal distress memories and limited the effectiveness of ASP (7a,7b,7e). Additionally, six studies in the review found that only avoidant attachment style moderated the effects of ASP (1,9,11a,11b,11c,12). Bryant and Chan (2017) suggested that individuals with attachment avoidance may hypo-activate their attachment system in response to ASP due to previous experiences of attachment figure unavailability, and thus did not benefit from the ASP being applied. However, Carnelley, Bejinaru, Otway, Baldwin and Rowe's (2018) study did find that ASP became more effective for individuals with avoidant attachments after repeated priming, suggesting a cumulative effect (9).

Canterberry and Gillath (2012b) looked at the neural mechanisms underlying attachment security and found that both attachment anxiety and avoidance were associated with differences in brain activation in response to explicit (supraliminal) ASP (13). Individuals with attachment anxiety increased activation in areas related to emotional processing and social perception processing. Thus, the ASP may be perceived as especially salient and result in more intense

emotional responses or searches for security. Individuals with attachment avoidance showed increased activation in areas associated with memory processes, suggesting that these individuals are making increased memory retrieval attempts reflecting a lack of easily accessible secure models. These findings reflect the IWMs of individuals with insecure attachments; attachment avoidance relates to negative models of others and a tendency to avoid closeness, whereas attachment anxiety relates to negative models of the self and a tendency to worry about rejection and abandonment (Brennan et al., 1998).

Summary of supraliminal priming studies. Eighteen studies that utilised a supraliminal priming technique were reviewed. The studies varied across a number of factors including: type of supraliminal task used (e.g., mental imagery, picture prime), number of times the prime was administered (e.g., one-off, repeated priming), interaction analyses with global attachment style, and follow-up measures over time to assess long-term effects. Analysis across the studies suggests that the majority of the studies which utilised a supraliminal ASP approach were successful in reducing negative affect or increasing positive affect. The best type of prime to use was difficult to establish due to the lack of effect sizes recorded in the picture and word prime tasks compared to the mental imagery tasks. Although, McGuire et al. (2018) did find the mental imagery tasks to be significantly more effective compared to picture writing tasks in his study which exposed participants to a range of supraliminal priming tasks (4b), which may be due to the focus being on the self rather than other people. Moreover, a small number of studies reported that the ASP group did not significantly differ to the control group or produce any significant difference to outcome variables post prime (3b,12,15a). Administering insecurity priming caused mixed results; for some studies participants reported greater negative affect (3a,6,7e), whilst others found it had no effect on participants (3a,7e), and in one case it even produced positive results (12). A lack of reported effect sizes, however, made it difficult to ascertain how large the effect was. Repeating priming appeared to have a cumulative effect on participants, with the majority of studies reporting reduced negative affect and increased positive affect at the final time the prime was administered. When participants were assessed one day after the last prime, the ASP group still reported significantly higher positive affect and felt security compared to the control group, although within the ASP group the effects of the prime had begun to decline (3,9). Similar to the subliminal findings, interaction effects between global attachment styles varied across the 18 studies. Some studies found no moderating effects, whilst others found that either attachment anxiety or avoidance moderated the effects of ASP.

1.3.4 Combination of Priming Methods

In the current review, four papers out of 15 used a combination of supraliminal and subliminal priming techniques in their research (4,7,13,15). Using a combination of priming techniques allows researchers to evoke ASP on both a subconscious and conscious level of awareness. This enables researchers to assess whether both types of priming methods are effective in influencing the outcome variable and allows for comparison, so they can identify the optimum type of priming to use. Mikulincer et al. (2001b) demonstrated comparable findings when they utilised supraliminal and subliminal priming techniques in their research (7); both priming techniques produced significant results in terms of strengthening empathy and inhibiting personal distress. Similarly, McGuire et al. (2018) found that using a combination of subliminal and supraliminal ASP methods in their study resulted in a greater decrease in depressive symptoms compared to the control group (4a).

Conversely, Mikulincer et al. (2001a) tested both types of primes in their first study and found that subliminal ASP was superior as it led to significantly higher positive evaluations compared to the supraliminal ASP presentations (15a), whilst Canterbury and Gillath (2012b) found that only the supraliminal ASP resulted in significantly higher positive evaluations and the subliminal prime did not (13). The contrasting results between the two studies may be due to a range of variables such as the different environmental contexts (fMRI scanner vs. standard laboratory setting) and participants recruited (general population vs. university students).

1.3.5 Quality Assessment

Reporting. All of the 30 studies considered within both the supraliminal and subliminal papers clearly described their key aims, objectives, outcomes being measured and their main findings. All studies also provided basic participant information including number of participants, age and gender. Missing participant information often included attrition, ethnicity, location and incentives used. The majority of studies reported hypotheses but failed to describe potential confounders or threats to validity such as psychological conditions or environmental variables which may have impacted on their findings. A number of studies failed to report any effect sizes in relation to experimental and control group differences (4a,4b,8, 12,14a,14b).

External validity. Participant samples were largely drawn from local universities, many of whom rewarded students with course credits for completing the study. Some studies used purpose sampling, which is selected based on characteristics of the population and objectives of the research (4b,5,8,9,13). Across all 30 studies included in the review, none reported the source population from which the sample was derived. Thus, it is not possible to determine the

representiveness of the samples used. Furthermore, none of the studies provided information about whether the interventions, staff or resources were familiar to the participants, all of which could impact on the validity and reliability of the findings.

Internal validity. The majority of studies used reliable outcome measures (e.g., ECR, Profile of Mood States) and statistical tests (e.g., Analysis of Variance, T-Tests) to analyse their findings. Most studies reported that the time between pre-measure, intervention and follow-up were approximately consistent between participants. Nearly all studies which used a repeated measure design controlled for order effects by counterbalancing their intervention measures (11c,15b,15c,15d), apart from one study which omitted this information (13). Intervention treatment fidelity varied across studies; most were carried out entirely under laboratory conditions which helped to standardise procedures, whilst other studies permitted participants to complete measures outside the laboratory which can make it harder to control for confounding variables (1,3b,4a,4b,9,11a,11b,11c,12). Additional attempts to ensure high intervention fidelity varied between studies; there was a complete absence of independent observer reports or training, and only half the studies included self-reports of performance or probed the participants on the true purpose of the experiment afterwards (6,11a,11b,11c,15a,15b,15c,15d,15e,15f,15g). The majority of studies stated that the participants were blind to the experimental condition they were assigned, and a smaller number of studies used a double-blinded procedure (2,8,15a,15b,15c,15d,15e,15f,15g). Filler questions or distraction tasks were used in approximately half the studies in order to prevent the participant guessing the purpose of the research (2,3a,3b,5,6,7a,7b,7c,7d,7e,11a,11b,11c,14a,14b). Finally, only six studies conducted a manipulation check on felt security to determine whether the prime manipulation had successfully induced attachment security in participants (2,3a,3b,4b,6,9).

Bias. The majority of studies suffered from a sampling bias as they recruited participants from local universities rather than taking a random sample of the population. Additionally, in most studies participants directly chose whether to be involved in the study, thus a self-selection bias inevitably occurred. Nearly all studies recruited participants from the same population, apart from two studies which used two different institutions or settings (2,4b). Approximately half of the studies analysed group differences before administering the intervention in order to determine that the two groups were approximately equal in their characteristics at baseline (e.g., personality traits, socio-economic background, gender; 2,3a,3b,4a,4b,5,7a,7b,7c, 7d, 7e,13,9). Data lost at follow-up was reported by half the studies (1,3a,3b,4a, 4b,5,6,11a, 11b,11c, 12,14a,14b), this included attrition, missing responses and research errors.

Power. Twenty studies reported power calculations to determine the target sample size (1,3a,3b,7a,7b,7c,7d,7e,9,11a, 11b,11c,12,15a,15b,15c,15d,15e,15f,15g). Sixteen studies were significantly powered to detect a large effect (1,3b,7a,7b,7c,7d,7e,9,12,15a,15b,15c,15d,15e,15f, 15g), whilst four studies were low on statistical power due to small samples sizes (3a,11a,11b, 11c).

1.3.6 Highest Rated Studies

The highest rated studies based on Down and Black's quality checklist were Stupica et al. (2017; 5), Hudson and Fraley (2018; 12) and Carnelley et al. (2016; 3b). Down and Black's checklist can produce a quantitative score from 0 to 27 for each study which is quality assessed. Stupica et al. (2017) scored 23 out of 27; notable strengths were their preliminary analyses which were carried out to test for potential confounds, the use of multimodal assessment (e.g., physiological measurement instruments and self-report ratings) and the statistical procedures they used to deal with missing data. Hudson and Fraley (2018) scored 22 out of 27; strengths identified in their study were the longitudinal design which enabled researchers to determine long-term effects of priming, the high statistical power and their reporting of attrition analysis. Finally, Carnelley et al. (2016) scored 22 out of 27 for their study; identified strengths included their repeated prime methodology, attempts to blind the participants to the main outcomes of the experiment, and detailed reporting of statistical analyses, such as actual probability values and an explanation of how they dealt with outliers in their data.

1.4 Discussion

1.4.1 Summary of Findings

The 30 studies in this review used an ASP technique to evaluate the effectiveness of ASP in reducing negative affect and increasing positive affect. A range of methodologies and designs were utilised within the studies reviewed including: within and between-subject experimental designs, different questionnaire measures, subliminal and supraliminal techniques, one-time prime or repeated prime, and follow-up measures. Typically, questionnaire measures were used to collect data regarding attachment style, positive and negative affect, depression and anxiety, and felt security. Experimental designs generally compared ASP groups against anxiety prime, avoidant prime or neutral prime groups in order to determine its unique significance in reducing negative affect or increasing positive affect. Subliminal priming techniques measured unconscious priming of representations of attachment figures, whilst supraliminal priming techniques

measured overt priming by evoking a mental image of an attachment figure. There was also a lot of variation in how priming was measured in terms of the frequency and time-lag.

The results provide evidence that ASP interventions can effectively reduce negative affect and increase positive affect with most studies reporting significant group differences (i.e. intervention group compared to control groups) or within-subject differences post-intervention, with medium to large effect sizes being reported. Comparable results were reported for both supraliminal and subliminal priming methods which suggests that both methods are effective in influencing affect. Approximately half of studies found that global attachment style moderated the effects of ASP, specifically it limited how effective ASP was in increasing positive affect and reducing negative affect in participants. Moderating effects were found for both anxious and avoidant attachment styles. This may be related to the distinctive affect-regulation strategies of insecurely-attached individuals. Research has shown that individuals with an avoidant attachment style deactivate their attachment system and distance themselves away from positive emotions (Shaver & Mikulincer, 2002), whilst individuals with an anxious attachment style hyperactivate their attachment system causing them to become hypervigilant in relation to their attachment relationships which can negatively affect their thoughts and emotions (Shaver & Mikulincer, 2002). This suggests that both anxiety and avoidant attachment styles may negatively impact the effectiveness of ASP, at least when primed initially. The studies which used a repeated priming methodology showed a cumulative effect on reducing negative affect and other beneficial outcomes over time, even for insecure attachment dimensions. Studies which collected follow-up data at least 24 hours after the last prime was administered showed that the effect of the prime was maintained, but simply participants in the secure prime group continued to show significantly greater positive affect and reduced negative affect compared to the neutral prime group.

1.4.2 Strengths of the Literature

The majority of the studies used an experimental design, which involved either comparing the experimental group with an active control group (between-subjects design) or exposing participants to all intervention trials (within-subjects design). Active control groups receive a similar intervention to the experimental group but their intervention does not specifically target the variable of interest, whereas passive control groups receive no treatment at all. It is argued that the use of passive control groups may result in a number of confounding variables including the amount of experimenter contact, expectancy effects and motivation (e.g., Redick, Shipstead, Wiemers, Melby-Lervåg, & Hulme, 2015), all of which may affect the validity of the study. Additionally, the use of active control groups could be considered more ethical as participants may benefit from the alternative intervention (Temple & Ellenberg, 2000). All studies

which used a within-subject design in the current review counterbalanced their trials. Counterbalancing prevents order effects by administering procedures in different sequences (Coleman, 2009).

Additional methodological strengths of studies reviewed were the randomisation procedures, use of published self-report measures, blind condition assignment and matched group designs. Mikulincer et al. (2001a) applied a particularly strong methodology in order to study the affective component of ASP. They used a double-blind procedure in which neither the participant nor the experimenter was aware of the experimental manipulations, attachment scores or purpose of the experiments. This helped to eliminate possible biases that are usually present in participant randomisation and experiment administration. Additionally, Carnelley et al. (2016) attempted to blind the participants to the true purpose of their study by providing an alternative rationale for why they were interested in people's responses to visualisation tasks and by including filler items in their measures to support their cover story. This helped to reduce internal bias that may occur when participants are aware of what type of behaviour is being observed and measured.

Over two thirds of the studies measured whether global attachment style moderated the effects of ASP. This is important because it highlights whether the priming intervention is effective for all dispositional attachment styles (i.e., secure, anxious and avoidant). The findings in the current review were mixed; approximately half of the studies found ASP worked regardless of attachment style, whilst the other half found that attachment style moderated the effect of ASP. For the studies that found ASP to be successful for all attachment styles, they reported that individuals with insecure attachment styles (anxious and avoidant) were able to activate relationship-specific working models where they were able to focus specifically on the secure relationships they possessed (e.g., Carnelley et al., 2016). The researchers believed that these stronger more specific models are likely to affect IWMs at a more general level thus changing affect and attachment security levels. This has important practical implications, as it suggests that interventions for insecure individuals might focus on ASP as a way to improve mental health conditions such as anxiety and depression. However, for the studies which found dispositional attachment style to moderate the effects of ASP, they argued that their findings fell in line with Bowlby's (1988) classical theory of attachment system activation. Bowlby's theory stated that secure individuals will respond positively to ASP due to their previous experience of secure attachment figure availability, whereas individuals with insecure attachment possess previous experiences of inconsistent availability or absent attachment figures (e.g., Mikulincer & Shaver, 2007), making the ASP less effective as they cannot easily draw upon secure attachment figure experiences during times of threat. It may be advantageous, therefore, to use a combined approach (i.e. both subliminal and supraliminal priming) as not all individuals respond to help or

interventions in the same way (McGuire, Gillath, Jackson, & Ingram, 2018), which is reflective of the differences in how individuals respond to various psychotherapies (Cuijpers et al., 2013).

