

Correlates of Anxiety, Depression and the Paternal-Fetal attachment in Expectant Fathers.

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Abstract

The transition of men into fatherhood is a period of adjustment and uncertainty. Research into expectant fathers is neglected in comparison to pregnant mothers. The aim of this study was to analyse the correlates of anxiety, depression and the paternal-fetal¹ attachment in expectant fathers within the United Kingdom (UK). A series of questionnaires were used to measure psychological symptoms, relationship variables, pregnancy variables, demographic variables and the fetal attachment relationship towards their unborn baby during their partner's pregnancy. A total of one hundred and sixty six expectant fathers completed the study. Anxiety and depression measures were found to be significantly correlated with each other however they did not appear to be significantly associated with fetal attachment levels. Multiple stepwise regression analysis identified the significant variables associated with fetal attachment to be relationship satisfaction and the gestational age of the pregnancy which explained approximately 8% of the variance. Further research is needed into determining fathers who may be at risk of low fetal attachment or psychological distress during pregnancy and how this relates to the fetal attachment towards the unborn child.

Keywords: paternal, fetal, attachment, expectant fathers.

¹ The term 'fetal' is used within the North American English population however, it is also more commonly used in the scientific community and therefore is used throughout this document. It is recognised the term in the UK is usually referred to as 'feotal' (Oxford Dictionaries, 2018).

Correlates of Anxiety, Depression and the Paternal-Fetal attachment in Expectant Fathers

My Epistemological Position

My overall epistemological position is largely positivist. I believe that knowledge is a search for 'truth' of how and why things happen and that science is the basis for discovering this 'truth'. I believe that discovering 'truth' in a scientific context can be explained through logical assessment, measurement and examination. I do however, believe that as human individuals we all have our own 'truths' which are socially constructed and are influenced through a lens of our own beliefs and values. So in this regard, a search for a pure and absolute 'truth' is undoubtedly unrealistic.

I believe that human behaviour cannot be simplified into a single algorithm and that our behaviours are a complex combination of social systems continually interacting with one another. I see language as an assistance in organising some of these terms and experiences but also a limitation in articulating complex behaviours. To illustrate, throughout my clinical work I have met many children who have lived through different experiences, lifestyles, finances, environments and yet, they appear to have distinct similarities when viewed through the lens of their most early attachment experiences.

Within this research, the overall ontology is objective and the epistemological position is generally positivist. This research is quantitative and I acknowledge my background of living and working within a largely quantitative and positive world which is likely to have influenced my methodology.

Throughout this research it is recognised the term 'attachment', 'love' and 'bonding' are socially determined constructs and language limitations restrict our ability to clearly

articulate these terms. It is assumed however, that these concepts are valid in their use and although they cannot be directly observed, they can be deduced from what is observable. Therefore, I view these concepts as terms that can be measured by indicators of either the presence or absence of these constructs i.e. thoughts, feelings and behaviours which reflect them. My language used in this research therefore is mainly positivist. I do however realise that by placing myself within this epistemological stance is problematic as I am aware my perceptions of these constructs will have been influenced by my gender and culture and will have different meanings for others. Being able to recognise my own influences in this research, I also recognise that people who read this research may have different interpretations based on their own social GRACES (Burnham, 2011) which are equally valid.

Much of the research conducted so far in the prenatal area has mainly been through the nursing profession which operates within a largely positive and medicalised system. The term pregnancy itself has its own ontological difficulties in that expectant parents talk of a relationship with a being who is present in utero, but absent as they have not yet been born. Expectant parents also find themselves in a position that can be medically confirmed (pregnancy testing) but is also socially constructed, and therefore they are positioned within a transitional phase where they cannot describe themselves as not being a parent, but also are not quite yet parents (Sandelowski, Black, Mercer, Bergum & Stainton, 1994). This transition to parenthood is particularly challenging for fathers in that they are aware of their unborn baby but only via their pregnant partner's body. Their 'knowledge' and 'truth' therefore is more detached and conceptual. This research does assume that the fetus is the object of attachment throughout pregnancy but it is recognised that expectant parents have many objectives occupying their minds during this time and because of this, will enter many 'realities' about themselves and their developing baby.

My main hope in conducting this research is to facilitate clinical outcomes that may be useful in creating clinical change for those in distress or who may be considered as vulnerable. The journey into expectant parenthood is a complex one and we need to understand the processes behind this developing relationship. On this basis, I feel using positive language within this research is the most beneficial and pragmatic in terms of explaining the methodology, interpreting the results and most importantly, improving clinical outcomes.

Outline of Introduction Section

This chapter will begin by outlining some definitions of the terms used throughout this research and how they are conceptualised. It will then outline the academic interest in fathers over the years. The history and relevance of attachment theory will then be presented. The relationship between an infant and parent will be conceptualised by attachment theory. The complexities of defining prenatal attachment will then be explored as well as the varying factors that may influence measuring this concept during the prenatal period such as psychological wellbeing. Information about what is known regarding paternal-fetal attachment will be presented alongside key policy documents.

Following this exploration, an extensive literature review will be presented outlining the key findings of what is known so far in relation to pregnancy and the developing relationship towards the unborn baby from the position of the expectant father. This literature review will conclude that research into the antenatal period for fathers is sparse with inconsistent methodology. The ability to generalise these findings is therefore limited and areas for development will be highlighted. The literature review will highlight the importance of conducting research during this vulnerable time period leading up to the birth, and what impact poor mental health of the expectant father may have on the developing relationship towards their unborn baby. It will conclude more research needs to be conducted into the

antenatal period and the parental attachment of expectant fathers towards their infants, particularly in the UK. The end of the introduction section then leads into the aims of this study looking into the variables and correlates of anxiety, depression and the fetal attachment in expectant fathers.

Key Concepts Defined

The prenatal/antenatal period: The antenatal or prenatal period refers to the period in which a mother is pregnant up until the baby is born.

Postnatal/postpartum period: The postnatal or postpartum period refers to time point beginning immediately after a child is born and up to a year following the birth.

The perinatal period: The perinatal period refers to the period of time extending approximately from the 28th week of pregnancy to the 28th day after the child is born.

Couvade syndrome: Couvade syndrome is a term used when a prospective father reportedly experiences changes which are similar to their pregnant partner, not explained by injury or illnesses; it is operationalised by the couvade scales (Clinton, 1985). Indicators or symptoms can be characterised by the father experiencing weight gain, pain and intense emotional experiences similar to those of the mother during pregnancy.

Research into Fatherhood

It is recognised that the term 'fatherhood' is a socially and culturally created construct which is continually evolving (Gregory & Milner, 2011). Over the last forty years, the role of fathers in terms of parenting has changed from being the financial provider to a more nurturing role (Wall & Arnold, 2007). Traditionally, mothers were seen as adopting the household and caring role whereas fathers were viewed as the breadwinner for the family (Hood, 1986). Mother's perceptions of their partner's investments within the parenting role appear to be a strong predictor behind this change (McBride & Rane, 1997). This change in

the way fathers are viewed has impacted on the amount of involvement fathers have within family life, but has also contributed to shaping the developmental course of children and how they see the role of fatherhood today (Cabrera, Tamis-LeMonda, Bradley, Hofferth, & Lamb, 2000). As the involvement of fathers has increased over the years, so too has the amount of academic interest in fathers which has led to a significant increase in the number of publications focused towards fathering and their parenting of children (Goldberg, Tan & Thorson, 2009).

Research has shown many beneficial cognitive and educational outcomes when there has been increased paternal involvement (Flouri & Buchanan, 2004; Lundahl, Tollefson, Risser & Lovejoy, 2008; Sarkadi, Kristiansson, Oberklaid & Bremberg, 2008). Recent policy changes may have also allowed more opportunities for fathers such as the introduction of statutory frameworks which now enable fathers to take on differing responsibilities within the home (Gregory & Milner, 2008). For example, the rise in stay-at-home fathers has been influenced by changes in social policy and legislation for fathers including Additional Paternity Leave (APL) which now entitles fathers to an additional twenty six weeks of paternity leave if the mother returns to work (Home Office, 2012).

Despite these changes in social policy, a stigma still remains for stay-at-home fathers even when a decision is based on economic or pragmatic reasons (Rochlen, McKelley & Whittaker, 2010). Cultural representations suggest fathers are generally viewed as the secondary parent, with the position of the mother remaining of being the primary parent (Wall & Arnold, 2007). Therefore, even when policy is changed to enable fathers a more equal role in parenting, other variables have an impact on the transition to fatherhood (Premberg, Hellström & Berg, 2008).

Historically, context and social policy appear to provide some explanation towards the bias of mothers being seen as the primary caregivers. Research appeared to show support for this premise as when infants were placed under stress, they appeared to show a preference for their mothers (Lamb, 1976). However, was this perception due to a lack of research towards fathers, or due to the spotlight of parenthood being focused on mothers which in turn, maintains this position? To explore this question, I go back to the start of the transition to parenthood: pregnancy.

Historically, men were told to keep out of the birthing room and the decisions about birthing and pregnancy were mainly made by health care professionals (Leavitt, 2009). More recently, fathers' involvement in pregnancy is seen to positively impact the woman both psychologically and physically (Dudgeon & Inhorn, 2004). Fathers' experiences during pregnancy are minimally reported, but this research is usually framed in the context of their feelings of supporting their partner during the pregnancy (Widarsson, Kerstis, Sundquist, Engström, & Sarkadi, 2012). It is unsurprising perhaps, that men report they feel 'invisible' when it comes to psychological support during the transition to parenthood (Widarsson et al., 2012). Despite this, men now feel they are expected to be more involved and part of the birth (Chalmers & Meyer, 1996).

