Adult attachment, cognitive, emotional and behavioural responses and the impact of social media

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Thesis declaration form

I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

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Date: 01.07.2022

Overview

Part one of this research project is a literature review of two areas of research. First I present research into working models of attachment and how they function to shape cognition, emotion and behaviour. I consider how contextual and environmental factors may influence this functioning. Second, I review the literature on the role of social media in shaping cognition, emotion and behaviour in interpersonal interaction. Two frameworks for understanding this are considered. The evidence considered suggests that interpersonal interaction on social media may impact how attachment working models shape cognition, emotion and behavioural responses within adult romantic relationships.

Part two of this project is a research study into the associations between attachment and cognitive, emotional and behavioural responses to potentially stressful partner behaviours. Furthermore, I test whether these associations are different when stressful partner behaviours take place on social media using regression analyses. Results support previous work showing that attachment anxiety is associated with different patterns of interpretation, emotional distress and behaviour. Furthermore, the results show that the associations between attachment anxiety and the majority of these responses are stronger in response to events that take place on social media compared to those that take place face-to-face.

Part three is a critical appraisal of the process of undertaking this research project. I describe the different stages of the processes and the challenges they presented. I also include some broader reflections on the questions and challenges the project raised.

Impact Statement

The findings presented in this research project bring together two distinct areas of study that will be useful in contributing to future academic research and clinical practice.

Academically, the empirical study showed for the first time that social media can influence the association between attachment and cognitive, emotional and behavioural processes. Specifically, it showed that attachment anxiety is more strongly associated with some cognitive, emotional and behavioural responses in response to the behaviours of romantic partners. This contributes to two important but separate academic areas, namely adult attachment and cyberpsychology literature. First, it contributes to research into how contextual factors impact the functioning of working models of attachment in adulthood. This has previously been identified as an area in which further research is needed (Mikulincer & Shaver, 2016). Whilst much work has been done into understanding the structure, content and functioning of working models, less has been done to understand how contextual social and environmental factors such as social media might influence this functioning. As a near ubiquitous fixture in contemporary adult relationships, this study shows that it is an important context that can alter the functioning of attachment working models in adult romantic relationships. Therefore, it contributes to a growing body of empirical work examining how context interacts with established understandings of the functioning of attachment working models in shaping cognitive, emotional and behavioural experiences in romantic relationships.

Second, the empirical study also contributes to debates in cyberpsychology regarding how social media influences psychological processes. It provides evidence that supports theoretical frameworks (McFarland & Ployhart, 2015; Nesi et al., 2018) that suggest that social media is a distinct context which impacts cognitive, emotional and behavioural processes. Furthermore, it shows that social media can impact the functioning of attachment working models in romantic relationships. It provides evidence that the social media context strengthens the association between attachment anxiety and particular cognitive, emotional and behavioural experiences in romantic relationships. In conjunction

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with the frameworks the hypothesis for this study was drawn upon, it provides a platform for further research into how social media can transform cognition, emotion and behaviour, particularly amongst those higher in attachment anxiety.

Understanding the impact of social media on the functioning of working models of attachment in romantic relationships also has important implications for clinical work. Importantly, this study shows that attachment anxiety is more strongly positively associated with emotional distress and predicted conflict in response to partner behaviours. This is relevant to clinical practice in a number of ways. High attachment anxiety for example has been associated with a range of markers of relationship quality and satisfaction (Collins & Read, 1990; Feeney, 2008; Li & Chan, 2010). Markers such as relationship quality and conflict are in turn associated with a range of mental health difficulties such as depression and suicidality (Whisman & Robustelli 2016). Therefore, by contributing to the understanding of how social media impacts the functioning of attachment working models, it is hoped that this research can inform a range of clinical practice, particularly in regards to interventions aimed at relationship difficulties.

It is hoped that through publication and dissemination of these findings will go on to contribute towards academic research and clinical practice.

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Part 1: Literature Review

Adult attachment, relationship experiences and the

interpersonal context of social media

Abstract

Individual differences in attachment style have been associated with a range of different experiences in adult romantic relationships including how we think, feel and respond behaviourally (Gillath et al., 2016). These differences are understood through the operation of internal working models of attachment of self and other (Simpson & Rholes, 2017; Collins & Allard, 2001; Collins & Read, 1990). Despite the theoretical importance of context in understanding how working models function, there is little empirical work into the impact of contextual differences on the operation of working models and the consequent impact on relationship experiences (Mikulincer & Shaver, 2016). As a near ubiquitous feature of contemporary romantic relationships, the role of social media on the activation of attachment working models is an under-researched area. Furthermore, there is a growing interest in the impact of social media on social psychological processes. Little is known, however, about whether and in what way social media contexts transform offline processes as opposed to merely mirroring them, as described in the mirroring framework (see Nesi et al., 2018). This conceptual introduction will describe research on adult attachment, internal working models, the associations with cognitive, emotional and behavioural responses in adult romantic relationships and the impact of context on attachment processes. In the second part, it will consider two frameworks (McFarland & Ployhart, 2015, Nesi et al., 2018) that explain how social media is a distinct interpersonal context that impacts the cognition, affect and behaviour of individuals. The introduction will conclude by drawing on this research to make predictions about how social media context might influence the relationship between attachment and cognitive, emotional and behavioural responses in romantic relationships.

Introduction

This thesis hopes to explore how changes in context might influence the association between attachment anxiety and how events in romantic relationships are experienced. It's thought that attachment can shape the way in which individuals think, feel and behave in relationships through working models of attachment (Bowlby, 1982). Individual differences in these models therefore facilitate different cognitive, emotional and behavioural responses to romantic partners (Collins et al., 2004; Mikulincer & Shaver, 2014; Gillath et al., 2016). Working models operate differently depending on environmental and contextual factors by directing individuals towards certain aspects of events, creating biases in memories and their retrieval, as well as explanation processes (Collins & Allard, 2001; Feeney, 2015). There is though, no research found on how social media communication might impact how attachment working models might shape thought, feelings and behaviour in romantic relationships.

A large body of research probing how individuals' different working models operate suggests that those higher in attachment anxiety interpret partner behaviours more negatively, experience greater emotional distress and respond in ways that are more likely to result in conflict (Collins, 1996; Collins et al., 2006). This is of direct relevance to mental health professionals as research demonstrates strong associations between romantic relationship difficulties and a range of mental health outcomes (Braithwaite and Holt-Lunstad, 2017). Associations have been found, for example, between relational distress and anxiety (Whisman, 2007), depression, suicidal ideation and attempts (Whisman & Robustelli, 2016) and personality disorders (South et al., 2008). Further, research shows that attachment anxiety (Meyer & Pilkonis, 2004) and insecurity (Bouchard et al., 2009) is higher amongst those diagnosed with borderline personality disorders and that those with these diagnoses are at greater risk of breakups and reconciliations (Bouchard et al., 2009), at greater risk of being subject to violence and abuse in their romantic relationships (Holtzworth-Munroe & Meehan, 2002; Zanarini et al., 1999) and lower marital satisfaction (Bouchard et al., 2009).

One of the most significant global changes to relational context since the majority of the research into working models of self and other was undertaken is the near ubiquity of social media use in twenty-first century romantic relationships. The phenomenon of the "blue ticks" on messaging app WhatsApp allows partners to see the instant their message is read. Photographs and videos can be shared privately or publicly with the social network of those in the relationship. These create new forms of relationship experiences and expectations for partners to navigate.

Exactly how different contextual factors affect the activation of working models of attachment is under-researched. There are a number of studies investigating the associations between attachment style and particular social media behaviours such as electronic intrusion (e.g. Reed et al., 2015) and partner surveillance (e.g. Fox & Warber, 2014) (e.g., Blackwell et al., 2017, D'Arenzio et al., 2019). Despite this, there is little research into the moderating role of social media in attachment and relationship behaviours and experiences. Two theoretical frameworks may be of relevance in this regard: (i) the mirroring framework (see Nesi et al., 2018), and (ii) the contextual/transformation framework (McFarland & Ployhart, 2015; Nesi et al., 2018). The former suggests that social media experiences *mirror* offline experiences. In contrast, the latter frameworks suggest that interpersonal experiences are transformed or changed by the social media context. Given the significant changes in social and relational context in the last four decades, there is a clear rationale for repeating investigations into how attachment styles might be associated with particular patterns of cognitive, emotional and behavioural responses to romantic partners.

This conceptual introduction will introduce adult attachment, working models of attachment and the research base on how working models of the other might be activated in romantic relationship experiences. It will then consider the social media frameworks noted above, and how they might explain the impact of social media on the association between attachment and relationship experiences. In order to undertake this literature review, searches for literature were performed on PubMed and Google Scholar. Search terms

included 'romantic attachment and social media' and 'romantic attachment and cognition, emotion and behaviour' for example. Unfortunately, because the literature on adult attachment is so large, interesting and overlapping areas of research such as coercive control and stalking literature were not included for the purposes of this review.

Attachment theory

In this section, I will summarise the background of attachment theory and two important strands in attachment theory research (Mikulincer & Shaver, 2016). There is a normative account of attachment that describes the typical features and development of the attachment behavioural system. The second component concerns individual differences in the functioning and development of the attachment system.

Normative account of attachment

Derived from evolutionary and ethological perspectives, Bowlby's normative account of attachment characterised it as a behavioural system that was orientated towards survival (Bowlby, 1958, 1969/1982). Bowlby suggested that this behavioural system could direct responses towards 'goals' that sustain survival. The overarching, biological goal of the attachment behavioural system was to achieve protection or 'felt security' (Bowlby, 1969, 1982; Sroufe & Waters, 1977). The attachment behavioural system is typically 'activated' in contexts in which stressors or threats to security or protection are most pertinent, e.g. when an attachment figure is not near or responsive.

The primary behaviour that is activated by the attachment system is proximity seeking (Bowlby, 1969, 1982). The attachment figure can also function in two other important ways (Bowlby, 1969, 1982; Ainsworth, 1991; Hazan & Shaver, 1994). Firstly, the attachment figure provides a 'safe haven'. This means that when a threat is experienced an infant will be provided comfort and protection from that threat. Second, the attachment figure also provides a 'secure base'. This means that the attachment figure can provide a reassuring base from which to explore goals and ambitions that are not related to attachment (e.g. playing with peers).

During infancy, attachment strategies are mostly innate behaviours that might involve crying or reaching out to be picked up, for example. As time passes, these strategies become increasingly flexible and context-sensitive. In adulthood, proximity seeking might for example, merely involve the mental representation of an attachment figure (Mikulincer & Shaver, 2004). Bowlby theorised that the threshold for activation becomes higher as individuals become better able to cope, self-soothe and problem-solve throughout the life-course.

Individual differences in attachment

Individual differences in the operation of the attachment behavioural system develop 'ontogenetically' (Bowlby, 1969,1982) on the basis of previous activation of the attachment system. The strategies employed by the attachment system to achieve safety and security become increasingly refined to the specific characteristics of the environment. In infancy and childhood therefore, we learn to adapt behavioural strategies on the basis of expectations drawn from previous experience (Bowlby, 1969). Bowlby's early work therefore emphasised the importance of caregiver responses to attempts at achieving felt security (Bowlby, 1958, 1969). In infancy, effective caregiver responses to threat are often characterised by the provision of available, sensitive and responsive behaviour (Marvin et al., 2016). These responses allow the caregiver to function as a safe haven and secure base.

Different caregiver responses are associated with the development of different strategies adapted to achieve the goals of safety and felt security with their caregiver (Ainsworth, 1978). An infant's proximity seeking behaviour will often not result in available or responsive caregiver responses that achieve felt-security. In response to the inadequate functioning of proximity seeking strategies, individuals can develop 'secondary attachment strategies'. Two such strategies are emphasised in the research: hyperactivating and deactivating strategies (Cassidy & Kobak, 1988; Main, 1990). Hyperactivating strategies, described by Bowlby as 'protest' involve responses that intensify proximity seeking, demanding support and attention (associated with anxious attachment orientations). Deactivating strategies involve a recognition that support and responsiveness are more

likely if the activation of the behavioural system seeking proximity is suppressed and experienced threats are managed independently (associated with avoidant attachment orientations).

Ainsworth and colleagues tested the idea that there were different patterns of responses to attachment related threats in her use of the Strange Situation assessment (Ainsworth, 1967, 1978, 1982). This assessment involved the separation of an attachment figure from the infant, before reuniting them. These different patterns of responses were formalised into different attachment 'styles' or 'categories'. The majority of children (approximately 65-70%), labelled as 'securely' attached, responded by searching for their caregivers when separated and seeking contact and being soothed upon reunion. Those children labelled avoidantly attached (20-25%) did not express distress during separation and did not seek physical contact on reunion. In contrast, anxious resistant children (10%) were distressed during separation and whilst seeking close contact during reunion were not able to be soothed easily. Latterly these three attachment categories of secure, anxious (sometimes known as 'preoccupied') and avoidant (sometimes known as 'dismissing') expanded to include a fourth, when a category of 'disorganised' (sometimes known as 'fearful' attachment) was proposed (Main & Solomon, 1990). This category is characterised by both anxious and avoidant responses. These attachment categories have since been tested in a broader sample across countries with similar results (Mesman et al., 2016).

Attachment in adulthood

In this section, I will how research into adult attachment developed from Bowlby's initial work. I will also describe how differences in adult attachment patterns are measured and how these differences are associated with differences in relationship experiences, particularly in terms of thought, emotion and behavioural strategies. Bowlby's later work (e.g. 1988) emphasised the role of the attachment system throughout the life course, "from cradle to grave" (Bowlby, 1979, p. 129). Theoretical work conceptualising romantic love as an attachment process and as the primary adult attachment (Ainsworth, 1989) developed at the same time. Weiss (1982) proposed that attachment systems function to provide a 'secure

base' and a 'safe haven' in romantic relationships too. Furthermore, empirical research asking participants to describe their experience and attitude to their romantic relationships supported the idea that attachment styles could be usefully categorised in the same way as Ainsworth's initial work on infant attachment style (Hazan & Shaver, 1987; Shaver & Hazan, 1988; Shaver, Hazan, & Bradshaw, 1984). The same approximate proportion of participants were categorised into each style, half being "secure", a quarter as "avoidant" and a quarter as "anxious-ambivalent". As noted in their results, this study had a number of limitations, including the simplicity of the measures and the focus of questions on one particular relationship, and therefore "factors unique to particular partners and circumstances" (Hazan & Shaver, 1987, p. 521).

Much of the contemporary research in adult attachment uses a dimensional structure for explaining differences in adult attachment (Mikulincer & Shaver, 2018; Fraley et al., 2015; Brennan, Clarke & Shaver, 1998). This includes the Adult Attachment Questionnaire (Simpson, 1990), the Adult Attachment Scale (Collins & Read, 1990) and the Attachment Style Questionnaire (Feeney et al., 1994). These measures suggest two principle factors underlying the measurement of adult attachment (see Figure 1 for an illustration of the relationship between dimensional and categorical understandings). The first dimension of measures used in these studies is attachment anxiety. This involves a concern with being rejected by one's partner. The second dimension captures avoidance. The avoidance dimension captures the extent to which someone might avoid dependency, intimacy or emotional expressiveness (e.g. Mikulincer & Shaver, 2016). Dimensional understandings and measures are generally considered to offer a deeper understanding of the operation of attachment (Raby et al., 2021). This is in part due to the increased statistical power and increased accuracy of estimated associations with other variables (Ravitz et al., 2010, Raby et al., 2021). This review includes research from both perspectives because research using contemporary categorical measures have been used to significantly advance understanding of individual differences in attachment and remain of heuristic value in contemporary research (Raby et al., 2021).

HIGH AVOIDANCE

DISMISSING AVOIDANT

FEARFUL AVOIDANT

LOW ANXIETY

HIGH ANXIETY

SECRURE

PREOCCUPIED/ ANXIOUS

LOW AVOIDANCE
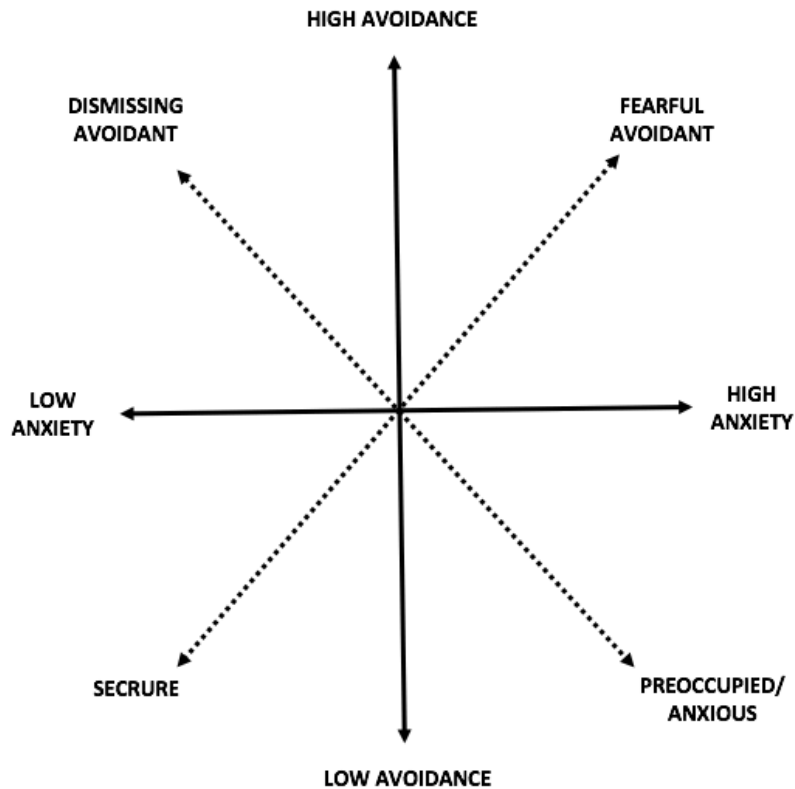
Figure 1 Diagram of the four attachment styles suggested by Bartholomew and Horowitz (1991) illustrated in terms of the two dimensional conceptualisation of attachment.

When the attachment system is activated in close relationships in adulthood, those higher in attachment anxiety might experience and enact hyperactive coping styles, such as demonstrating a need for approval and validation, and excessively seeking support (Mikulincer & Shaver, 2016). In contrast, those high in attachment avoidance might experience and enact deactivating coping styles such as displaying discomfort with closeness, excessive self-reliance, and a distant or controlling style of providing support. Those with both high anxiety and avoidance (the 'fearful' style in categorical terms) might engage *ad hoc* in both hyperactive *and* deactivating strategies, such as expressing a need for closeness and a fear of rejection as well (Karantzas et al., 2019). Those who are low in both avoidance and anxiety (secure style) are more likely to adopt problem-focused coping, to be willing to receive support and to be responsive with others. They are more likely to

experience comfort with closeness, and allow for a balance of interdependence and autonomy in their romantic relationships.

Research into attachment style differences shows that they are associated with a range of different behavioural strategies. First, attachment styles are associated with differences in relationship goals. For example, secure participants emphasise the importance of a balance between intimacy and autonomy compared to avoidant individuals, who express preferences for limits to commitment and dependence (Holmes, 1997; Lynch, 2013; Feeney et al., 2016). Those with avoidant attachment styles tend towards goals that involve emotional distance and ignore maintenance of relationships, with consequences for relationship satisfaction (e.g. Feeney, 2008; Li & Chan, 2010). In contrast, anxious participants have been shown to express preferences towards *limitless* commitment and closeness (Feeney & Noller, 1991). Relationship commitment is higher amongst the anxiously attached, and this commitment partially mediates the positive association between insecure attachment and relationship satisfaction amongst the anxiously attached (Dandurand et al., 2013).

Attachment style has also been shown to be associated with different experiences of relationship quality. Securely attached individuals tend to describe their romantic relationships as more satisfying (Simpson, 1990; Collins & Read, 1990), loving, committed, intimate, selfless and passionate, compared to those with insecure styles (e.g. Levy & Davis, 1988; Heaven et al., 2004; Hendrick & Hendrick, 1989). In contrast, those with insecure styles report being less satisfied in their relationships (Feeney & Noller, 1990; Collins & Read, 1990). Those high in attachment anxiety describe more possessiveness, neediness and regular jealousy in their relationships (Fricker & Moore, 2002; Feeney & Noller, 1990). This in turn can be associated with controlling behaviours, and in cases of 'pathological jealousy' (Wigman et al., 2008) is associated with stalking behaviours or aggression (Davis et al., 2000; Dutton et al, 1994; Mauricio & Gormley, 2001). Those with anxious attachment styles also describe a desire for passion, commitment and intimacy, but also suggest that they do not experience this in their relationship, and this is associated with conflict and

dissatisfaction (Feeney & Noller, 1990; Collins & Read, 1990). Securely attached individuals tend to have intimacy and closeness as goals and hold optimistic beliefs in regard to their romantic partners (Hazan & Shaver, 1987; Simpson, 1990).

The initial development of adult attachment research established that attachment patterns similar to those observed in childhood might also be applied to adult romantic relationships. Continued refinement of the understanding and measurement of attachment 'patterns' has facilitated an increasingly nuanced understanding of how these patterns might relate to broader relational experiences and behaviours.