1.4.3 Limitations of the Literature

Methodological limitations were apparent across all studies within the review. These included: an over reliance on university samples and female participants, effect sizes not being reported, limited recruitment of children or older adults and studies measuring negative but not positive affect (and vice versa).

The majority of studies used self-report measures at pre- and post- intervention, however self-report can suffer from many limitations including recall and response bias (e.g., social desirability), as well as the inability to objectively assess one's own attachment orientation and affect (e.g., Rosenman, Tennekoon, & Hill, 2011). Triangulating self-report questionnaires with assessment of the individuals' behavioural and physiological symptoms may help to strengthen research findings (e.g., MacNeil, Lopes, & Minnes, 2009). For instance, Stupica et al. (2017) used a variety of outcome measures to assess children's physiological, expressive and self-reported fear reactions, which enabled them to make a more comprehensive conclusion about their findings due to their use of multimodal assessment techniques.

Additionally, no studies within the review identified different types of avoidant attachment such as dismissing or fearful (Bartholomew & Horowitz, 1991); separating the two types of avoidant attachment styles may have uncovered distinct differences in their responses to the ASP. The reason for this may be due to the majority of studies measuring attachment orientation through the ECR questionnaire which sorts insecurely-attached participants into two attachment dimensions (e.g., anxious or avoidant). Thus, both avoidant types are clustered together which makes it impossible to distinguish between dismissing and fearful individuals.

Finally, a notable limitation of the studies reviewed was the lack of post-intervention follow-up data, which made it difficult to determine whether ASP produced long lasting effects. A renowned criticism of priming studies is that it only produces short-term effects rather than maintaining improvements over time (e.g., Joordens & Becker, 1997; Kaschak, Kutta, & Coyle, 2015; Wheeldon & Smith, 2003). Repeated priming, however, seems to affect the duration of the ASP by making the effects of the prime stronger and longer lasting (e.g., Brown, 1996). Bowlby (1973) conceptualised that repeated interactions with an attachment figure altered attachment system functioning in the short-term and affected consolidation of IWMs in the long-term, which reflects the possible effects repeated ASP could have on long-term behaviour and attitude (Gillath et al., 2008). Hudson and Fraley (2018) carried out repeated priming over a four month period,

the longest repeated prime study within the current review, and they found it to be effective in reducing trait levels of attachment anxiety and it also maintained the participants' psychological wellbeing over time (although it did not significantly increase it). Additionally, the four other studies in the current review which utilised a repeated priming methodology also showed encouraging results, they demonstrated that priming effects of positive affect or reduced negative affect can be maintained for a number of days post-prime (e.g., Carnelley et al., 2016). Therefore, repeated priming should be a necessary component of future priming studies to ensure that effects are maintained over time making it beneficial for participants in the long-term.

1.5 Conclusions and Future Research

The current systematic review has examined the literature specifically related to the effectiveness of ASP on influencing positive and negative affect. The systematic approach undertaken resulted in a thorough quality assessment through the use of clear inclusion and exclusion criteria. This resulted in a comprehensive analysis of the methodologies and data, minimising opportunities for bias in the studies chosen and within the analysis. Overall, the findings have demonstrated that ASP appears to be associated with reduced negative affect and increased positive affect, as well as other beneficial effects across a diverse set of outcomes.

These findings were apparent in the majority of supraliminal and subliminal studies analysed in the current review. There were a small number of studies, however, which found that ASP did not successfully influence affect or produce superior effects over other priming techniques (i.e., positive-affect priming). Repeated priming may, therefore, be imperative as the findings have demonstrated that whilst the first prime does not always produce the desired effects, repeating the prime over time seemed to produce a cumulative effect for people shown by the significant changes in their self-reported affect and felt-security. Furthermore, over half the studies found that global attachment style moderated the effects of ASP. Thus, a combined priming approach (using subliminal and supraliminal priming methods) may be necessary to enable ASP to be effective for a larger number of individuals who may respond better to either subliminal, supraliminal or a combination of both priming styles.

In 2017, the Office of National Statistics carried out a survey looking at the trends of mental health conditions within children and young people (Sadler et al., 2018). The findings revealed that one in eight children and young people⁴ had a mental disorder⁵, and one in twelve

⁴ Aged between 5 to 19 years old.

had an emotional disorder such as anxiety and depression. Few studies in the current systematic review carried out ASP with children and young people below 18 years old or within a real-world setting. Future research should therefore aim to explore the impact of ASP as an intervention for children and young people within real-world settings, such as their school in order to improve their emotional wellbeing. Attempts should also be made to triangulate data through use of multi-informant self-reports, behavioural observation and academic progress.

This review demonstrates that there is a scarce amount of studies within the literature that explores the effectiveness of ASP in children and young people. Given that mental health conditions within this cohort have risen exponentially over the last few decades (Pitchforth et al., 2018), it would be useful to explore the effectiveness of ASP as an intervention for improving wellbeing in educational settings. Thus, the empirical study that follows investigated the effectiveness of ASP in reducing negative affect in children and young people (aged 11-19 years old) within schools.

1.5.1 Implications for Educational Psychologists

Educational Psychologists (EPs) play a key role in supporting educational settings with meeting the needs of students who are exhibiting mental health conditions such as anxiety and depressive moods. They have the necessary theoretical and empirical knowledgebase related to how mental health conditions can affect children and young people's learning and psychosocial outcomes. An important part of an EP's role is to disseminate evidence-based practice to enable teaching staff to effectively support children and young people within their educational settings. This is becoming imperative as the waiting times to be seen by Child Adolescent Mental Health Service (CAMHS) is continuing to increase, and children and young people are sometimes having to wait over a year for treatment (e.g., Frith, 2017; Moore & Gammie, 2018). Thus, schools can offer support and treatment within that time and also help the children and young people who do not meet diagnostic threshold. Thus, carefully designed research which explores effective interventions for improving children and young peoples' emotional wellbeing in schools is necessary. EPs have good links to children and young people, parents and educational settings, which makes them well placed to do this.

⁵ Mental disorders were identified according to International Classification of Diseases (ICD-10) to standardise diagnostic criteria. Mental Disorders were defined by symptoms which caused significant distress to children and young people or impaired their functioning.

Chapter 2 Empirical Paper

2.1 Introduction

2.1.1 Attachment Theory

According to attachment theory (Bowlby, 1973), the interactions shared with primary caregivers become internalised into working models of attachment and facilitate the formation of felt security (Sroufe & Waters, 1977). This creates an early prototype of expectations about the availability and responsiveness of significant others in times of stress (Waters, Rodrigues, & Ridgeway, 1998). This prototype of early relationship expectations predicts the formation of specific attachment orientations (Bowlby, 1973). Attachment orientations are often conceptualised along a two-dimensional continuum of attachment anxiety and avoidance (Brennan, Clark, & Shaver, 1998). Individuals with high levels of attachment anxiety, avoidance or a combination of both, are considered to be insecurely attached. Attachment anxiety is characterised by fear of abandonment, reassurance seeking and feeling overwhelmed by emotions (Brennan et al., 1998; Mikulincer & Florian, 1998). Individuals with attachment avoidance experience difficulties with intimacy, are compulsively self-reliant and will distance themselves from others (Bartholomew, 1990). In contrast, securely attached individuals who possess low levels of attachment anxiety and avoidance, view themselves and others positively (Bartholomew & Horowitz, 1991).

2.1.2 Insecure Attachments and Psychopathology

Bowlby (1973, 1980) argued that disruptions in attachment-related experiences and the internalisation of negative working models function as risk factors in the development of psychopathology. For instance, children who typically experience inconsistent or overinvolved caregiving, may develop chronic anxiety and an over-proportionate dependency on their caregiver (Madigan, Atkinson, Laurin, & Benoit, 2013). A preoccupation with a caregiver generates anxiety about whether their needs can be met in the larger social world, leading to a relational style characterised by emotional dependence, regressed behaviour and social isolation (Fraley & Shaver, 2000; Howe, 2011). Moreover, children who receive unresponsive or rejecting caregiving have a tendency to expect similar behaviours from other people and so will react to others in a hostile manner (Madigan et al., 2013). As a means of coping with rejection, children may learn to inhibit emotional arousal and distance themselves from potential interpersonal threat (Goldberg, 1997; Mikulincer & Shaver, 2003).

Empirical findings have shown that insecure attachment dimensions are associated with anxiety (see Colonnese et al., 2011, meta-analysis; $r=.30$) and depression (Armsden, McCauley, Greenberg, Burke, & Mitchell, 1990). Hankin (2005) found that a childhood history of emotional maltreatment and adversity specifically predicted prospective depressive symptoms. Additionally, adolescents with a diagnosis of anxiety (compared to no diagnosis) were more likely to be categorised with an insecure attachment style (Brumariu, Obsuth, & Lyons-Ruth, 2013). Moreover, insecure attachment dimensions in adulthood have also been linked to subsequent depression and anxiety (e.g., Shaver & Mikulincer, 2002; Widom, Czaja, Kozakowski, & Chauhan, 2018). Taken together, theoretical models and correlational findings demonstrate strong evidence towards attachment insecurity functioning as a vulnerability factor for emotional disorders.

Conversely, a protective factor against the development of mental health problems is the development of a secure attachment style (Sroufe, 1988). A study looking at adolescents who had been exposed to trauma found that individuals with secure attachment styles demonstrated fewer depressive and anxious symptoms compared to individuals with insecure attachment styles (Okello, Nakimuli-Mpungu, Muisi, Broekaert, & Derluyn, 2014). Attachment security may serve as a buffering system whereby the perception of social support helps to reduce the likelihood that stressful life events will produce emotional distress (Cohen & Syme, 1985; Olstad, Sexton, & Sogaard, 2001). This has led researchers to explore whether attachment-based treatments could help to promote emotional-wellbeing (Bucci, Roberts, Danquah, & Berry, 2015).

2.1.3 Attachment-based Treatments

Attachment-focused treatment has taken on different forms such as using attachment theory to tailor treatment to the individuals' attachment style (e.g., Shorey & Snyder, 2006), therapy to enhance attachment security (e.g., Davila, 2003), and child and parent intervention programmes (e.g., the circle of security; Hoffman, Marvin, Cooper, & Powell, 2006). Whilst these forms of treatment can help to enhance attachment security, specific attachment security based interventions for reducing anxiety and depressive symptoms have been limited (McGuire, Gillath, Jackson, & Ingram, 2018). Evidence-based interventions which have focused on enhancing attachment security have primarily focused on adult romantic relationships (e.g., Emotionally Focused Therapy; Johnson, 2002) and other traditional talking therapies, which tend to be costly in terms of time and resources (Bernard et al., 2012). Thus, an intervention which is time-efficient, low cost and suitable for individuals with mental health difficulties is needed.

Attachment security priming (ASP) involves exposing individuals to implicit or explicit attachment-related cues to activate a relationship-specific attachment orientation (e.g., secure),

which leads individuals to think, feel and behave in a manner consistent with that dispositional attachment style (Carnelley, Otway, & Rowe, 2016). Previous research has shown that ASP can significantly increase positive mood and decrease negative mood compared to neutral primes (e.g., Carnelley et al., 2016; Mikulincer & Arad, 1999; Mikulincer & Shaver, 2001a). More recently, one study looked at the effects of ASP on a clinical sample to determine whether the technique could be used as a potential treatment option (Carnelley et al., 2018). Carnelley et al. (2018) carried out ASP with outpatients with primary depressive disorders using a repeated prime methodology where participants were primed initially in the laboratory and then via text messages on three consecutive days afterwards. They found that participants in the secure ASP condition experienced higher felt-security and lower anxiety and depressive symptoms compared to the control group. This suggests that ASP could be used as an intervention to reduce anxiety and depressed symptoms in individuals, including those with clinically significant conditions.

The majority of research looking at whether ASP can reduce anxiety and depression has been carried out with adults and very little research currently exists involving children and young people. McGuire et al. (2018) recently carried out a study exploring whether ASP could be used with adolescents to reduce depressive symptoms and they found that after a two-week period of repeated priming adolescents showed lower depressive symptoms compared to participants exposed to neutral primes.

The current study explored whether ASP could help to reduce anxiety and depressive symptoms and enhance felt-security in children and young people with social, emotional and mental health (SEMH) difficulties. This is the first study to date which has examined this combination of variables together with a cohort of children and young people aged between 11 to 19 years old. Additionally, this is the first time that ASP will have been carried out directly in mainstream schools and specialist educational placements for children with SEMH difficulties.

2.2 Research Questions and Hypotheses

The current study used a school-based intervention that aimed to reduce participants' negative affect. The participants were children and young people who had been identified with having SEMH difficulties. This research aimed to extend empirical evidence in ASP with children and young people with SEMH difficulties by answering the following questions:

- Is ASP more effective in improving felt security in children and young people with SEMH difficulties compared to neutral priming?
- How effective is ASP in reducing negative affect (anxiety and depressive mood) in children and young people with SEMH difficulties compared to neutral priming?