With fathers becoming of greater interest during pregnancy, so followed this area of interest in research. Much of the pregnancy research conducted on fathers is done via the mother for recruitment or relies upon mother reports of fathers' intentions (Bronte-Tinkew, Ryan, Carrano, & Moore, 2007; Boyce, Condon, Barton & Corkindale, 2007; Poh, Koh, Seow & He, 2014). These findings highlight the methodological and recruitment difficulties for the studies of fathers and raises the question of how much do we really understand about the contributions of fathers and their attachment relationships towards their children? As George and Solomon (2008) highlight the father-infant relationship is in many respects

subject to the mother-infant relationship. This clouds our understanding of the variables that influence the father-infant attachment and hence, the variations and influences towards this relationship are largely unknown. Given that fathers pregnancy intentions and prenatal behaviours have implications to the amount of warmth and nurturing they show towards their children it is vital that fathers are not only included in research but studied in their own right (Bronte-Tinkew et al., 2007).

Whilst there has been an increase in publishing in relation to fathers over the years, the majority of research tends to focus on the mother's relationships with their infants. Publications concentrate on the struggles of being a father and feelings of exclusion in childcare in comparison to mothers which collectively contribute to fathers feeling there is a lack of guidance on how to be a father from the outset (Gregory & Milner, 2011). Pregnancy is described by fathers as the 'time of transition' and is accompanied by feelings of inadequacy and exclusion (Finnbogadóttir, Svalenius, & Persson, 2003). Furthermore, as men report feeling there is a lack of information about pregnancy, this leaves them more vulnerable to experiencing psychological distress, highlighting that more attention needs to focus on fathers, childbirth and the attachment to their unborn child (Boyce et al., 2007).

The prenatal period

The prenatal period for fathers is not only an area of interest due to the contributions of fathers towards their children, but it is also a time which can be associated with serious problems. In particular, there is a marked prevalence in violence in men towards their partner which can manifest in the form of verbal, physical, sexual abuse or controlling behaviours (WHO, 2011). Prevalence's rates for domestic violence during pregnancy in a cohort of English woman was found to be at 17% (Johnson, Haider, Ellis, Hay & Lindow, 2003). Research suggests that for some women, pregnancy can be the onset for domestic violence

(Hedin 2000) and for others suggesting the violence can escalate during pregnancy (Campbell et al., 1992; Martin, Mackie, Kupper, Buescher, & Moracco, 2001). The consequences of domestic violence during pregnancy have also been associated with low birth weight, premature labour, fetal trauma and unhealthy behaviours such as alcohol and drug abuse during pregnancy within the mother (Jasinski, 2004). The exact triggers for this increase in domestic violence during pregnancy is largely unknown however unplanned or unwanted pregnancies appear to be a particular risk factor (Fanslow, Silva, Robinson & Whitehead, 2008).

Research suggests the pregnancy period can also be a vulnerable time for separations amongst couples to occur. Marital satisfaction for woman has been shown to decline after the birth of their first child (Cowan & Cowan, 1995). Although it is difficult to pinpoint pregnancy as being the definitive factor in divorce, research suggest most couples divorce within the first five years of marriage which is when most the first child is most often born (Stevenson, B., & Wolfers, J. (2007). This assertion is further supported by findings which indicate that nearly a third of pregnant partners fall within the clinical range for marital distress during the first 18 months after the birth of a child (Cowan & Cowan, 2000). Although it may be expected that relationships may decline to an extent in most marriages, comparisons between parent and non-parent couples suggest a sharper decline in relationship cohesion amongst those who are parents (Kurdek, 1993). Collectively, given the significant clinical implications associated within this time period, this highlights the need for further research within the prenatal time period for fathers.

Attachment Theory

The term 'attachment' was originally explained by Bowlby (1958) who asserted it was the most important relationship a child could form in their first years of life. Bowlby (1958) asserted that human attachment began at birth and was biologically based in which a

human was driven by fear (either real or perceived) with the primary goal being to maintain close proximity to the caregiver in order to survive. Within this literature, the caregiver was primarily referred to as the mother.

Mary Ainsworth (1970) later expanded on Bowlby's ideas and felt there was more to the attachment process than biology. Ainsworth included the child's appraisal and expectations of the mother's reactions and how this response developed a child's internal working model (Ainsworth, Blehar, Waters & Wall, 1978). During her earlier research, Ainsworth tried to capture the mother's reactions towards the infant's behaviour and her ability to engage with the emotions of the infant (Ainsworth & Wittig, 1969). This method of trying to measure the mother's degree of 'sensitivity' towards the infant became a widely used method of assessing the parent-child attachment called the 'strange situation' (Ainsworth et al., 1978). The quality of the attachment is then based on the infant's reaction upon the caregiver's return. This is usually categorised into four dimensions, insecure-resistant, insecure-avoidant, secure and insecure-disorganised. These categorisations or expectations became very influential and were believed to be preverbal and to help in developing the child's internal working model.

Both Bowlby and Ainsworth's methods of assessing attachment were based on behavioural observation of the infant and mother and it is now argued that in order to gain a holistic understanding of the parent-infant relationship, subjective experiences as well as behaviours need to be measured (Condon, 2012). Other methods of attachment include the Adult Attachment Inventory (AAI; Main, Kaplan & Cassidy, 1985). Empirically, these assessments of attachment have become very influential and have enabled greater insight into the impact of the attachment categorisations and outcomes in later life.

Concurrent with the time of Bowlby's attachment theory, researchers began to question his hypothesis that attachment began at birth. During the 1950's child birth was the biggest killer for mothers and if they survived the birth, many babies did not (Chamberlain, 2006). It was observed that mothers whose babies died during pregnancy were experiencing extreme grief regardless of whether they had held their babies after they had been delivered (Kennell, Slyter & Klaus, 1970). This gave rise to some of the findings made by psychoanalytic theorists such as Benedek (1959) and Winnicott (1956) referring to pregnant women being in a preoccupied state towards their unborn baby. These writings appear to be the foundation of the findings that the process of attachment begins pre-birth (Brandon, Pitts, Denton, Stringer, & Evans, 2009).

Research is now beginning to support the assertion that the relationship between mother and infant does not start after the birth of the child, but develops during pregnancy (Condon, 1993; Brandon et al., 2009). More recently, attachment theory has also developed such that it has been applied to the experiences and health behaviours during pregnancy (Brandon et al., 2009). Developments in attachment theory are now highlighting that a unique relationship occurs between a parent and their unborn baby which can have many potential benefits. Further research is needed to understand the nature of this relationship and identify any difficulties or protective factors that may contribute to it.

Attachment Theory and conceptualisation of Prenatal Attachment

From the start of this research, it is important to distinguish between the terms 'attachment' as described in the original concept by Bowlby (1958) and the term 'prenatal attachment' that is being explored here. In 1958, Bowlby conceptualised attachment within an evolutionary framework which suggested the infant was primarily motivated by real or perceived danger with the primary goal being to seek as close proximity to the parent in order to maximise a sense of security and survive. In this regard, attachment referred to one part of

the relationship, where an infant sought care from a caregiver (Bowlby, 1982). It is recognised that the attachment system is shaped by perceptions and interactions with the caregiver and therefore, it can be argued to be a bidirectional interaction, prompted by the infant, between the infant and caregiver (Cassidy, 2008). In contrast, prenatal attachment can be argued as a different experience which is unidirectional, as parents develop cognitions and emotional responses to the pregnancy and their unborn baby (Redshaw & Martin, 2013).

Due to this lack of clarification, it is easy to see how researchers have associated the concept of attachment with love, bonding and protection (e.g., Cranley 1981; Condon, 1993). These attachment terms as described by Bowlby (1958) however, are potentially misleading as they are referring to the infant provoking care from the parent which he termed care seeking. The term care seeking appears to be unidirectional whereas care-giving is a two way process hence the responsibility on reciprocity and exchange in attachment terms between the parent and child (Walsh, 2010).

Biologically, there is a two way relationship between the mother and the fetus (umbilical cord). Epistemologically however, the relationship between the parent and fetus is one way if we are to assume a fetus does not have an awareness of self (Sandelowski et al., 1994). Therefore, the debate in prenatal attachment is whether there can be true reciprocal interactions between a mother and fetus, and whether a fetus has the capacity to consciously interact with its mother (Eichhorn, 2012). It is beyond the scope of this research to answer whether a fetus is a conscious and responsive being or not, although this has been debated (Lagercrantz, 2007; 2009). Alternatively, Walsh (2010) proposes the term 'care-giving system' may be more appropriate when thinking about prenatal attachment as parents do not seek care from their unborn infants (Walsh, 2010). In the context of this research, the baby has not yet been born and the expression therefore, refers to a one way thought process of how a parent perceives their child prenatally or the 'prenatal attachment' towards the

developing baby. It is in this context that the term prenatal or fetal attachment is understood and used herein.