Internal working models

Research into working models of attachment has developed to further develop understanding how differences in attachment may relate to different experiences and behaviours in adult romantic relationships (Bowlby, 1973). In this section, I will describe how working models do this, describing theoretical and empirical research into content, function and structure of working models. Following this, I will summarise the relevant research exploring how differences in working models are associated with differences in cognition, emotion and behaviour in romantic relationships. I will also outline some of the limitations of this body of empirical research.

Particularly during infancy, but throughout life, differences in the relative success of behavioural strategies aimed at achieving the goals of the attachment system can develop into a more ingrained approach. Previous attempts to achieve protection and felt security can be stored in memory and form what Bowlby called an internal working model (IWM) (Bowlby, 1958, 1961). Internal working models support an individual to adjust their behaviours to increase the likelihood of attaining protection. These models are not entirely stable though, and are 'working' in so far as they are changeable in response to new experiences of the world and relationships (see Fraley, 2019 for a discussion of changeability of attachment style).

Working models of attachment consist of internalised representations of self and others. The model of other can include the extent to which others are responsive to claims

for proximity and comfort. Models of self can contain information on one's skills and capacity to get adequate proximity and comfort (Bartholomew, 1990). These models are characterised as cognitive-affective, and in turn shape behavioural responses in relationships (Dykas & Cassidy, 2011; Collins & Read, 1990; Collins & Allard, 2001). These 'representations' include thoughts, attitudes, expectations and beliefs. They are 'activated' in contexts in which attachment needs are relevant. These contexts will be different depending on the particular character of the working models that have developed.

Working models of self and other are associated with attachment style (see Figure 2). Those with high levels of attachment anxiety for example are more likely to have a negative internal model of self (e.g. 'I am incapable'), a negative model of others (e.g. 'others are not there for me'), and a controlling style of providing support. Those with negative views of romantic partners, for example, are more common amongst those with anxious attachment styles who tend towards minimising distance but also avoiding closeness (i.e. anxious attachment) (Gillath et al., 2006; Locke, 2008). Those high in avoidance are likely to have a negative internal working model of others (e.g. 'others are not dependable') and a positive working model of self (e.g. 'I am capable'). Those categorised as securely attached tend to have more positive images of themselves and more hopeful expectations of others compared to those with insecure styles (Carnelley & Pietromonaco, 1994; Mikulincer, 1995; Baldwin et al., 1993). More broadly, research shows associations between measures of attachment style and self, for example, with self-esteem (e.g. Hart, 2015; Strodl & Noller, 2003); self-competence (Tatnell et al., 2014; Wei & Ku, 2007) and positive self-attributions (e.g. Wei & Ku, 2007).

		MODEL OF SELF (Dependence)	
		Positive (Low)	Negative (High)
MODEL OF OTHER (Avoidance)	Positive (Low)	**SECURE** Comfortable with intimacy and autonomy	**PREOCCUPIED** Preoccupied Ambivalent Overly dependent
	Negative (High)	**DISMISSING** Denial of attachment Dismissing Counterdependent	**FEARFUL** Fear of attachment Avoidant Socially avoidant

Figure 2 Four attachment styles as proposed by Bartholomew, in terms of models of self and other, from Bartholomew (1990).

Structure, content and function of internal working models

Theoretical and empirical research into attachment working models focus on their content, structure and function (Collins & Allard, 2004).

The content of internal working models

A prominent account of the content of working models (Collins & Read, 1994; Collins et al., 2004) suggests that they consist of four important components: (1) attachment related goals and needs; (2) memory of attachment related experiences; (3) attachment related beliefs, attitudes and expectations; and (4) plans and strategies for achieving these goals. Whilst these specify predominantly cognitive components, they also contain emotional components.

The third and fourth components are particularly relevant to understanding how working models operate in responding to romantic partner behaviours (Collins & Allard, 2004). Attachment related beliefs, attitudes and expectations of self and others can vary in abstraction according to the concreteness of particular social experiences, with concreteness being associated with less abstract beliefs, attitudes and expectations (Collins & Allard, 2004). An example of such an expectation might be 'my partner will reject me'. Internal working models also contain plans and strategies orientated towards achieving

attachment goals (Collins & Allard, 2004). A large body of research has investigated associations between attachment style and behavioural strategies that people undertake in response to relationship stress (e.g. Gillath et al., 2016; Birnbaum et al., 1997), support seeking (Karantzas & Cole, 2011; Mallinckrodt & Wei, 2005; Collins & Feeney, 2004), relationship conflict (Karantzas et al., 2014; Shi, 2003) and regulating a partner's behaviour (Simpson & Overall, 2014). Experimental studies using participant descriptions (e.g. Collins, 1996; Gillath & Shaver, 2007) show how those who are securely attached behave in less punishing ways compared to those who are insecurely attached. One disadvantage of this research is that it is limited to consciously accessible content (Shaver et al., 1996).

The structure of internal working models

Individuals frequently develop a range of different working models of attachment. A framework proposed by Collins & Read (1994) suggested that working models could differ according to their level of generality, with general representations operating across a broad range of contexts, and within a "default hierarchy" (p.68, Collins & Allard, 2004). The default working model at the top corresponds to a wide variety of relationships but without a high level of specificity. Moving down the hierarchy, models operate more specifically according to kinds of relationship, such as with romantic relationships, for example. Below this, there are representations of particular individuals. For example, we may well have different models of different romantic partners or different family members. Contemporary accounts of structures of working models suggest that different models relate and interact in a much more complex network than exclusively hierarchically (see Figure 3). Whilst the figure below describes an example of how an individual's internal working models might be structured it reveals a limitation of the model. Importantly, the relationships in the example structure below might be considered unrepresentative and not be fully inclusive of those with different relationship structures. For example, those individuals who were raised in a one parent family, who are not heterosexual, or share polyamorous relationships are not represented in the example figure below.
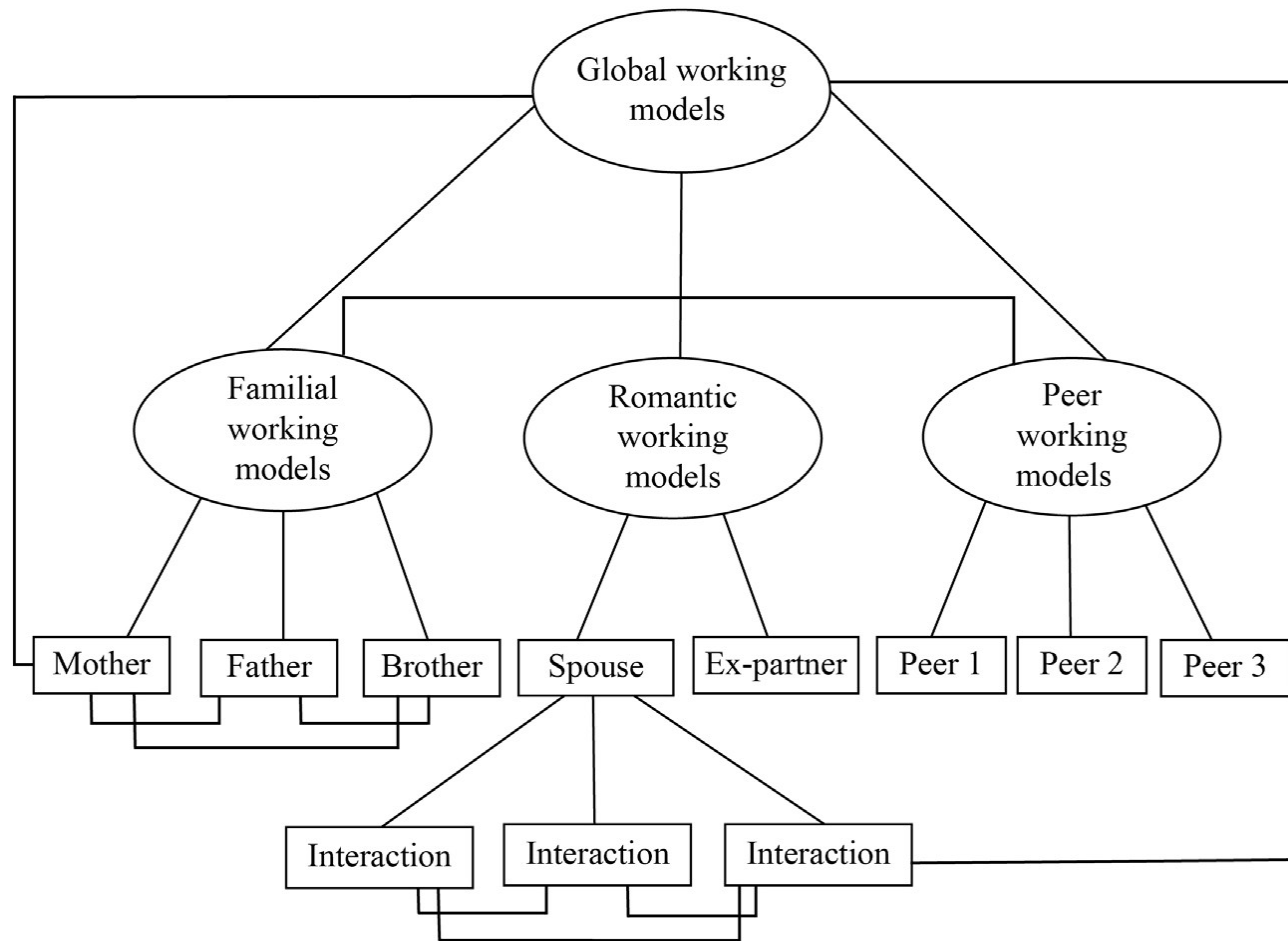
Figure 3 Adapted interpretation of Collins' hierarchical model (Gillath, Karantzas, Fraley, 2016)

Empirical support for the multiplicity of working models of attachment has found attachment representations between parents and peers in interviews only correlated moderately with each other (Bartholomew & Horowitz, 1991). In a study of young adults who were engaged, they found only a moderate correlation between measures of parent-child attachment and romantic attachment (Crowell & Waters, 2005). A study exploring self-reported attachment styles of participants' ten most significant relationships found the majority of participants reported at least two attachment patterns (Baldwin et al., 1996). Despite this, participants reported more relationships that were consistent with their overall attachment style. For example, those who were categorised as anxiously attached were more likely to report relationships that matched the anxious prototype. Subsequent approaches to the structure of working models, such as the 'connectionist' approach reconceptualise global working models as emergent properties formed from specific representations of attachment figures (e.g. Fraley, 2007). This is distinct from hierarchical approaches that characterise models as connected but distinct (Collins & Allard, 2004).

Collins and Read (1994) suggest that the model that is activated will be associated with the model itself but also the contextual features of the situation. Connectionist models suggests that in a new relationship an individual may draw on a specific representation because of shared similarities (e.g. an individual reminiscent of another individual) as opposed to global representations (e.g. a previous romantic partner with a new romantic partner) (Fraley, 2007). Situational features might include the interaction partner, nature of the relationship and relationship goals. One previous study found, for example, that the internal working model of the opposite sex parent is more strongly associated with features of romantic relationships compared to the same sex parent in heterosexual relationships (Collins & Read, 1990).

The function of internal working models

Bowlby emphasised that each interpersonal situation is "construed in terms of the representational models we have of the world about us and of ourselves" (Bowlby,1980, p. 229). A significant body of research has shown how different working models of self and

other can facilitate the construction of meaning, the experience of affect in adult romantic relationships and associated behavioural responses (Collins & Allard, 2004). Collins & Read (1994) suggest that working models of attachment are accessible cognitive constructs that are activated automatically in response to an attachment relevant event. These models are likely to shape the cognitive processing, emotional appraisal and behavioural strategy employed in response. The extent to which cognitive interpretation and emotional responses mediate behavioural responses remains the subject of continued research (Collins & Allard, 2008; Collins, 1996; Collins et al., 2006). For example, social cognition research suggests that mental representations of others organise our perception of their behaviour (e.g. Fiske & Taylor, 2013). Secure working models function to support the maintenance of models of self and other that are positive within their current social relationships. Inversely, insecure working models are associated with negative self-image and experiencing others in more pessimistic ways (Collins & Read, 1994). They are also associated with negative explanations, emotional distress and less helpful behavioural responses (Collins & Read, 1994). This may function as a vulnerability to the negative 'social construal' of, and response to, events in adult romantic relationships.

Attachment working models and cognition, emotion and behaviour

Attachment styles are in turn associated with "models that direct not only feelings and behaviour but also attention, memory, and cognition" (p.67, Main et al., 1985). A range of research has therefore been conducted into how working models of attachment might shape cognition, emotion and behaviour. Given the significance of attributions in relationship functioning (e.g. Bradbury & Fincham, 1990), research exploring the influence of working models on cognitions has researched 'attributions' about events and partners. Emotions such as anger and jealousy and behaviours such as conflict or problem solving responses have also been extensively explored to better understand the influence of working models in romantic relationships.

Cognition in romantic relationships

Like other psychological structures, one important way in which working models might impact the experience and quality of relationships is by shaping how people make sense of events in their relationships (Collins & Allard 2008). Particularly, working models of attachment are understood to influence how events are explained and the attributions that are made of their partner's behaviour (Bradbury & Fincham, 1990). Models of self and other associated with different attachment styles are therefore likely to shape the interpretation of these events.

A number of studies have examined the associations between attachment style and a range of measures of attributions and explanations of partner behaviour. One of the first such studies into these associations found that securely attached partners had more positive expectations and fewer negative expectations of their partner compared to insecure participants when rating how likely it would be that their partner would fulfil particular relational expectations (Baldwin et al., 1993). In another study by Mikulincer (1998), researchers orally presented university students with hypothetical ambiguous partner behaviours. After re-reading these scenarios, participants were asked for their cognitive reactions. Insecure adults were more likely to attribute hostile intent to their partner when compared to secure participants (Mikulincer, 1998). In a study of heterosexual couples, it was found that anxious and avoidant husbands made more negative attributions about their partners' behaviour than secure husbands. For wives, only attachment-related anxiety was associated with more negative attributions towards their husbands (Gallo & Smith, 2001). Two further studies showed that attachment anxiety was associated with negative attributions in response to partner 'transgressions', but avoidance was not (Whisman & Allen, 1996; Sumer & Cozzarelli, 2004). Overall, these studies suggest that individuals high in attachment anxiety and avoidance are more likely to make pessimistic attributions regarding their partners' behaviour. This association is particularly strong amongst those high in attachment anxiety.

Collins and colleagues (1996; 2006) investigated the associations between attachment working models and a range of cognitive responses in two frequently referenced studies. Participants in these studies were asked to imagine themselves in a relationship with a partner and respond to a range of imagined partner behaviours (e.g. 'your partner didn't respond when you tried to cuddle') and rate a range of 'attributions' of the cause of the event, i.e. participants' emotional and anticipated behavioural responses. In the earlier study participants also wrote down open-ended explanations of their partner's behaviour which were coded according to the presence of themes of attachment. Overall results showed that, when compared to secure attachment, high attachment anxiety and to a lesser extent avoidance, were associated with more negative explanations of partner behaviours. Both studies showed that those with higher scores on the dimensions of anxiety and avoidance attributed the causes of behaviour more to themselves, the relationship and the partner's negative attitude and motivation. Furthermore, they were more likely to attribute the partner behaviour to a cause that was unchanging and that affected other areas of the relationship (Collins, 1996; 2006).

Other research supports Collins' (1996; 2006) results by showing show that, compared to secure attachment styles, individuals categorised as anxious and avoidant were more likely to attribute the cause of their partners behaviour to factors that are: stable; global; controllable; negatively motivated; relationship threatening and intentional (Heene et al., 2005; Pearce & Halford, 2008; McCarthy & Taylor, 1999) Furthermore, studies show that these associations remain after controlling for potential confounding variables such as depressed mood, pessimistic attributional style and self-esteem (Collins, 1996; Collins & Allard, 1999). Studies have also shown that negative or maladaptive attributions partially mediate the association between attachment anxiety and relationship satisfaction (Sumer & Cozzarelli, 2004) and poor relationship functioning (Whisman & Allen, 1996).

Emotion in romantic relationships

As well as social construal processes, such as attributions and explanations, a second function of working models is the shaping of emotional responses in romantic

relationships (Mikulincer et al., 2003). A significant body of research shows attachment styles are associated with a range of differences in emotional experience (Collins, 1996; Kobak & Sceery, 1988). When presented with different hypothetical partner behaviours, individuals categorised as anxiously attached reported higher levels of anxiety and jealousy compared to securely and avoidantly attached individuals (Carnelley & Pietromonaco, 1994). Research also shows that compared to the securely attached, insecure attachment is associated with greater anger, hostility, 'exit' (trying to harm or leave a relationship) and 'neglect' (ignoring the partner) responses to the experience of partner criticism or rejection (Carnelley et al., 2007; Pizzano et al., 2013; Jang, et al., 2002; Mikulincer & Shaver, 2008; Kachadourian et al., 2004). Anger and hostility among those with categorised as anxiously attached can be externalising (e.g. arguments) or internalising (e.g. rumination) (e.g. Collins, 1996; Mikulincer et al, 1998). Collins and colleagues' (1996; 2006) studies showed a positive association between attachment anxiety and emotional distress. These studies also showed that despite negative attributions of partner behaviour, avoidant attachment style was associated with lower emotional distress compared to anxious and secure attachment style.

Different attachment styles are associated with differences in the management and processing of emotion. In response to perceived negative partner behaviour, those with a secure attachment style shower higher rates of 'functional anger' (see Mikulincer & Shaver, 2011 for a review). For example, individuals with secure attachment styles were more likely to accept and encourage apologies as well as forgive their partner to a greater extent (Fitzgerald, 2017) and were more hopeful about partners' willingness to apologise (Mikulincer, 1998). Those categorised as securely attached were also found more likely to accept apologies and forgiveness compared to other attachment styles (Fitzgerald, 2017). Those with avoidant attachment styles were found to be more likely to enact deactivating strategies (Cassidy & Kobak, 1988) and tend to express anger in general ways such as a general hostility (Mikulincer & Shaver, 2011). This might occur at some time after the negative behaviour rather than at the same time (Rholes et al., 1995, Collins, 1996).

Individuals higher in attachment anxiety can also be less forgiving of partners (Martin et al., 2012). This has also been found in a study analysing daily diary entries over twenty-one days (Birnbaum et al., 2006). Overall, this research shows that attachment anxiety is associated with greater negative emotion experienced to a greater intensity. Avoidant attachment is associated with dissociative responses that are not always immediate and secure attachment is associated with emotional distress but that is more fleeting.

Behaviour in romantic relationships

Behaviour in romantic relationships has also been shown to be associated with different attachment styles. Collins and colleagues (1996; 2006) showed that attachment security and avoidance was associated with lower ratings of conflict intention in response to potentially stressful partner behaviours compared to attachment anxiety. Attachment anxiety was associated with responses that were more punishing to their partner (Collins, 1996). Pathway analysis also showed that behavioural intentions were partially mediated by explanation patterns and emotional distress (Collins, 1996; 2006). Secure adults' responses to relationship events have been found to express greater confidence in their partner's availability (Collins, 1996; Gallo & Smith, 2001). Those who are categorised as securely attached have been shown to respond to a stressful task with higher rates of compromise, being more solution focused and listening to their partner's views (Simpson et al., 1992; Simpson et al., 2002; Feeney et al., 1994). Behavioural responses associated with secure attachment styles are also associated with greater relationship stability compared to insecure responses (Feeney, 2005; Mikulincer et al,. 2006), which are associated with 'poor' relationship outcomes (i.e. the relationship ends) (Collins & Read, 1994).

The empirical paper for this thesis replicated elements of the seminal studies by Collins and colleagues (1996, 2006). By evidencing associations between dimensions and categories of attachment with cognitive, emotional and behavioural responses to partner behaviour, these studies provide an evidence base for showing how working models of attachment function in romantic relationships.

Limitations of the research

There are a few outstanding limitations to this body of research on individual differences in attachment and cognitive, emotional and behavioural responses. First, the evidence base is limited because a significant portion of this research relies on self-report. Self-reporting can threaten validity in a number of ways. Most pertinently in this literature, it can threaten the external validity and therefore generalisability of the findings in these studies. Self-report studies may not generalise for a number of reasons. In this area of research one important way in which it might not generalise is due to the possibility of social desirability bias. For example, the bias towards providing socially desirable responses to partner behaviours may impact the extent to which participants' responses provide true reflections of their perspective or how they may act in their actual lives (Elrofaie, 2020). Nonetheless, other methodologies such as observational studies have found that self-reporting methodology relate strongly to actual observed responses in observational studies (e.g. Baldwin et al., 1993; Mikulincer & Florian, 1995; Feeney & Kirkpatrick, 1996). For example, some research into the provision of social support in romantic relationships supported the use of vignette methodologies, finding that insecure individuals found ambiguous messages more distressing, unhelpful and negatively motivated than secure individuals (Collins & Feeney, 2004). There is also an increasing body of work measuring neural and social information processing responses. For example, compared to secure participants, individuals categorised as avoidantly attached displayed more neural activation in response to negative facial expressions than positive facial expressions (Chavis & Kisley, 2012). This could indicate a bias in perception or more resources dedicated to the processing of others' negative emotions (Chavis & Kisley, 2012). Individuals categorised as anxiously attached have also been found to inhibit attention in response to sad and angry faces (Dewitte, 2011). Furthermore, anxious attachment style has been associated with seeing more negative traits (e.g. less friendly) in emotionally neutral faces (Meyer et al., 2004).