I hypothesised that children and young people with SEMH difficulties in the ASP condition would report higher felt security and reduced anxious and depressed mood compared to children and young people with SEMH difficulties in the control (neutral primed) condition.

2.3 Method

2.3.1 Ethical Approval

The study was granted ethical approval by the University of Southampton's Ethics Committee (ERGO 31710), followed by approval from the Research Integrity and Governance team.

Key ethical considerations were taken into account when designing the study due to the vulnerable nature of the participants. Firstly, I chose to use a neutral prime as my control group rather than an attachment anxiety prime or attachment avoidant prime which has commonly been used in previous adult ASP literature (e.g., Carnelley et al., 2016), in order to avoid the possible adverse effects of priming participants with attachment insecurity. Secondly, I mitigated the risk that participants in the secure prime group would not have a security-inducing attachment figure to visualise by providing the participants with two versions of the secure prime task. The first version asked participants to visualise a security-inducing attachment figure, whilst the second version asked participants to visualise a hypothetical security-inducing attachment figure. Hypothetical security-inducing attachment figures have been used successfully in adult clinical samples (Carnelley et al., 2018). Thirdly, I incorporated a mood repair task near the end of the study to counteract any possible negative affect that may have occurred after completing the anxiety and depression items in the pre- and post-measures. Finally, I provided parents and young people with information on their debrief forms about support services that they could contact in case they needed further help.

2.3.2 Design

The study was a mixed design, consisting of one between-subject variable (priming task) and one within-subject variable (Time 1 and 2). The dependent variables (DVs) were felt-security, anxious mood and depressed mood ratings.

To compute sample size estimation, a statistical power analysis was performed using GPower 3.1 software. To detect a medium or large effect for .80 power in Analysis of Variance (ANOVA) with two groups ($f=.25$) and $p=.05$, a sample size of 96 or 40, was necessary (Cohen,

1992). My sample size was greater than 96 and therefore able to detect a medium and large effect.

2.3.3 Participants

A purposive sample of children and young people who had been identified with SEMH needs were recruited from mainstream secondary schools and special school settings within Southern England. In total 150 students from seven schools were asked to take part in the study, including five mainstream schools ($N=128$) and two special schools ($N=22$). Six participants were excluded from the analysis because they either declined participation or failed to complete the study. A further 37 participants were omitted because they failed to engage or follow instructions properly in the visualisation task⁶. In addition, seven outliers were identified through inspection of histograms, box plots and studentized residuals and were subsequently removed. The final analyses included 100 participants (see Appendix E for participant flow diagram). More males ($N=57$) than females ($N=43$) were included in the final analysis. Participants were aged between 11 to 19 years old ($M=14.5$ years old; $SD=1.57$). There was no significant difference in age, year group or gender between conditions.

The special schools were small settings which had approximately 50 to 60 students on roll. One school was single gender only and the other school was mixed (although the majority of their pupils were male). The special schools were located within (or near) inner city areas and more than 60 percent of their pupils were eligible for free school meals. The special schools catered for a range of special educational needs (e.g., autism, specific learning difficulties), although their primary focus was SEMH difficulties including behavioural regulation and social and emotional functioning. To access these settings all pupils need an Education, Health and Care Plan (EHCP), which is a legal document that identifies their needs and sets out the relevant provisions and support that is required for that child. In contrast, the mainstream schools were much larger settings and had approximately 550 to 1200 pupils on roll. All the mainstream schools were mixed gender and there were no admission requirements. The schools were predominantly located in suburban areas although one school was situated in a relatively deprived area. Less than 15 percent of pupils from the mainstream schools were eligible for free school meals and less than 10 percent had an EHCP.

Participants were recruited via Special Educational Needs Coordinators (SENCOs) or other senior staff members (e.g. Deputy Head, Head Teacher) in their schools who identified the

⁶ Results from the larger sample ($N=144$) were similar to the reduced sample ($N=100$) in regards to the direction and significance of the main findings.

children or young people as having anxiety or depressive symptoms. Letters were sent out to parents by the Head Teacher or senior staff members using either an opt-in or opt-out recruitment method chosen by the individual setting (see Appendix F). Four schools chose opt-in (one special and three mainstream schools) and three schools chose opt-out (one special and two mainstream schools).

Participants were randomly allocated to a secure prime condition (experimental, $N=48$) or neutral prime condition (control, $N=52$). Both interventions were carried out at the same time during the data collection period of five months (excluding school holidays). Participants were not made aware of the two conditions until they received the debrief information at the end of their participation in the study. The members of staff from each school who assisted with collecting the participants and bringing them to the allocated research room, were not informed about the assignment of the conditions. Measures were taken at baseline (Time 1, pre-intervention) and immediately after the priming task (Time 2, post-intervention). The participants' written texts (completed during the prime visualisation task) were collected immediately after the prime task and were later analysed to provide further understanding of the results.

2.3.4 Measures

Demographics. This form included information related to the participants' gender, age, year group and school.

Pre-prime depressed and anxious mood. The participants' depressed and anxious mood was measured using the Profile of Mood States (POMS; McNair, Lorr, Droppelman, & Service, 1971), a commonly used measure for assessing transient, active mood states. The original POMS consist of a list of 65 adjectives and respondents are asked to indicate the degree to which the adjectives describe how they are feeling right at the present moment on a 5-point Likert scale (0= *not at all* to 5= *extremely*). The POMS provide an overall total mood disturbance score and distinct scores for each of the 6 sub-scales. In the current study, children and young people were only asked to rate the items that referred to the tension-anxiety subscales such as tense, shaky, anxious and on edge (9 items, $\alpha = .81$; Carnelley et al., 2016), and the depression-dejection subscale such as unhappy, sad, blue and discouraged (15 items, $\alpha = .93$; Carnelley et al., 2016). The tension-anxiety and depression-dejection items were first piloted with a small sample of children and young people ($N=7$) to help determine whether it was appropriate for the desired age range (11-19 years old). The 5-point Likert scale was replaced with a 10-point Likert scale (see Appendix G) and the order of adjectives in the post-measures were different to the pre-measures

to ensure that participants did not remember and simply reproduce the same POMS rating after the experimental manipulation.

Experimental manipulation. As part of the experimental manipulation, participants completed an adaption of Bartz and Lydon's (2004) attachment style priming method. Participants wrote for 10 minutes about a relationship that made them feel secure. During this task participants were asked to visualise the person and how they feel when they are with them (see Appendix H). An alternative security prime was provided for participants if they could not think of a secure relationship (See Appendix I). The neutral prime was an adaption of the one used by Mikulincer and Shaver (2001); participants wrote for 10 minutes and visualised themselves going into a local newsagents, taking items from the shelves and moving them around (see Appendix J).

Felt security. The participants' felt security was measured post-prime to determine whether the experimental manipulation was successful. Previous research has conceptualised felt security as comprising of feelings of care, self-esteem, love and safety (e.g., Bowlby, 1969; Mikulincer & Shaver, 2007). Thus, this measure helped to establish whether the participants felt more secure as a result of thinking about a security-inducing attachment figure. The participants were asked to complete a 10-item ($\alpha=.96$) Felt Security Scale (Luke, Sedikides, & Carnelley, 2012; see Appendix K), in which they were asked to rate the extent to which the person (secure prime) or scenario (neutral prime) in the visualisation task made them feel in each item (e.g., loved, safe) on a 6 point Likert scale (1=*not at all*, 6=*very much*).

Post-prime depressed and anxious mood. The participants' anxious and depressed mood was measured post-prime to assess their current mood state as a result of the experimental manipulation. The participants rated POMS depression-dejection items ($\alpha=.92$; Carnelley et al., 2016) and tension-anxiety items ($\alpha=.85$; Carnelley et al., 2016) based on how they felt at the present moment.

Mood repair. The participants wrote about the five best things in their life in order to counteract any negative affect they may have experienced after completing the anxiety and depression POMS measures.

Text analysis. A text analysis software program called Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth, & Francis, 2001) was used to analyse the participants' written scripts. LIWC examines written texts and compares each word against a dictionary which contains words associated with psychologically-relevant categories. It then calculates the percentage of total words that match each of the dictionary categories for each individual text. In the current study, LIWC was used to analyse the amount of affect-related words (i.e., affect, positive emotion,

negative emotion, sad, anger and anxiety) and social words (i.e., social, friend and family) in the participants' written texts. I specifically wanted to find out whether the secure prime group used significantly more social and affect related words in their written texts compared to the neutral prime group. This would help to further demonstrate how effective the secure prime was in terms of inducing attachment security and also whether it induced attachment security more than the neutral prime.

2.3.5 Pilot Study

A pilot study was carried out to examine the feasibility of using the measurement instruments (POMS, filler items, felt security) and the priming tasks (ASP task, neutral task) with children and young people aged 11- 19 years old. Seven children and young people (4 females, 3 males) aged between 11-15 years old ($M=13$) were recruited to take part. Participants were asked to complete demographics and then indicate their anxious and depressed mood through POMS measures (tension-anxiety, 9 items; depression-dejection, 15 items). The participants were then randomly assigned to the secure prime condition ($N=4$) or neutral condition ($N=3$). Afterwards, the participants completed their allocated priming task and then post-measures of POMS and felt security. The participants finished with a short mood-repair task. At the end of the pilot study, the participants were asked whether there were any words in the POMS or filler items that they were unfamiliar with or had not understood. In regards to the priming tasks, they were asked about how they found the time duration, complexity of the task and instructions, as well as how easy they found it to visualise a mental image in their head. Based on the participants' responses five words were removed (perspective, resourceful, scientific, discouraged, blue) from the pre and post measures as the participants were unsure of their meaning. The time duration for the priming tasks also increased from 5 minutes to 10 minutes as the participants explained that 5 minutes did not give them enough time to write all of their thoughts down on paper. The participants' responses helped to determine the necessary modifications that needed to be made before carrying out the main experiment.

2.3.6 Procedure

I approached Head Teachers or senior leadership staff at mainstream secondary schools and specialist SEMH provisions to ask if they would be interested in taking part in the study. Once Head Teachers or the senior leadership staff had agreed they were asked to provide written consent. The Head Teacher or senior leadership staff then sent out letters to parents asking for their consent regarding their child's participation in the research. I arranged a convenient time with the school to come in and complete the experiment with the participants who had parental

permission. On the day of the experiment, I introduced myself and provided a cover story to try and hide the true purpose of the study by stating that the research was looking at how children's creativity and memory skills were affected by visualisation tasks. The purpose of the methodological deception was to make sure the participants were not aware of what aspect of their psychology was being studied and why (Bortolotti & Mameli, 2006). The participants were first asked to read the participant information sheet (see Appendix K), if the participants were happy to proceed they were asked for their assent to take part in the study and informed that they had the right to withdraw at any point. Participants were then asked to complete demographics, pre-measures of depression and anxiety symptoms, and filler items to support the cover story. Afterwards participants were randomly allocated to a secure-prime or neutral-prime condition and were asked to complete the priming task assigned to their condition. Immediately after the priming task, participants completed post-measures of depressed and anxious mood, filler items and felt security. Participants then completed the mood-repair task. Finally, participants were thanked and fully debriefed (see Appendix M).

2.4 Results

2.4.1 Data Preparation

The statistical package SPSS (IBM, version 25; 2017) was used to analyse the data. Missing values were dealt with by inputting numeric values to represent the missing data points (Field, 2009). Seven outliers were identified through visual inspection of histograms, box-plots and studentized residuals (values greater than ± 3 standard deviations; Field, 2009). The analysis was run with and without the outliers to determine if the outliers had a significant impact upon the findings. When the results from the two data sets were compared, the data with outliers contained extreme values within the gender analysis which were significantly skewing the data. With the exception of the gender analysis, however, no other significant differences in the main analyses were found between data with outliers and data without outliers.

Preliminary analyses demonstrated that the basic assumptions were met for ANOVA (see Appendix N) and Analysis of Covariance (ANCOVA, see Appendix N). For the main analyses, a one-way ANOVA was conducted on felt security, and a mixed-design ANCOVA was conducted on anxiety and depression with gender as a covariate. Table 2 presents the means and standard deviations for all the DVs in relation to prime condition.

Table 2.

Means and Standard Deviations of Dependent Variables

Prime type	N	Felt Security		Anxious Mood		Depressed Mood	
		Post-prime	Pre-prime	Post-prime	Pre-prime	Post-prime	Pre-prime
Secure	48	4.83 (1.18)	2.83 (1.61)	2.55 (1.92)	2.39 (1.50)	2.28 (1.71)	
Neutral	52	3.33 (1.41)	3.07 (1.59)	2.60 (1.53)	2.52 (1.47)	2.05 (1.38)	

2.4.2 Felt Security

A manipulation check was carried out to examine whether post-prime felt security was higher for participants in the secure prime condition compared to the neutral prime condition. A one-way ANOVA was conducted, with the prime condition (two levels: secure, neutral) as the independent variable (IV) and felt security as the DV. The main effect of prime condition on felt security was significant, $F(1,98) = 33.104$, $p = .001$, $\eta^2 = .252$. Participants in the secure prime condition ($M = 4.83$, $SD = 1.18$) reported significantly higher felt security compared to participants in the neutral prime condition ($M = 3.33$, $SD = 1.41$) as hypothesised (see Figure 4).