Much of the misperception around the concept of prenatal attachment in relation to attachment theory appears associated with the historical difficulty of conceptualising the definition and therefore it appears helpful to explore this dilemma briefly. The first definition of Maternal Fetal Attachment (MFA) was coined by Cranley (1979) in which she developed a model detailing six aspects of MFA based on the number of behaviours that a mother engaged in that were associated with her unborn child. Cranley (1981) later continued her findings to develop the first measure of MFA.

Muller (1990) then expanded the work of Cranley (1979) and felt the definition of MFA was too behavioural and lacked the mother's thoughts and feelings towards the fetus. Critically, Muller (1990) felt the mother's feelings toward the unborn baby were independent to her own about being pregnant or embarking on motherhood. Muller later developed a new model emphasising that a woman's attachment with her baby was guided by her own early experiences with her mother.

Later definitions of parent-infant attachment were developed by Australian researcher John Condon. Condon (1993) detailed love as a core construct that encompassed the developing relationship between mother and the unborn baby and defined the parental-fetal bond as a feeling state of love for the unborn child experienced by mothers and fathers. Empirically, Condon (1993) concluded the measurement of the parental-fetal bond could be obtained by the quality of experiences the parent feels when thinking about the unborn child and the intensity of these preoccupations. Furthermore, this relationship can be seen as a precursor or moderator of future interactions between the parent and infant (Condon & Dunn, 1988).

Overall, attachment theory has provided the foundations of helping us to understand the motivations behind some of the early infant behaviours. Bowlby (1973) asserted attachment security can help us to predict other aspects of development. It has helped us to understand how the same attachment classifications can occur from one generation to the next (Bouchard, 2011). The term prenatal attachment however, is still in its infancy and is a complex process to conceptualise and more research is needed to help define and measure the concept.

Fathers pre-existing attachments

When considering a fathers attachment towards his unborn child, it is also important to understand how the fathers own experience of parenting and his pre-existing attachments may contribute towards this relationship.

According to Bowlby (1969) 'attachment' represents a feature within relationships that is dependent on the attachment behaviours elicited by a child (e.g. seeking proximity to the parent when distressed) and the sensitivity of the parent. Depending on this interaction, children will then develop a strategy in order to keep themselves safe during times of perceived stress or threat. The safest environments are hypothesised to produce children who place the most trust in relationships and grow up to value relationships. These children are also able to repair any ruptures that may occur in future relationships. Unsafe or abusive interactions, produce strategies within children that may lead them to minimise negative events and develop into adulthood dismissing the importance of relationships. The most abusive interactions (disorganised) often produces children who are unable to use a clear strategy when faced with threat, which poses a risk during adulthood as they have been

unable to resolve conflict, loss or trauma (Lyons-Ruth and Jacobvitz, 1999). Hence, a parents pre-existing attachment patterns inform an adult's state of mind.

These pre-existing attachment relationship patterns provide a cognitive framework for individuals known as an internal working model for understanding future interactions and ultimately the understanding of the self, the world and others (Bowlby, 1969). It is these patterns which guide future social, cognitive and emotional responses and appraise the individuals' internal working model based on their early attachment experience. In this regard, a parent's earlier experience will define later attachment relationships.

Bowlby's (1969) attachment theory therefore provides a framework not only for the attachment relationship between the parent and child but the potential mechanisms behind wider adult interactions. Farnfield (2007) highlights how these early attachment experiences contribute to the trajectory of subsequent attachments and are specific to parenting behaviours. Developmentally, a childhood attachment system progresses and forms into an adult's sexual partnership or spousal attachment system. If adults then go on to have children of their own, the adults then enter into a 'caregiving' system (between them and their own child) which is informed by the previous attachment systems. Therefore, if a childhood attachment system is disorganised, this pattern is likely to progress and develop onto future spousal and caregiving systems.

Moreover, it is asserted that if adult attachment needs are not met within the spousal system this has the capability of revoking parental instincts such as putting their children before their own survival (Farnfield, 2007). For example, couples who are expecting a child undergo marked changes within their relationship such as reduced sexual activity, which can lead to fears of relationship breakdown and ultimately abandonment (Condon et al., 2004). These changes within the relationship can heighten feelings of arousal and therefore increase

attachment seeking behaviours (Reeder & Duncan, 2001). If the attachment needs of the adult are not met, this has the potential for them to put their needs before their own children's survival, therefore invalidating the usual evolutionary parental instincts. Moreover, a parent's earlier experience of being parented, is likely to define later patterns of how they parent their child. Therefore, difficulties in the childhood and subsequent spousal system can have adverse effects on the wellbeing of future children.

The transitions and interactions between these attachment systems appears to be systemic and can ultimately lead to 'good' or 'poor' parenting behaviour, the outcome of which, will be dependent on the adults pre-existing attachment relationships and experiences. Given the strong associations between a parents' secure attachment and the security of their children which can be detected by a parental attachment measure taken even before the child is born (Fonagy, Steele and Steele, 1991) and that prenatal attachment appears to be the biggest predictor for postnatal attachment (Boyce et al., 2007), it appears vital that further research is conducted into understanding the moderators of fetal-attachment. The pregnancy window appears to be a unique opportunity for potential intervention and if we can identify the moderators of a poor fetal-attachment early, this may provide an opportunity to make changes within the postnatal fetal-attachment relationships and the subsequent attachment systems.

Measuring Prenatal Attachment

As already introduced, prenatal attachment is an abstract concept which tries to capture a parent's ability to intellectualise about their unborn baby. Therefore, trying to capture this complexity in a single dimension is equally challenging. Much of the research into prenatal attachment has been conducted on mothers and significantly less so on fathers. Prenatal attachment has mostly been measured through the use of self-report questionnaires.

There are three widely used and evidenced measures of prenatal attachment for mothers. The earliest measure, the Maternal Fetal Attachment Scale (MFAS) was developed by Cranley (1981). This measure includes subscales that were largely centred on behavioural interactions of the mother towards her unborn baby including: differentiation of the self from the fetus, attributing characteristics to the fetus, giving of self and role taking. It is the most frequently used measure by nurses and prenatal staff.

Later, the Prenatal Attachment Inventory (PAI) aimed at measuring the prenatal attachment in mothers and was designed to capture the thoughts and feelings (rather than behaviours) that the mother develops toward her unborn baby (Muller, 1993). The most recent measure of prenatal attachment is the Maternal Antenatal Attachment Scale (MAAS) developed by Condon (1993). Condon developed this measure as he felt previous measures were capturing thoughts relating to the pregnancy and motherhood role rather than the attitude towards the fetus (Condon, 1985).

In addition, only a few researchers have developed their measures further to try to capture the prenatal bond between fathers and their unborn babies. A few comparisons of maternal and paternal-fetal attachment have displayed mixed results. One study suggests mothers have a higher maternal-fetal attachment to their unborn child compared to fathers (Mercer, Ferketich, May, DeJoseph, & Sollid, 1988). Another study found higher fetal attachment towards their unborn infants in fathers compared to mothers (Schodt, 1989) and another study suggested similar levels of fetal attachment in both mothers and fathers (Wilson, White, Cobb, Curry, Greene & Popovich, 2000). Therefore, it appears the difficulty in measurement of fetal attachment is concordant with the availability and validity of the measures to do so (Beck, 1999).

Overall, more research is needed into the area of prenatal attachment, particularly with fathers in order to understand the development and implications of the relationship towards their unborn child.

Paternal Mental Health and the antenatal period

Research into the psychological wellbeing of expectant fathers is neglected in comparison to pregnant mothers. Pregnancy is a time of particular stress for fathers, more so than the post birth period (Condon, Boyce & Corkindale, 2004). Although fathers' experiences of pregnancy and childbirth in the UK have been attracting increasing research and policy interest, the focus has tended to remain on the mother (DoH 2007; Draper 2003). Depression levels of mothers during the antenatal period are estimated at 10-30% for incidence (Bennett, Einarson, Taddio, Koren, & Einarson, 2004). The emerging literature on paternal depression suggests that similar to mothers, fathers are at increased risk of depression in the postnatal period (Goodman, 2004). Less literature has focused on the wellbeing of fathers during the antenatal period (Cox, 2005).

The antenatal period has been described as a unique phase of adjustment for men (Finnbogadottir, Svalenuis & Persson, 2003). During the transition to fatherhood, fathers anticipate a great time of change alongside feelings of not being prepared for such changes (Boyce et al., 2007). For some fathers, this transition may simply require a period of adjustment to their change in circumstances however, for others it can be a critical time characterised by stress, anxiety or depression (Condon et al., 2004). Moreover, research looking at the changes in the psychological wellbeing of first time fathers across the pregnancy and into parenthood concluded expectant fathers displayed the highest symptoms of psychological distress during pregnancy more so than post birth (Condon et al., 2004). The psychological adjustment for expectant fathers during pregnancy therefore appears a critical area of focus.

During the period of pregnancy men have been shown to have fewer support networks than women and are more likely to rely on their partners, putting them at greater risk of perinatal distress (Zelkowitz & Milet, 1997). Men tend not to seek support from services during the antenatal period due to them feeling they need to support and protect their partner and unborn baby and therefore, they modify their behaviours accordingly (Poh et al., 2014). This finding suggests, not only is the antenatal period a vulnerable time, but also that men feel largely unsupported or unable to ask for help.