Secondly, it is important to note research that shows that adult attachment patterns can be sensitive to attachment relevant events and life transitions. The possibility that attachment patterns or styles change over time might suggest that the associations found in this body of research partially reflect the particularities of an individual's relational context and history rather than a stable working model (e.g. Cozzarelli et al., 2003). Despite this, meta-analyses show a moderate to strong level of stability (Mikulincer & Shaver, 2016) in attachment patterns, and meta-analyses have shown a higher degree of stability (.54) in adult attachment compared to child attachment (.39) (Fraley & Brumbaugh, 2004). Fraley and colleagues (2011) longitudinal study concluded that data was better explained by a latent and stable factor underlying attachment scores rather than the exclusive outcome of contextual changes like relationship break ups. Despite this, it is highly likely that these contextual factors such as life transitions and relationship break-ups do explain part of the associations found within this body of attachment research.

Lastly, it is important to consider the heteronormativity, mononormativity and the 'weird' bias (Henrich et al., 2010) in the empirical research and the associated theoretical work. There is little research considering whether and how the content, structure and function of working models and the associations between attachment and relationship experiences may be different for marginalised groups and this research may therefore not be externally valid. The importance of understanding cultural influence on the operation of working models for example, is illustrated by recent research suggesting differences in attachment styles depending on whether a culture can be characterised as 'individualist' or 'collectivist' (Strand et al., 2019). This is a further confirmation of the importance of social, relational and environmental context in considering the generalisability of theoretical and empirical research in this area.

Context in attachment

In the research theorising and validating particular structures of and individual differences of working models, the role of context and environment is under-researched (Mikulincer & Shaver, 2016). Furthermore, there is little research into how differences in

context might influence the relationship between measures of overall attachment styles and cognitive, emotional and behavioural responses to partner behaviour. This is despite the fact that the features of a particular context can impact the activation of a particular working model. It has therefore been identified as an important area for future research (Shaver et al., 2005; Mikulincer & Shaver, 2016). In this section, I will describe some research on how the association between attachment patterns and relationship responses might be impacted by contextual changes such as security priming. In light of the relevance of contextual factors to these associations, following Mikulincer and Shaver (2015), I suggest that research into other contextual factors such as social media is an important area for further empirical research.

The importance of context in the activation of attachment working models is supported by other models of cognition in adult romantic relationships which also emphasise the importance of context in cognitive processing of relational information. For example, the contextual model of interpersonal-marital interaction (Bradbury and Fincham, 1988) and the model of explanation processes in adult romantic relationships (Fletcher & Fincham, 1993) suggest that cognitive processing can be affected by distal factors (e.g. goals) but also proximal factors such as social norms or mood states (Shaver et al., 1996).

There is a body of research showing that associations between attachment and cognitive, emotional and behavioural responses can be "moderated by contextual forces" (p.183, Mikulincer & Shaver, 2009). The most significant area of this research concerns the impact of the priming of secure attachment figures on responses to partner behaviour (e.g. exposing an individual to the name of a loving one) (Gillath et al., 2022). A recent meta-analysis found particularly strong affective effects of security priming, as well as cognitive and behavioural effects (Gillath et al., 2022). One study showed that participants categorised as avoidantly attached who were not primed exhibited more defensive reactions to partner behaviours than those who were primed (Cassidy et al., 2009). Anxiously attached individuals' reactions were associated with greater negative emotion and crying compared to the group who were primed (Cassidy et al., 2009). Studies have also shown that cueing a

participant with the availability, love and support of an attachment figure can also facilitate the activation of secure models of attachment (Mikulincer & Shaver, 2007). Furthermore, security priming, through the subliminal presentation of close others, has been shown to increase forgiveness of partners for particular 'offenses' (Karremans & Aarts, 2007).

More broadly, security priming has been associated with more positive affect (even when priming was subliminal) (Mikulincer et al., 2001), with accelerated emotional recovery and reduced negative thoughts (Selcuk et al., 2012). Analysis of writing samples found that the group who were security primed as opposed to merely positively primed included more content relating to security, positive care and togetherness (Carnelley & Rowe, 2010). fMRI brain scans of participants rapidly exposed to security priming words showed greater activation of medial-frontal and prefrontal cortices, compared to neutrally primed participants (Canterberry & Gillath, 2013). These first two areas are associated with cognitive control and emotional self-regulation and the striatum is associated with positive affect. Compared to neutral priming, security priming has also been shown to attenuate amygdala activity – associated with threat response – in response to threatening words and faces (Norman et al., 2015).

A range of other contextual factors might have an impact on the association between attributions and attachment styles. For example, anxiously attached adults who were induced into a negative mood offered more pessimistic attributions of others' behaviour than anxious adults who were not induced into negative moods (Pereg & Mikulincer, 2004). Research has also shown that participants that had been affectionately touched exhibited greater security in accessing secure words on a memory task and self-reported state security and that this effect was greater for those higher in attachment anxiety (Jakubiak & Feeney, 2016). Furthermore, Collins and colleagues' (2006) study showed that relationship satisfaction reduced levels of pessimism in their explanations of partner behaviour amongst participants who were anxiously attached.

The evidence so far suggests that contextual factors such as mood, priming for attachment security or emotional state, and relationship satisfaction can have an impact on

the functioning of working models of attachment. In line with Bowlby's original emphasis on the importance of environmental context on the operation of attachment systems (Bowlby, 1958), research on other environmental factors might provide a better understanding of the influence of contextual forces on the functioning of working models of attachment. The empirical paper therefore investigated the role of social media in influencing the functioning of working models of attachment. Given the rapid growth of social media in the way everyday close relationships are conducted (Ofcom, 2021), this was selected as it would facilitate an understanding of attachment functioning in contemporary relationships and contribute to the body of research investigating the role of context on attachment working models.

Social Media

In this section, I will describe the important role social media plays in individuals' lives in the UK and discuss different definitions of 'social media'. I will then consider frameworks explaining how interaction on social media is different to interaction in face-to-face contexts and how our experiences of interaction may therefore be transformed. Finally I will consider research exploring how social media behaviours are associated with differences in attachment patterns or related constructs, such as partner expectations.

Understanding how social media impacts attachment and relationship experiences provides an important basis for understanding relational experiences during interaction on social media. Attachment theory provides a prominent and validated account of the development of human relationships, and can therefore provide a valuable framework for understanding how differences in social media communication can impact romantic relationship experiences. Mikulincer and Shaver (2018) have argued from this perspective for the use of attachment theory as a framework for studying relationships in a broader range of contexts such as relationships within groups. Despite this, there is little research that uses attachment as a basis for understanding individual differences in adult romantic relationship experiences when using social media.

Interpersonal experience on Social Media

Social media is almost ubiquitous in contemporary romantic relationships. Eighty two per cent of internet users in the UK reported having a social media profile and using social media for 49 minutes a day on average (Ofcom, 2021). Younger adults (16 – 25 years old) spend more time (80 minutes) compared to adults who are older; for example over-54s who use social media spend 29 minutes a day on average (Ofcom, 2020). Messaging use was concentrated on two apps: WhatsApp (83%) and Facebook Messenger (74%) (Ofcom, 2021). Use of social media and online technology is expanding so quickly that relationships are increasingly taking place on social media including romantic relationships too (Van Dijk, 2020). Therefore it is an important focus of psychological research, particularly in romantic relationships.

During the initial expansion of computer mediated communication (CMC), attempts to explain how it differed from offline communication developed too, initially focusing on the deficits of CMC (e.g. McLuhan, 1964). During the 1990s, attempts to theorise CMC such as the social information approach and social identity theory began to emphasise and/or incorporate the assets of CMC (e.g. Fernback & Thompson, 1995). For example, social exchange theory (see Cropanzano and Mitchell (2013) for a review) and social network theory (Wilson, 1975; Scott, 2011) provide frameworks for theorising differences in online interactions compared to offline interactions. One consequence of these frameworks is that they recognise CMC as a distinct context that may involve differences in cognitive, emotional and behavioural experiences. In not recognising these differences, there is a risk of neglecting the important changes to how contemporary relationships are conducted. Despite the research on CMC, much of the psychological research into relationship experiences on social media has been atheoretical or assumed a 'mirroring perspective' (e.g. Mikami & Szwedo, 2011; Subrhmanyam & Šmahel, 2011). This perspective suggests that experiences on social media merely mirror experiences offline. This negates the need for new frameworks to explain how relationships are conducted online and allows research to proceed on the basis of established theories of relating.

Definitions of social media

Despite the proliferation of research into social media there is no consensus on definition (Obar & Wildman, 2015; Kaplan & Haenlein, 2010) (see Figure 4). In some definitions, social media is understood to be the same as social networking sites (SNS). For example, one prominent definition only includes digital platforms that host user-created content and information sharing such as TikTok (Elefant, 2011). Another common definition only includes Web 2.0 applications with user-generated content, profiles and the connection of these profiles into a "social network" such as Facebook (Obar & Wildman, 2015). Other definitions distinguish these social networks not only from non-digital interactions but also from more traditional online communication such as email and Zoom, lying between social networks and offline interaction (McFarland and Ployhart, 2015). Some definitions though are more inclusive (Moreno & Kota, 2013; Nesi et al., 2018). These definitions incorporate any media used for social interaction or applications that facilitate communication and the sharing of content. It is argued that these more inclusive definitions facilitate a clearer distinction than those that attempt to distinguish within online media due to the fluid and multiple ways in which these different media are used over time. A lot of social media platforms, for example, are used to facilitate communication through multiple functionalities (e.g. messaging, games, videocalls). Attempts to draw finer distinctions to capture social media, therefore, can quickly become obsolete due to the pace of change in online communication technology and fashion. Therefore, in this conceptual introduction this broader definition of social media as "media used for social interaction, or any digital applications that allow users to share content and communicate with others" (p.270, Nesi et al., 2018) will be used. It is distinguished from face-to-face interaction in which there is bidirectional exchange of information with the involvement of non-verbal as well as verbal communication (Thompson, 1995).
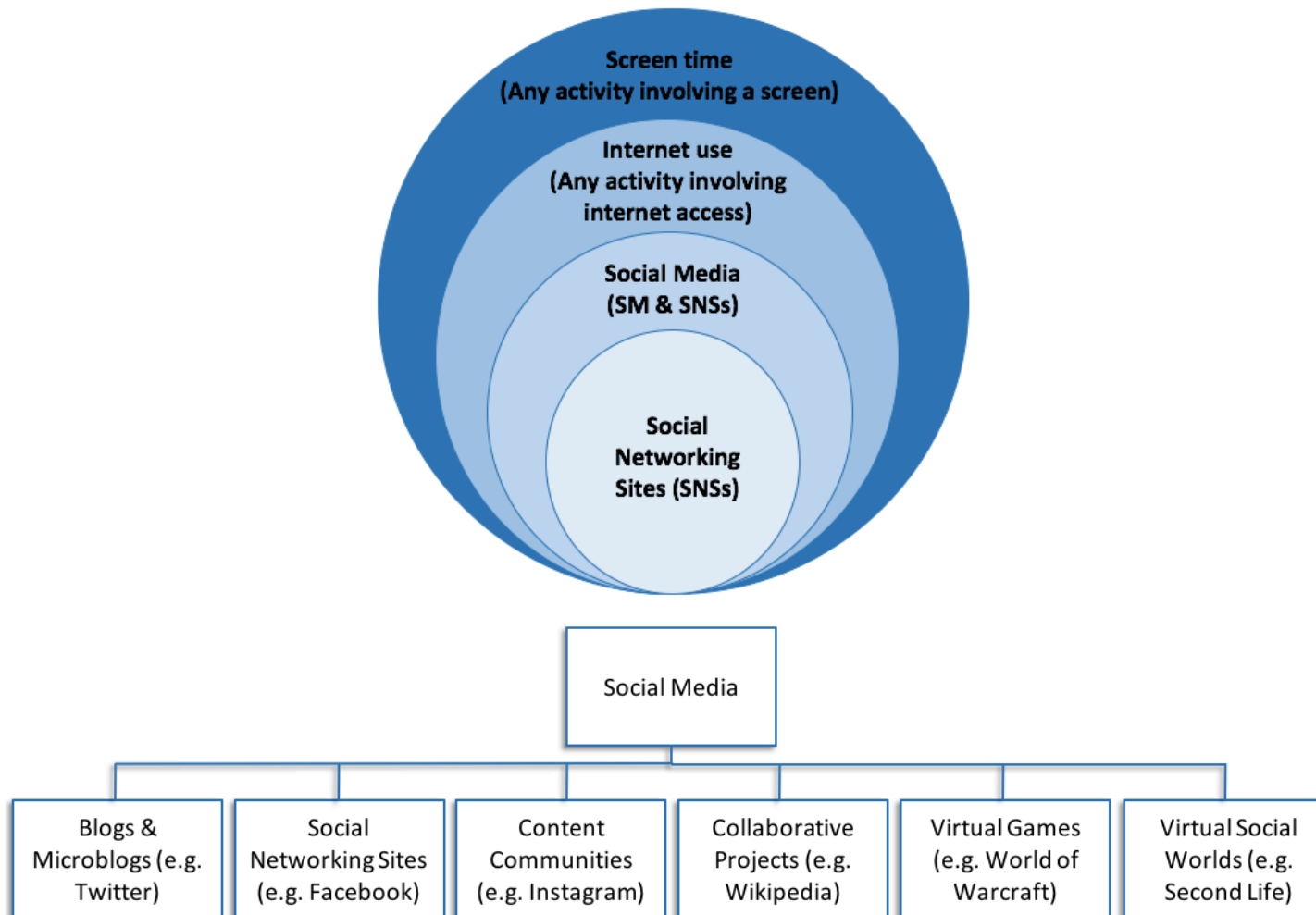
Figure 4 Visualisation of different levels of technology use, including screen time, internet use, social media and social networking sites (SNS), drawn from Kaplan & Haenlein, 2010.

Theoretical frameworks of social media

There are few theoretical frameworks guiding research into how social media affects individuals' relationship experiences (Nesi et al., 2018). Perhaps the most prominent attempts to provide theoretical framework to guide future empirical research on social media are the contextual and the transformation frameworks (McFarland & Ployhart, 2015; Nesi et al., 2018). In the following sections, these two frameworks will be appraised. These frameworks were developed to explain relations in organisational contexts and adolescent peer relations, respectively, and yet also provide useful insight into understanding how social media might influence close adult attachment relationships. They are also able to indicate how, as a unique psychosocial context, social media might impact cognition, emotion and behaviour in different relationships (McFarland & Ployhart, 2015; Nesi et al., 2018; Valkenburg & Peter, 2013; Subrahmanyam & Šmahel, 2011).

The Contextual Framework

McFarland and Ployhart (2015) suggest that social media should be conceptualised not only as a technology but as a distinct "context" for interaction. Social media therefore is an unexamined context that "may affect the cognition, affect, and behaviour of individuals" (McFarland & Ployhart, 2015, p.1653). This recommends the need for a new framework to understand and explain cognition, affect and behaviour in this new interpersonal context. They draw on previous work on 'context' to distinguish two contexts: the omnibus context and the discrete context (Johns, 2006). The omnibus context describes general features of the context such as space and time. The typical restrictions of these features are almost eliminated in a social media context. It is possible, for example, to communicate immediately across the globe using social media. The discrete context is characterised by the proximal factors that influence cognition, emotion and behaviour. McFarland and Ployhart (2015) identify eight discrete features that can characterise differences in context (see Figure 5).

How the Discrete Ambient Stimuli Differ Across the Contextual Continuum

This stimulus . . .	. . . makes social media contexts distinct from physical contexts because . . .		Contextual continuum ⟷			
Physicality	Geographic location, weather, distance, and so on, are largely irrelevant.	Physical; tangible to all of the senses	F2F		DCM SM	Digital
Accessibility	There is more open access to social media than other relationship or communication platforms.	Less opportunity to join network; less open access	F2F	DCM	SM	More opportunity to join network; more open access
Latency	The posting or spread of content on social media is nearly instant.	Sharing of content is slower	F2F		DCM SM	Sharing of content is faster
Interdependence	There are more opportunities to share information across a wider range of people.	Fewer opportunities to share information across a large range of people	F2F	DCM	SM	More opportunities to share information across a large range of people
Synchronicity	Relationships and communication can be either synchronous or asynchronous, with equal effectiveness.	Synchronous	F2F	DCM	SM	Either synchronous or asynchronous
Permanence	Content posted on social media is permanent or nearly so.	Less permanent	F2F		DCM SM	More permanent
Verifiability	Content posted to social media can be verified or cross-examined by others.	Harder to verify	F2F	DCM	SM	Easier to verify
Anonymity	Users often think and behave differently when using social media because they have the perception that they are more anonymous.	Less anonymity	F2F		DCM SM	Greater anonymity

Note. F2F = face-to-face; DCM = digital communication media (e.g., email, texting, and Web 1.0 platforms); SM = social media (e.g., Linked-In, Facebook, and Web 2.0 platforms). Note that "ties" between DCM and SM may be possible (e.g., physicality, permanence).

Figure 5 How discrete stimuli differ between contexts according to contextual framework (McFarland and Ployhart, 2015).

The features used to distinguish the differences between social media and offline contexts have three important implications for how social media impacts interpersonal experience. Firstly, meanings and interpretation of concepts and processes during interpersonal interaction can be different in social media contexts compared to offline (McFarland & Ployhart, 2015). Secondly, the elements of the context can directly alter the size and direction of relationships between cognition, emotion and behaviour. For example, it is suggested that social media may "enhance or suppress" (McFarland & Ployhart, 2015, p.1661) associations between phenomena and cognitions, emotions and behaviour. Lastly, the discrete features of social media might interact with each other to influence the size and direction of particular relationships between cognition, emotion and behaviour. For example, the relationship between a particular cognition and emotion in a particular circumstance might be either weakened or strengthened in the social media context.

The Transformation Framework

This framework describes how social media transforms adolescents' relationships (Nesi et al., 2018). Nesi and colleagues (2018) draw on the contextual framework to theorise that the specific features of social media create an interpersonal context that is distinct from offline contexts but for adolescent interactions. The transformation framework describes seven critical features of social media that help to explain adolescent interpersonal relationships, which differ in prominence depending on the functionality of a particular app or platform. These features are: asynchronicity; permanence; publicness; availability; cue absence; quantifiability and; visualness. These features are all more prominent on social media compared to offline communication (see Figure 6).

Features of social media	Definition	Related approaches described in prior literature
Asynchronicity	Time lapse between aspects of communication	Asynchronicity (Peter and Valkenburg 2013); "Cues-filtered-out" approaches (Culnan and Markus 1987); written communication (Berger 2013); transmission velocity, parallelism, rehearsability (Dennis et al. 2008); synchronicity (McFarland and Ployhart 2015)
Permanence	Permanent accessibility of content shared via social media	Persistence, searchability, replicability (boyd 2010); retrievability (Peter and Valkenburg 2013); verifiability, permanence (McFarland and Ployhart 2015); reprocessability (Dennis et al. 2008)
Publicness	Accessibility of information by large audiences	Invisible audiences (Boyd 2007); undirected communication, larger audiences (Berger 2013); interdependence (McFarland and Ployhart 2015)
Availability	Ease with which content can be accessed and shared, regardless of physical location	Accessibility (Peter and Valkenburg 2013); physicality, latency, accessibility (McFarland and Ployhart 2015); scalability (boyd 2010)
Cue Absence	Degree to which physical cues absent can range from including most in-person cues to being entirely anonymous (no cues)	"Audiovisual" and "source" anonymity (Valkenburg and Peter 2011), Cue management (Peter and Valkenburg 2013); "Cues-filtered-out" approaches (Culnan and Markus 1987); reduced social presence, anonymity (Berger 2013); anonymity, disembodied users (Subrahmanyam and Šmahel 2011); anonymity (McFarland and Ployhart 2015); symbol sets (Dennis et al. 2008)
Quantifiability	Allowance for countable social metrics	Not previously proposed in prior frameworks
Visualness	Extent to which photographs and videos are emphasized	Not previously proposed in prior frameworks

Figure 6 Social media features highlighted within the transformation framework (Nesi et al., 2018).

Asynchronous interaction on messaging sites or apps can facilitate more consciously selected self-presentation and occur simultaneously with a number of other interactions (Nesi et al,. 2018). The permanence of shared media can often mean that interactions can be retrospectively searched for, shared with others, and verified. Media can be shared publicly (described in the contextual framework as 'interdependence') amongst groups of friends or with groups of hundreds and thousands of followers on other platforms such as Instagram. The availability of communication (similar to the feature of 'accessibility' described by McFarland and Ployhart) can mean that friends and strangers are much more available and expectations around availability are also different to those in face-to-face contexts. Derived from CMC (Culnan & Markus, 1987), cue absence can mean that cues associated with offline contexts like vocal tone, facial expressions and physical touch are not always present during interaction on social media. A number of social media platforms also provide functions that facilitate quantifiable metrics of social success e.g. 'retweets', 'shares', 'views' which can influence behaviour enacted. Many social media platforms are dominated by photographs and videos such that the 'visualness' of individuals can dominate the content of interaction (Waddell, 2016) and might emphasise physical appearance in the judgement of peers and others (de Vries et al., 2016). Using this theory it is possible to examine more closely the prominence of all these features according to different types of social media in use (see Figure 7).