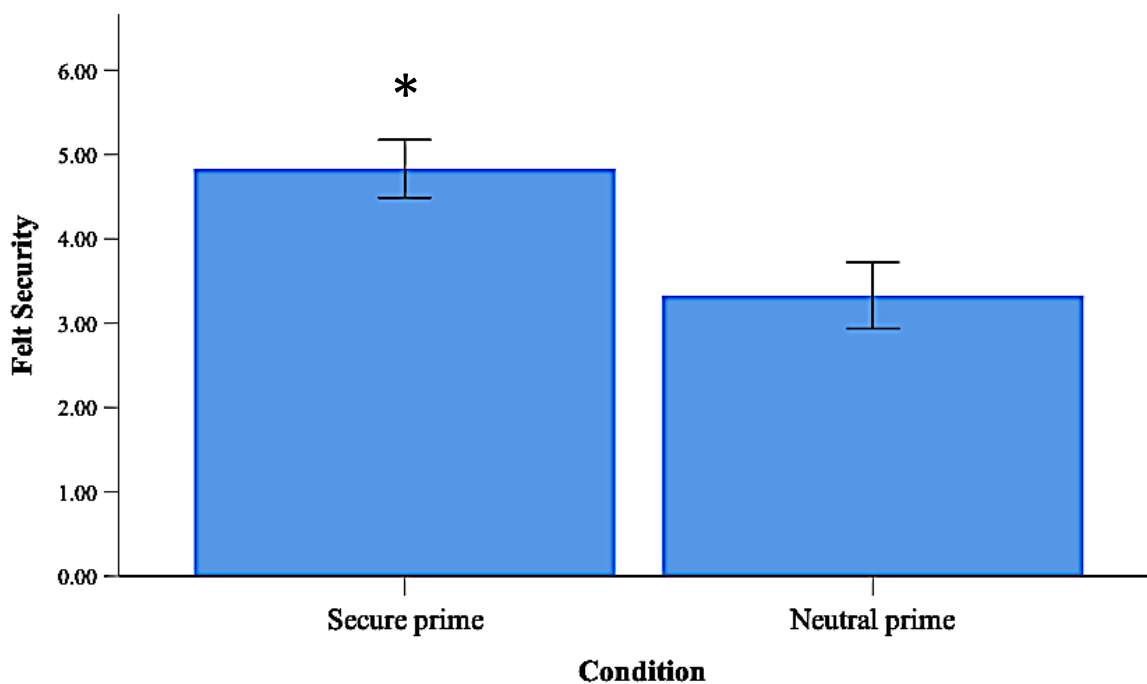


Figure 4. Means for felt security in each prime condition.

2.4.3 Anxious Mood

A mixed-design ANCOVA was conducted on anxious mood with time (two levels: Time 1 and Time 2) as a within-subject factor and prime condition (two levels: secure and neutral) as a between-subject factor, with gender as a covariate. The main effect of prime condition was nonsignificant, $F(1, 98) = .400$, $p = .529$, participants in the secure prime condition ($M = 2.55$,

$SD=1.92$) did not differ to those in the neutral prime condition ($M=2.60$, $SD=1.53$). There was not a significant interaction between time and prime condition, $F(1, 97) = 0.761$, $p = .385$, although the pattern of results were in the expected direction (see Figure 5).

The main effect of time was nonsignificant, $F(1, 97) = .004$, $p = .953$, $\eta^2 = .001$. Gender significantly predicted anxious mood, $F(1, 97) = 9.507$, $p = .003$, $\eta^2 = .089$, females reported significantly greater anxious mood compared to males at Time 1, $F(1, 98) = 6.608$, $p = .012$, and Time 2, $F(1, 98) = 10.407$, $p = .002$.

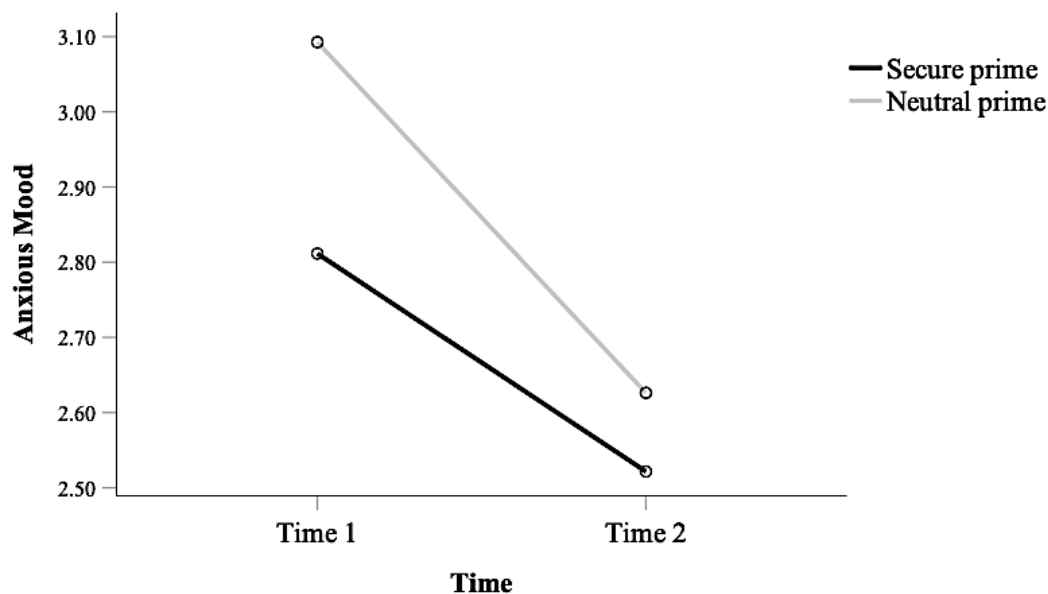


Figure 5. Means for anxious mood in each prime condition at Time 1 and Time 2.

2.4.4 Depressed Mood

A mixed-design ANCOVA was conducted on depressed mood with time (two levels: Time 1 and Time 2) as a within-subject factor and prime condition (two levels: secure and neutral) as a between-subject factor, with gender as a covariate. The main effect of prime condition was nonsignificant, $F(1, 97) = .002$, $p = .962$, indicating that those in the secure prime condition ($M=2.28$, $SD=1.71$) did not differ to those in the neutral prime condition ($M=2.05$, $SD=1.38$). The interaction between time and prime condition was significant, $F(1, 97) = 5.042$, $p = .027$, $\eta^2 = .049$, which suggests there was a significant finding for one of the prime conditions (see Figure 6).

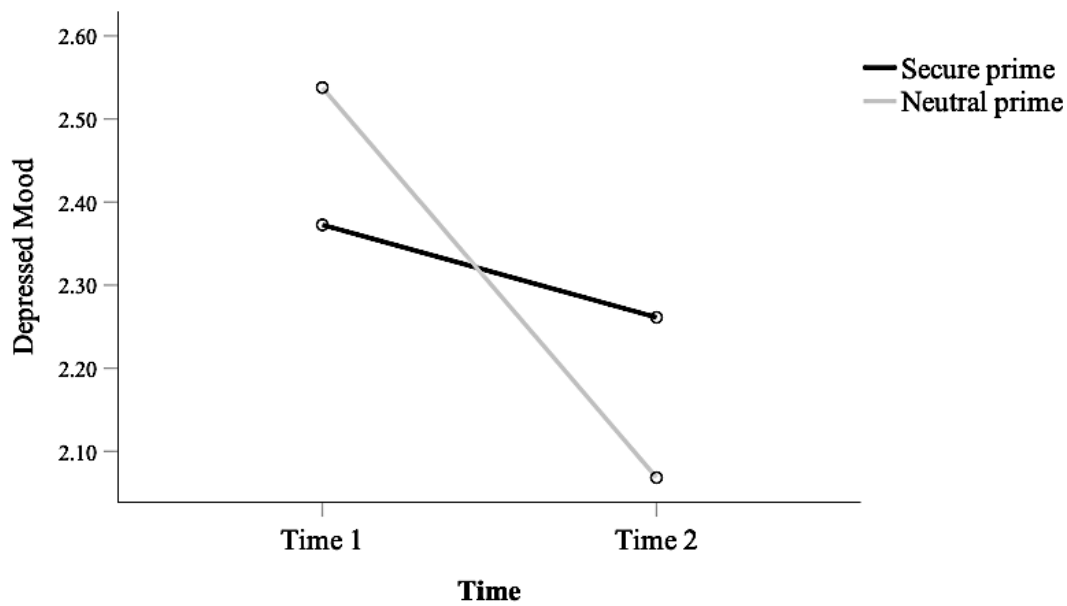


Figure 6. Means for depressed mood in each prime condition at Time 1 and Time 2

Results showed there was no significant difference between the primes at Time 1, $F(1, 98) = .199, p = .657$ or Time 2, $F(1, 98) = .534, p = .467$. However, there was a statistically significant effect of time at the neutral prime level, $F(1, 51) = 20.891, p = .001$. Depressed mood was 0.47 lower, 95% CI [0.26, 0.68] at Time 2 compared to Time 1 within the neutral prime condition. There was not a significant effect of time at the secure prime level, $F(1, 47) = 0.36, p = .365$.

The main effect of time was nonsignificant, $F(1, 97) = 1.125, p = 0.291, \eta^2 = .011$. Gender significantly predicted depressed mood, $F(1, 97) = 4.275, p = .041, \eta^2 = .042$, females reported greater depressed mood compared to males at Time 1, $F(1, 98) = 4.010, p = .048$ and Time 2, $F(1, 98) = 4.032, p = .047$.

2.4.5 Gender

I investigated whether gender would moderate the effects of the prime manipulation by conducting all analyses with gender and prime condition as IVs. Preliminary analyses demonstrated that the assumptions of two-way ANOVA were met for felt-security and a mixed-design ANOVA had been met for anxious mood and depressed mood (see Appendix N). Table 3 presents the means and standard deviations for DVs in relation to gender.

Felt-security. A two-way ANOVA was conducted, with gender (two levels: female, male) and prime condition (two levels: secure, neutral) as the IVs and post-prime felt security as the DV. The interaction between gender and prime condition was not significant, $F(1, 96) = .012, p = .913$. Additionally, the main effect of gender on felt security was not significant either, $F(1, 96) = .374, p = .102$.

Table 3.

Means and Standard Deviations of Dependent Variables for Gender

Gender	N	Felt Security	Anxious Mood		Depressed Mood	
		Post prime	Pre-prime	Post-prime	Pre-prime	Post-prime
Female	43	4.00 (1.54)	3.42 (1.85)	3.19 (2.14)	2.79 (1.79)	2.51 (1.88)
Male	57	4.09 (1.49)	2.61 (1.29)	2.12 (1.14)	2.21 (1.14)	1.90 (1.17)

Anxious mood. A mixed-design ANOVA was conducted on anxious mood with time (two levels: Time 1 and Time 2) as a within-subject factor and gender (two levels: female and male) and prime condition (two levels: secure and neutral) as between-subject factors. The interaction between gender, prime condition and time was not significant, $F(1, 96) = .004, p = .949$. Additionally, the interactions between time and gender, $F(1, 96) = 1.670, p = .199$, and gender and prime were not significant, $F(1, 96) = .230, p = .633$.

There was a significant main effect of time, $F(1, 96) = 12.281, p = .001, \eta_p^2 = .113$. The means for anxious mood were 3.01 ($SE = 0.16$) for Time 1 and 2.65 ($SE = 0.17$) for Time 2, a statistically significant difference of 0.36, 95% CI, [0.16, 0.56], $p = .001$. There was also a statistically significant main effect of gender, $F(1, 96) = 9.499, p = .003, \eta_p^2 = .090$. The means for anxious mood were 3.30 ($SE = 0.23$) for females and 2.35 ($SE = 0.20$) for males, a statistically significant difference of 0.95, 95% CI, [0.34, 1.57], $p = .003$.

Depressed mood. A mixed-design ANOVA was conducted on depressed mood with time (two levels: Time 1 and Time 2) as a within-subject factor and gender (two levels: female and male) and prime condition (two levels: secure and neutral) as between-subject factors. The interaction between gender, prime and time was not significant, $F(1, 96) = .485, p = .488$. Additionally, the interactions between time and gender, $F(1, 96) = .003, p = .956$, and gender and prime, $F(1, 96) = .021, p = .886$ were also not significant.

The main effect of time was significant, $F(1, 96) = 13.170, p = .001, \eta_p^2 = .121$. The means for depressed mood were 2.50 ($SE = 0.15$) for Time 1 and 2.21 ($SE = 0.16$) for Time 2, a statistically significant decrease of 0.29, 95% CI [0.13, 0.45], $p = .001$. There was also a significant main effect of gender, $F(1, 96) = 4.214, p = .043, \eta_p^2 = .042$. The means for depressed mood were 2.65 ($SE = 0.22$) for females and 2.05 ($SE = 0.19$) for males, a statistically significant decrease of 0.60, 95% CI [0.02, 1.18], $p = .040$.

2.4.6 Age

A Kendall's tau-b correlation was run to examine the relationship between age and ratings of felt-security, anxious mood and depressed mood (Time 1 and Time 2). Preliminary analysis demonstrated that a non-parametric correlation was necessary and that Kendall's tau-b was the most suitable test (see Appendix N). There was not a statistically significant association between age and any of the DVs ($p>.05$).

2.4.7 School Type

Independent Sample T-Tests were run to determine if there were any differences between school type and the DVs. Preliminary analyses showed that the assumptions had been met for the Independent Samples T-Test (see Appendix N). No significant differences were found for felt security, anxious mood or depressed mood between special schools and mainstream schools ($p>.05$), although the mainstream schools had the highest overall mean scores for all the DVs.

2.4.8 Individual School

A one-way ANOVA was run to determine if there were any differences between individual schools and the DVs. Preliminary analyses showed that the assumptions had been met for the one-way ANOVA (see Appendix M). There was no statistically significant difference in ratings of felt-security, anxious mood and depressed mood between individual schools ($p>.05$), although school B and school G had the highest overall mean scores of anxious and depressed moods out of all settings.