Additionally, men have a significant impact on their partner's pregnancy and post birth behaviours. Attitudes of the fathers have shown to be a significant determining factor in their pregnant partners' post birth behaviours such as whether they choose to breastfeed (Scott, Landers, Hughes & Binns, 2001). Men are now viewed as having a crucial role to play during their partners' pregnancy, however this is viewed in the context of their ability to manage their own stress levels, as these can influence their partners' pregnancy (Chapman, Hobfoll & Ritter, 1997). Findings suggest fathers who meet the criteria for an anxiety or depressive disorder during the perinatal period are twice as likely to have a partner who also meets this criteria (Matthey, Barnett, Howie & Kavanagh, 2003).

Findings are unclear however as to how many of these men (or their partners) may have experienced difficulties with mental health in the past. It is difficult to conclude whether the onset of anxiety took place during the prenatal period or whether it was present before this time (Leach, Poyser, Cooklin & Giallo, 2016). Additionally, a partner's mood may not just be a correlate, but also a factor in the aetiology of depression (Bielawska-Batorowicz & Kossakowska-Petrycka, 2006; Paulson & Bazemore, 2011). Furthermore, a literature review into the correlates of antenatal and postnatal depression in fathers found having a partner with depression was the most common correlate (Wee, Skouteris, Pier, Richardson & Milgrom, 2011). Clinically, this can mean first time fathers may be

particularly vulnerable if they lack social support, or if their primary support is their partner, who is also depressed then the support is likely to be limited. More longitudinal research is needed to understand the associations and patterns of mental health in parents' pre and post pregnancy.

Some studies have shown first time fathers to be particularly vulnerable to depression (Cowan, Cowan, Heming, & Miller (1991). Other studies have shown second time fathers to show greater levels of anxiety than first time expectant fathers (Condon & Esuvaranathan, 1990). These increased levels of anxiety may be due to having to incorporate a second baby into an already existing system, or having to take care of two children at the same time (Figuerido & Conde, 2011). Nevertheless, the research appears to suggest that expectant fathers (regardless of the pregnancy number or trimester) are particularly vulnerable to increased rates of anxiety and depression symptoms during the prenatal period.

A meta-analysis of research into the prevalence of anxiety and depression during the prenatal and postnatal period also suggests the lack of outcomes for fathers may be due to inconsistent methodology and varying prevalence rates for fathers compared to mothers (Paulson & Bazemore, 2010). These findings are likely to explain why there appears to be a historical bias in the literature that only mothers are effected by or are the empirical focus of prenatal and postnatal depression. This is also emphasised and maintained in the antenatal and postnatal guidelines (NICE, 2014) which only refer to mothers when asking about mental health.

Information for mothers regarding mental health during pregnancy is relatively well considered within NHS services however, this is less so for fathers. For men who perceive they have relevant information about pregnancy, research has shown they feel more in control and therefore are less likely to have depressive symptoms (Diemer, 1997). Unplanned

pregnancies have also indicated greater impact on relationship functioning compared to planned pregnancies which have been shown to impact on perceptions of transitioning into parenthood (Bouchard, Boudreau & Hébert, 2006). Fathers of unplanned or unanticipated pregnancies are also likely to experience greater difficulty in adjusting (Boyce et al., 2007). These findings suggest feeling included, being given information in order to plan during the pregnancy and relationship functioning may play a crucial part in symptoms of anxiety and depression in expectant fathers. These factors can have significant clinical implications in the way men are supported during the antenatal period.

Overall, the prevalence of risk factors and effects of anxiety or depression among new fathers is poorly understood. Anxiety and depression levels appear highest during the period of pregnancy for fathers (Condon et al., 2004). Furthermore, the anxiety for an expectant father within the prenatal period can adversely impact themselves, their partner and infant (Leach et al., 2016; Ramchandani, Stein, Evans, O'Connor, 2005; Ramchandani et al., 2008). Further research is needed however to establish which fathers are most vulnerable for psychological difficulties during the prenatal period and the potential outcomes this may have with the relationship to their unborn baby.

Paternal Mental Health and its impact on Prenatal Attachment

The factors influencing prenatal attachment for mothers and fathers appear to be linked to biological, psychological and environmental components. A review of the literature for the transition to parenthood has suggested the caregiving system undergoes a marked shift during pregnancy (George & Solomon, 2008). This shift is suggested at a biological level in that changes in the structure of the brain and of and hormonal levels can be identified (Kinsley et al., 2006).

For mothers, it is suggested that these changes during pregnancy at a neurobiological level can produce an increase in anxiety which is pertinent to the way in which they are able to see themselves as a caregiver for their child (George & Solomon, 2008). For fathers, the prenatal period also appears to be a unique phase of adjustment neurologically (Finnbogadottir, Svalenuis & Persson, 2003).

During the transition to fatherhood, fathers anticipate a time of change alongside feelings of not being prepared for such changes (Condon et al., 2004). Few studies have examined the neurological effects of this transition to fatherhood during pregnancy and how it may impact on attachment towards the fetus although more studies are emerging. Mammal studies have identified hormones in the male brain that do play a significant role in very early parenting behaviours (Mak & Weiss, 2010). For humans, they show a decline in testosterone and estradiol levels (Edelstein, Wardecker, Chopik, Moors, Shipman & Lin, 2015). These hormonal and psychological changes during their partners' pregnancy appear to help prime males to care for their young in the transition to fatherhood (Storey, Walsh, Quinton & Wynne-Edwards, 2000).

Research has suggested the psychological wellbeing of fathers during pregnancy is also associated with levels of attachment towards their unborn baby (Condon, Corkindale, Boyce, & Gamble, 2013). More specifically, expectant fathers' attachment levels appear to hold a strong level of continuity throughout the pregnancy but the levels of preoccupation with regard to the attachment can vary according to their own psychological wellbeing (Condon et al., 2013). This appears to support wider research on parental levels of reflective functioning; that a caregiver's psychological capacity to understand and think of an infant's behaviours in terms of mental processes is likely to determine the attachment (Fonagy, Steele, Steele, Moran & Higgitt, 1991). Therefore, for expectant fathers who experience anxiety or depression during the prenatal period, they may experience difficulties in their

capacity to be able to think about their unborn child and this may influence their ability to develop the attachment relationship towards their unborn child.

Summary of Background Research

Attachment research and literature appear to focus exclusively on the mother's relationship with the child. Attachment theory and its focus on the relationship with the mother being the main caregiver may have contributed to the focus on the mother-infant relationship. The perceived importance of fathers and their role during pregnancy is now changing. When conceptualising the term 'prenatal attachment', attachment theory is somewhat misleading. This is because the baby has not yet been born and the attachment relationship is unidirectional and different to what Bowlby (1958) was originally referring to in terms of attachment for survival. Measuring prenatal attachment has also presented challenges particularly for research relating to fathers due to inconsistent measures and varied outcomes.

It is important to understand more about the prenatal period for fathers and their experiences as they play a significant part in supporting their pregnant partners. Pregnancy is a time of significant adjustment and many psychological processes and changes are taking place. Fathers can experience psychological difficulties such as anxiety during this time just as the mother does. They are however less likely to discuss these issues and therefore remain potentially vulnerable and ill-supported by professionals. The lack of policy and guidelines for psychological support for fathers during the antenatal period exacerbate this problem. This lack of support can heighten expectant father's sense of uncertainty and isolation. It is important to gain a greater understanding of fathers during pregnancy and particularly those who are most likely to experience psychological difficulty or have poor attachment in order to make changes clinically.

Overall, there are many reasons why the prenatal period may contribute to the vulnerability of poor mental health; increased stress and anxiety, significant life changes and potentially the recurrence of pre-existing psychological difficulties (Leigh & Milgrom, 2008). Paternal mental health across the prenatal period and the development of the pre-birth attachment is under researched. Although there is increasing recognition that parental mental wellbeing may be a requirement to optimal parental-fetal attachment, it is essential that we understand the wider variables which may influence the developing relationship in order to understand the implications. Therefore, it appears useful to examine the evidence that includes what research is known about expectant fathers' wellbeing and the attachment towards their unborn baby as well as the factors that may influence these relationships.

Literature Review

In order to conduct further research into expectant fathers, their psychological wellbeing and the factors that may influence the attachment towards their unborn baby, a comprehensive literature review was conducted. This was done to provide a clearer picture of what is currently understood about expectant fathers and to synthesise these research findings in order to identify the gaps in this area for future research.

Literature search strategy

Electronic databases were systematically searched in order to identify relevant articles for this review. The selection of databases and search items was initially an iterative process, whereby a series of trial searches were conducted in order to identify a suitable balance between sensitivity (identifying relevant papers) and specificity (excluding irrelevant articles) (Khan, Ter Riet, Glanville, Sowden & Kleijnen, 2001).

The final search terms were informed by previous literature reviews conducted for maternal fetal attachment such as Cannella (2005) and Alhusen (2008). The search terms were then focused on fathers. Figure 1 below outlines the search terms used. Please see Appendix A for the search terms and criteria used for each database.