Critically, Nesi et al., (2018) suggest that these features can transform interpersonal experiences and processes in five important ways. First, social media can increase the frequency of interactions. Second, social media might 'amplify' some experiences and interpersonal expectations through, for example, the features of publicness, cue absence and quantifiability. Third, social media can be distinct in the qualitative experience of interaction in both how others are experienced and how individuals are perceived themselves. Fourth, 'compensatory behaviours' may become possible because of features facilitating comfort and time that may not be available in offline contexts. Lastly, 'novel

behaviours' may also be more possible during interaction on social media including for example, sharing content that may have been previously private.

		LOW HIGH
Face-to-Face Communication	Asynchronicity	X-------------------------------------
	Permanence	X-------------------------------------
	Publicness	X-------------------------------------
	Availability	X-------------------------------------
	Cue Absence	X-------------------------------------
	Quantifiability	X-------------------------------------
	Visualness	X-------------------------------------
Private Text Messaging • Text messaging • Use of messaging apps (e.g., WhatsApp) • "Chat" features on social networking sites • Instant messaging	Asynchronicity	----------X-----------------------
	Permanence	--------------------------X---------
	Publicness	----------X-----------------------
	Availability	-----------------------------------X
	Cue Absence	-----------------------------------X
	Quantifiability	----------X-----------------------
	Visualness	-X--------------------------------
Private Photo Messaging • Sending photos via text message or messaging apps • Sending photos dyadically (i.e., "privately") via photo-based apps (e.g., Snapchat messaging, Instagram "direct messaging")	Asynchronicity	----------X-----------------------
	Permanence	--------------------------X---------
	Publicness	----------X-----------------------
	Availability	-----------------------------------X
	Cue Absence	---------------------X------------
	Quantifiability	----------X-----------------------
	Visualness	-------------------------------X-----
Public Photo Sharing • Posting photos on Facebook, Instagram, Snapchat "stories," and other social networking sites	Asynchronicity	-----------------------------------X
	Permanence	-----------------------------------X
	Publicness	-----------------------------------X
	Availability	------------------------------X-----
	Cue Absence	----------------------------X-------
	Quantifiability	-----------------------------------X
	Visualness	-----------------------------------X
Private Videochatting • Live videochatting through Facetime, Skype, etc.	Asynchronicity	--X-------------------------------
	Permanence	--X-------------------------------
	Publicness	--X-------------------------------
	Availability	----------------------X-----------
	Cue Absence	--X-------------------------------
	Quantifiability	--X-------------------------------
	Visualness	--X-------------------------------

Figure 7 Illustration of presence of key features of social media (from Nesi et al., 2018). All features are lowest in offline communication.

Social media and relationship experience

While much research has been undertaken on novel social media behaviours such as 'electronic intrusion' (e.g. Reed et al., 2015), there is less on how relationship experiences might be *transformed* by the social media context. Despite this, there are a number of empirical studies that provide mixed results when considering how social media may be associated with the influence relationship experiences. One transformation that has been the subject of empirical research is the opportunity and deficit social media provides in expectations regarding partner availability. A number of studies have shown that availability facilitated by social media can transform partner expectations. For example, communication technology can alter boundaries and expectations between partners who have been victim to violence from the other, including excessive contact or check-ins (e.g. Draucker & Martsolf, 2010; Baker & Carreño, 2016).

A study of 100,000 participants from 2002 – 2012 found that levels of attachment anxiety in relationships has reduced (Chopik & Peterson, 2014). This decrease was primarily found amongst younger adults, a population in which CMC, including social media use, has increased. The authors of the study suggested that this decrease may be a result of the increasing accessibility and availability of others facilitated by technology. There is some further support for this theory from empirical research suggesting that social media can facilitate the availability and felt proximity of important others (Morey et al., 2013). This is particularly the case amongst anxiously attached individuals who report greater intimacy and support when able to communicate through social media (Morey et al., 2013). Furthermore, studies show that a higher proportion of technology mediated communication (TMC) (compared to face-to-face communication) is reported by those with anxious attachment styles compared to other attachment styles and that higher proportions of TMC were associated with lower relationship quality (Goodcase et al., 2018). Individuals categorised as avoidantly attached use CMC comparatively less than those with other attachment styles (Morey et al., 2013), suggesting that technology may not facilitate the attachment strategies

of the avoidantly attached to the same extent that it does amongst the anxiously attached, who rely on hyperactivating, or 'approach' strategies.

Research into the effects of social media and CMC on conflicts in romantic relationships are also mixed. Research shows that levels of anger, distress and conflict resolution success did not differ between face-to-face and CMC mediated discussion about a conflict topic, despite higher levels of distress amongst the anxiously attached (Pollman et al., 2020). Other research supports these findings, showing that conflict resolution success was the same between face-to-face and CMC communication (Ruppel et al., 2021). Conversely, levels of social media use has been found to be positively associated with conflict in romantic relationships, and that jealousy, infidelity and partner monitoring partially mediate this association (Arikewuyo et al., 2020; 2022). Furthermore, research shows that the association between attachment anxiety and Facebook surveillance is mediated by jealousy (Marshall et al., 2013) and that jealousy can prompt partner monitoring online (Muise et al., 2014; Marshall et al., 2013). Other research found that increased Instagram use reduced relationship satisfaction and was associated with increased conflict and negative relationship outcomes (Bouffard et al., 2021). This research suggests the association between levels of social media use and relational conflict may be explained by the reduced time and attention people may focus on their relationships (Bouffard et al., 2021).

The theoretical frameworks above provide a useful theoretical basis on which to make predictions about how social media might influence the operation of working models of attachment in shaping relationship experiences and behaviour. Particularly, these frameworks suggest that cognitive, emotional and behavioural responses to romantic partners may be influenced by the social media context. Furthermore, different attachment orientations are likely to be impacted differently. For example, the increased availability provided by social media may particularly facilitate proximity seeking strategies enacted by the anxiously attached, but may not facilitate strategies for the avoidantly attached. The possibility of differences in how working models of attachment may influence experiences

and behaviour in romantic relationship is particularly important in the context of the ubiquity of its current use.

Summary and aims of the thesis

In this section, I will summarise the literature review above and consider the relevance of the empirical paper in the context of this research. So far, adult attachment research has established strong associations between attachment styles and cognitive, emotional and behavioural responses. Internal working models of self and models of other particularly help to explain how these constructs might be related. Whilst theoretical work has emphasised the importance of context, there is still a gap in the empirical research on how context impacts the activation of working models of attachment. Social media is a relatively new, little understood and near-ubiquitous context in contemporary romantic relationships and is therefore an important context to better understand. By repeating elements of previous studies, this empirical paper facilitates a robust comparison of the different contexts in which adult romantic relationships are conducted.

Secondly, this research makes an important contribution towards debates in cyberpsychology regarding the impact of social media on psychological processes, including cognition, emotion and enacted behaviour. This study will offer evidence with relevance to the two competing positions on the impact of social media on the processes: the mirroring framework (see Nesi et al., 2018) and the contextual and transformation frameworks (McFarland & Ployhart, 2015, Nesi et al., 2018). The research design will examine differences in the experience of romantic relationship events between social media and face-to-face, 'offline' contexts. By measuring cognitive, emotional and behavioural responses to events in adult romantic relationships, this study could lend support to the position that social media communication does not impact these psychological processes, a consequence of the mirroring framework (e.g. Mikami & Szwedo, 2011). Conversely, it could provide evidence that communication via social media does have an impact on psychological processes, thus supporting the contextual and transformation frameworks (McFarland & Ployhart, 2015, Nesi et al., 2018).

The mirroring framework has been the basis of much early research into psychological processes on social media. However, two theoretical frameworks have been presented that argue persuasively that characteristics of social media interaction such as asynchronicity mean that it is distinct from face-to-face communication. These characteristics and some of the empirical research so far provide tentative reasons to hypothesise that the social media context may impact cognition, emotion and behaviour responses differently in important ways. It is also of interest that the association between attachment style and these responses may be impacted differently by the social media context.

Considering the research and theoretical frameworks summarised above, the status of social media as a distinct environment with the potential to transform interpersonal interactions, remains an important area of research. This is important for two principal reasons. Firstly, the ubiquity of social media in contemporary romantic relationships and an understanding of its impact is still developing. Secondly, because attachment style is associated with a range of poorer relationship outcomes such as relationship conflict, relationship satisfaction and relationship breakdown (Karantzas et al., 2014). Furthermore it is associated with mental health outcomes including suicidality, depression and anxiety (Whisman & Robustelli, 2016; Miniati et al., 2017).

Aims of the thesis

The aim of this paper has been to provide a critical introduction to the existing research on the association between attachment and experiences of partner behaviour and the role of internal working models in mediating the relationship. Secondly, it has set out the current debate surrounding the nature and importance of contextual differences in relationship experiences. Relationship experiences influenced by social media context have been shown to be associated with measures of attachment. These two strands provide the central theoretical framework for the research conducted in the empirical paper.

The overall aim of the empirical paper was twofold. Firstly, to retest the idea that working models of attachment bias and shape responses to events in relationships in a 21st

century sample. This provided an important support to current understandings of the association between attachment and cognitive, emotional and behavioural experiences in contemporary relationships. Secondly, to compare whether and how responses may vary in different interpersonal contexts (social media vs. face-to-face) as a function of attachment style. The study used a paradigm developed by Collins and colleagues (1996, 2006) that gauges participant responses to a range of (imagined /hypothetical) relationship events in order to explore participants' (a) attributions - or explanations of - the relationship event, (b) emotional responses to the event, and (c) the likelihood their behavioural response may lead to conflict. The relationship between these responses and scores on an attachment measure will then be analysed.

More specifically six hypotheses were tested. Hypotheses H1-H3 represent an attempted replication of findings reported in the work of Collins (1996) in a novel 21st century sample. H4-H6 represent extensions of this work to explore these processes in social media (online) and face-to-face (offline) contexts.

Hypothesis 1: *"Individuals with higher levels of attachment anxiety will exhibit higher levels of attributing negative attitudes and intention."* (*Effect of attachment anxiety on cognitions*).

Hypothesis 2: *"Individuals with higher levels of attachment anxiety will exhibit higher levels of emotional distress."* (*Effect of attachment anxiety on emotions*).

Hypothesis 3: *"Individuals with higher levels of attachment anxiety will exhibit higher levels of conflict intention."* (*Effect of attachment anxiety on behavioural intentions*).

Hypotheses 4-6: *The patterns described in Hypotheses 1-3 will be moderated in social media contexts, i.e. the association between anxious attachment and responses will be stronger in social media contexts.* (*Interaction between attachment anxiety and context*).

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Part 2: Empirical paper

A study investigating the impact of social media on the association between attachment and cognitive, emotional and behavioural responses

Abstract

Background: There is growing interest in the impact of social media on social and psychological processes. However, little is known about the extent to which the online environment transforms these processes offline (*transformation framework*) as opposed to merely reflecting them (*mirroring framework*).

Aims: The purpose of this study, therefore, was to: (i) replicate previous findings in the to-date untested context of social media interaction into the association between attachment anxiety and cognitive, emotional and behavioural responses to (hypothetical) potentially negative partner behaviours, and (ii) determine whether such responses differ in online and offline contexts.

Methods: 267 participants completed a measure of adult attachment (RAAS, Collins, 1996) and a revised relationship events questionnaire (R-REQ), which asked participants to rate their cognitive, emotional and behavioural responses to hypothetical potentially negative partner behaviours. The association between attachment anxiety subscale scores and these responses were explored using bivariate correlation and multi-level regression analyses.

Results: Cognitive, emotional and behavioural responses were strongly positively correlated with scores on the attachment anxiety subscale. Further, social media was found to interact with the association between attachment anxiety and emotional and behavioural responses. In regards to cognitive responses, interaction effects were found for variables measuring participant attribution of partner behaviour to self (participant) and to the relationship but no interaction effects were found for the outcome variable measuring participant attribution of negative attitude/intention to their partner.

Conclusion: These results contribute to a growing body of attachment research into the role of context in shaping the functioning of working models of attachment. Furthermore, it supports approaches such as the contextual and transformation frameworks that suggest

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that social media forms a distinct context that impacts our cognitions, emotions and

behaviour.

Introduction

Individuals bring a history of previous relationship experiences which can structure their thoughts, feelings and behaviour in their romantic relationships. Attachment theory has been used as a framework to explain this process (Bowlby, 1969/1982). Particularly, the concept of attachment working models of self and others, has been used to explain how relationships are experienced. Specifically, how they structure the thoughts, feelings and behaviours in response to relationship events (Main et al., 1985; Bartholomew & Horowitz, 1991; Collins & Read, 1990). Whilst the processes through which these models function is well understood (Collins, 2006), the contextual and situational factors that might impact these processes is still little understood (Mikulincer & Shaver, 2016). This is despite the fact that the adaptive, context dependent activation of these models are central to the understanding of the functioning of working models (Sroufe & Waters, 1977).

Social media is an increasingly ubiquitous context in which adult romantic relationships are conducted. Mirroring frameworks of social media suggest that psychological processes do not relevantly differ between online and offline contexts and would predict continuity in the operation of psychological constructs (see Nesi et al., 2018). In contrast, frameworks such as the contextual (McFarland & Ployhart, 2015) and transformation frameworks (Nesi et al., 2018) suggest that online contexts impact thoughts, emotions and behaviours and the relationship between them.

The purpose of this study was twofold. First, to retest the idea that working models of attachment impact cognitive, emotional and behavioural responses in adult romantic relationships. Specifically, it tested the hypothesis that attachment anxiety was positively associated with cognitive, emotional and behavioural responses to potentially negative partner behaviours. Secondly, this study explored how social media might influence how attachment working models shape cognitive, emotional and behavioural responses in adult romantic relationships. It hypothesised that this positive association between attachment anxiety and responses would be amplified in scenarios occurring online compared to those occurring offline.

These areas of study are of particular clinical importance. Attachment styles are related to a range of relationship outcomes and a range of mental health outcomes. For example, styles of attachment characterised by higher anxiety are associated with poorer marriage quality (Kobak & Hazan, 1991; Banse, 2004; Feeney; 2002) and relationship quality after a year (Feeney, 1999) compared to those who are lower in attachment anxiety. Second, attachment style is also associated with mental health outcomes such as depression, suicidal ideation and attempts (Whisman & Robustelli, 2016) and meeting the criteria for the diagnosis of personality disorders (South et al., 2008). This study will hope to contribute to an understanding of the factors that might influence these associations.

Attachment theory

As discussed in the Conceptual Introduction above, Bowlby's initial theory of attachment developed after observing links between the existence and nature of parent-child relationships and children's emotional health (Bowlby, 1951, 1958, 1960). Grounded in an evolutionary perspective Bowlby suggested that behaviours that increased the level of child-mother proximity and therefore child protection were associated with an evolutionary advantage (Bowlby, 1958, 1969/1982). Bowlby's early studies suggested that emotional health was in some way associated with a "warm, intimate, and continuous" (Bowlby, 1951, p.13) relationship with a child's mother or attachment figure. Ainsworth's early studies of attachment provided the basis for distinguishing how the character of this relationship was associated with different styles of parent-infant attachment (Ainsworth, 1967; 1978).

Individual differences in parent-infant attachment were categorised into distinct 'styles' of attachment. Differences in attachment style can be characterised by differences in the dimensions of attachment anxiety and attachment avoidance. The anxiety dimension is characterised by differences in the representations of the self as loveable (or not), worthy of attention (or not) and representations of the other as caring, reliable or rejecting (or not). The avoidance dimension is characterised by differences in an individual's comfort with interdependence with others.

Differences in the anxiety and avoidance dimensions are associated with differences between the four categories of attachment style characteristic of attachment research. Individuals with a 'preoccupied' attachment style are high in anxiety and low in avoidance; comfortable with closeness but concerned with being unloved and rejected. They are often characterised as needing the acceptance of others for their wellbeing but lack confidence in responsiveness and showing affection to others when feeling threatened. The fearful attachment style is characterised by high anxiety and avoidance. Social contact is sought, but expectations of rejection by others and distrust of others can result in the avoidance of close relationships and difficulty establishing intimacy. The 'dismissing' style is characterised by high avoidance and low anxiety (Gillath et al., 2016). Dismissing individuals tend to feel confident and not feel threatened by negative feelings but may experience others as unreliable and uncaring. They will often distance themselves from others, denying their own emotions and attachment needs in order to maintain a positive self-image and avoid rejection. In contrast to these three 'insecure styles', a secure attachment style is characterised by low avoidance and anxiety. Secure adults tend to experience comfort with closeness and the ability to depend on others when needed. Secure adults tend to have more optimistic expectations of the social world (Mikulincer, 1995; Brennan & Bosson, 1998; Carnelley & Janoff-Bulman, 1992). These styles have been shown to characterise patterns in adult romantic relationships as well as childhood (Bartholomew, 1993; Hazan & Shaver, 1994).

Individual differences in attachment style and dimensions are associated with differences in internal representations, or *working models,* of self and other (Baldwin et al., 1993; Mikulincer, 1995; Carnelley & Pietromonaco, 1994). For example, negative models of self are associated with higher attachment anxiety and negative models of other are associated with higher attachment avoidance (see Figure 1). These working models are shaped in infancy by the availability and responsiveness of the caregiver (Ainsworth et al., 1978). As time passes, a scheme or 'script' of these attempts, whether successes or failures, become stored and generalised into beliefs and expectations regarding the self and

others (Bretherton, 1991; Bretherton et al., 2008). As individuals move into adulthood these representations continue to develop into general beliefs and expectations regarding others and the self. These representations can change in response to new close relationship experiences (Bartholomew, 1993; Hazan & Shaver, 1994). These models operate to guide cognitive, emotional and behavioural responses within adult romantic relationships (Collins & Read, 1990; Collins & Feeney, 2000; Collins & Allard, 2001).

MODEL OF SELF
(Dependence)

		Positive (Low)	Negative (High)
MODEL OF OTHER (Avoidance)	Positive (Low)	SECURE Comfortable with intimacy and autonomy	PREOCCUPIED Preoccupied Ambivalent Overly dependent
	Negative (High)	DISMISSING Denial of attachment Dismissing Counterdependent	FEARFUL Fear of attachment Avoidant Socially avoidant

Figure 1 Four attachment styles as proposed by Bartholomew, in terms of models of self and other, from Bartholomew (1990).

Attachment style and differences in cognition, emotion and behaviour

In shaping cognition, emotion and behaviour working models can explain how individual differences in attachment style are associated with different relationship outcomes and conflict (Collins & Read, 1994; Collins & Allard, 2001; Collins et al., 2004). Discussed in more detail in the literature review, a range of empirical research has explored how attachment styles and cognitive, emotional and behavioural responses are related to relationship outcomes. For example, attachment anxiety, but not avoidance has been found to be associated with 'maladaptive' attributions in response to perceived or actual transgressions by their partner (Whisman & Allan, 1996). These attributions were in turn associated with poor relationship quality and were partial mediators of attachment anxiety and relationship dissatisfaction (Sümer and Cozzarelli, 2004). Gallo and Smith (2001) have

also found that husbands' attachment related anxiety was associated with relationship conflict and that negative attributions regarding their partner partially mediated this association. This body of research suggests that attachment anxiety particularly is associated with pessimistic attributions and 'maladaptive' behavioural responses which in turn impacts the quality and character of their relationships. 'Maladaptive' attributions are here defined as attributions that are less accurate, and may be biased by negative interpretation of events.

There is a large body or research specifically exploring the role of individual differences in attachment and particular attributions (capturing cognition) as well as emotional and behavioural responses in romantic relationships. Anxious individuals also tend towards more negative explanations of partner behaviour, experiencing events as relationship threatening and their partners as untrustworthy and rejecting (Pereg & Mikulincer, 2004; Gallo & Smith, 2001). Individuals with dismissing and fearful attachment styles have also been found to respond to ambiguous partner cues with attributions of hostility compared to secure adults, who only attributed hostile intent in response to unambiguously hostile cues (Mikulincer, 1998). Anxious individuals experience stressful scenarios with greater emotional distress (Feeney & Kirkpatrick, 1996) which is also sustained longer following the stressful scenario (Rholes et al., 1999). Anxious individuals behavioural responses also tend to be more defensive and destructive (Campbell et al, 2001; Gaines et al., 1997).

Two seminal studies exploring the association between attachment and cognitive, emotional and behavioural responses were provided by Collins and colleagues (1996; 2006). In the earlier study, participants responded to hypothetical scenarios describing potentially negative relationship events by writing open ended explanations and descriptions of how they would feel and behave. Individuals with a preoccupied attachment style explained events in more negative ways, reporting more emotional distress and behaviour more likely to result in conflict compared to other attachment styles (Collins, 1996). Participants with a reported secure attachment style explained events in ways that

minimised their impact and the threat to the relationship. Attachment dimensions were also correlated with ratings of the hypothetical behaviour along *structured attribution dimensions*. Individuals with high scores on the attachment anxiety dimension were more likely to attribute their partner's behaviour to the relationship and their partner's negative attitude and motivation. Higher anxiety was positively correlated with emotional distress and predicted conflict. Those low in avoidance dimensions attributed partner behaviour less to themselves. In the later study Collins and colleagues (2006) also found high attachment anxiety responded to the same scenarios by attributing greater threat to the relationship, greater emotional distress and conflictual behavioural responses, whilst controlling for pessimistic explanatory style, depression and self-esteem.