2.4.9 LIWC Analyses

I analysed the written texts that the participants wrote during the priming intervention using LIWC. This process enabled me to determine whether the participants engaged in the priming tasks as expected. For example, it was predicted that the participants in the secure prime group would use more affect-related words and social words compared to participants in the neutral group. Preliminary analysis demonstrated that the assumptions had been met to analyse the data using T-Tests (see Appendix N).

Participants in the secure prime condition used significantly more words related to affect, negative emotions, positive emotions, anxiety, anger and sadness than those in the neutral prime condition (see Table 4). Further analyses were carried out to determine whether participants in the neutral prime condition were writing about potential attachment figures as much as

participants in the secure prime condition. The results showed that participants in the secure prime condition used significantly more family-related words and social words than those in the neutral prime condition, although the prime groups did not differ in the amount of friend-related words they used (see Table 4). Additionally, although participants in the neutral prime group wrote significantly fewer social words, over a third of their written texts still included a social situation or attachment figure. Specifically, 40.48% of their data was affected by the social nature of the neutral prime.

Table 4.

Linguistic Analysis Descriptives

Word type	Secure prime		Neutral prime		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Affect	10.48	4.45	1.44	1.63	13.277	.001**
Positive emotions	8.56	0.57	1.14	1.45	10.791	.001**
Negative emotions	1.80	1.78	0.27	0.57	5.676	.001**
Anger	0.20	0.45	0.03	0.15	2.546	.014*
Anxiety	0.90	1.16	0.10	0.32	4.637	.001**
Sad	0.42	0.89	0.08	0.24	2.563	.013*
Social	15.50	4.26	4.95	4.58	11.895	.001**
Family	1.30	1.81	0.59	1.17	2.290	.025*
Friend	0.50	0.84	0.32	0.79	1.077	.284

Note: The amount of social and affect related words used in the written texts of both prime conditions; descriptive data and group differences are presented.

$p < .05$ * $p < .001$ ** indicates significant differences between prime groups

2.5 Discussion

2.5.1 Felt Security

The current study is the first to examine the impact of ASP on both anxious and depressed mood in children and young people with SEMH difficulties. As predicted, the findings for felt security supported the initial hypothesis. ASP successfully evoked a sense of felt security immediately after the priming manipulation. The secure primed participants reported significantly

greater felt security compared to the neutral primed participants. These results are encouraging, indicating that ASP has the potential to enhance children and young peoples' sense of security which has been associated with a greater capacity to cope with stress (Lopez & Brennan, 2000) and relationship functioning (Carnelley, Pietromonaco, & Jaffe, 1994). The current findings support and extend existing evidence which has also shown that ASP can successfully evoke a sense of felt security (e.g., Carnelley et al., 2018; Otway, Carnelley, & Rowe, 2014).

2.5.2 Anxious Mood

Both prime groups decreased in anxious mood over time, however, the difference between the secure prime and neutral prime conditions were not significant. The lack of significance between the two groups could be due to two possible reasons. Firstly, I noticed after reading through the participants' written texts for the prime task that many of the participants in the neutral condition wrote about going to their local shop with family or friends and so I wondered whether this could have improved their mood post-prime. Writing about a family member or friend may have caused the control prime to be less "neutral" (i.e., related to the experimental variable of interest—attachment security) than I had intended. The LIWC results demonstrated that whilst participants in the secure-prime condition wrote significantly more family-related words in their written texts, there was not a significant difference between the prime groups in the amount of friend-related words they used. During adolescence attachment to peers becomes as prominent as parental attachments, in fact Freeman and Brown (2001) found that parents and peers were equally likely to be identified as primary attachment figures. Thus, the secure and neutral prime conditions may have triggered similar levels of reference to significant others, a finding consistent with Carnelley et al. (2016) who found no significant difference in the amount of family or friend words used between the two prime conditions in their study.

Secondly, the attachment figures that the participants in the secure prime group chose to visualise appeared to induce a mixture of emotions. When reading through the written texts in the secure prime condition I noticed that many included negative and positive emotive language to describe their feelings when visualising their attachment figures. The LIWC analyses revealed that the secure prime condition reported significantly more words related to affect, positive emotions, negative emotions, anger and anxiety compared to the neutral prime condition. The participants that took part in the current study had been identified with anxiety and depressive symptoms; research has shown that individuals with these mood conditions experience considerable difficulty with emotional regulation (e.g., Gross & Muñoz, 1995; Werner & Gross, 2010). Individuals with depression report difficulties identifying, tolerating and modifying their emotions, whilst individuals with anxiety demonstrate lower emotional understanding, greater

negative reactivity to emotions and less ability to self-soothe (Berking & Wupperman, 2012). Thus, it is possible that the participants in the secure prime group found it hard to understand and manage the emotions they were experiencing in relation to their attachment figure and because of this they reported a mixture of strong emotions. Additionally, the specific choice of which attachment figure to focus on may have also led to mixed emotions. Whilst the majority of participants seemed to choose attachment figures which induced attachment security, as shown by the findings, they may have also chosen attachment figures which induced negative emotions in them as well such as hurt feelings (e.g., being told off) or a sense of longing (e.g., missing someone who lives far away). Therefore, the children and young people I focused on would benefit from support and guidance from a trusted adult who could help to support their emotional regulation and help them to choose a suitable attachment figure to focus on during the prime visualisation.

2.5.3 Depressed Mood

Both prime groups reported lower depressed mood after the prime manipulation, although the decrease in depressed mood was much greater for the neutral prime group. The neutral prime group reported significantly lower depressed mood after the prime (Time 2) compared to before the prime (Time 1). The direction of these results were the opposite to what was expected; it was predicted that the secure prime would help to alleviate symptoms of depressed mood more than the neutral prime congruent to previous research findings (e.g., Carnelley et al., 2016; McGuire et al., 2018). When reading through the written texts, however, I noticed that a number of the participants in the secure prime condition had chosen to visualise attachment figures who were no longer around which is likely to have evoked feelings of sadness. For example, three participants had chosen deceased family members and another three participants had chosen family or friends that had moved away. Using LIWC, I found that the participants in the secure prime condition did report significantly more sad words compared to the neutral prime condition. Rochman (2013) found that even when individuals reflect on a deceased attachment figure with fond memories it still induces feelings of sadness. Thus, whilst choosing an attachment figure that was no longer around may have induced feelings of attachment security and positive memories for the participant it may also have left them feeling sad as they reflected on their loss.

2.5.4 Low Baseline Score Measures

Another potential reason for the non-significant findings for both anxious and depressed mood could be the low baseline score measures. The participants only seemed to use the lower end of the mood measure scales (i.e., 1 - 3) rather than the whole scale (i.e., 1 - 10) when rating

their anxious and depressed mood at baseline and post prime. Thus, the possibility of getting significant results was reduced as participants were already rating themselves as low on anxious and depressed mood at baseline. This was unexpected as the participants chosen for the study were identified by school staff as having SEMH difficulties. It may be that the school staff who had been appointed to identify the specific pool of children and young people with SEMH difficulties did not choose the children and young people with the greatest needs. Also the parents of children with high SEMH needs may have been harder to reach and therefore consent was not obtained for these children and young people to take part. Additionally, the lack of trait measures for anxiety and depression and the absence of social-economic status data made it difficult to determine whether the purposive sample of children and young people with SEMH needs had been accurately identified for the current study.

2.5.5 Gender

Males reported significantly lower anxious and depressed mood compared to females before and after the prime. These findings are congruent to research evidence which has shown that adolescent females report greater anxiety (Hale, Raaijmakers, Muris, van Hoof, & Meeus, 2008) and are two to three times more likely to become depressed compared to adolescent males (Zahn-Waxler, Crick, Shirtcliff, & Woods, 2015). Girls react more strongly to stressful life events such as disruptions in relationships because they tend to be more heavily invested in peer and romantic relationships compared to boys (e.g., Leadbeater, Kuperminc, Blatt, & Hertzog, 1999; Rudolph, 2002). Vulnerability to interpersonal stressors may lead to feelings of helplessness, fear of abandonment and a heightened need for intimacy (Leadbeater et al., 1999), thereby creating a negative cycle of distress. This suggests a higher number of females will need access to support for anxious and depressed mood and as ASP focuses on key relationships this technique may be especially beneficial for females.

2.5.6 Schools

There was not a significant difference between participants in special school versus mainstream schools in their ratings of felt security, depressed mood or anxious mood, although based on mean scores participants who attended a special school reported lower anxious and depressed mood ratings compared to their mainstream counterparts. This finding was unexpected as I predicted that there would be higher rates of anxious and depressed mood for pupils in specialist schools which specifically cater for children with SEMH difficulties. Children who attend SEMH provisions have exceptional needs related to emotional and behavioural difficulties and up to 75% of these children also have reading difficulties (e.g., Crawford &

Simonoff, 2003; Place, Wilson, Martin, & Hulsmeier, 2000). Thus, a possible explanation for the unexpected results could be related to the participants' reduced ability to identify their own emotions and correctly interpret the words within the questionnaire, all of which is likely to have affected their ability to accurately report on their anxious or depressed mood. Conversely, the children and young people in special schools may experience less anxious and depressed moods because specialist provisions are typically smaller settings which offer students a high level of adult support and interventions to improve their skills and manage emotions.

The individual schools did not significantly differ in their ratings of felt security, depressed mood or anxious mood. School B and School G reported the highest rates of anxious and depressed moods out of the seven schools based on their mean scores (see Appendix B, Table 6). These two schools have the highest academic results based on findings from the government's school performance comparison matrix (GOV.UK, 2019). Thus, there may be more pressure on the students to do well in their exams as these two schools are likely to place higher expectations on their students. Suldo, Shaunessy and Hardesty (2008) found that students from high achieving schools experienced significantly more perceived stress compared to students from average achieving schools due to the greater demands placed on them (e.g., studying for tests, getting good grades). High levels of perceived stress co-occur with compromised mental health and maladaptive coping, which may put students at greater risk of negative outcomes (Suldo et al., 2008). This suggests that more emotional support should be provided to students in high achieving schools to ensure that perceived stress and negative mental health does not impede the potential of their students.

2.5.7 Strengths

This is the first study to explore the impact of ASP on depressed and anxious mood in a sample of children and young people with SEMH difficulties. The novelty of the study meant that many of the measures had to be modified in order to be suitable for the chosen sample. Carrying out a pilot study helped to determine what items in the mood measures were not suitable and whether any aspect of the prime tasks needed to be changed. The systemic review demonstrated that the number of ASP studies carried out with children and young people below 18 years old is extremely limited, thus this study has helped to increase the literature with this under-researched sample.

Additionally the sample size obtained in the current study may be seen as a relative strength especially given the difficulties in recruiting children and young people with SEMH needs. The recruitment process involved gaining consent from a number of sources including Head

Teachers or senior leadership staff, parents and the children and young people themselves. This proved difficult because drop-out occurred at all three levels of recruitment for a number of reasons such as schools reporting lack of capacity to host the study (e.g., time and space), schools choosing an opt-in consent approach with parents which resulted in lower response rate, and children and young people declining participation on the day of the study. Despite these challenges, the final sample size was relatively large and the study was sufficiently powered.

2.5.8 Limitations

There are a number of limitations within the current study. Firstly, the participants' choice of attachment figures could have been more carefully monitored. Previous studies (e.g., Carnelley et al., 2018; Carnelley & Rowe, 2007) have asked participants to write down their 10 closest relational figures and then the researchers have exclusively selected attachment figures (from the list of 10) reported to be strong secure attachment figures. This process has helped to ensure that the relationships with which the participants were primed induced attachment security. In the current study, I did not include this preliminary step before the prime task and thus I had less control over which type of attachment figures the participants would choose. Selecting a security-inducing attachment figure can be difficult, especially for children and young people who may find it hard to choose an attachment figure that is highly representative of a secure attachment style and does not possess insecure attachment traits. This may help to explain why many participants in the current study chose attachment figures that evoked mixed emotions rather than purely attachment security. Additionally, the experimenter did not explicitly state that the participants should visualise an attachment figure that was alive or currently present in their lives, thus some participants chose attachment figures that were no longer around which inadvertently caused them to feel sad about their loss. Secondly, I suspect that the neutral prime task was not "neutral" enough as I found that many of the participants in the neutral prime condition also referred to attachment figures (e.g., friends) in their written texts. Thus, the neutral prime needs to be chosen more carefully, this could be achieved by piloting a number of different neutral primes with children and young people first and then asking them to rate how "neutral" they found them to be. This may be difficult though as children and young people are usually around other people whilst doing neutral tasks (e.g., going to the shop with a parent or friend) compared to adults who are more likely to complete similar neutral tasks alone.

Secondly, I only carried out a single prime with participants which may have partially accounted for the non-significant findings. Studies which have carried out repeated priming over time have found that the effect of the prime tends to increase over time (Carnelley et al., 2018, 2016). For instance, Carnelley et al. (2018) carried out ASP to reduce anxiety and depressive

symptoms in a clinical sample and they found that ASP only became statistically significant after the third prime. Therefore, future research should consider using a repeated priming methodology to increase the effectiveness of the prime.

2.5.9 Implications for Educational Psychologists

Ten percent of children and young people suffer from clinically significant anxiety or depression (Mental Health Foundation, 2016). These mental health conditions typically emerge during adolescence when significant biological changes (e.g., brain structure, hormones) and psychosocial challenges (e.g., peer relationships, school pressures) take place in a young person's life (Kessler et al., 2005; Paus, Keshavan, & Giedd, 2008). By the age of fourteen, fifty percent of lifetime mental health conditions are established (Kessler et al., 2005). This is a significant concern as anxiety and depressive disorders are associated with adverse life course outcomes, such as drug dependence, impaired social functioning and unemployment (Fergusson & Woodward, 2002; Woodward & Fergusson, 2001).