*paternal AND fetal AND attachment OR paternal
AND fetal AND bonding OR paternal AND
attachment OR prenatal AND attachment OR
antenatal AND attachment*

Figure 1. Search terms used for literature review

In total six databases were used in order to identify research articles. As the research was looking into prenatal attachment and mental health, the databases used needed to have a wider scope than typical psychology sources and include the nursing and social care disciplines. The databases comprised PubMed, CINAHL Plus, PsychINFO, SCOPUS, MEDLINE and Science Direct. The first database selected was PubMed. PubMed includes over 27 million citations from MEDLINE and other life science journals (National Library of Medicine, 2017). The second database used was CINAHL Plus. CINAHL Plus provides publications from the journals of nursing and allied health, with reporting dating back to 1937 (EBSCO industries, 2007). The third database searched was PsychINFO. PsychINFO is a database which provides indexing for over 1800 scholarly journals including psychology and the behavioural and social sciences (APA, 2017). A fourth database search was conducted using SCOPUS. SCOPUS is a database which has over 36,000 journal titles including the social sciences (Elsevier, 2017). A fifth database, MEDLINE was searched which contains more than 26 million records in life sciences (National Library of Medicine, 2017). The final database searched was Science Direct which finds scientific and medical articles from over 3,500 journals (Elsevier, 2017).

The search was limited to include original peer reviewed research articles between the databases start date of journal collection and October 2017. The terms were searched within titles, abstracts or key words of published articles. Articles were limited to those which studied human participants and were written in English. This resulted in a total number of 845 articles being produced. A table of the databases searched and results retrieved can be found in Table 1 below.

Table 1:

Databases searched and number of articles retrieved

Database	Number of Articles
PubMed	264
CINAHL Plus	83
Psych INFO	46
Scopus	186
MEDLINE	145
Science Direct	117
Total	841

Study Review and the Selection process

The titles were then screened for duplicates which yielded 174 results. The remaining 671 titles were then screened for suitability based on the criteria found in Table 2 below.

Table 2:

Inclusion and exclusion criteria for papers found in the search

Inclusion criteria	Exclusion Criteria
Studies containing human participants	Studies using animals or mammals
Studies written in English conducted inside and outside of the UK	Studies not written in English
Studies that included expectant fathers (in whole or in part)	Studies that included pregnant mothers only
Studies that were conducted on expectant fathers during the time of their partner pregnancies (in whole or in part)	Studies that were conducted postnatally
	Studies which measure attachment in adulthood
	Studies that focus on transition to parenthood but in retrospect after the birth.
Both qualitative and quantitative studies that measure fetal attachment during pregnancy from expectant fathers AND have a measure of anxiety, depression or other sociodemographic variables related to pregnancy	Studies that focus only on high risk (or non-typical) pregnancies
	Studies that relate to parenting but not specifically the pregnancy period
	General pregnancy experiences not specifically related to attachment e.g. autism/biological factors
	Studies that focus on anxiety/depression following birth
	Studies relating to the role of attachment in later life e.g. drug use, criminal behaviours
	Studies relating to pregnancy care from staff that may help promote attachment
Peer reviewed articles	Book chapters, dissertations, letters or editorials
Community based samples	Clinically based samples/sample within inpatient services

This resulted in a total of 138 abstracts being read. A hand search was conducted by manually scanning the reference lists of the journals found in order to potentially discover any important references that may have been missed within the electronic search. Finally, 22 papers were selected to be read in full which can be seen in Appendix B. All 22 papers were then considered using the Critical Appraisal Skills Program (CASP, 2017, 2017b, 2017c) checklists leaving a total of 17 studies to be discussed within the literature review. The results of this process can be found in Appendix C. A flow diagram for the selection process is shown in Figure 2 below.

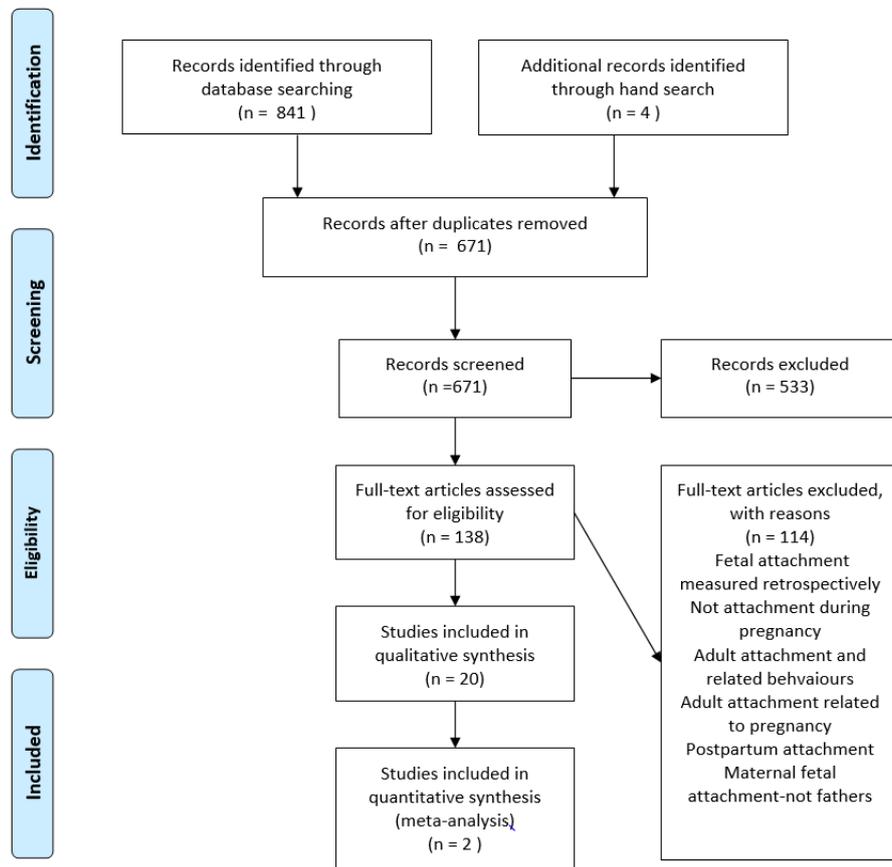


Figure 2. Flow diagram of the literature review screening process (Moher, Liberati, Tetzlaff, Altman & Prisma Group, 2009).

Interpreting the findings of the Literature review

On completion of the literature review, it was noted that at the time of writing this article, no previous literature review had been published specifically looking at prenatal attachment for expectant fathers. A systematic review of the prenatal attachment into the parent-infant relationship was considered (Cataudella, Lampis, Busonera, Marino & Zavattini, 2016). This review however, only contained three studies which included fathers, all of which were already found and included within this review and therefore it was excluded.

This literature review specifically looks at the findings relating to fathers however, it is noted that some studies within the review do contain studies that include the findings relating to mothers also. Excluding these studies would have reduced an already small area of literature that includes findings for fathers.

The studies that were initially found on parental attachment varied significantly in relation to when they were written. It appeared that much of the earlier literature into fathers was carried out as a result of research into mothers during the 1980's. There then appeared to be little interest or pursuit into the prenatal attachment of fathers until much later. Interest in fathers' prenatal attachment then appears to pick up post 2000, however overall, it appears the literature into fathers' attachment with their unborn children was generally underrepresented. This is also demonstrated in this literature review as some studies included the findings of both mothers and fathers rather than fathers being researched in their own right. This may also reflect the lack of valid instruments to measure such a complex process for fathers.

When reviewing the literature, it was of note that many of the studies were conducted on fathers outside of the UK. It is important to note this when interpreting the findings as

culture may limit the extent to which the findings can be generalised. Only in the last three years studies have emerged investigating the prenatal attachment of fathers in the UK so there does appear to be an interest, albeit they are still few in number. All studies in this review were drawn from a community-based sample. This was due to the focus of this research being on early identification of difficulties of people using primary services with a view to make the findings more generalisable. Inpatient settings for mothers or fathers are already likely to be experiencing severe or longstanding difficulties with mental health and the focus of this study was on early detection in a community sample.

Many findings of the research studies appeared to be strongly influenced by gender and role stereotypes. When measuring fathers' attachment, there was a noted difference in the expression of their bond towards their unborn child compared to mothers and this is reflected in the difficulty of measuring paternal attachment (Vreeswijk, Maas, Rijk & Bakel, 2013). Psychosocially, during the pregnancy fathers often felt they could not share their true feelings due to concerns around their masculinity and wanting to support their pregnant partners. Again, this may be linked to the lack of research conducted on fathers' prenatal attachment and psychological wellbeing within the UK. This makes fathers particularly vulnerable in terms of their mental health, supporting their pregnant partner and the developing attachment towards their unborn child.

All studies within this review included some measure of paternal-fetal attachment although some studies used qualitative methods in addition. It was considered important to include qualitative as well as quantitative studies particularly as fathers' opinions and views are underrepresented within the perinatal research. Given the difficulty in conceptualising the term 'prenatal attachment' it was considered acceptable to view these studies together. It is noted there may be advantages to doing this in terms of generating multiple perspectives

through different methodologies however, it does also highlight the difficulty in conceptualising the term.

Many of the papers also focused on first time fathers' experiences of pregnancy. This may impact on the overall generalisability of the findings as men who have multiple children may experience different difficulties in terms of an increase in financial pressures, increase of time demands that have to be divided amongst other children and difficulties in adjusting to multiple family members (Figuerdio & Conde, 2011). Finally, the data presented in these studies were largely based on self-report questionnaires which can be subject to response biases such as social desirability (Crowne & Marlowe, 1960). The literature review investigated a wide range of variables in relation to paternal-fetal attachment (PFA) and they will be discussed by logical groupings of the variables in relation to PFA.