Both studies also explored how cognitive, emotional and behavioural responses were related to each other. The earlier study found that behavioural differences were partially mediated by explanations and emotional distress (Collins, 1996). Collins and colleagues (2006) found that behavioural intentions associated with conflict were partially mediated by cognitive attributions and affective responses (Appendix 1). Pessimistic attributions and emotional distress were also associated with conflict intention, which in turn, is likely to be associated with less sustainable relationship functioning over time (Collins et al., 2006).

The role of context in the activation of attachment working models

Bowlby, as described in more detail in the Conceptual introduction, conceived the attachment system as one in which the environmental context is central to its formation, maintenance and functioning (Sroufe & Waters, 1977). Despite the centrality of context to differences in the activation of working models, context is under-researched in the adult attachment literature (Mikulincer & Shaver, 2011). Therefore, the investigation of contextual factors and how they facilitate the activation of working models has been identified as an important future direction of research (Mikulincer & Shaver, 2016).

In order to achieve the goals of the attachment system, working models of attachment evolve to facilitate responses that are sensitive to contextual factors (Mikulincer & Shaver, 2007). General working models that are most regularly activated might not be

activated in favour of a less frequently accessed working model because of features of context (Mikulincer & Shaver, 2016). A range of contextual cues, such as the priming of security enhancing mental representations have been shown to impact the behavioural responses of adults in attachment relevant situations (Gillath et al., 2022; Mikulincer et al, 2001; Mikulincer & Shaver, 2001). For example, the priming of participants through cues about a partner's availability, supportiveness and love have been shown to be associated with more secure responses amongst those with insecure styles compared to non-primed groups (see Mikulincer & Shaver, 2007).

Research suggests that anxiety in attachment may be particularly susceptible to contextual factors. For example, in response to negative mood induction, anxiously attached participants' pessimistic attributions were exacerbated in response to hypothetical scenarios, when compared to those who were securely attached (Pereg & Mikulincer, 2004). Regression analyses examining interaction effects showed that compared to a neutral priming condition, security priming attenuated the strength of the association between attachment anxiety and negative emotions, feelings of rejection and less constructive behavioural responses (Shaver et al., 2009). Furthermore, in a study of couples in heterosexual relationships during their transition to parenthood, women categorised as preoccupied and who perceived their husbands as unsupportive experienced decreased marital satisfaction and increased depressive symptoms compared to those who were securely attached (Rholes et al., 2001; Simpson et al., 2003). Women categorised as preoccupied who experienced their partners as supportive showed the same levels of satisfaction as secure women (Rholes et al., 2001).

In contrast, the impact of contextual factors on cognitive and emotional responses for those high in avoidance is mixed. In response to negative mood induction, individuals high in attachment avoidance showed no differences in cognitive effects compared to those who did not experience negative mood induction (Pereg & Mikulincer, 2004). Collins' (2006) study also found that the relationship threatening attributions made by anxiously attached individuals in response to negative partner behaviours were more likely to occur amongst

those in unsatisfying relationships compared to those in satisfying relationships. In contrast the pessimistic attributions made by avoidantly attached individuals in response to partner behaviour were made regardless of relationship satisfaction (Collins et al., 2006). This suggests attachment avoidance is associated with working models less amenable to change in different contexts.

Despite this, some priming studies have shown that avoidantly attached individuals can be impacted by being exposed to security priming. For example, regression analyses examining interaction effects of attachment dimensions and security priming (reading the words 'love', 'secure', 'affection') showed that compared to a neutral priming condition, security priming mitigated avoidant participants disposition towards dismissing hurtful events, inhibiting negative feelings and reacting with hostility in behavioural responses (Shaver et al., 2009). In another study, participants were given unsupportive messages from their partners prior to performing a task in a laboratory study. Insecure individuals (anxious and avoidant) perceived more hurtful intent, felt worse and performed worse compared to secure participants who received the same messages. In comparison, when they received supportive messages, attribution of intent, emotional responses and task performance were the same as secure individuals (Collins & Feeney, 2004).

Social media

Social media has become ubiquitous in a huge majority of people's lives during the last 10 years. Eighty-two percent of internet users in the UK have profiles on social media such as Instagram and Twitter (Ofcom, 2021), spending an average of 49 minutes per day using them. Younger adults (aged 16-25) average 80 minutes of daily use (Ofcom, 2021). Communication though social media sites and apps such as WhatsApp and Facebook Messenger is a common and regular feature of contemporary adult romantic relationships. Despite this, to the author's knowledge, there is no research on how social media might influence the associations between attachment and cognitive, emotional and behavioural experiences.

The exploration of the existence and nature of differences between computer-mediated communication and in-person communication has developed significantly since the significant increase in its use in the 1990s. Research in these two forms of communication suggest that there are significant differences in cognitive, emotional and behavioural experiences (e.g. Fernback & Thompson, 1995). Despite the development of this rich area of research in the field of computer-mediated communication, much of the contemporary psychological research in relationships doesn't distinguish this interpersonal context. In fact, a lot of research has either explicitly or implicitly adopted what's called a "mirroring" framework (Nesi et al., 2018). This framework characterises social media interaction as simply mirroring interactions that are enacted face-to-face. Whilst this facilitates the maintenance of the relevance of existing psychological constructs, one would also expect continuity in research comparing social media and offline contexts (Mikami & Szwedo, 2011).

There are few studies exploring how attachment patterns are expressed and associated with social media use. Some studies though, have shown that secure attachment is associated with lower scores of problematic internet use, compared to insecure styles (Odacı & Çıkrıkçı, 2014). Those categorised as anxiously attached use Facebook more frequently when their mood is more negative, compared to securely attached individuals who use it when their mood is higher (Oldmeadow et al., 2013). Those with an anxious attachment style use greater electronic surveillance of their partners (Fox & Warber, 2014) and undertake more electronic intrusion on their partners compared to those who are not anxiously attached (Reed et al., 2015). One recent study was found exploring the moderating role of Social Network Site (SNS) communication on the relationship between attachment insecurity and relational satisfaction among young adult couples (Candel et al., 2021). Attachment anxiety and avoidance was strongly inversely correlated with relational satisfaction. Higher frequency and quality of SNS communication buffered the relationship between female anxiety on relationship satisfaction. This is consistent with previous work showing that individuals categorised as anxiously attached might communicate using

technology to feel closer to their partner (Goodcase et al., 2018). The inverse correlation between avoidance and female's own relationship satisfaction was also attenuated by higher frequency SNS communication.

As discussed in the Conceptual Introduction above, frameworks describing the differences between social media and other contexts have been proposed by McFarland and Ployhart (2015) and Nesi and colleagues (2018). The contextual framework (McFarland & Ployhart, 2015) suggests conceptualising social media as a distinct 'context' for interaction that can impact cognition, emotion and behaviour. This framework distinguishes two relevant contexts, the omnibus context and the discrete context. The omnibus context consists in general differences between social media and other contexts, and can be understood in terms of differences in their relationship to space and time. The omnibus context of social media is characterised by the absence of the typical parameters of space and time. For example, it's possible to communicate immediately almost anywhere in the world through social media. The discrete context represents the more proximal, specific factors of context that may influence cognition, emotion and behaviour on social media. The contextual framework specifies eight categories of discrete 'stimuli' that can distinguish online contexts from offline contexts (see Figure 2). One such stimuli for example, is 'synchronicity', which captures the extent to which interaction is happening between parties at the same time. Different interpersonal contexts can be characterised by different levels of synchronicity or asynchronicity. Typically, social media can accommodate greater asynchronicity because interaction may happen at different times with a number of different people. For example, a WhatsApp group in which one participates very little might be high in asynchronicity.

How the Discrete Ambient Stimuli Differ Across the Contextual Continuum

This stimulus . . .	. . . makes social media contexts distinct from physical contexts because . . .	Contextual continuum ← →				
Physicality	Geographic location, weather, distance, and so on, are largely irrelevant.	Physical; tangible to all of the senses	F2F		DCM	SM	Digital
Accessibility	There is more open access to social media than other relationship or communication platforms.	Less opportunity to join network; less open access	F2F	DCM		SM	More opportunity to join network; more open access
Latency	The posting or spread of content on social media is nearly instant.	Sharing of content is slower	F2F		DCM	SM	Sharing of content is faster
Interdependence	There are more opportunities to share information across a wider range of people.	Fewer opportunities to share information across a large range of people	F2F	DCM		SM	More opportunities to share information across a large range of people
Synchronicity	Relationships and communication can be either synchronous or asynchronous, with equal effectiveness.	Synchronous	F2F	DCM		SM	Either synchronous or asynchronous
Permanence	Content posted on social media is permanent or nearly so.	Less permanent	F2F		DCM	SM	More permanent
Verifiability	Content posted to social media can be verified or cross-examined by others.	Harder to verify	F2F	DCM		SM	Easier to verify
Anonymity	Users often think and behave differently when using social media because they have the perception that they are more anonymous.	Less anonymity	F2F		DCM	SM	Greater anonymity

Note. F2F = face-to-face; DCM = digital communication media (e.g., email, texting, and Web 1.0 platforms); SM = social media (e.g., Linked-In, Facebook, and Web 2.0 platforms). Note that "ties" between DCM and SM may be possible (e.g., physicality, permanence).

Figure 2 How discrete stimuli differ between contexts according to contextual framework (McFarland and Ployhart, 2015.

The differences between social media and offline contexts described by McFarland and Ployhart (2015) have three significant implications. First, the social media context can change meanings and interpretation of phenomena, concepts and processes compared to offline contexts. Second, differences in the social media context compared to offline contexts can directly influence the size and direction of relationships between thoughts, feelings and behavioural responses. McFarland and Ployhart suggest that this implication can form the basis of hypotheses about how the social media context might "enhance or suppress the relationships of interest" (McFarland & Ployhart, 2015, p.1661). Third, discrete stimuli specific to social media contexts can interact with each other to influence the size and direction of relationships between thoughts, feelings and behaviours. These interactions may lead to the amplification or attenuation of particular responses to stimuli.

Nesi and colleagues' (2018) 'transformation framework' built on the contextual framework, identifying seven critical features of the social media context that might distinguish it from the offline context (see Figure 3). These features are present on different social media platforms to different degrees(see Figure 4). For example, 'permanence' is low on private video-chatting, but it is much higher in public photo sharing. This framework was developed initially to explain adolescent interpersonal relationships but also seems to extend adequately to adult relationships. Nesi and colleagues describe five important ways in which interpersonal experiences may be transformed by these differences. One important transformation is that the experience of self and other in interaction can be qualitatively different. A second important transformation is social media's tendency to amplify social experiences and demands, increasing its intensity. The difference in the speed and volume of content with a larger group of people for example may function to amplify particular cognitive affective processes. Expectations from others and of others can also change as a result of the new opportunities for interaction social media facilitates.

Features of social media	Definition	Related approaches described in prior literature
Asynchronicity	Time lapse between aspects of communication	Asynchronicity (Peter and Valkenburg 2013); "Cues-filtered-out" approaches (Culnan and Markus 1987); written communication (Berger 2013); transmission velocity, parallelism, rehearsability (Dennis et al. 2008); synchronicity (McFarland and Ployhart 2015)
Permanence	Permanent accessibility of content shared via social media	Persistence, searchability, replicability (boyd 2010); retrievability (Peter and Valkenburg 2013); verifiability, permanence (McFarland and Ployhart 2015); reprocessability (Dennis et al. 2008)
Publicness	Accessibility of information by large audiences	Invisible audiences (Boyd 2007); undirected communication, larger audiences (Berger 2013); interdependence (McFarland and Ployhart 2015)
Availability	Ease with which content can be accessed and shared, regardless of physical location	Accessibility (Peter and Valkenburg 2013); physicality, latency, accessibility (McFarland and Ployhart 2015); scalability (boyd 2010)
Cue Absence	Degree to which physical cues absent can range from including most in-person cues to being entirely anonymous (no cues)	"Audiovisual" and "source" anonymity (Valkenburg and Peter 2011), Cue management (Peter and Valkenburg 2013); "Cues-filtered-out" approaches (Culnan and Markus 1987); reduced social presence, anonymity (Berger 2013); anonymity, disembodied users (Subrahmanyam and Šmahel 2011); anonymity (McFarland and Ployhart 2015); symbol sets (Dennis et al. 2008)
Quantifiability	Allowance for countable social metrics	Not previously proposed in prior frameworks
Visualness	Extent to which photographs and videos are emphasized	Not previously proposed in prior frameworks

Figure 3 Features of social media that distinguish it from offline contexts within the transformation framework (Nesi et al., 2018).

		LOW ————————————— HIGH
Face-to-Face Communication	Asynchronicity	X—————————————————
	Permanence	X—————————————————
	Publicness	X—————————————————
	Availability	X—————————————————
	Cue Absence	X—————————————————
	Quantifiability	X—————————————————
	Visualness	X—————————————————
Private Text Messaging	Asynchronicity	———X—————————————
• Text messaging	Permanence	——————————X————
• Use of messaging apps (e.g., WhatsApp)	Publicness	———X—————————————
• "Chat" features on social networking sites	Availability	——————————————X
• Instant messaging	Cue Absence	——————————————X
	Quantifiability	———X—————————————
	Visualness	—X———————————————
Private Photo Messaging	Asynchronicity	———X—————————————
• Sending photos via text message or messaging apps	Permanence	——————————X————
• Sending photos dyadically (i.e., "privately") via photo-based apps (e.g., Snapchat messaging, Instagram "direct messaging")	Publicness	———X—————————————
	Availability	——————————————X
	Cue Absence	—————————X————
	Quantifiability	———X—————————————
	Visualness	————————————X——
Public Photo Sharing	Asynchronicity	——————————————X
• Posting photos on Facebook, Instagram, Snapchat "stories," and other social networking sites	Permanence	——————————————X
	Publicness	——————————————X
	Availability	————————————X——
	Cue Absence	—————————X————
	Quantifiability	——————————————X
	Visualness	——————————————X
Private Videochatting	Asynchronicity	—X———————————————
• Live videochatting through Facetime, Skype, etc.	Permanence	—X———————————————
	Publicness	—X———————————————
	Availability	—————————X————
	Cue Absence	—X———————————————
	Quantifiability	—X———————————————
	Visualness	—X———————————————

Figure 4 Illustration of presence of key features of social media (from Nesi et al., 2018). All features are lowest in face-to-face communication.

On the basis of the frameworks above, it would seem reasonable to hypothesise that social media may be a relevant contextual factor influencing the differential activation of attachment working models. Further, it might be hypothesised that the character of differences between social media and offline contexts may impact adults differently depending on their attachment style. Previous research also suggests that those higher in attachment anxiety might be more sensitive to changes in contextual factors (Mikulincer & Shaver, 2016). Therefore, the increased intensity of experiences in social media contexts may particularly impact the cognitive and emotional experiences of those with higher levels attachment related anxiety.

In view of the reported gaps in the existing literature described above, i.e. the impact of context on attachment working models and examination of differences between social media and face-to face contexts (McFarland & Ployhart, 2015; Nesi et al., 2018), this study was undertaken to examine cognitive, emotional and behavioural responses to potentially negative partner behaviours in offline and social media contexts. The over-arching aim of this part of the study was to examine whether and how working models of attachment might function differently in social media contexts compared to offline contexts. Specifically, this study was interested in whether and how the social media context impacted the association between attachment anxiety and cognition, emotion and behaviour in response to potentially negative partner behaviours.

Aims

This study examined the relationship between attachment anxiety and cognitive, emotional and behavioural responses. Overall, six hypotheses were tested. Hypotheses 1-3 were based on findings reported in the work of Collins (1996; 2006). Hypotheses 4-6 extended this work to explore the impact of context (online vs. offline) on these findings.

Hypothesis 1: *"Individuals with higher levels of attachment anxiety will exhibit higher levels of attributing negative attitudes and intention."* (*Effect of attachment anxiety on cognitions.*)

Hypothesis 2: *"Individuals with higher levels of attachment anxiety will exhibit higher levels of emotional distress."* (*Effect of attachment anxiety on emotions.*)

Hypothesis 3: *"Individuals with higher levels of attachment anxiety will exhibit higher levels of conflict intention."* (*Effect of attachment anxiety on behavioural intentions.*)

Hypotheses 4-6: *The patterns described in Hypotheses 1-3 will be moderated in social media contexts, i.e. the association between anxious attachment and responses will be stronger in social media contexts*. (*Interaction between attachment anxiety and context.*)

Method

Participants and data collection

All participants were recruited online. The personal and professional contacts of the researcher and supervisors were asked to participate. Participants were also recruited through social media (e.g. Facebook, Reddit). Participants needed to be over 18 and have had some experience of social media in order to participate in this study. Participants were asked for their age, their level of social media usage and their gender, and asked to complete an attachment questionnaire and a questionnaire exploring cognitive, emotional and behavioural responses to hypothetical scenarios describing potentially negative partner events (described below). Participants were able to include their email address in order to enter a prize draw of four £50 vouchers for participating. This information was entered and stored in a separate survey. The data was therefore anonymous.

Ethical approval was obtained by UCL for this thesis (UCL Research Ethics Committee reference: 15781/002, Appendix 2). Participant responses were completed on Qualtrics, an online survey platform. Relevant data was exported from Qualtrics and imported into analysis software Stata for cleaning and analysis (version 17; StataCorp LLC., Texas, USA).

Measures

Participants completed two sets of questionnaires: (1) an attachment scale, and (2) a revised relationship events questionnaire.

Revised Adult Attachment Scale (RAAS)

The Revised Adult Attachment Scale (RAAS) (Collins, 1996) was used to measure individual differences in attachment style. It is an 18-item scale that consists of three subscales of six items: (a) comfort with closeness; (b) comfort depending on others; and (c) anxiety or worry about rejection and abandonment. For example, an item on the anxiety subscale reads; "*I find that others are reluctant to get as close as I would like*". An item on the depend subscale reads: *"I am comfortable depending on others".* An item on the closeness subscale reads: *"I am comfortable developing close relationships with others."*

Respondents indicate their response on a Likert scale from 1 'not at all characteristic of me' to 5 'very characteristic of me'. The scale gives a separate score for each of the three subscales (comfort with closeness, comfort with depending on others and anxious concern about being abandoned or unloved). Attachment subscale scores were calculated by reverse scoring selected items and averaging the six items that constitute each subscale. This yielded three subscale scores, one for 'closeness'(a = .77), 'depend' (a = .78) and 'anxiety' (a = .85) respectively (Collins, 1996). The correlation between the anxiety subscale in the revised scale and the original was r = .86 (N=295) (Collins, 1996). The anxiety subscale was then used as an index of attachment-related anxiety (a = .83) (Collins, 2006). The other two subscale scores were not analysed. The anxiety subscale of the RAAS correlates with the anxiety dimensions of other self-report attachment scales (r=.74) (Brennan et al., 1998). The test-retest reliability of the similar AAS was found to be 70% over 4 years and the three subscales showed internal consistency reliability, α coefficient, of >.58 over a 2-month period (Kirkpatrick & Hazan, 1994) (please see Ravitz and colleagues (2010) for further analysis).

Revised Relationship Events Questionnaire (R-REQ)

This questionnaire consisted of elements of the questionnaires used in Collins' previous study (Collins, 1996) examining the relationship between attachment and the experience of particular hypothetical relationship events.

In order to assess participants' cognitive-emotional-behavioural response patterns, a vignette methodology described by Collins and colleagues (1996) was used. Specifically, participants' attributions regarding the event were measured following the presentation of a series of hypothetical relationship events.

Specifically, each participant was presented with a set of eight hypothetical relationship events describing potentially stressful partner behaviours. Four of these events take place in an offline context and were developed previously by Collins (1996). The four events were: (1) "Your partner didn't respond when you tried to cuddle", (2) " Your partner didn't comfort you when you were feeling down", (3) " Your partner wanted to spend an evening by himself/herself", and (4) "Your partner left you standing alone at a party". Each of these events were selected to represent potential violations of four central attachment themes: warmth and responsiveness, emotional availability (safe haven), separation (proximity seeking), and one's partner as a secure base, respectively. The original Collins questionnaire contained 6 scenarios: four attachment related and two attachment irrelevant. These attachment irrelevant events were not relevant to the hypotheses that were made in this study and so were not included.

In addition to the four offline scenarios, four (additional) online scenarios were created for this study, facilitating direct comparison of online/offline contexts. These were intended to be equivalent to the four offline events in terms of structure (e.g. tapping into the same four central attachment themes described above), and be similar in terms of distress level, merely transferred into a social media setting. The four events were: (1) 'You sent an affectionate message to your partner and they read it but didn't reply'; (2) 'You sent your partner a voice-note about a difficulty in your day and they replied without offering any

comfort'; (3) 'Your partner said they wouldn't be able to respond to messages this evening as they were out with friends'; (4) 'You had a video call with your partner and a group of friends and people you didn't know. Your partner spent the whole video call speaking to their friends and not to you'.