Therefore, the findings of this research have important implications for Educational Psychologists (EPs) because the need to find effective interventions in school which reduce anxiety and depression is paramount. In the current study, ASP led to significantly higher felt security compared to neutral priming. Felt security has been associated with a range of positive outcomes, such as increased feelings of safety (Bowlby, 1969), reduction in barriers to social connection (Holmes & Murray, 2007) and emotional regulation (Lopes & Brennan, 2000). Additionally, ASP is a low-cost and time efficient technique which has strong theoretical underpinnings. These factors are particularly important for EPs and schools because interventions need be evidence-based, easy to implement and economical for the setting. The ease at which ASP can be carried out also means that individuals can complete the priming tasks in various different contexts (e.g., school, home and out in the community) after receiving their initial prime. This has been demonstrated in a number of studies which have successfully primed participants via text messages (e.g., Carnelley et al., 2018; Otway et al., 2014). Priming children and young people via text messages could be a practical solution as it means they can easily integrate it into their lives by completing it at a location and time that suits them. Technology and mobile phone are being used increasingly in mental health services for a variety of tasks including symptom assessment, psychoeducation and tracking treatment progress (Luxton, McCann, Bush, Mishkind, & Reger, 2011). A systematic review looking at the use of mobile-phone technology for psychological intervention in mental health disorders, concluded that mobile-phone technology was a feasible and acceptable treatment option which helped to improve on core outcomes of mental health illness (Menon, Rajan, & Sarkar, 2017). Thus, future research could explore the use

of repeating priming with children and young people via text-messages to reduce anxious and depressed mood.

2.6 Conclusion

This study is the first to examine the effects of ASP as a possible intervention for reducing anxious and depressed moods in children and young people with SEMH difficulties. Although the findings did not demonstrate statistically significant reductions in anxious or depressed mood, it did show that priming (in general) reduced symptoms post-prime and that ASP resulted in significantly higher felt-security. Future research should continue to investigate the potential of ASP as an intervention for children and young people with a larger sample size and through a repeated priming methodology. Studies should also ensure that children and young people are choosing attachment figures which are representative of secure attachment styles through carefully monitored procedures. Given the high prevalence of emotional problems in child and young people and the extensive waiting times to be seen by Child and Adolescent Mental Health Services, there is an increasing need for schools to deliver interventions which improve emotional wellbeing. ASP is a low-cost and easy to administer technique which could help to support children and young people in school by alleviating emotional barriers to their learning and development.

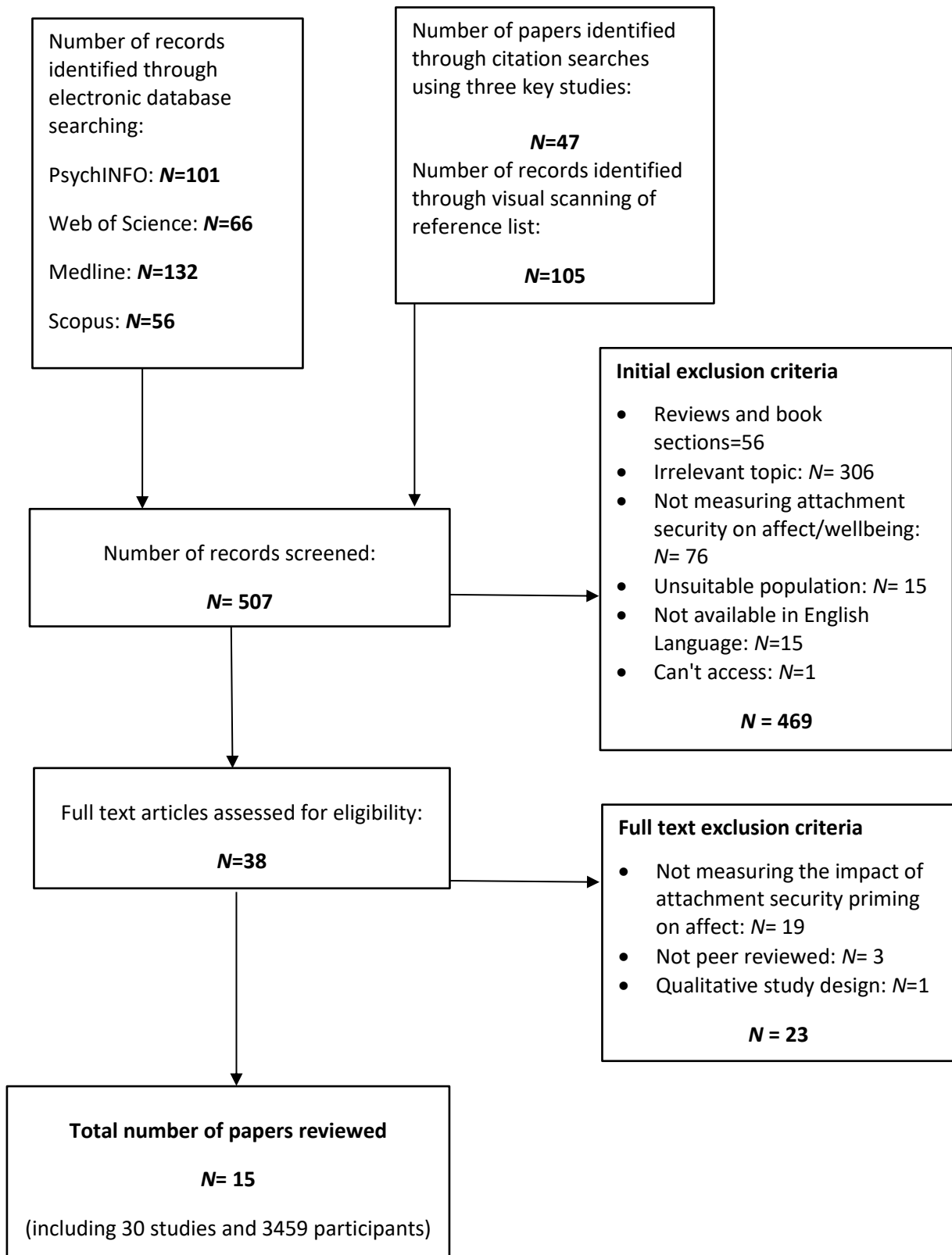
Appendix A Search Procedure

The following search terms were used to identify relevant articles in each database. The search terms include a list of specific keywords generated by the authors of key articles. Search terms were combined with either AND or an OR command.

PsychINFO:	Web of Science:	MEDLINE:	Scopus:
((Prime* OR Priming)	((Prime* OR Priming)	((Prime* OR Priming)	((Prime* OR Priming)
AND	AND	AND	AND
(Attach* OR Secur*)	(Attach* OR Secur*)	(Attach* OR Secur*)	(Attach* OR Secur*)
AND	AND	AND	AND
(Affect* OR Effect* OR anx* OR depress* OR positive mood OR negative mood)	(Affect* OR Effect* OR anx* OR depress* OR positive mood OR negative mood)	(Affect* OR Effect* OR anx* OR depress* OR positive mood OR negative mood)	(Affect* OR Effect* OR anx* OR depress* OR positive mood OR negative mood)
AND	AND	AND	AND
(Child* OR “Young Person” OR Adolescen* OR Teen* OR “Young Adult))	(Child* OR “Young Person” OR Adolescen* OR Teen* OR “Young Adult*))	(Child* OR “Young Person” OR Adolescen* OR Teen* OR “Young Adult))	(Child* OR “Young Person” OR Adolescen* OR Teen* OR “Young Adult))
Total yield: 101	Total yield: 66	Total yield: 132	Total yield: 56

Excluded using the following criteria:	
Not in English	N= 15
Reviews, book chapters	N= 12
Database error (study content/ design inappropriate for research question)	N= 269
Duplications of papers already included	N=25
Unobtainable	N=0
Population	N=12
Inappropriate measures	N=0
Total yield after exclusion criteria: 22	

Appendix B Flow Chart of Search and Retrieval



Appendix C Down and Black Checklist

Appendix 12 (as supplied by the authors): Modified Downs and Black checklist for the assessment of the methodological quality of both randomized and non-randomized studies¹

Item	Criteria	Possible Answers
Reporting		
1	Is the hypothesis/aim/objective of the study clearly described?	Yes = 1 No = 0
2	Are the main outcomes to be measured clearly described in the Introduction or Methods section? If the main outcomes are first mentioned in the Results section, the question should be answered no.	Yes = 1 No = 0
3	Are the characteristics of the patients included in the study clearly described? In cohort studies and trials, inclusion and/or exclusion criteria should be given. In case-control studies, a case-definition and the source for controls should be given.	Yes = 1 No = 0
4	Are the interventions of interest clearly described? Treatments and placebo (where relevant) that are to be compared should be clearly described.	Yes = 1 No = 0
5	Are the distributions of principal confounders in each group of subjects to be compared clearly described? A list of principal confounders is provided.	Yes = 2 Partially = 1 No = 0
6	Are the main findings of the study clearly described? Simple outcome data (including denominators and numerators) should be reported for all major findings so that the reader can check the major analyses and conclusions. (This question does not cover statistical tests which are considered below).	Yes = 1 No = 0
7	Does the study provide estimates of the random variability in the data for the main outcomes? In non-normally distributed data the interquartile range of results should be reported. In normally distributed data the standard error, standard deviation or confidence intervals should be reported. If the distribution of the data is not described, it must be assumed that the estimates used were appropriate and the question should be answered yes.	Yes = 1 No = 0
8	Have all important adverse events that may be a consequence of the intervention been reported? This should be answered yes if the study demonstrates that there was a comprehensive attempt to measure adverse events. (A list of possible adverse events is provided).	Yes = 1 No = 0
9	Have the characteristics of patients lost to follow-up been described? This	Yes = 1 No = 0

	should be answered yes where there were no losses to follow-up or where losses to follow-up were so small that findings would be unaffected by their inclusion. This should be answered no where a study does not report the number of patients lost to follow-up.	
10	Have actual probability values been reported (e.g. 0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001?	Yes = 1 No = 0
External validity		
11	Were the subjects asked to participate in the study representative of the entire population from which they were recruited? The study must identify the source population for patients and describe how the patients were selected. Patients would be representative if they comprised the entire source population, an unselected sample of consecutive patients, or a random sample. Random sampling is only feasible where a list of all members of the relevant population exists. Where a study does not report the proportion of the source population from which the patients are derived, the question should be answered as unable to determine. Appendix to: Trac MH, McArthur E, Jandoc R, et al. Macrolide antibiotics and the risk of ventricular arrhythmia in older adults. <i>CMAJ</i> 2016. DOI:10.1503/cmaj.150901. Copyright © 2016 8872147 Canada Inc. or its licensors	Yes = 1 No = 0 Unable to determine = 0
12.	Were those subjects who were prepared to participate representative of the entire population from which they were recruited? The proportion of those asked who agreed should be stated. Validation that the sample was representative would include demonstrating that the distribution of the main confounding factors was the same in the study sample and the source population.	Yes = 1 No = 0 Unable to determine = 0
13	Were the staff, places, and facilities where the patients were treated, representative of the treatment the majority of patients receive? For the question to be answered yes the study should demonstrate that the intervention was representative of that in use in the source population. The question should be answered no if, for example, the intervention was undertaken in a specialist centre unrepresentative of the hospitals most of the source population would attend.	Yes = 1 No = 0 Unable to determine = 0
Internal validity - bias		
14	Was an attempt made to blind study subjects to the intervention they have received? For studies where the patients would have no way of knowing	Yes = 1 No = 0 Unable to determine

	which intervention they received, this should be answered yes.	= 0
15	Was an attempt made to blind those measuring the main outcomes of the intervention?	Yes = 1 No = 0 Unable to determine = 0
16	If any of the results of the study were based on “data dredging”, was this made clear? Any analyses that had not been planned at the outset of the study should be clearly indicated. If no retrospective unplanned subgroup analyses were reported, then answer yes.	Yes = 1 No = 0 Unable to determine = 0
17	In trials and cohort studies, do the analyses adjust for different lengths of follow-up of patients, or in case-control studies, is the time period between the intervention and outcome the same for cases and controls? Where follow-up was the same for all study patients the answer should be yes. If different lengths of follow-up were adjusted for by, for example, survival analysis the answer should be yes. Studies where differences in follow-up are ignored should be answered no.	Yes = 1 No = 0 Unable to determine = 0
18	Were the statistical tests used to assess the main outcomes appropriate? The statistical techniques used must be appropriate to the data. For example nonparametric methods should be used for small sample sizes. Where little statistical analysis has been undertaken but where there is no evidence of bias, the question should be answered yes. If the distribution of the data (normal or not) is not described it must be assumed that the estimates used were appropriate and the question should be answered yes.	Yes = 1 No = 0 Unable to determine = 0
19	Was compliance with the intervention/s reliable? Where there was non-compliance with the allocated treatment or where there was contamination of one group, the question should be answered no. For studies where the effect of any misclassification was likely to bias any association to the null, the question should be answered yes.	Yes = 1 No = 0 Unable to determine = 0
20	Were the main outcome measures used accurate (valid and reliable)? For studies where the outcome measures are clearly described, the question should be answered yes. For studies which refer to other work or that demonstrates the outcome measures are accurate, the question should be answered as yes.	Yes = 1 No = 0 Unable to determine = 0
Internal validity - confounding (selection bias)		
21	Were the patients in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited from the same population? For example, patients for all comparison groups should be selected from the same hospital. The question should be answered unable	Yes = 1 No = 0 Unable to determine = 0