Measurement of PFA in fathers

This literature review shows largely that there is a difficulty in defining the concept of prenatal attachment and capturing the fathers' representations and feelings towards their unborn infant. This difficulty appears to be twofold. Firstly, how the concept of attachment is used and defined and secondly, the instruments used to measure it. Although measures to identify paternal-fetal attachment were developed over thirty years ago (as a result of maternal measures), it appears that very little research has been conducted since in modifying these measures.

From the review of the literature, very few measures of the father's attachment appeared to exist until the 1980's. The first measure developed for fathers was named the Paternal-Fetal Attachment Scale (PFAS; Weaver & Cranley, 1983). This measure looked at the constructs of the quality and strength of the father's attachment towards the unborn child, with a higher score suggesting a better attachment.

A few years later, a further instrument for PFA was developed by Condon (1985) and this measure was used in a study to compare the fetal attachment of mothers and fathers. This research was highly significant for its time, as no previous comparison studies between the maternal and paternal-fetal attachment had been conducted. The study concluded that the fetal attachment towards the unborn baby was similar for mothers and fathers but that fathers were less likely to express this in a behavioural way (Condon, 1985). Although this finding suggested that mothers and fathers may 'express' this attachment in different way, empirically the global levels of attachment for mothers and fathers were similar. Condon (1985) suggested this difference in expression for fathers may be due to male role stereotypes. The physiological aspect of the mother carrying the baby is also likely to have an effect.

Other methods of capturing the attachment concept in fathers are also available. Van Bakel, Mass, Vreeswijk and Vingerhoets (2013) used a more abstract methodology (non-verbal) to measure fathers' fetal attachment such as pictorial measures known as the Pictorial Representation of Attachment Measure (PRAM; Van den Bergh & Simons, 2009). The authors compared the PRAM tool to more traditional self-report measures such as Condon's (1993) PAAS and MAAS measure (Bakel, Maas, Vreeswijk & Vingerhoets, 2013). This study concluded that the PRAM was concordant to the PAAS and MAAS for mothers and fathers respectively, but suggested the PRAM may be a general reflection of the attachment feelings for the unborn child at the moment of measurement. The authors also found similarities in Condon (1985) study and noted that fathers were less likely to express their feelings of attachment in a behavioural (proximal) way. Despite the similarities found in the PRAM measure and other self-report measures, the authors highlight that they made an assumption that higher scores (placing the sticker representing the fetus closer to the representation of the self) indicated a greater attachment to the baby. However, these results

could also have reflected a strong preoccupation with the child thus again highlighting the difficulty in measuring PFA in fathers and how other variables may be contributing to the preoccupation other than the developing attachment relationship (van Bakel et al., 2013).

Overall, it would appear there is difficulty in measuring and validating what can be described as a complex concept such as attachment. The 'usefulness' of clinical measures depends on their ability to capture and replicate paternal-fetal attachment but more importantly to identify those cases where the developing attachment relationship may be poor. These measures need to be used frequently in order to increase knowledge around the concept of attachment which will in turn validate existing measures. Measures also need to be sensitive to change to allow for the modifications in the attachment process through the duration of the pregnancy. This would also enable measurement of potential interventions targeted at this specific population of expectant fathers. These measures not only need to be chosen to help assess and evaluate key clinical outcomes but also for helping researchers identify a valid and reliable measure.

Sociodemographic variables

First time fathers.

Ferketich and Mercer (1995) studied 79 fathers who already had one or more children and 93 first time fathers for differences in paternal attachment from pregnancy to 8 months post birth. No significant differences were found in the father infant attachment by previous experience of already being a father compared to first time fathers. The author suggests this finding may be due to each relationship developed with a child being individual and unique. Social and psychological variables e.g. depression levels were controlled for in this study. However, the two groups were compared against each other and it was not a longitudinal study it is difficult to establish the extent to which the experiences of first time to again

fathers changed in terms of having had the experience of already parenting a child. Similarly, Berg and Wynne-Edwards (2001) reported that testosterone levels were lower for men expecting the birth of their first child than for controls and so a biological and hormonal aspect may also play a part in the development of fetal attachment.

Relationship with partner.

Relationship quality appears an important factor in relation to prenatal representations and during the transitional period across pregnancy. One study examined fathers' prenatal representations of the fetus alongside marital distress and depressive symptoms and found a weak but significant, association between marital distress and prenatal representation (Ahlqvist-Björkroth, Korja, Junttila, Savonlahti, Pajulo, Rähä, & Aromaa, 2016). Although the measure in this study lacked validity criteria for its use with fathers, the findings are supported by other research. For instance, the regression and function analysis in Condon, Corkindale et al., (2013) identified the antenatal attachment and the quality of partner relationship as the two most powerful influences on the father-infant attachment at 6 and 12 months postpartum, explaining 20% of the variance and with 80% confidence.

This suggests that expectant fathers' experiences of their relationship status may be an organising factor in their prenatal attachments and relationship towards their unborn child. This finding appears consistent with previous research where conflicts within relationships can lead to a difficulty in expectant fathers developing their identity as a father (Genesoni & Tallandini, 2009). More recent studies have also replicated findings that a father's attachment towards their unborn child is influenced by the mother's attachment towards the child and marital quality (Luz, George, Vieux & Spitz, 2017). This study also showed that a father's antenatal attachment was predictive of postnatal attachment. This suggests that fathers who show greater levels of attachment towards their baby during pregnancy will show

more attachment behaviours towards their baby post birth. This study also indicated an interdependency between the attachment relationship of a mother and father and the attachment relationship with their baby (Luz et al., 2017).

The findings of similarity between a father's relationship status and their attachment towards their unborn child appear consistent with previous studies which suggest that difficulties with attachment prenatally (such as the relationship they had with their own parents) is strongly related to their prenatal attachment with their unborn child (Boyce et al., 2007; Condon et al., 2013). This finding is also supported by Bouchard's (2011) study in multiple regression analysis which concluded that the quality of the relationship between a mother and father acted as a protective factor in the quality of their attachment to their unborn child.

This is likely to be due to the attachment towards their unborn child being informed by their own emotional experiences of warmth felt from their parents during childhood (Alhusen, 2008). This is also consistent with the findings of Bretherton (1987) in which internal working models of attachment may result from the individual parenting that a person received and in which suggested antenatal attachment may be reflecting an underlying characteristic of having the cognitive internal capability to form this attachment to a baby with whom the individual has not yet interacted with (Condon et al., 2013). This concept is similar to the idea of internal working models which parents have of their children based in the principles of attachment theory (Ainsworth & Bowlby, 1991).

As is the case for mothers, prenatal attachment amongst fathers is likely to be contextual and influenced by a range of psychological and social factors (Doan & Zimmerman, 2003). The studies looking at sociodemographic and psychological variables for fathers were studied in isolation rather than interaction which is likely to provide mixed

results (Van den Bergh & Simmons, 2009). Research into expectant fathers needs to look at these variables in relation to each other.

Psychological and Physiological variables

Expectant fathers can experience a range of emotions during pregnancy from elation to anxiety (Lewis, 1982). In line with these emotions, literature appears to suggest that men can be more vulnerable to experiencing mental health problems during the period of pregnancy than after their child is born (Buist, Morse and Durkin, 2003; Figueiredo, & Conde, 2011; Condon et al., 2004). Although physical changes for expectant fathers during their partner's pregnancy, known as Couvade syndrome have also been found, this literature appears dated and lacking in scientific evidence base (Clinton, 1986). More recently, measurable biological and hormonal changes during pregnancy have been found in fathers during their partner's pregnancy (Storey et al., 2000). Moreover, these physiological and hormonal changes appear to correlate with expectant mothers' emotional states.

Research by Condon et al. (2004) aimed to look at the changes in the psychological wellbeing of first time fathers across the pregnancy and into parenthood. They concluded that the expectant fathers displayed the highest symptoms of psychological distress during pregnancy. Later, Condon et al. (2013) aimed to ascertain which correlates, including psychological variables, may be associated to father infant attachment. Fathers were assessed during week 23 of their partners' pregnancy and subsequently at the 3, 6 and 12 month postpartum period. Eleven measures were used to assess characteristics such as attachment to fetus, mental health, depression, irritability, adjustment, social support, and sex roles. Predictive and cross-sectional analyses were used to identify which pregnancy variables best distinguished fathers in the upper quartile of attachment scores from those in the lower quartile at 6 and 12 months postpartum. Mental health was found to explain 41% of the variance in the attachment scores six months postnatally, suggesting expectant fathers'

mental wellbeing can have an important influence on the attachment. Due to the antenatal and postnatal scales of attachment being different, the author was unable to make a direct comparison of these scores.

Additionally, from a theoretical perspective, this study also highlights that there is a high degree of continuation of attachment prenatally to postnatally, suggesting that a fathers' attachment may not originate purely from interactions with the infant but it may be a result of the father's underlying 'capacity' to form an attachment bond which occurs before the infant is born and which appears to correlate with mental wellbeing (Condon et al., 2013). This is also consistent with research on Parental Reflective Functioning (PRF) which refers to the parent's capacity to be able to take into consideration their infant as having a mind of its own (Slade, 2005). This process is likely to differ for fathers who have already had a child as they have previous experience of the pregnancy developing into a living being.

Ferketich and Mercer (1995) concluded that depression levels were higher amongst first time fathers as opposed to experienced fathers although there was no difference found in attachment levels. They suggest first time fathers may experience greater transitional and adjustment difficulties than fathers who already have children. Therefore first time expectant fathers may be more likely to experience mental health difficulties associated with adjustment such as depression. Further longitudinal research into men's depression levels across the first and subsequent pregnancies and how this may interact with attachment levels is warranted.