For each relationship event presented (described above) participants were then asked to complete three subscales, rating: (1) their attributions of the causes of their partner's behaviour (*attributions),* (2) their emotional distress (*emotional distress)*, and (3) the likelihood of conflict behaviour (*conflict intentions*). Collins' original subscale (1996) included an additional four items that were excluded because they were less discriminating of attachment style and to reduce survey burden. Specifically, two items were dropped that were not differentially associated with attachment style ('partner' and 'circumstance'), and two further items were dropped as they exhibited *smaller* differences by attachment style ('stable' and 'global') than the included items. The structure of the questionnaire is as follows:

Cognitive attribution subscale

Participants were asked to attribute the cause of their partners' behaviour (*attributions*) on a number of dimensions following Collins (1996). Thus, participants rated the extent to which behaviour in each relationship event was caused by: (a) themselves, and (b) their relationship. They were also asked to rate the extent to which their partner's behaviour was: (c) 'controllable', (d) 'intended to have an impact on them', (e) 'intended to be negative', and (f) 'caused by the partner's negative attitude towards them'. Following Collins and colleagues' (1996) items 'c', 'd' and 'e' were averaged and combined into an index of measuring the extent to which the behaviour was perceived to be negatively motivated. This item was called 'negative attitude/intention' in this study. Each dimension was rated on a 7-point scale.

Emotional distress subscale

Participants were asked to rate the extent to which they anticipated experiencing seven different emotions on a seven-point scale: angry, hurt, disappointed, unappreciated,

sad, jealous, and unloved. Following Collins (1996), these scores were averaged and combined to form an index of 'emotional distress'. Indices of (a) nervousness, and (b) unemotional (Collins, 1996) were excluded here due to the relative weakness of the associations found with indices of attachment and to reduce the overall burden on those participating.

Conflict intentions subscale (behaviour)

Participants were asked to rate the likelihood that each event would lead to an argument or conflict on a seven-point scale. This is an item that was included in both of Collins' previous studies (1996; 2006). Attachment dimensions were previously found to be strongly related to participants' ratings of the likelihood of conflict in both of these studies (Collins, 1996; Collins et al., 2006).

Generation of online scenarios

In order to generate online scenarios that were matched to the offline scenarios on the basis of attachment-relevant theme and distress, a pilot study was run. Twenty-five participants responded to the four offline scenarios, as well as 12 potential online scenarios (3 online scenarios for each offline scenario) by estimating their level of distress in response to each scenario. Respondents indicated their response on a Likert scale from 1 'not distressed' to 7 'extremely distressed'. Potential online scenarios were generated by the author and two supervisors a priori. Mean differences of ratings of emotional distress between original offline scenarios and candidate online scenarios were calculated (see Appendix 3 for details). Online scenarios with mean distress scores that were most similar to the distress scores for the equivalent offline scenarios were then selected for inclusion in the main study. However, this selection was based on the responses of predominantly securely attached individuals only (n=12 out of 25), since according to previous literature, securely attached individuals are generally less sensitive in their cognitive and emotional responses to changes in context. They therefore represented a suitable baseline by which to equate scenarios. (Note: predominant attachment style was calculated using the Methods described by Collins, 2008).

Analyses

Correlation analyses

In order to test Hypotheses 1 – 3 (*associations between attachment anxiety and cognitive, emotional and behavioural responses*), a series of bivariate correlational analyses were undertaken comparing anxiety subscale scores against each of the six outcome variables included (emotional distress, negative attitude/intention, conflict intention, attributable to self, and attributable to relationship, and partner behaviour was controllable). These were run separately for both online and offline scenarios, since cognitive, emotional and behavioural intention responses were obtained for both types of scenario. A Spearman's Rho was performed for correlational analyses. Data met the assumptions of being at least ordinal and bearing a monotonic relationship to each other.

Multi-level regression analyses

In order to test Hypotheses 4 – 6 (*interaction between attachment anxiety and context*) a series of regression analyses were performed, with cognitive, emotional and behavioural intention responses and two predictor variables: attachment anxiety (continuous variable) and interpersonal context (binary variable: online or offline, i.e. online or offline), as well as their interaction (attachment anxiety*interpersonal context). Multilevel (or mixed) models were well suited to Hypotheses 4 – 6. This is because the data are nested or clustered with two observations per participant (one in online and one in offline contexts) (cognitive, emotional and behavioural intention responses were measured in both *online* and *offline* contexts for each individual). As the data involves multiple observations per individual (one online, one offline), there were non-independencies in the data, thus violating a key assumption of linear models (Winter, 2014). A mixed effect model was therefore the most appropriate analysis for the hypotheses, using subject-level random intercepts to prevent violating the independence assumption

Analyses were run separately for each of the emotional distress, negative attitude/intention, and conflict intention variables relevant to the hypotheses. Three variables measuring cognitive responses not directly relating to hypotheses remained. Two of these

(attributable to self and attributable to relationship) were also analysed to inform better understanding of cognitive responses to these scenarios despite no *a priori* hypotheses. The variable 'controllable' was excluded from regression analyses as no significant association was found with anxiety in the initial correlational analyses. In addition to the two key predictor variables, an interaction term was included in order to test for an interaction between context and attachment anxiety. All predictor variables were added simultaneously to the model. Finally, all models were re-run with the inclusion of a number of co-variates (age, gender and social media use) in order to assess the robustness of key findings following their inclusion.

Assumptions for the performance of linear regression were also tested. The five main assumptions of linear regression are: (i) homoscedacity (variance in the residuals does not vary as a function of the predictors) , (ii) linearity and additivity, (iii) normal distribution of residuals, and (iv) independence of errors (Gelman & Hill, 2007). Homoscedacity and linearity were assessed by plotting residuals against predicted residual scores. Independence of errors was assessed by looking at plots of the residuals versus independent variables. The normality of residuals was assessed using Shapiro-Wilks test for normality (see Table 1) (see Appendix 4 for histograms). Skewness and kurtosis tests were also performed (see Table 1) testing for skewness and kurtosis in plots of distribution.

All analyses were undertaken in Stata (version 17; StataCorp LLC., Texas, USA). Repeated-measure data were reshaped in STATA using the 'reshape' command, and regression analyses run using the 'mixed' command. All variables were defined as continuous except the following: context was defined (categorical / binary, with offline defined as the baseline category), gender (categorical, with female defined as the baseline category), and social media use (categorical), with 3 levels ranging from less than '1 hour per day' (defined as the baseline category) to '1 -3 hours per day', and 'more than 3 hours per day.

Table 1 *Key descriptive statistics for outcome variables and age. Statistics provided include number of responses, the median, Shapiro-Wilks test of normality, skewness and kurtosis*

Variable	Level	N	Median	Shapiro-Wilks (z-score)	Shapiro-Wilks (p)	Skewness	Kurtosis	Missing or excluded data
Negative attitude/intention	Offline	230	3 (1, 6.25)	3.42	<0.001	0.387	-0.414	0
	Online	230	2.75 (1, 6.58)	4.11	<0.001	0.437	-0.429	0
Attributable to self	Offline	230	3.25 (1, 7)	2.75	0.003	0.305	-0.54	0
	Online	230	2.75 (1, 6)	2.91	0.002	0.256	-0.674	0
Attributable to relationships	Offline	230	3.75 (1, 7)	0.99	0.161	0.114	-0.394	0
	Online	230	3.25 (1, 6.25)	2.39	0.009	0.1	-0.741	0
Controllable	Offline	230	5.5 (1.75, 7)	5.04	<0.001	0.182	-0.504	0
	Online	230	5.25 (1.75, 7)	3.58	<0.001	0.113	-0.714	0
Emotional distress	Offline	230	3.59 (1.14, 6.29)	1.3	0.096	0.117	-0.562	0
	Online	230	3.54 (1, 6.32)	1.24	0.108	-0.03	-0.549	0
Conflict Intention	Offline	230	3.25 (1, 7)	1.4	0.081	0.182	-0.504	0
	Online	230	3.25 (1, 6.25)	2.23	0.013	0.113	-0.714	0

Results

Excluded and reshaped data

Responses were obtained from 267 participants. Of these, 37 participants' responses were incomplete. A complete case analysis approach was used, and therefore these responses were removed from analysis resulting in removal of 13.9% of the data. A complete data set was available for the 230 remaining participants, which formed the basis of all analyses.

Individual level data – descriptive analyses

In the sample of 230 participants, 187 participants were female, 37 participants were male and 6 participants were non-binary or agender. The median age of participants was 23 years and ranged from 18 to 64 years old with an inter-quartile range of 21-31 years (Table 1). 27 participants (11.7%) used social media up to one hour a day, 115 for 1 – 3 hours (50%) and 88 participants (38.2%) stated they used social media for more than 3 hours per day. Only 15 of the 37 excluded responses gave descriptive information. Of these responses 13 were female and all 15 were aged below 25 years old.

Attachment style and scenario responses

In order to understand the relationship between attachment and responses to scenarios, patterns of association between participant attachment subscale scores and scenario responses were explored using bivariate correlations, for both online and offline scenarios.

Correlational analyses - offline scenarios

After Bonferroni correction for the 3 hypotheses (corrected alpha=0.02), analyses showed (Table 2) that higher attachment anxiety was positively correlated with higher levels of the attribution of negative attitudes in offline scenarios, (Spearman's Rho (r_S) = 0.26, p<.001); higher levels of emotional distress (r_S = 0.31, p<.001); and conflict intention (r_S = 0.18, p<.001). These all remained significant once corrected. Although not included in the hypotheses, attribution of partner behaviour to self (r_S = 0.33, p<.001) and to the relationship

($r_S = 0.22$, p<.001) were also significantly associated with higher anxiety. These results were supportive of Hypotheses 1 – 3, which hypothesised that high attachment anxiety would be associated with higher attributions of negative attitude/intention (Hypothesis 1), emotional distress (Hypothesis 2) and conflict intention (Hypothesis 3). The strength of these correlations ranged from weakly associated (conflict intention) to moderately strongly associated (attributable to self).

Table 2 *Correlational analysis results (Spearman's Rho) showing attachment anxiety scores against cognitive, emotional and behavioural response variables. Significant correlations at an alpha of 0.02 are shown in bold.*

	Negative Attitude/Intention	Emotional Distress	Conflict intention	Attributable to self	Attributable to relationship	Controllable
Offline	**0.259**	**0.314**	**0.175**	**0.33**	**0.224**	0.046
	(<0.001)	**(<0.001)**	**-0.008**	**(<0.001)**	**(<0.001)**	-0.492
Online	**0.343**	**0.401**	**0.275**	**0.469**	**0.352**	0.072
	(<0.001)	**(<0.001)**	**(<0.001)**	**(<0.001)**	**(<0.001)**	-0.276

Correlational analyses - online scenarios

To explore whether attachment working models are associated with responses to partner behaviour in online interpersonal contexts as well as offline, analyses conducted for offline scenarios were replicated for online scenarios. After Bonferroni correction for three correlations (corrected alpha=0.02), analyses showed that higher anxiety related attachment was related to increased negative attitude and intention (Spearman's Rho (r_S) = 0.34, p<.001); emotional distress ($r_S = 0.4$, p<.001); and conflict intention ($r_S = 0.28$, p<0.001) (Table 1). These findings remained significant at a corrected alpha of 0.02. Further, attribution of partner behaviour to self ($r_S = 0.47$, p<.001) and to the relationship ($r_S = 0.35$, p<.001) were also significantly associated with higher anxiety. The strength of these correlations could be described as moderately strong. The outcome variable 'attributable to self' was particularly strongly association with attachment anxiety scores.

Regression analyses

In order to compare participant responses to online and offline scenarios a number of mixed effect linear regression analyses with maximum likelihood estimates (MLE) were performed. A separate analysis was run for each outcome variable (negative attitude/intention, emotional distress, conflict intention, attributable to self, attributable to relationship) (see Table 3).

For all models, anxiety emerged as a significant individual predictor (each coefficient was positive and had a p value of <.01), supporting the findings from the correlational analyses and indicating that individuals with higher attachment anxiety showed more emotional distress (coefficient = .36, p<.001, CI = 0.22, 0.48), attributed more negative attitude/intention (coefficient = .34, , p<.001, CI= 0.19, 0.5), attributed behaviour more to the self (coefficient=.49, p<.001, CI=0.32, 0.65) and the relationship (coefficient = .31, p<.001, CI = 0.14, 0.48), and conflict intention (coefficient = 0.23, p=.007, CI = 0.06, 0.39).

Interestingly, for all models context *also* emerged as a significant predictor (p<.01). However, the coefficients were all negative (ranging from -.85 to -.51), indicating that levels of emotional distress (coefficient = -.57, p<.001, CI = -0.87, -0.27), negative attitudes/intentions (coefficient=-.51, p=.003, CI=-0.84, -0.17), conflict intention (coefficient = -.66, p=.002, CI = -1.08, -0.24), attribution to self (coefficient = -.72, p<.001, CI = -1.1, -0.35), and attribution to relationship (coefficient = -.85, p<.001, CI = -1.24, -0.46), were lower in the online scenarios.

Table 3 *Mixed effects linear regression results. Model 1 indicates analysis of main and interaction effects between attachment anxiety, interpersonal context and outcome variables. Model 2 indicates analysis with covariates of age, gender and SM use.*

Predictor	Level	Model 1		Model 2 – with covariates	
		Coefficient (95% CIs)	p	Coefficient (95% CIs)	p
Emotional distress	Interaction	**0.14 (0.05, 0.24)**	**0.003**	**0.14 (0.05, 0.24)**	**0.003**
	Main effect (anxiety)	**0.36 (0.22, 0.5)**	**<0.001**	**0.32 (0.17, 0.46)**	**<0.001**
	Main effect (context)	**-0.57 (-0.87, -0.27)**	**<0.001**	**-0.57 (-0.87, -0.27)**	**<0.001**
Age	-	-	-	0.00 (-.01, 0.02)	0.707
Gender	Male	-	-	**-0.4 (-0.72, -0.09)**	**0.012**
Social media use	>1hr per day	-	-	-0.16 (-1.51, 1.19)	0.816
	1-3hrs per day	-	-	0.11 (-1.22, 1.43)	0.877
	<3hrs per day	-	-	0.27 (-1.08, 1.62)	0.7
Conflict intention	Interaction	**0.15 (0.02, 0.28)**	**0.025**	**0.15 (0.02, 0.28)**	**0.025**
	Main effect (anxiety)	**0.23 (0.06, 0.39)**	**0.007**	**0.17 (0, 0.34)**	**0.045**
	Main effect (context)	**-0.66 (-1.08, -0.24)**	**0.002**	**-0.66 (-1.08, -0.24)**	**0.002**
Age	-	-	-	0.01 (-0.01, 0.02)	0.457
Gender	Male	-	-	-0.31 (-0.67, 0.05)	0.09
Social media use	>1hr per day	-	-	0.23 (-1.32, 1.77)	0.773
	1-3hrs per day	-	-	0.68 (-0.84, 2.2)	0.379
	<3hrs per day	-	-	1 (-0.55, 2.55)	0.204
Negative attitude/intention	Interaction	0.09 (-0.01, 0.19)	0.089	0.09 (-0.1, 0.19)	0.089
	Main effect (anxiety)	**0.34 (0.19, 0.5)**	**<0.001**	**0.32 (0.16, 0.48)**	**<0.001**
	Main effect (context)	**-0.5 (-0.84, -0.17)**	**0.003**	**-0.5 (-0.84, -0.17)**	**0.003**
Age	-	-	-	0.01 (0.003, 0.02)	0.587
Gender	Male	-	-	0.003 (-0.01, 0.01)	0.115
Social media use	>1hr per day	-	-	-0.84 (-2.37, 0.69)	0.281
	1-3hrs per day	-	-	-0.51 (-2.01, 1)	0.506
	<3hrs per day	-	-	-0.4 (-1.93, 1.13)	0.61
Attributable to self	Interaction	**0.12 (0, 0.24)**	**0.048**	**0.12 (0, 0.23)**	**0.049**
	Main effect (anxiety)	**0.49 (0.32, 0.65)**	**<0.001**	**0.44 (0.27, 0.62)**	**<0.001**
	Main effect (context)	**-0.72 (-1.1, -0.35)**	**<0.001**	**-0.72 (-1.1, -0.35)**	**<0.001**
Age	-	-	-	-0.01 (-0.03, 0.01)	0.544
Gender	Male	-	-	0.21 (-0.58, 0.16)	0.275
Social media use	>1hr per day	-	-	0.02 (-1.57, 1.6)	0.982
	1-3hrs per day	-	-	0.3 (-1.26, 1.86)	0.708
	<3hrs per day	-	-	0.3 (-1.29, 1.9)	0.708
Attributable to relationship	Interaction	**0.16 (0.04, 0.28)**	**0.009**	**0.16 (0.04, 0.28)**	**0.009**
	Main effect (anxiety)	**0.31 (0.14, 0.48)**	**<0.001**	**0.3 (0.12, 0.48)**	**0.001**
	Main effect (context)	**-0.85 (-1.24, -0.46)**	**<0.001**	**-0.85 (-1.24, -0.46)**	**<0.001**
Age	-	-	-	0.01 (-0.01, 0.03)	0.305
Gender	Male	-	-	-0.12 (-0.5, 0.26)	0.537
Social media use	-1hr per day	-	-	0.28 (-1.36, 1.92)	0.739
	1-3hrs per day	-	-	0.45 (-1.17, 2.07)	0.582
	<3hrs per day	-	-	0.71 (-0.94, 2.36)	0.399

With respect to interaction effects (between attachment anxiety and context), these were significant for all outcome variables with the exception of the attribution of 'negative attitudes/intentions to their imagined partner' outcome. Thus, there were significant interaction effects for emotional distress (Hypothesis 5: coefficient= .14, p = .003, CI = 0.49,0.24), conflict intention (Hypothesis 6: coefficient = .15, p = .025, CI = .02, .28), attributable to self (coefficient = .12, p = .048, CI = 0, 0.24), and attributable to relationship (coefficient = .16, p = .009, CI = 0.04, 0.28). Further, the sign of the coefficients were all positive indicating that interpersonal context moderates the association between anxiety and responses to partner behaviour (Figure 5). Thus, hypotheses 5 and 6 were supported (*relationship shown between attachment anxiety and emotional distress / conflict intention amplified in social media contexts)*, but hypothesis 4 was not (*relationship shown between anxiety and negative attitudes/intentions amplified in social media contexts).* Due to the mixed results of the regression analysis, post hoc power analysis were undertaken using G*Power3 (Faul et al., 2007) to confirm that the analysis was sufficiently powered to detect effects in for the outcome variable negative attitude/intention was performed. The power to detect an effect size found on the outcome negative attitude/intention (0.09) was determined to be 0.937. The power for the effect size found for the outcome variable 'conflict intention' (0.15) was found to be 0.997. Therefore, it is unlikely that the mixed results in the regression analysis were due to a lack of power.

Finally, all models were re-run with the inclusion of the following covariates: age, gender and level of social media use (Table 3). Since non-binary participants represented a very small proportion of the sample (N=6, 0.03%), these were collapsed into the category of 'male' for analyses. No significant associations were found with these covariates except for gender in the association between anxiety and emotional distress (coefficient = -0.40, p <.038, CI= -0.72, -0.09). This suggests that for male and non-binary respondents' attachment anxiety did not experience as high a level of emotional distress as female participants. The interaction effects found between attachment anxiety and interpersonal

context remained significant for all outcome variables that were significant in the original

'Model 1' analysis excluding covariates (Table 3).
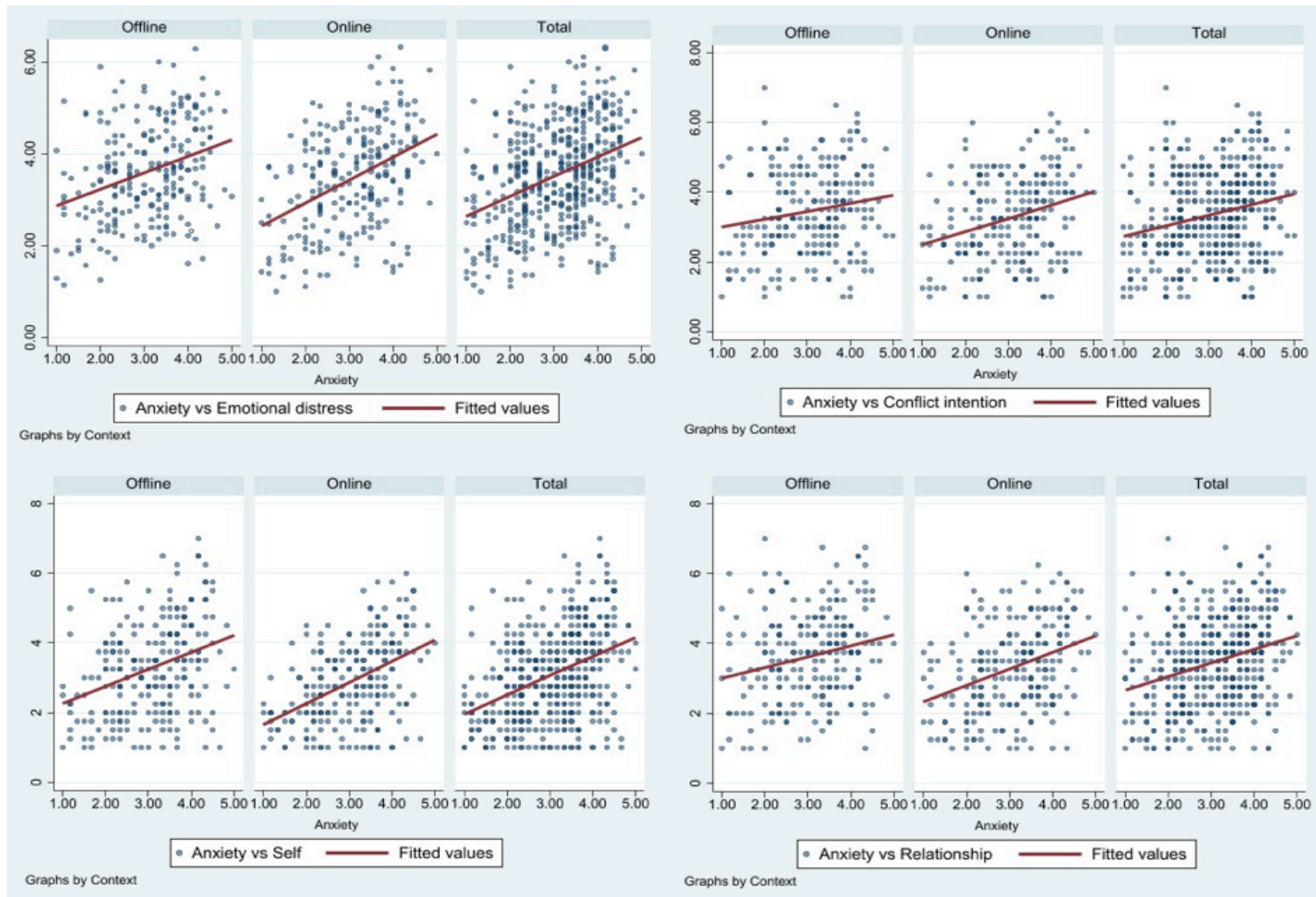
Figure 5 Scatter plot of results comparing correlation between attachment anxiety and each significant outcome variable (Emotional distress; Conflict intention; Attributable to self and; Attributable to relationship) separated by interpersonal context.