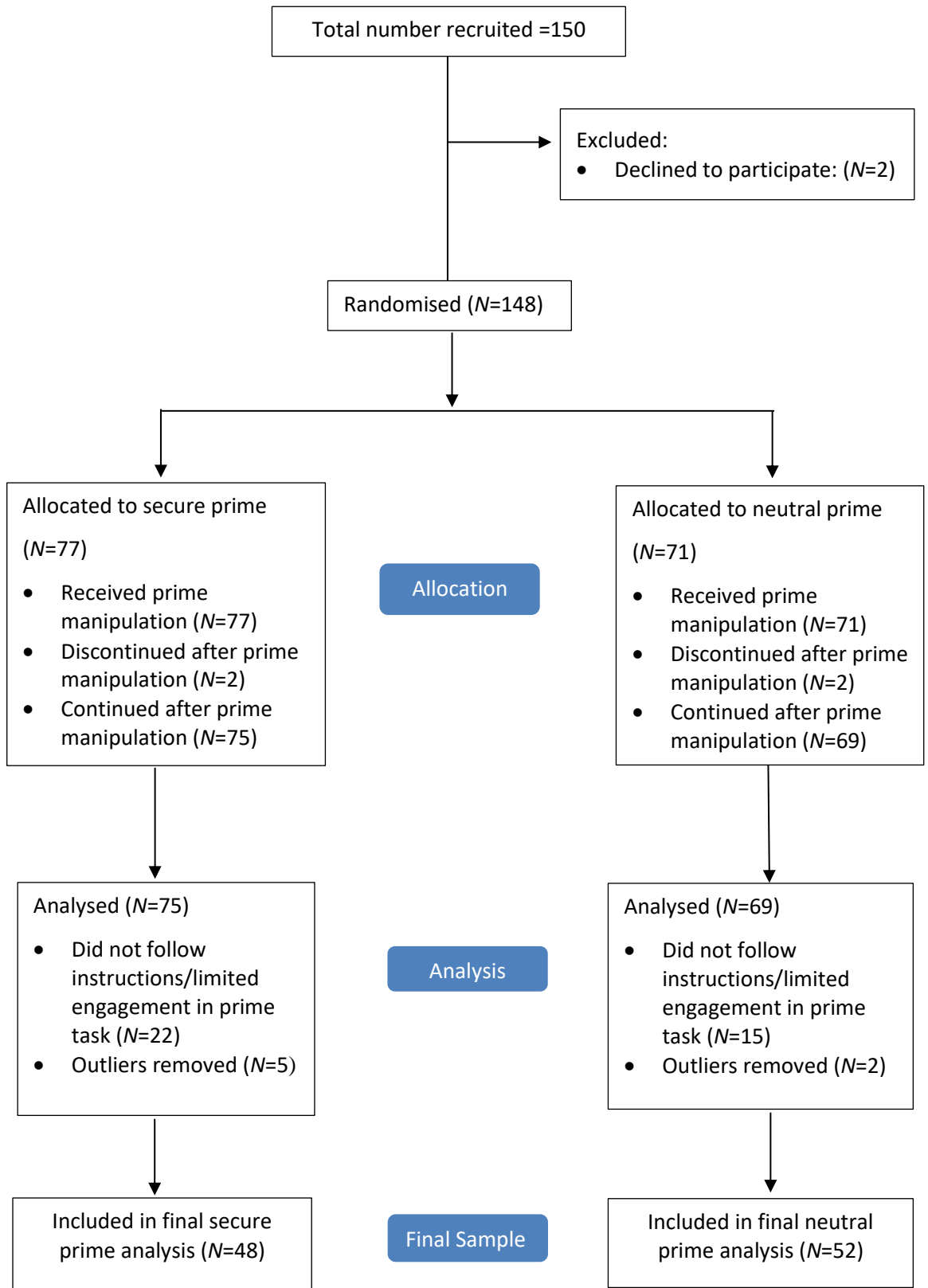
	to determine for cohort and case-control studies where there is no information concerning the source of patients included in the study.	
22	Were study subjects in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited over the same period of time? For a study which does not specify the time period over which patients were recruited, the question should be answered as unable to determine.	Yes = 1 No = 0 Unable to determine = 0
23	Were study subjects randomized to intervention groups? Studies which state that subjects were randomized should be answered yes except where method of randomization would not ensure random allocation. For example alternate allocation would score no because it is predictable.	Yes = 1 No = 0 Unable to determine = 0
24	Was the randomized intervention assignment concealed from both patients and health care staff until recruitment was complete and irrevocable? All non- randomized studies should be answered no. If assignment was concealed from patients but not from staff, it should be answered no.	Yes = 1 No = 0 Unable to determine = 0
25	Was there adequate adjustment for confounding in the analyses from which the main findings were drawn? This question should be answered no for trials if: the main conclusions of the study were based on analyses of treatment rather than intention to treat; the distribution of known confounders in the different treatment groups was not described; or the distribution of known confounders differed between the treatment groups but was not taken into account in the analyses. In non-randomized studies if the effect of the main confounders was not investigated or confounding was demonstrated but no adjustment was made in the final analyses the question should be answered as no.	Yes = 1 No = 0 Unable to determine = 0
26	Were losses of patients to follow-up taken into account? If the numbers of patients lost to follow-up are not reported, the question should be answered as unable to determine. If the proportion lost to follow-up was too small to affect the main findings, the question should be answered yes.	Yes = 1 No = 0 Unable to determine = 0
Power		
27*	Did the study have sufficient power to detect a clinically important effect where the probability value for a difference being due to chance is less than 5%? Sample sizes have been calculated to detect a difference of x% and y%.	Yes = 1 No = 0 Unable to determine = 0

Appendix D

Reported Effect Size and Classification

Studies	DV	Effect sizes (secure vs control groups)	Classification
1	Personal distress	$\eta^2 = .18$; $\eta^2 = .19$	Large
	Positive affect	$\eta^2 = .11$	Medium
2	Positive self-views	$\eta p^2 = .25$	Large
3a	Depressed mood	$\eta^2 = .21$	Large
	Anxious mood	$\eta^2 = .22$	Large
3b	Anxious mood	11% of the variance	Medium
4a	-	-	-
4b	-	-	-
5	Electrodermal activity	$d = 1.79$; $d = 1.84$	Large
	Respiratory sinus		
	arrhythmia	$d = 1.95$; $d = 3.40$	Large
5	Fearful facial expressions	$d = 15.00$; $d = 15.92$	Large
6	-	-	-
7a	Personal distress	28% of variance	Large
7b	Passive identification	20% of variance	Large
7c	Personal distress	33% of variance	Large
7d	Personal distress	10% of variance	Medium
7e	Personal distress	34% of variance	Large
8	-	-	-
9	Depression	$\eta p^2 = .10$	Medium
	Anxiety	$\eta p^2 = .13$	Medium
10	Rejected feelings	23.5 % of variance	Large
	Negative emotions	32.1 % of variance	Large
	Positive emotions	5.8 % of variance	Small
11a	Negative affect	$\eta p^2 = .22$	Large
11b	Negative affect	$\eta p^2 = .37$	Large
11c	Negative affect	$\eta p^2 = 1.21$	Large
12	-	-	-
13	Positive affect	$\eta^2 = .22$	Large
14a	-	-	-
14b	-	-	-
15a	Positive affect	$\eta^2 = .07$	Medium
15b	Positive affect	$\eta^2 = .15$	Large
15c	Positive affect	$\eta^2 = .18$	Large
15d	Positive affect	$\eta^2 = .16$	Large
15e	Positive affect	$\eta^2 = .14$	Large
15f	Positive affect	$\eta^2 = .13$	Large
15g	Positive affect	$\eta^2 = .18$	Large

Appendix E Participant Flow Chart



Appendix F Letters to Parents (Opt-in and Opt-out)

Invite for your child's participation in research

(version 7, 06/10/2018)

Study title: The effect of visualisations tasks on children and young people's imagination and memory skills

Researchers: Emily Gold, Dr Katherine Carnelley and Dr Angela Rowe

ERGO Study ID number: 31710

Dear parents of _____,

A Trainee Educational Psychologist from the University of Southampton is carrying out a research project looking at the effect of visualisation tasks on children and young people's imagination and memory skills. The research is funded by the University of Southampton as part of their Doctorate in Educational Psychology qualification.

I am writing to enquire whether you would be interested in having your child participate in the research project. The project will require your child to complete a pre-measure questionnaire, a visualisation task, and then two post-measure questionnaires. The study will last approximately 30 – 45 minutes and will take place either during the school day, or shortly after school.

Please find attached an information sheet which provides further information about the research. If you wish for your child to take part in the study, please could you '**opt-in**' by completing the attached consent form and sending it back to school.

Please contact the Trainee Educational Psychologist, Emily Gold: E.Gold@soton.ac.uk if you have any questions or require any further information about the study.

Kind Regards,

Head Teacher

Invite for your child's participation in research

(version7, 06/10/2018)

Study title: The effect of visualisations tasks on children and young people's imagination and memory skills

Researchers: Emily Gold, Dr Katherine Carnelley and Dr Angela Rowe

ERGO Study ID number: 31710

Dear parents of _____,

A Trainee Educational Psychologist from the University of Southampton is carrying out a research project looking at the effect of visualisation tasks on children and young people's imagination and memory skills. The research is funded by the University of Southampton as part of their Doctorate in Educational Psychology qualification.

I am writing to enquire whether you would be interested in having your child participate in the research project. The project will require your child to complete a series of pre-measures, a visualisation task, and then post-measures. The study will last approximately 30 – 45 minutes and will take place in school during the day.

Please find attached an information sheet which provides further information about the research. If you do not want your child to take part in the study, please could you '**opt-out**' by completing the attached consent form and sending it back to school.

Please contact the Trainee Educational Psychologist, Emily Gold: E.Gold@soton.ac.uk if you have any questions or require any further information about the study.

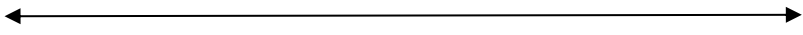
Kind Regards,

Head Teacher

Appendix G Profile of Mood State Questionnaire

Participant number:

Please read each word carefully and a circle a number between 1 (not at all) to 10 (very much) to describe how you are feeling RIGHT NOW.

	Not at all Very Much									
										
Tense	1	2	3	4	5	6	7	8	9	10
Miserable	1	2	3	4	5	6	7	8	9	10
Relaxed	1	2	3	4	5	6	7	8	9	10
Shaky	1	2	3	4	5	6	7	8	9	10
On edge	1	2	3	4	5	6	7	8	9	10
Gloomy	1	2	3	4	5	6	7	8	9	10
Uneasy	1	2	3	4	5	6	7	8	9	10
Guilty	1	2	3	4	5	6	7	8	9	10
Desperate	1	2	3	4	5	6	7	8	9	10
Panicky	1	2	3	4	5	6	7	8	9	10
Sorry for things done	1	2	3	4	5	6	7	8	9	10
Restless	1	2	3	4	5	6	7	8	9	10
Lonely	1	2	3	4	5	6	7	8	9	10
Nervous	1	2	3	4	5	6	7	8	9	10
Worthless	1	2	3	4	5	6	7	8	9	10

Anxious	1	2	3	4	5	6	7	8	9	10
Unhappy	1	2	3	4	5	6	7	8	9	10
Sad	1	2	3	4	5	6	7	8	9	10
Helpless	1	2	3	4	5	6	7	8	9	10
Hopelessness	1	2	3	4	5	6	7	8	9	10
Terrified	1	2	3	4	5	6	7	8	9	10
Unworthy	1	2	3	4	5	6	7	8	9	10
Logical	1	2	3	4	5	6	7	8	9	10
Forgetful	1	2	3	4	5	6	7	8	9	10
Distractible	1	2	3	4	5	6	7	8	9	10
Inventive	1	2	3	4	5	6	7	8	9	10
Creative	1	2	3	4	5	6	7	8	9	10
Productive	1	2	3	4	5	6	7	8	9	10

Appendix H Attachment Security Prime

Task A - Version 1

Please think about a relationship where you found that it was easy to get close to the other person. You felt comfortable because of this person and you didn't often worry about them going away.

Have you got a relationship in mind? You may have this type of relationship with your mum, dad, close friend or another relative such as a grandparent. *If you **do not** have this type of relationship, please complete version 2.*

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 mental 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 write your thoughts on the piece of paper provided and whilst you are writing try hard to visualise this person. You will have 10 minutes to complete this task and the researcher will let you know when the time is up.

Appendix I Alternative Attachment Security Prime

Task A - Version 2

Please imagine a relationship where you find it easy to get close to the other person and you feel comfortable being around them. In this relationship you don't often worry about the person going away. You may have experienced a similar relationship in the past but if not try to imagine what a relationship like this 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 mental 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 write your thoughts on the piece of paper provided and whilst you are writing try hard to visualise this type of relationship. You will have 10 minutes to complete this task and the researcher will let you know when the time is up.

Appendix J Neutral Prime

Task - B

Try to think of a particular time that you visited a local shop to buy something and give information about the order of events that you completed as you moved around the shop. For example, you may have selected a basket 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 and looked at e.g. did you have to reach the bottom shelf?

Please write your thoughts on the piece of paper provided and whilst you are writing try and visualise the situation. You will have 10 minutes to complete this task. The researcher 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 situation and write down anything else that comes to mind.

Appendix K Felt Security Scales

Felt Security

Please respond to the items below using the following 6-point rating scale.

1 2 3 4 5 6

not at all

very much

Thinking about the person I described in the visualization task makes me feel ...

_____ comforted

_____ secure

_____ supported

_____ safe

_____ loved

_____ protected

_____ better about myself

_____ encouraged

_____ sheltered

_____ unthreatened

Felt Security

Please respond to the items below using the following 6-point rating scale.