Vreeswijk, Maas, Rijk and Bakel (2013) studied the links between a father's internal representations of their infant, psychological wellbeing and the attachment relationship to their unborn baby. Questionnaires relating to their attachment towards their unborn baby and their psychological wellbeing were completed by 301 fathers. The 'meaning' of the child or the internal representation of the fetus to the father was assessed using the Working Model of

the Child Interview (WMCI; Zeanah, Benoit, Barton & Hirshberg, 1996). The study found that fathers who experienced fewer symptoms of anxiety and depression reported higher prenatal attachment however, this was not related to father's internal representations of the fetus as measured by the WMCI (Vreeswijk, Maas, Rijk & Bakel, 2013). This suggests poor psychological wellbeing in expectant fathers can be negatively related to levels of prenatal attachment towards the fetus but it does not significantly influence the fathers internal representational of the fetus. Therefore, internal representations of the fetus appear independent to prenatal attachment.

The authors suggest that these findings are due to the self-report measurement of attachment being a continuous scale of scores whereas the WMCI enforces classification into 3 categories and therefore differences in scores for the representations of the fetus may not have been strong enough to establish significant differences (Vreeswijk, Maas, Rijk & Bakel, 2013). This study supports the findings of expectant fathers' mental health being related to prenatal attachment but also the difficulty in making comparisons across other domains due to methodological limitations.

Low levels of attachment appear to be differentiated by high levels of anxiety, stress and partner support suggesting that psychosocial problems and partner support with parenting may reinforce each other (Herwig, Wirtz, & Bengel, 2004). For instance, fathers may experience anxiety or stress symptoms as particularly negative if there is low partner support to help buffer these feelings. Clinically, these findings have implications in potentially screening and identifying couples who report high anxiety or stress levels alongside low support from their partner as they may be particularly vulnerable to having low attachment with their developing baby. The results of this study also appear to confirm that the inconsistencies of previous studies regarding correlates of attachment may have been due to the failure to look at interactions amongst predictors (Baron & Kenny, 1986). It appears

therefore that psychological wellbeing can impact attachment but also needs to be viewed in parallel with partner support.

The mixed findings of the relationship between a father's psychological symptoms and attachment levels may also be due to them being compared to those of the mother and this adjustment period being different. Fathers generally show more of a disengaged representation to their unborn child during pregnancy than mothers suggesting the relationship between psychological status and attachment levels may be due to fathers being generally less psychologically involved (Vreeswijk, Maas, Rijk, & van Bakel, 2013). This finding appears in keeping with studies that suggest men may display symptoms of depression differently to women (Angst, Gamma, Gastpar, Lépine, Mendlewicz & Tylee, 2002). Moreover, findings within these studies suggest that fathers who may be at high risk for depression or anxiety also scored highly on avoidance (Armstrong, 2002).

A study looking at the correlates of prenatal attachment in mothers and fathers alongside maternal depressive symptoms suggested that father's attachments during the last trimester were focused towards the future of the baby and what his role as a father would be (Seimyr, Sjögren, Welles-Nyström, & Nissen, 2009). For mothers, their attachment was loaded on questions regarding concerns for the health of baby and physical contact with the child (Seimyr, Sjögren, Welles-Nyström, & Nissen, 2009). These thoughts of fathers appear to support Habib and Lancaster (2010) study that identity of the father role begins once the pregnancy is confirmed and this preoccupies the fathers thinking (positively or negatively depending on their psychological wellbeing), throughout the pregnancy. Collectively, these findings appear to show that changes in feelings and expectations across the pregnancy period may be related to the adjustment process which can be different from measures of psychological wellbeing. More research is needed to establish how these variables relate to

psychological changes in pregnancy and contribute to attachment across the transition to fatherhood.

Pregnancy Variables

Gestation of pregnancy.

Habib and Lancaster (2010) found levels of prenatal attachment in fathers increased between the first and third trimesters of pregnancy. As the birth became more imminent, fathers' paternal attachment increased. This study also included measures of identity amongst fathers to see if this could predict attachment levels across the pregnancy. No changes were found in identity measures for fathers across the pregnancy suggesting that expectant fathers give importance to the father role upon discovering their partner is pregnant and this status remains unchanged throughout pregnancy (Habib and Lancaster, 2010). In contrast, the study found the expectant fathers' attachment levels towards the unborn child increased throughout the pregnancy. The authors suggest that the fatherhood status appears to emerge once it is confirmed they are going to be a father but that the nature of the attachment relationship appears to develop across pregnancy. Social desirability was not controlled for in this study and due to the sample not having a baseline measure of identity status prior to pregnancy, the direction of association between identity and attachment could not be confirmed and more longitudinal research is needed.

De Cock, Henrichs, Vreeswijk, Maas, Rijk, & van Bakel, (2016) looked further into establishing correlates of the prenatal attachment examining the stability and potential patterns with these attachment levels. This study measured bonding of pregnant mothers and fathers (as measured by the Paternal/Maternal Antenatal Attachment Scale, (PAAS, MAAS) at 26 weeks into the pregnancy, 6 months and 24 months postpartum (Condon, 1993). Results indicated that bonding from pregnancy to toddlerhood was relatively stable across

these time periods and parents did not appear to shift from high or low bonding scores or vice versa, but instead continually reported the same relative level of bonding throughout (de Cock et al., 2016). The authors used latent class analysis to derive 4 classification patterns of bonding through rank-ordering of their data ranging from low to very high. This finding does not only support the stability of the bonding prenatally to postnatally, but also suggests that without intervention, those fathers who report low levels of attachment during pregnancy will remain in this category postnatally.

Conception, prenatal testing and planning of pregnancy.

Research into the decisions parents face during conception and pregnancy (such as whether to undergo further diagnostic screening over and above the standard testing) can act as a method of reassurance to mothers as well as a source of anxiety (Kowalcek, Huber, Lammers, Brunk, Bieniakiewicz & Gembruch, 2003). Little research has been conducted on the impact of these decisions on fathers and their attachment to the unborn baby.

Hjelmstedt, Widstrom & Collins (2007) looked at the influence of conception either by In Vitro Fertilisation (IVF) or naturally and measures of prenatal attachment. The study concluded that the method of conception did not appear to influence prenatal attachment or prenatal anxiety or depression in fathers. The study of fathers concluded they were attached to their unborn infants to the same extent as those fathers whose partner was not undergoing IVF. Measures were taken at weeks 26 and 36 which suggested that the prenatal attachment increased slightly throughout the pregnancy although scores remained relatively stable across the pregnancy for both the IVF and control groups (Hjelmstedt et al., 2007).

A further study looked the attachment levels, and measures of anxiety and depression in couples who either have to undergo preimplantation genetic diagnosis (PGD) through IVF or those who conceived naturally but chose to undergo PGD do so because of a particular

inherited condition in their family (Winter et al, 2016). Measures of parental attachment, anxiety and depression did not statistically differ amongst the two groups or in mothers or fathers compared to controls (Winter et al, 2016). These findings suggest regardless of the mode of conception, the patterns and levels of attachment across the pregnancy for fathers whose partners have undergone IVF follow a similar pattern to those who have conceived naturally.

In line with these findings, research has shown significant differences in father's levels of warmth between planned and unplanned pregnancies. More specifically, fathers who did not want the pregnancy were less likely to display warmth towards the baby post birth whereas fathers who wanted a pregnancy sooner than it occurred were more likely to display nurturing behaviours towards the baby (Bronte-Tinkew et al., 2007). It therefore appears that the planning of pregnancy is important in terms of prenatal behaviours, but if a child is planned or wanted, attachment levels appear similar regardless of how the baby was conceived.

Prenatal care.

The examination of ultrasound scanning as a potential variable to aid the attachment process is under-researched in fathers as many studies have focused on the reactions of the mother. In one study consisting of 44 couples undergoing ultrasound scanning the couples were asked to complete attachment questionnaires before and after ultrasound scanning using a randomly allocated group of either 2D or 4D scanning methods (Righetti, Avanzo, Grigio & Nicolini, 2005). Results indicated there was a significant pre to post increase in attachment for mothers who underwent both the 2D and 4D scanning however no significant differences were found for fathers. Although these results suggest scanning method does not appear to increase attachment scores in fathers across the pregnancy, the small sample size in this study

and lack of control group limits these conclusions and a larger sample is needed to investigate the role of the scanning procedure in the prenatal attachment of fathers.

Perinatal loss.

The literature on a loss of a previous pregnancy and the impact on expectant fathers' prenatal attachment is more apparent. A qualitative study using IPA analysis of interviews with men whose partner was currently expecting but had experienced a previous perinatal loss, found men experienced feelings of intense loss (Armstrong, 2001). Although one may have anticipated these feelings of loss, for the men interviewed, they were described as far greater than they had expected. Moreover, these loss experiences appeared to be connected to whether fathers had seen ultrasounds or had been able to hold their babies after they had been born which is contrary to the findings of Righetti et al. 2005. Collectively these studies suggest, regardless of time since the perinatal loss, men's experiences of the loss influenced the subsequent pregnancy and reported increased anxiety towards the outcome (Armstrong, 2001).