Discussion

With respect to my initial hypotheses, 5 out of 6 were supported. Thus, I found that attachment anxiety was positively associated with (Hypothesis 1) negative attributions/intentions, (Hypothesis 2) emotional distress and (Hypothesis 3) conflict intentions. This was true for online and offline contexts. With respect to hypotheses 4-6, I found that the association between attachment anxiety and emotional distress was stronger in social media contexts (Hypothesis 5). I also found that the association between attachment anxiety and conflict intention were stronger in social media contexts (Hypothesis 6). No significant differences in the associations with attachment anxiety and negative attitudes/intentions in social media contexts compared to offline contexts (Hypothesis 4).

These findings provide further evidence that working models of attachment can shape cognitive, emotional and behavioural responses in adult romantic relationships (Collins, 1996; Collins et al., 2006). Further, they are consistent with previous research showing strong relationships between attachment anxiety and heightened emotional distress (Collins, 1996; Collins et al., 2006), more negative cognitive attributions (Collins, 1996; Collins et al., 2006) and increased likelihood of conflict in response to potentially negative partner behaviours (Collins, 1996; Collins et al., 2006). The results of this study support findings showing that participants higher in attachment anxiety are likely to explain events in ways that reflected more negative about their partners and about the meaning of the events (Collins, 1996; Collins et al., 2006). This research contributes to the broader literature on adult romantic relationships by showing how individual differences in attachment are associated with more negative and pessimistic attributional dispositions (Collins et al., 2006). Furthermore, it also supports previous work showing that higher attachment anxiety was associated with greater levels of emotional distress and responses likely to result in conflict (Collins,1996; Collins et al., 2006). This is consistent with infant attachment literature that shows preoccupied children have a low tolerance for emotional distress and respond with greater anxiety in attachment relevant situations (e.g. Kobak & Sceery, 1988).

Attachment anxiety in online scenarios

The second over-arching aim of the study was to compare the associations between attachment and responses to partner behaviour in different interpersonal contexts (online vs offline). Participant responses to the four online scenarios showed that attachment related anxiety was positively correlated with a range of cognitive, emotional and behavioural responses. Thus, higher attachment anxiety was positively associated with greater attribution of negative attitudes/intentions to their partners, higher levels of emotional distress and an increased likelihood that their partner's behaviour on social media would result in conflict. Those individuals higher in attachment anxiety were also more likely to attribute their partner's behaviour to themselves and to the relationship itself online.

Particularly, the second aim of this study was to explore whether differences in interpersonal context were associated with differences in the relationship between attachment related anxiety and cognition, emotion and behaviour. This study found that attachment anxiety was generally more strongly associated with cognition, emotion and behaviour in online scenarios compared to offline scenarios. As hypothesised, the association between attachment anxiety and emotional distress (Hypothesis 5) and conflict intention (Hypothesis 6) was stronger in the online scenarios. Furthermore, the association between attachment anxiety and emotional distress covaried with gender, suggesting that emotional distress in these scenarios may be experienced differently by men and people who are non-binary. Results for cognitive attributions were mixed. Interpersonal context was not found to interact with the association between attachment anxiety and the attribution of negative attitudes and intentions (Hypothesis 4). Despite this, the association between attachment anxiety and the attribution of partner behaviour to the relationship and to themselves (the participant) was stronger in online scenarios.

Overall, these results provide prima facie support for the basic claim of the contextual and transformation frameworks (McFarland & Ployhart, 2015; Nesi et al., 2018). Namely, it lends support to their basic claim that social media is a distinct interpersonal context. Second, it also consistent with the claim that the social media context can impact cognition,

emotions and behaviour. McFarland and Ployhart (2015) suggest that hypotheses about these relationships should focus on whether the social media context amplify or attenuate relationships of interest. This study is therefore an important contribution towards research showing that the social media context does impact individuals' cognition, emotions and behaviour, and in particular, in ways that are more closely associated with the operation of attachment working models. This emphasises the potential of attachment orientated understandings and explanations of adult romantic relationship interactions in online contexts.

This study is also consistent with theory and research exploring the role of context in the operation of attachment working models. Particularly it supports prior research showing that high attachment anxiety may be particularly sensitive to differences in social and environmental contexts (Mikulincer & Shaver, 2016). Whilst research emphasising quite proximal environmental differences (e.g. priming of security-enhancing attachment figures) has been shown to influence associations between attachment and social perception processes (Mikulincer & Shaver, 2001; Mikulincer et al., 2001), this research shows that less interpersonally located factors such as social media context can influence the activation of working models. This is consistent with Bowlby's original grounding of the attachment system in the infant's experience of its environment (Bowlby, 1951; 1958; 1969/1982). Despite the increasing importance of context in understanding the mechanisms involved in the activation of working models, this study is one of few that contributes to this overall aim and continues to be an important future direction of research (Mikulincer & Shaver, 2016).

Further research

This research contributes to a body of empirical studies showing that the social media context is a distinct context that can impact cognitive, emotional and behavioural processes in adult romantic relationships. I have not though shown exactly *how* particular features of the social media context impact these processes. Therefore, research identifying exactly how specific features of social media may impact how working models of attachment shape cognition and behaviour would be a valuable extension of this work. This would

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enable researchers to understand how particular applications (e.g. Instagram) high in particular features characteristic of social media (e.g. quantifiability) relate differently to the functioning of attachment working models. Understanding how some applications relate differently to the functioning of working models would allow for more nuanced and targeted interventions in clinical work too. The features described and 'transformations' described in Nesi and colleagues' framework would provide a good foundation for further empirical work. For example, Nesi and colleagues identify that particular features of social media such as 'cue absence' and 'asynchronicity' may amplify experiences such that interaction on social media is experienced "as more harsh" (Nesi et al., 2018, p.278) in some interpersonal situations. Furthermore, it is particularly important to develop understanding of how social media contexts may transform interpersonal experiences for those individuals that are higher in avoidance (see Strand et al (2019) for an exploration of the context of cultural individualism and avoidant attachment).

Further research would also be useful in understanding how social media context might impact the relationship between cognition, emotion and behaviour. This study showed that the association between attachment and cognitive, emotional and behavioural responses were amplified by context. It did not show whether the relationship between cognitive, emotional and behavioural responses differed between contexts. McFarland and Ployhart (2015) theorise that social media contexts do "influence the nature of relationships among cognitive, affective, and behavioural constructs and processes" (McFarland & Ployhart, 2015, p.1661). Therefore pathway analysis would help to further elucidate differences between the relationships between cognition, emotion and behaviour on social media compared to face-to-face (see Collins and colleagues for an example of pathway analysis (1996; 2006)).

Furthermore, this research used a unitary measure of emotion; emotional distress. In order to better understand how emotion and behaviour are associated, research exploring distinct emotions and their associations with distinct behavioural responses to scenarios would be helpful. As well as providing a better understanding of the links between emotional

and behavioural responses it would be particularly important in further understanding the basic association between behaviour and attachment patterns. Furthermore, it is worth considering in this study how particular items capturing emotions might involve cognitive elements. For example, one item in within the 'emotional distress' measure is 'unappreciated' which also involves a cognitive element. Further research that provides more distinct cognitive, emotional and behavioural elements or that accommodates that emotion and cognitions can be mutually constitutive might therefore be useful.

Limitations of research

Several limitations of this research should be named. In this study, participants were asked to respond to *hypothetical* scenarios involving *imagined* partners. As a result, participants were responding on the basis of very little information. This has two potential limiting consequences. First, there is a risk that using an imaginal scenario might not elicit the activation of working models of attachment of interest and therefore be responsible for the associations found. Second, although this is a standard methodology in the relevant literature, it is still not certain how far these findings can be generalised to the real world, or in other words how externally or ecologically valid they are. Despite this, laboratory research on social perception and attachment style differences has found results consistent with hypothetical vignette methodologies (Collins & Feeney, 2004). Further, a vignette methodology used to explore attachment style differences in social media contexts does not yet have such corroborating laboratory studies and therefore there remains a lack of certainty around the generalisability of these findings. Despite this, there are no prominent reasons to think that generalisability of results in vignette methodologies specifying social media scenarios would differ greatly in their generalisability compared to those in offline contexts.

A second limitation of the study involves how equivalence between scenarios in social media scenarios and offline scenarios was determined in the pilot study. Only emotional distress scores were used to ensure the scenarios were roughly equivalent in this respect. Therefore, differences in scores on outcome variables could have been impacted by

different elements of the new online scenarios. The risk of confounding variables impacting differences between responses to online scenarios compared to online scenarios must therefore be considered. The extent to which small differences in the mean distress scores amongst secure participants of a small sample impacted differences between the overall means discovered in the main study is also underdetermined. Despite this, the aim of this study was to understand the interaction effects rather than main effects and therefore the impact of the method to establish the baseline was less likely to have impacted the results. Whilst interaction effects were of different sizes, the graphs showed a consistent steeper gradient in the association between anxiety and each outcome variable in online scenarios, when compared to offline scenarios (Figure 5). This suggests that differences reflect differences in interpersonal context rather than merely differences in the scenario themselves. Furthermore, there is a possibility that confounding variables are responsible for the association between attachment anxiety and responses to scenarios. Whilst the scenarios developed were designed to tap into attachment themes, there remains a possibility that associations between attachment anxiety scores on the RAAS and scores on the outcome variables were influenced by other confounding variables. Collins' (1996) early study included attachment irrelevant scenarios in order to accommodate the possibility of confounding variables. This would be useful to include again in future studies that build on this work.

Thirdly, there are a number of other limitations that are entailed by the design of the study. First, the recruitment of participants through personal contacts and through social media may have led to selection bias in the sample. Therefore, caution is recommended in assuming external validity of these results. Second, whilst the measure of emotional distress was taken from Collins' previous study (1996), other measures of emotional distress have included different items (e.g. Collins, 2006). Therefore, the construct validity of this scale as a measure of emotional distress should be considered. Furthermore, some of the items in the scale like 'unappreciated' for example, might include cognitive content. Therefore, the interpretation of there being distinct cognitive and emotional responses measured by each

scale is limited. In reality cognitive and emotional elements are likely intertwined and constitutive of the each other. The very general conceptualisation of emotional distress therefore limits the construct validity of this measure. Future observational research including behavioural indicators of emotional distress might be useful in future research therefore.

The cross sectional nature of this study design is also a limitation. The attribution of a causal relationship between attachment patterns and the outcome variables measured in this study is therefore beyond the scope of this study. Furthermore, there is a risk that the associations found might be partially explained by reverse causality. For example, emotional distress scores in a particular scenario may play a causal role in the relational patterns captured in the RAAS. In future, a longitudinal study would be better able to indicate a causal relationship between attachment patterns and responses to partner behaviour and therefore support the theorised function of working models.

Implications of research

The results of this study provide important evidence that working models of attachment operate during interaction on social media. Furthermore it shows that the operation of these working models may be different in these scenarios compared to offline scenarios. Particularly, it suggests that working models may be more active in emotional, behavioural and some cognitive responses in attachment relevant scenarios.

This research suggests that social media is a distinct interpersonal context that can influence cognitive, emotional and behavioural responses. Specifically, it also suggests that the attachment behavioural system may impact responses differently on social media. This contributes support to models of social media like the contextual and transformation frameworks that suggest that it constitutes a distinct environment that will result in differences in experiences compared to offline (McFarland & Ployhart, 2015; Nesi et al., 2018). Furthermore, it is consistent with the way in which the transformation framework suggests experiences might be transformed (e.g. experiences may be amplified).

Clinically, this research contributes to how social media contexts may activate attachment working models differently and therefore how to alter interventions. This might be particularly relevant when working with couples experiencing relationship difficulties for example. Behaviourally focused interventions may incorporate communication on social media into both formulation and intervention stages of an intervention. Better understanding of how different levels of attachment anxiety might shape their experience of social media interaction might be particularly relevant. This results of this study can contribute to a growing understanding of how those with different attachment patterns might be best served by social media communication, and how it might both exacerbate or attenuate relationship conflict, distress and ultimately satisfaction (see Candel et al., 2021). This might be particularly pertinent for those who are high in attachment anxiety due to their comparatively high sensitivity to context in attenuating or exacerbating associations between anxiety and relationship experiences (e.g. Candel et al., 2021; Gillath et al., 2022).

Conclusion

These research contributes to three main findings. First, it shows contributes to evidence showing associations between individual differences in attachment and cognitive, emotional and behavioural responses in adult romantic relationships (Collins, 1996; Collins et al., 2006). Secondly, it offers support to the transformation and contextual frameworks which suggest that social media contexts do influence the cognitive-emotional and behavioural responses in interpersonal interaction, and in this case, in romantic relationships (Nesi et al., 2018; McFarland & Ployhart, 2015). Thirdly, it contributes to the growing body of research showing how environmental context can impact the operation of working models (Mikulincer & Shaver, 2016).

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Part 3: Critical Appraisal

Overview

In what follows, I will present a critical reflection on the research process involved in both the literature review and empirical study for this research project. The critical appraisal will be organised into two sections. First, I will detail the stages of the research process and discuss challenges and reflections this prompted. Second, I will consider some of the general personal reflections prompted by the process of undertaking this research project. Before that I will briefly describe my background and the important context it provides for the nature and character of the thesis that was eventually written.

Background

Before undertaking a psychology conversion course, I worked in policy and parliamentary affairs in mental health and child development. This work involved presenting research on the effectiveness of clinical interventions and the socio-economic risk factors in regards to a range of outcomes. Much of the policy work in child development used attachment and psychological research to advocate for particular policy interventions, and emphasis. This professional experience left me with an acute awareness of the multiplicity of the social, environmental and psychological inputs into physical and psychological wellbeing. Particularly, this experience left me awed by the complexity of the symbiotic interaction of social, environmental and political context with psychological and interpersonal wellbeing has been of particular interest to me ever since. It also motivated an interest in how psychological research and attachment research particularly could function towards progressive policy change. Since then, I have produced research on job insecurity and organisational attachment within the NHS. I noticed as this project developed how my interest in the interaction between social structures and other contextual factors on psychological factors influenced the shape of this research project too.

Research process

Selection of a project

I applied for three projects, two of which centred on attachment and one in the impact of an intervention on the wellbeing of older adults, an area of clinical interest. My interest in

attachment and social psychology initially drew me to this project. Furthermore, I was attracted by the clinical relevance of this project. It seemed to me that improving understanding the role of such a ubiquitous feature of our contemporary relationships in social media was of significant value. Particularly, it felt clinically useful to contribute towards improve clinician understanding of how social media might impact the relationships of younger adults who might use social media differently to these young adults. In my mind therefore the project contributed towards a clinical provision that understands this aspect of younger adults' lives. More broadly, improving understanding of how technology is used and how it facilitates relationship functioning amongst some groups felt of clinical import and interest. Furthermore, the exact shape of the project was nebulous at the time of choosing a project, and the opportunity of having a role in designing the research project from conception to finish particularly appealed to me too.

Designing the study

Methodology

The methodology of the project was decided in partnership with my research supervisors. In undertaking a review of the literature on attachment working models, the vignette methodology that came to form the methodology of this project was common. When choosing a study design, the vignette methodology seemed attractive firstly, because of its popularity in the research, but for two other reasons too. First, at the time of doing this literature review, Covid-19 was a few months old and it was clear that any methodology needed to be one that was compatible with distancing measures. Second, the idea of repeating quantitative analysis provided a well validated and reliable methodology from which could form the basis for introducing social media elements to the design. By choosing a methodology grounded in the literature I began to develop the possibility of introducing social media scenarios against which face-to-face scenarios could be compared.

We decided to base the methodology specifically on two papers by Nancy Collins', who's work on working models of attachment are canonical for the area of research. Collins' work broadly appealed in the combination of its theoretical richness and how it linked it with

the empirical work that she had done on a range of different facets of attachment working models. The two studies on which the methodology of this project was based (Collins, 1996; Collins et al., 2006) found a range of significant and interesting findings. As well as this, these papers were directly orientated towards better understanding the pathways between cognition, emotion and behaviour in the operation of working models. This particularly appealed to me when considering how it provided a basis for conceptualising how differences in social media context might be interpreted were they to be found in the empirical study. Furthermore, the results in these two papers were significant and I felt confident that a similar associations between attachment and cognitive, emotional and behavioural responses would be found if replicated. The replication of these results was a precondition of being able to make a meaningful comparison between social media and face-to-face contexts.

As I went through this process I became increasingly aware of the need for reflexivity in planning the shape of the empirical study. I became conscious that the need for clarity regarding the hypotheses of the study was a precondition of effectively choosing a methodology and that making informed hypotheses grounded in the literature was also part of this familiarisation with the research area.

Pilot study

In order to investigate how social media might impact the associations between attachment and cognition, emotion and behaviour, this study needed to develop vignettes within a social media context. Of principal concern in the development of these scenarios was that they be as close to the original face-to-face scenarios incorporated from the original study (Collins, 1996). Designing the pilot study to ensure that the equivalence of offline and online scenarios could best be achieved was a challenging but rewarding process. Identifying how to The challenge of this process was weighing up what it was most important to achieve in the pilot study and what would need to be understood as a weakness of the study. More practically, this process involved choosing what aspects of the scenarios to equalise and amongst whom. Particularly, the novel scenarios needed to tap into the same

attachment themes as the face-to-face scenarios. Another important consideration was that the particular features of the social media scenarios did not explain and resultant differences in the cognitive, emotional and behavioural responses captured in the main study. How to minimise the influence of potentially confounding variables attributable to these differences was what led to the design of the pilot study. This was a challenging but rewarding process that involved an engagement with quantitative study design I hadn't previously reflected on.

These considerations led me to measure the levels of emotional distress for each scenario and to choose scenarios on the basis of the similarity of emotional distress scores between candidate scenarios and the original face to face scenarios. I decided to do this for those who were securely attached only. Once, the design was chosen, running the analyses for the pilot study was relatively simple.

As someone from a humanities background I had come to this quantitative research with a preconception about how positivistic quantitative research was, and had been attracted to critiques of positivism in social science made by such writers as Foucault (1980) and Kuhn (1970). By engaging in this process of designing the pilot study, in acknowledging relative weaknesses and strengths in study design I was able to reconsider these critiques. I was able to incorporate the critique of knowledge claims made by positivist approaches to research but also hold on to the fact that one didn't have to hold on to the epistemological aspirations of positivistic approaches but hold on to the incredible value of quantitative research, and hence particularly, study design.

Questionnaires and measures

Once the four online scenarios had been selected a decision had to be made regarding what items measuring cognitive, emotional and behavioural responses to incorporate from the original study (Collins, 1996). The increased burden on participants of responding to eight scenarios was at the forefront of my mind in making this decision. This was particularly the case because of an underlying concern I had about recruitment during the Covid-19 pandemic and ensuring the study was as highly powered as it could be. Thirdly, the aforementioned dependence of hypotheses about the associations found in

offline scenarios on hypothesising about differences in social media were also considered. Therefore, only the items that were consistently associated with dimensions and categories of attachment were included in this study.