1	2	3	4	5	6
not at all			very much		

Thinking about the situation I described in the visualization task makes me feel

_____ comforted

_____ secure

_____ supported

_____ safe

_____ loved

_____ protected

_____ better about myself

_____ encouraged

_____ sheltered

_____ unthreatened

Appendix L Participant Information Sheet

Child and Young Person Information Sheet

This form explains important information about the research you have been asked to take part in, I can read this to you if you would like?

Study Title: The effect of visualisation tasks on children and young people's imagination and memory skills

Researchers: Emily Gold, Dr Katherine Carnelley and Dr Angela Rowe

ERGO number: 31710 (Version 6, 06/10/2018)

Please read this information carefully before agreeing to take part in this research study. It is your decision whether you would like to take part or not. If you are happy to participate you will be asked to sign an assent (agreement) form.

What is the research about?

I am a university student and I am carrying out this research project as part of my university qualification.

The research is investigating the benefits of visualisation tasks on children and young people's imagination and memory skills.

Why have I been asked to take part?

You have been asked to participate because my research is based on looking at the effect of visualisation tasks on children and young people aged 11 -17 years old. The school is supporting the research and your parent or guardian has given permission for you to be included if you would like to participate.

What will happen to me if I take part?

On the day of the experiment, the researcher and/or research assistants will introduce themselves and explain what the study is about. You will be asked for your permission to take part. You will then be told that you can stop taking part in the study at any point and skip any question you do not want to answer. You will firstly be asked to fill out general information about yourself (e.g. age, gender, ethnicity) and a few short questionnaires. You will then be asked to complete a visualisation task that will last approximately 5 minutes. Afterwards you will be asked to complete a few more short questionnaires. You will then complete a short, fun task not related to the study. Finally, you will be thanked and I will then explain what will happen to the responses you have provided and answer any questions you have. Your involvement in the study should last approximately 30 - 45 minutes.

Will anything good happen if I take part?

Your input will help towards current research regarding the effect of visualisation tasks on children and young people's mood and memory recall.

Are there any risks involved?

I will be asking children and young people to rate things that are related to how they feel (good and bad), which some children and young people may find hard. To prevent any children and young people feeling bad I have put in a fun task at the end which will make sure everyone leaves the study feeling happy.

What data (information and statistics) will be collected?

I will collect information before and after the visualisation task, so I can measure the effect it has had. I will input this information (all names of children/young people and schools, age and gender are removed) onto a computer which is password protected and use a statistical database to analyse the results.

Will anyone know that I have taken part in the research?

All information you provide will remain confidential (private) in line with the university's data protection policies. The questionnaires you fill in will be fully link-anonymised (all names removed) so you cannot be identified (someone cannot find out who you are). All the information sheets you fill out will be kept in a locked drawer and computer that requires a secure password. Only the research team will have access to this information.

What should I do if I want to take part?

You need to verbally agree to take part and also sign the consent form the researcher will give to you.

What happens if I change my mind?

You are allowed to withdraw (stop, not take part) any time before, during or after the experiment. If you decide to withdraw yourself, you or your parents can contact me using the details provided below.

What will happen to the results of the research?

The results will be put onto computer secured with a password and the data will be analysed. The project will be written up and submitted as part of my university qualification. The research may also be published (written up and available to other researchers or members of the public).

Where can I get more information?

If you have any questions about the research please contact:
Emily Gold: E.Gold@soton.ac.uk

What happens if something goes wrong?

If you are worried about how the research has been carried out, you or your parents can contact the Research Integrity and Governance Manager (023 8059 5058, rgoinfo@soton.ac.uk). The university has insurance in place to cover its legal liabilities in respect of this study.

Thank you!

Appendix M Debrief Form

Debriefing Statement
(Version no 6, 06/10/2018)

Study Title: Attachment Security Priming: Testing a New Intervention for Children and Young People

Researchers: Emily Gold, Dr Katherine Carnelley and Dr Angela Rowe

ERGO number: 31710

This form explains important information about the research you have taken part in, such as what it aimed to find out. I can read this to you if you would like?

The aim of this research was to investigate whether Attachment Security Priming (ASP), a technique which involves thinking about a secure attachment figure (e.g. parent, someone you are close to) can help to reduce feelings of anxiety (worry, nervousness) and depressed (sad, low) moods in children and young people. It is expected that children and young people in the ASP condition who wrote and thought about an attachment figure will feel more secure and experience lower anxious and depressed moods compared to the children and young people in the control condition who wrote about a neutral event. Your responses will help our understanding of whether an ASP task could be helpful in reducing anxious and depressed moods in children and young people. Once again results of this study will not include your name or anything else that may identify you.

The study did use a visualisation task like you were expecting but the focus of the study was on whether this reduced anxiety or depressed moods. A different explanation was given at the start because it may have affected how you responded to the questionnaires. It is important to understand that you were not selected because of anxiety or depression, the study was simply looking at on a general scale how you were feeling that day. Professional may use this technique in the future to help other children or young people in schools who are anxious or sad, to feel better. You may have a copy of this summary if you wish and the summary of research findings once the project is completed. If you have any more questions please contact me, Emily Gold, at E.Gold@soton.ac.uk.

Thank you for taking part in this research.

Signature _____

Date

Name: Emily Gold

If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, Psychology, University of Southampton, Southampton, SO17 1BJ. Phone: +44 (0)23 8059 3856, email fshs-rso@soton.ac.uk

If you are experiencing anxiety or depressive moods, you should tell an adult such as a parent or carer, or a member of school staff. If you would feel more comfortable talking to someone you don't know, you could contact childline on 08001111. They will help you to get the support you need to feel better.

Appendix N Preliminary Analyses

Felt Security: Preliminary Analyses

Felt security was normally distributed for the neutral group ($p=.130$) but not for the secure prime group ($p=.001$), as assessed by Shapiro-Wilk's test. Despite the assumption of normality being violated, an ANOVA test was still used as it is regarded as a robust test which can deal with deviations from normality (Maxwell & Delaney, 2004), particularly if the sample sizes are approximately equal (Lix, Keselman, & Keselman, 1996), and sample sizes are reasonably large (Sawilowsky & Blair, 1992). There was homogeneity of variance, as assessed by Levene's test for equality of variance ($p=.095$).

Table 5.

Descriptive Statistics and Correlations among all Continuous Variables

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1 T1A	2.96	1.60	1	.816**	.688*	.691**	-.235*	.129
2 T2A	2.58	1.72		1	.679**	.807**	-.334**	.157
3 T1D	2.46	1.48			1	.858**	-.273**	.118
4 T2D	2.16	1.54				1	-.275**	.087
5 FS	4.05	1.50					1	-.176
6 A	14.54	1.57						1

Note: $N = 100$. T1A = time 1 anxiety; T2A = time 2 anxiety; T1D = time 1 depression; T2D = time 2 depression; FS = felt security; A = age.

Anxious Mood: Preliminary Analysis

Age did not correlate with the DV at any time point therefore it did not meet the first assumption to become a covariate (Table 5). Gender, school type and school were not suitable for Pearson's correlation because they are not continuous variables, so I used ANOVA to test if there were any significant effects on the DV. There were no significant differences found between school type or schools on the DV at any time point so these were no longer considered as covariates. There were significant differences between gender on the DV at Time 1 and Time 2, and gender was independent from experimental effects (see Table 6). Additionally, there was

homogeneity of variance for Time 1 ($p=.510$) and Time 2 ($p=.376$), as assessed by Levene's test for equality of variance.

Table 6.

Summary of ANOVA Assumptions

DV	Potential covariate?	Correlated with DV?	Difference between groups on DV?	Independent from experimental effects?	Homogeneity of regression slopes?
Anxious Mood	Gender	-	yes, T1 and T2 $F(1,98)=6.68, p.012$ $F(1,98)=10.407, p.002$	yes $F(1,98)=.297, p=.587$	yes $F(1,96)=.230, p=.633$
	Age	No	-	-	-
	School type	-	No	-	-
	School	-	No	-	-
Depressed Mood	Gender	-	yes, T1 and T2 $F(1,98)=4.010, p.048$ $F(1,98)=4.032, p.047$	yes $F(1,98)=.297, p=.587$	yes $F(1,96)=.021, p=.886$
	Age	No	-	-	-
	School type	-	No	-	-
	School	-	No	-	-

Note: DV= dependent variable; T= time.

ANCOVA analyses were computed to determine if the assumption of homogeneity of regression slopes had been met. The within-subject factor was anxious mood (two levels: Time 1 and Time 2) and the between-subject factor was the experimental condition (two levels; security prime and neutral prime); gender was a covariate. The interaction between gender and condition was not significant. This indicated that the assumption of homogeneity of regression slopes was met for gender and thus entered as a covariate in the main anxious mood analysis (see Table 6).

Depressed Mood: Preliminary Analysis

Age did not correlate with the DV at any time point therefore it did not meet the first assumption to become a covariate (Table 5). I used ANOVAs to test if there were any significant effects on the DV for gender, school type and school. There were no significant differences found between school type or schools on the DV at any time point so these were no longer considered as covariates. There were significant differences between gender on the DV at Time 1 and Time 2, and gender was independent from experimental effects (see Table 6). Additionally, there was

homogeneity of variance for Time 1 ($p=.863$) and Time 2 ($p=.076$), as assessed by Levene's test for equality of variance.

ANCOVA analyses were computed to determine if the assumption of homogeneity of regression slopes had been met. The within-subject factor was depressed mood (two levels: Time 1 and Time 2) and the between-subject factor was the experimental condition (two levels: security prime and neutral prime); gender was a covariate. The interaction between gender and condition was not significant. This indicated that the assumption of homogeneity of regression slopes was met for gender and thus entered as a covariate in the main depressed mood analysis (see Table 6).

Gender: Preliminary Analysis

Felt Security. The assumption of normality was violated, as assessed by Shapiro-Wilk's test ($p<.05$). However, the two-way ANOVA is a robust statistical test which can withstand deviations from normality, as previously stated, especially if samples are large and groups are approximately equal. There was homogeneity of variance, as assessed by Levene's test for equality of variance ($p=.337$).

Anxious and Depressed Mood. The assumption of homogeneity of variances as assessed by Shapiro-Wilk's test ($p<.05$) were violated for anxious and depressed mood. However, the assumption of homogeneity of variances as assessed by Levene's test ($p>.05$) was met for both DVs. The equality of covariances for anxious ($p=.076$) and depressed mood ($p=.200$) was also met, as assessed by Box's test of equality of covariance matrices. The analyses only included two levels which meant that the assumption of sphericity was met. Thus, as the majority of the assumptions were met for a mixed-design ANOVA, I decided to proceed with this test.

Age: Preliminary Analyses

The assumptions of linearity were violated as assessed by visual inspection of scatter plots. Additionally, the variables were not normally distributed, as assessed by Shapiro-Wilk's test ($p<.05$). Thus, Kendall's tau-b (τ_b) correlation coefficient was used as it is a nonparametric alternative to the Pearson's Correlation when the data has failed more than one assumption. It is also considered an alternative to the nonparametric Spearman's correlation when there is not a monotonic relationship between variables.

School Type: Preliminary Analyses

The assumption of normality was violated, as assessed by Shapiro-Wilk's test ($p<.05$). However, I decided to proceed with the Independent Sample T-Test as it is a robust test that can

deal with deviations from normality (Fagerland, 2012). The assumption of homogeneity of variances was met for all DVs, as assessed by Levene's test ($p>.05$).

Individual Schools: Preliminary Analyses

The assumption of normality was violated, as assessed by Shapiro-Wilk's test ($p<.05$). Despite the assumption of normality being violated, an ANOVA test was still used as it is regarded as a robust test which can deal with deviations from normality, as specified previously. The homogeneity of variance was met for felt security and Time 1 anxious mood ($p>.05$), but not for Time 2 anxious mood, Time 1 depressed mood and Time 2 depressed mood ($p<.05$). See Table 7 for descriptive statistics.

Table 7

Descriptive Statistics of DVs for all Schools

School	Type	N	FS M (SD)	T1A M (SD)	T2A M (SD)	T1D M (SD)	T2D M (SD)
A	SS	11	3.79 (1.81)	2.29 (1.61)	2.13 (1.62)	1.84 (0.92)	1.77 (1.34)
B	MS	7	3.57 (1.66)	4.28 (1.68)	4.20 (2.22)	3.15 (2.01)	2.81 (2.17)
C	SS	2	3.75 (0.21)	3.50 (0.42)	2.90 (2.26)	2.58 (0.00)	1.42 (0.59)
D	MS	38	4.06 (1.51)	2.81 (1.30)	2.36 (1.32)	2.22 (1.08)	2.13 (1.34)
E	MS	6	3.85 (1.58)	2.20 (1.08)	1.50 (0.46)	2.08 (1.44)	1.26 (0.46)
F	MS	29	4.22 (1.43)	3.05 (1.80)	2.64 (1.92)	2.68 (1.76)	2.26 (1.70)
G	MS	7	4.40 (1.56)	3.56 (2.10)	3.37 (2.20)	3.39 (2.04)	2.88 (2.06)

Note: SS=special school; MS=mainstream school; FS=felt security; T1A=time 1 anxious mood; T2A=time 2 anxious mood; T1D=time 1 depressed mood; T2D=time 2 depressed mood.

LIWC: Preliminary Analyses

The assumption of homogeneity of variances as assessed by Shapiro-Wilk's test ($p<.05$) and the assumption of homogeneity of variances as assessed by Levene's test ($p<.05$) were violated for the DVs. However, I decided to proceed with T-Tests as it is considered a robust test that can deal with violations to normality and variances when samples sizes are approximately equal.

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