Second, I had to choose an attachment measure that would also need to be part of the main study. There is a lot of research on the relative strengths of measures of attachment in terms of validity and reliability (e.g. Ravitz et al., 2010; Raby et al., 2021; Shaver & Fraley, 2004). Choosing an attachment measure for this study became a process of comparing the strengths and weaknesses of the study for this study specifically. In the end, it was decided that the less frequently used measure of the RAAS would be best for this study. Particularly, this was chosen because it was used in the previous studies by Collins and colleagues (1996, 2006) on which the design of the study was based. Secondly, this measure yielded dimensional measures of attachment. This was considered particularly valuable as it would allow for a more precise measurement of associations and pick up on smaller effect sizes if they were there.

Collecting demographic information

Apart from age and gender, other demographic information was not collected. How and whether these results can be generalised to particular groups then is unclear. Whilst it is possible that social media and attachment in romantic relationships is likely to intersect with identities such as religion, culture and sexual orientation it was considered beyond the scope of this project. Particularly, this was due to the possible sample size needed to draw meaningful conclusions about any difference is based on these demographic factors. Therefore, recruiting diverse samples to better understand how social media use might impact the association between attachment and cognitive, emotional and behavioural responses would be important.

Analyses

Undertaking correlational analyses to answer Hypotheses 1 – 3 was relatively simple. Attachment measures were scored yielding three scores: attachment related anxiety; comfort with closeness; comfortable depending on others. Scores on attachment anxiety

were correlated with average scores for each item on the R-REQ in offline scenarios. The analysis for Hypotheses 4 – 6 was more challenging though. Ensuring how best to characterise the data of attachment anxiety was particularly a topic of reflection. Categorising attachment scores would have facilitated a more straightforward mixed ANOVA analysis. This categorisation would have limited the results in removing the sensitivity of the analysis to smaller differences in attachments scores. The challenge in leaving the attachment scores as continuous was that it would require the transformation of data to accommodate the comparison of the two conditions (online and offline). Furthermore, it would require a multi-level mixed effects linear regression which I had not done before. It was clear to me at the time that I was working at (beyond) the limits of my statistical knowledge and therefore seeking the support and guidance of my supervisor at this time was essential. In retrospect, going through this reappraisal of the best statistical methods to analyse the data is a process it would have been better to have finalised earlier in the process for my project. Again, being involved in this decision making though certainly helped me understand the choices regarding analysis better.

General reflections

Social determinants of mental health

My supervisor and I had initially approached this topic by reflecting on differences in dating practices in contemporary British society and the role of technology such as dating apps and online communication. Friends and loved ones had personal experience of using dating apps and had lived through the increase of their popularity. I was therefore interested in the differences this form of dating had on the character of dating relationships and the comparative quality of those relationships compared to those that did not depend on dating apps. It struck me in my reading that whilst opportunities to find romantic partners had exploded through technology, people were more likely than before to be single (e.g. DePaulo, 2017, Pronk & Denissen, 2020). As someone who is politically engaged, I was particularly interested in how dating apps might constitute and represent an increasing trend towards relational distance and isolation in some Western societies. As I read about this, I

came across critiques of dating applications in which dating and relationship development commodifies not only the process but the other too leading to increasingly 'frail' human bonds (e.g. Bauman 2003, 2012). These works characterised technology as transforming dating into a kind of entertainment in which people 'can always return to the marketplace for another bout of shopping' (Bauman, 2003, p.65).

Whilst this work confirmed the biases I had, I began to have this perspective challenged by research that emphasising the emancipatory history and possibilities provided by technology in dating. Giddens example of the emancipatory power of the technological development of contraception for example was particularly valuable (Giddens, 1992). By the end of my project scoping this left me more in view of the dialectic, acknowledging both the possibilities and risks of 'networked intimacy' (Hobbs et al., 2017).

This more nuanced position left me able to acknowledge just how important individual differences are on the impact of the increasingly mediated relationships we conduct. This was particularly emphasised during the continuing Covid-19 pandemic which left many of us in the UK relying on almost entirely technologically mediated context to conduct our relationships. Whilst I came across research into how individual differences in attachment impacted use of technology (e.g. Alexopolous et al., 2020), there was little on how technology might impact individuals differently. There is quite a bit of research on how attachment styles may be related to different social media use, including for dating apps. For example, research shows that dating app usage was higher amongst those with anxious attachment and lower for those with avoidant attachment and the reasons given for lower use was difficulty trusting others online (Chin et al., 2019). I was struck by the focus on finding associations between psychological constructs and particular measures of social behaviour but the relative absence of social behaviours and context on indicators of psychological constructs. This further motivated my interest in understanding that relationship between mental health and social context.

When reflecting on the journey of my perspectives on social media on intimate relationships I was left with two principle conclusions. First, I came to recognise how

significant the impact of the pandemic had been on my thinking, and my experience of the differences of technologically mediated interaction compared to face-to-face communication. I think my acute sense of loss of the interactions and experiences that Covid-19 had entailed led to me to confirmation bias (Nickerson, 1998) in my reading of research that was critical of social media technology. Furthermore, it became clearer that my comparison of technology mediated interaction compared to face-to-face interaction was heavily influenced by the intersection of a number of my privileges such as being able bodied, not immunosuppressed, and with socio-economic privilege (Crenshaw, 1989/2018). Second, I noticed how connected my perspective was to a sense of justice. This led me to reflect on the idea of bias and subjectivity in quantitative research. It seemed both important to be led by my social and political positions but also to notice the risks it posed to claims of objectivity in my research project. I noticed both that the hypotheses I was developing on the basis of research were the result of emotionally involved social and political views (Jung et al. 2014). On the other hand, it was less clear to me how an unbiased, purely objective method was possible and what implications this had for the relative status of my findings as objective or subjective. Particularly, it reminded me of the importance of approaching statistics from a critical perspective that leaves space for alternative methodologies.

Balancing how the study was framed

At its inception, the thesis project was presented as drawing on two distinct bodies of literature. First, the research on working models of attachment. Secondly, the debates surrounding social media and its impact on psychological and interpersonal processes. I found getting a handle on these two distinct and broad areas of literature challenging. Moreover, designing a research question that would be of relevance to both areas of the literature was a challenging task. This task was helped by discussing each area in greater detail with each of my supervisors. One of the challenges associated with this process was the split interests of my supervisors. I found myself vacillating between framing the research in terms of debates in cyberpsychology and debates within the attachment literature. I became conscious of my desire to retain their interest in the project and therefore finding a

solid way of grounding the project in a contribution to both areas of research preoccupied me. I hope in the end to have been able to have grounded the study effectively in both areas, but even then I was conscious of how to balance both areas of research. It was only later that I felt comfortable grounding the rationale for the study in both areas of the literature in a way that felt congruent with the literature and the research interests of my supervisors. In framing the research in contributing to understanding the role of context in the functioning of attachment working models and debates regarding the impact of social media on interpersonal processes, I hoped to strike the right balance.

Conclusions

I am very happy on reflection, to have chosen a topic that so aligns with my interests and values. As well as this, it provided me with an opportunity to undertake substantial quantitative research for the first time and to increase my skills in statistical methods. Furthermore, it's allowed me to develop a nuanced perspective on the respective roles and uses of different methodologies within psychology. More broadly, it has helped me to further develop my interest in the intersection of social factors, community and clinical psychology.

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Appendices

Appendix 1

Collins and colleagues (2006): Path testing attachment related anxiety, attributions, emotional distress and conflict behavioural intentions.
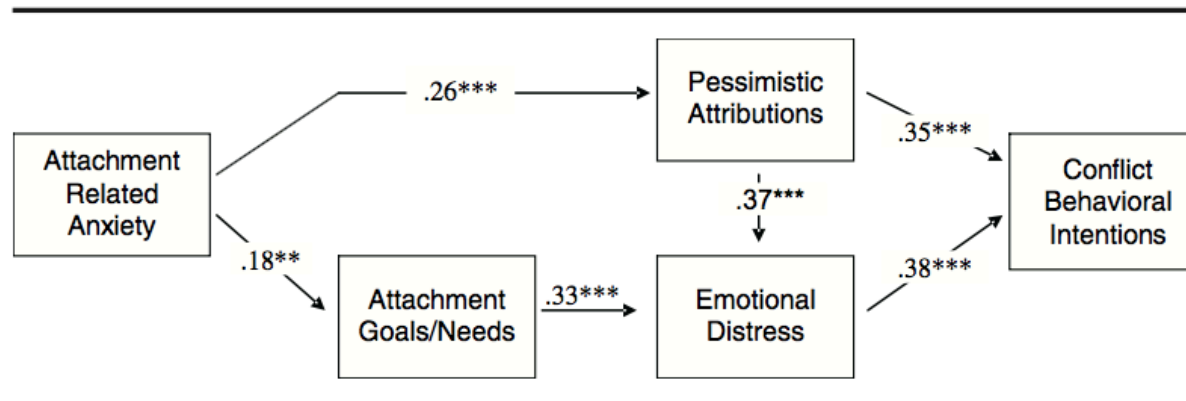
Figure 6   Path analysis testing the hypothesized model (Study 1).
NOTE: $N = 181$. Path values are standardized regression coefficients (βs). $\chi^2(4) = 6.75$; $p = .15$, Comparative Fit Index (CFI) = .98, Root Mean Square Error of Approximation (RMSEA) = .06.
$**p < .01$. $***p < .001$.

Appendix 2

Letter of ethical approval

UCL RESEARCH ETHICS COMMITTEE
OFFICE FOR THE VICE PROVOST RESEARCH

UCL

08/07/2021

Dr Kate Sherratt
Research Department of Clinical, Educational and Health Psychology
UCL

Cc: Timothy Hutchison

Dear Dr Sherratt,

Notification of Ethics Approval
Project ID/Title: 15781/002 Attachment style, cognitions and behaviours in dating relationships

Further to your satisfactory responses to the reviewer's comments, I am pleased to confirm that your study has been ethically approved until **08/07/2022.**

Ethical approval is subject to the following conditions:

Notification of Amendments to the Research
You must seek Chair's approval for proposed amendments (to include extensions to the duration of the project) to the research for which this approval has been given. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing an 'Amendment Approval Request Form'
http://ethics.grad.ucl.ac.uk/responsibilities.php

Adverse Event Reporting – Serious and Non-Serious
It is your responsibility to report to the Committee any unanticipated problems or adverse events involving risks to participants or others. The Ethics Committee should be notified of all serious adverse events via the Ethics Committee Administrator (ethics@ucl.ac.uk) immediately the incident occurs. Where the adverse incident is unexpected and serious, the Joint Chairs will decide whether the study should be terminated pending the opinion of an independent expert. For non-serious adverse events the Joint Chairs of the Ethics Committee should again be notified via the Ethics Committee Administrator within ten days of the incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Joint Chairs will confirm that the incident is non-serious and report to the Committee at the next meeting. The final view of the Committee will be communicated to you.

Final Report
At the end of the data collection element of your research we ask that you submit a very brief report (1-2 paragraphs will suffice) which includes in particular issues relating to the ethical implications of the research

i.e. issues obtaining consent, participants withdrawing from the research, confidentiality, protection of participants from physical and mental harm etc.

In addition, please:

- ensure that you follow all relevant guidance as laid out in UCL's Code of Conduct for Research: www.ucl.ac.uk/srs/governance-and-committees/research-governance
- note that you are required to adhere to all research data/records management and storage procedures agreed as part of your application. This will be expected even after completion of the study.

With best wishes for the research.

Yours sincerely
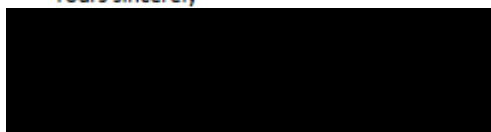
Professor Michael Heinrich
Joint Chair, UCL Research Ethics Committee

Appendix 3

Table indicating mean differences between candidate social media scenarios and original offline scenarios. Lowest mean score for each category of scenarios and therefore the category selected highlighted in bold.

Descriptive Statistics

|	Warmth & Responsiveness 1	Warmth & Responsiveness 2	Warmth & Responsiveness 3	Safe haven 1	Safe haven 2	Safe haven 3	Proximity seeking 1	Proximity seeking 2	Proximity seeking 3	Secure base 1	Secure base 2	Secure base 3
Valid	12	12	12	12	12	12	12	12	12	12	12	12
Missing	0	0	0	0	0	0	0	0	0	0	0	0
Mean	1.167	**0.9167**	1.083	1.500	**1.083**	2.000	0.5833	0.5000	**0.3333**	1.750	**1.000**	1.667
Median	1.000	1.000	1.000	1.500	1.000	2.000	0.5000	0.000	0.000	1.000	1.000	1.000
Std. Deviation	0.8348	0.7930	0.9003	0.7977	0.7930	1.044	0.6686	0.6742	0.4924	1.422	0.9535	1.435
Minimum	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum	3.000	2.000	3.000	3.000	3.000	4.000	2.000	2.000	1.000	4.000	3.000	4.000

Appendix 4

Distribution of cognitive, emotional and behavioural responses, separated into social media and face-to-face scenarios (i.e. online and offline contexts).
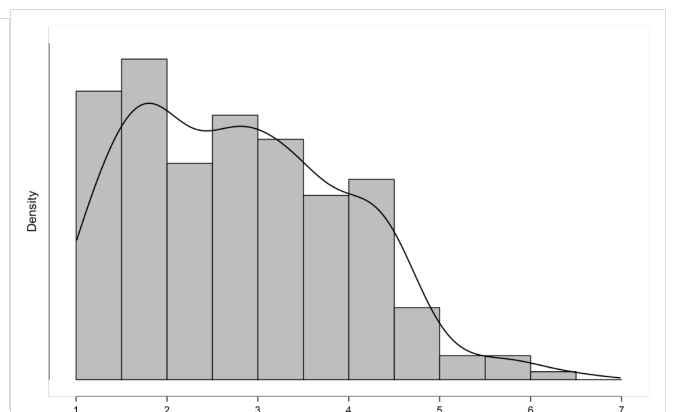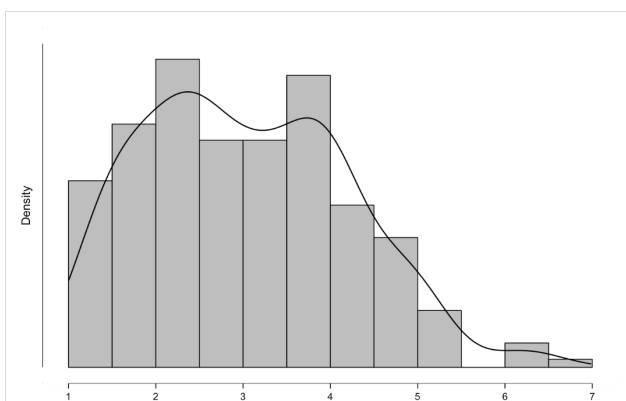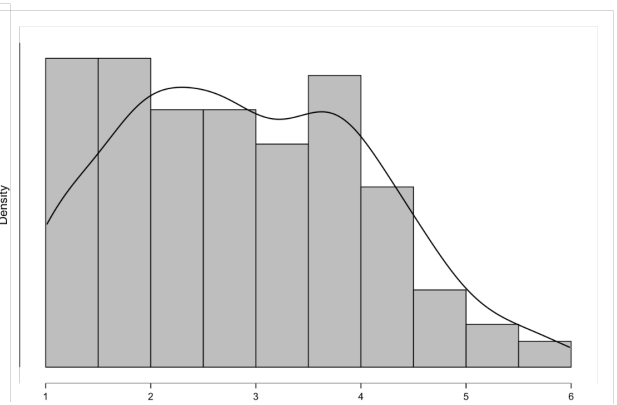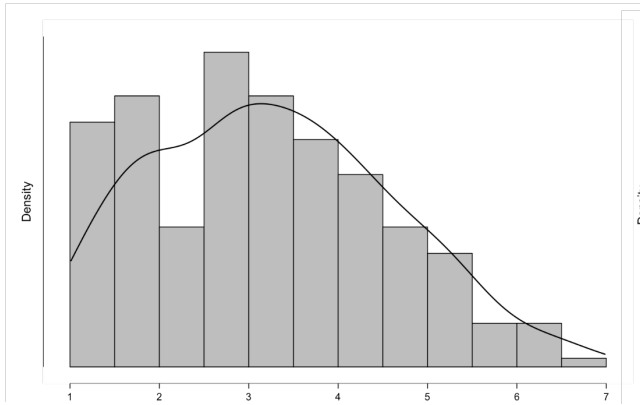
Emotional distress
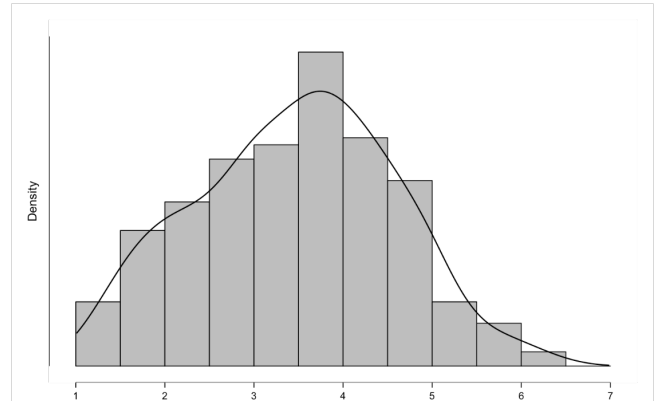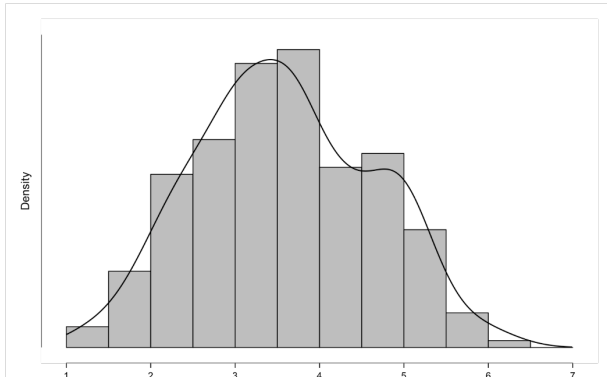
Conflict intention
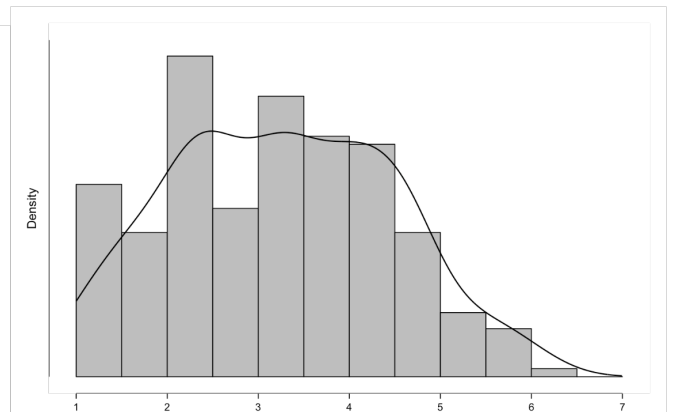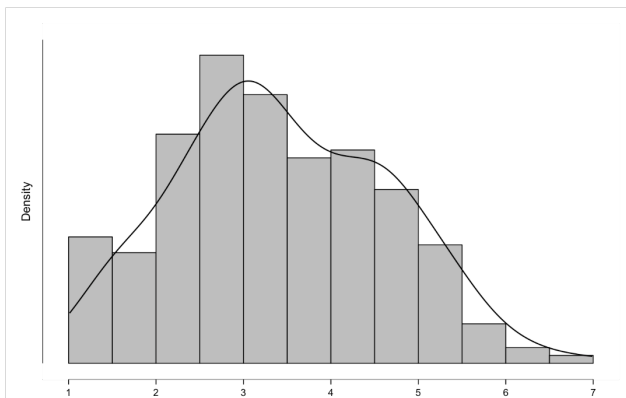
Negative attitude/intention

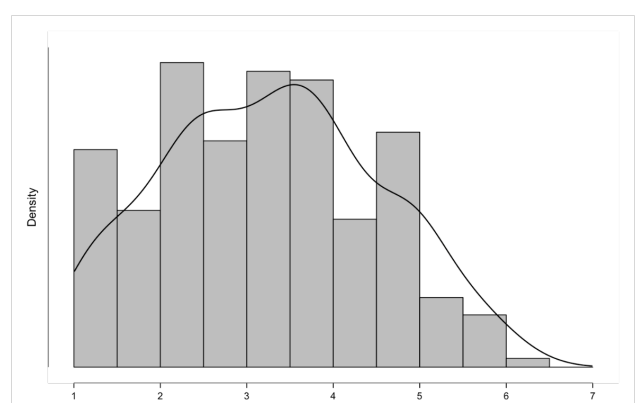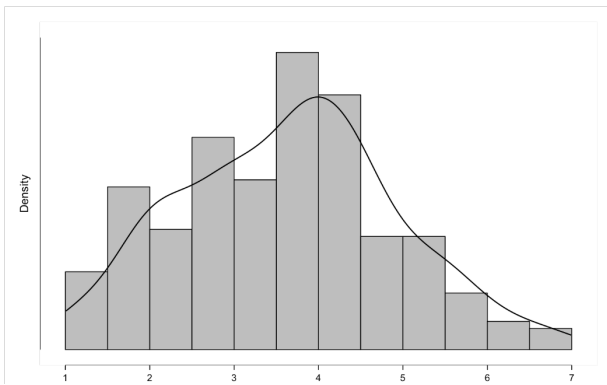*Attributable to self*

Attributable to relationship

Within partner's control