Hoping to substantiate earlier findings, another quantitative study by Armstrong (2003) investigating the impact of prior perinatal loss found that fathers reported lower symptoms of pregnancy-specific anxiety and prenatal attachment than for mothers. The impact of the loss on fathers was however positively correlated with the attachment to their unborn child in the subsequent pregnancy (Armstrong, 2003). This suggests that experiences of loss do impact the father's attachment in the subsequent pregnancy, but this was not reflected in the measures of anxiety or depression, despite measures of stress being higher than the mother's (Armstrong, 2003). Previous studies suggest that fathers show no differences in anxiety or depression symptoms during a subsequent pregnancy when they have experienced a previous perinatal loss (Theut, Pedersen, Zaslow & Rabinovich, 1988).

Collectively, these findings may suggest fathers experience a previous loss psychologically differently to mothers, which could be explained by the difference in physiological changes during pregnancy and perhaps not experiencing the baby as a real child.

A qualitative study that interviewed fathers who had experienced a previous perinatal loss during a subsequent pregnancy described a pre-occupation with pregnancy and feelings of anxiety which they felt unable to express to their partners due to pressures of needing to 'be strong' (O'Leary & Thorwick, 2006). This finding suggests fathers may not report their true feelings regarding previous perinatal loss.

Given the samples used in the above studies were fathers who had experienced a previous perinatal loss, the findings are somewhat limited in that the sample did not compare these findings alongside those couples who had not undergone previous perinatal loss (Armstrong, 2003; O'Leary & Thornwick, 2006).

One study directly compared attachment levels and symptoms of anxiety and depression in couples who had either had a perinatal loss in a previous pregnancy, were pregnant for the first time, or had a history of prior successful pregnancies found no significant differences (Armstrong, 2002). More specifically, no differences were found in prenatal attachment levels for mothers and fathers with and without a history of perinatal loss suggesting that the prenatal attachment of subsequent pregnancies after a perinatal loss is not affected. However, this previous loss experience does appear to influence depressive and anxiety symptoms in the parents in relation to a subsequent pregnancy suggesting although the attachment to the subsequent baby is unaffected, the impact of this loss on symptoms of anxiety and depression appears longstanding (Armstrong, 2002).

The findings from these studies are inconclusive but, it appears that fathers are less likely to discuss issues of anxiety, depression or prenatal loss compared to mothers making

them more vulnerable to psychological distress and putting them at greater risk for poor mental health. Equally, studies which compare expectant mothers to fathers provide little information about fathers in their own right other than that they often report under report psychological symptoms when they are aware this is being assessed (Hunt, Auriemma & Cashaw, 2003). The use of inconsistent measures and therefore clinical outcomes contributes to this lack of clarity and it appears difficult to generalise the findings.

Summary of Literature Review findings.

The objective of this literature review was to identify individual and contextual variables amongst expectant fathers for the development of the prenatal attachment. The lack of research on fathers within the UK is disappointing. Nearly all the studies included within this review for fathers' prenatal attachment analysed variables and the effects on prenatal attachment but only one study assessed the interaction between these variables.

Studies show mixed results on the perceived risk or protective factors related to the prenatal attachment particularly around the impact this has on the father psychologically. It is possible there is a bias in the measurement tools used within these studies particularly for anxiety and depression as men may display their symptoms differently to women (Angst et al., 2002).

The period of transition during pregnancy appears to be a challenging time for fathers. Upon review of the literature it would appear there are many pregnancy variables which can impact the experiences of expectant fathers. This is particularly evident for pregnancies that are considered to be high risk due to conception, abnormalities or previous loss. These perceived risks for fathers appear to have a greater impact on the expectant fathers in terms of their psychological symptoms but less impact on their attachment bond towards their unborn baby. This suggests the emotional distress associated with pregnancy appears to impact the

expectant father individually (internally) rather than in relation to the attachment bond to the unborn child.

Although the explanations behind these results are not clear, small samples sizes of fathers within these studies and inconsistent use of measures are likely to contribute. The studies do appear to confirm that prenatal attachment remains stable throughout and beyond the prenatal period and therefore early identification of the variables that are likely to identify fathers most at risk of psychological difficulties or low levels of attachment is paramount. Collectively, a broader spectrum of ages, culture and sociocultural levels of variables need to be explored.

Many studies have included fathers alongside mothers and these studies using couples were statistically analysed separately for men and women in order to control for non-independence. Arguably, the reason for doing this is because scores from couples are likely to be more similar than scores of men and woman who are not within the same dyad (Cook & Kenny, 2006). Given that the literature for expectant fathers is still emerging and relatively new, they need to be studied in their own right to give a more accurate picture. In addition, many studies focused on the experiences of fathers outside the UK. This may tell us something culturally about how expectant fathers are viewed in the UK but also about the social and cultural discourses that may contribute to this perception. Findings from high risk pregnancies or prenatal loss suggest fathers are less likely to report or communicate their distress which can impact relationally to their partner and the developing attachment towards their unborn baby.

Many of the conclusions within this review are drawn from self-report questionnaires, many of which, have not been widely used on fathers and therefore clinical cut offs should be treated with caution. As mentioned, the lack of consensus for fathers may be due to the fact

that the predictors of prenatal attachment have been studied in isolation for expectant fathers rather than in interaction (Van den Bergh & Simmons, 2009). Larger and more diverse samples of fathers within the UK are needed particularly as there are likely to be cultural differences impacting on how attachment and psychological symptoms are measured (Karasz, 2005).

Whilst there is an encouraging emergence in research focusing on men's mental health across the postnatal period, there is less focus on the antenatal period despite it being known that this period appears more stressful for the father than the postnatal period (Condon et al., 2004). In addition, rates of anxiety and depression during the antenatal period have been shown to be one of the strongest predictors for experiencing these symptoms in the postnatal period (Leigh & Morgan, 2008; Paulson & Bazemore, 2011) and the implications of this on the partner and the attachment towards their infant are vast (Chapman, Hobfoll & Ritter, 1997; Condon, 1993; Ramchandani et al., 2008). We know less however, about the early stages of the development of the attachment relationship towards their fetus and the potential effect that poor mental health may have on this relationship.

Overall, there is a lack of collated evidence of risk factors associated with the antenatal period for fathers particularly within the population of the UK. Knowledge about prenatal risk and protective factors that may be related to the quality of prenatal attachment may lead to opportunities for early detection of parents at risk for parenting problems in the postnatal period. Therefore, a next logical next step would be to investigate and collate the correlates of anxiety, depression and the paternal-fetal attachment in expectant fathers in the UK and the interactions between them.

Rationale for the study

As research into attachment continues, it is starting to be recognised that the attachment relationship does not begin once a baby is born, but begins much earlier, pre-birth. In this regard, prenatal attachment can be considered as the earliest form of parenting and therefore it is an important consideration in research (Habib & Lancaster, 2010). Mothers are usually seen as the main caregiver for a child although the focus on fathers in the academic literature is changing (Goldberg, Tan & Thorsen, 2009).

Recent evidence is now emerging that fathers undergo marked hormonal changes throughout the transition to parenthood in order to prepare them to care for their young (Edelstein et al., 2015). These hormonal changes are likely to have long term implications. For mothers, very high cortisol levels have been linked to poor child outcomes (Davis & Sandman, 2010). Much less is known about the long term psychological impact of these changes for fathers or how they may impact on the development of the attachment towards their unborn infant.

For mothers, perinatal mental health problems are very common affecting up to 20% (Bauer, Parsonage, Knapp, Iemmi & Adelaja, 2014). Fathers are also at increased risk of depression and anxiety around the pre and postnatal period (Condon et al., 2004; Goodman 2004; Matthey, Barnett, Kavanagh & Howie, 2001). However, the exact prevalence of this is unknown (Cox, 2005). Fathers appear less likely to communicate and report their difficulties compared to mothers and some argue that anxiety and depression in fathers may manifest itself differently such as drinking alcohol excessively or overworking (Angst et al., 2002). Feelings of attachment towards the fetus may be adversely affected by the mental state of the parent. For example, it may be harder for parents to develop an attachment to their unborn child if they are overwhelmed by their own difficulties. Therefore a wide range of variables needs to be considered.

Research Aims and Relevance for Clinical Practice

Identifying fathers who may be most vulnerable or at greater risk during this time will have clinical implications for the way fathers are supported within antenatal services. Further investigation is needed into the symptoms of negative mental health for fathers and how (if at all) this may impact on the developing relationship of the father towards the unborn child.

The perinatal period provides a unique opportunity for psychology and perinatal services to intervene early if necessary, which could improve the wellbeing of the father, partner and the developing child. Understanding the variables or potential risk factors for expectant fathers who are likely to experience mental health problems may have clinical implications on the type of support and interventions which may be offered to parents in the future (Walsh, 2010). Therefore, the antenatal period appears to be a significant phase in the father-infant attachment as well as providing a potential window to intervene early for any attachment difficulties or issues relating to the expectant father's mental health.

Although psychologists are trained in therapies to help reduce symptoms of anxiety and depression, few psychologists have training in meeting the specific needs for men who may be most vulnerable during the prenatal period. The aim of this research is to develop a better understanding of fathers who may be vulnerable during the antenatal period to experience negative mental health symptoms and what impact this may have on the prenatal attachment towards their developing baby. By identifying potential vulnerabilities or risk factors in expectant fathers, this may have clinical implications for addressing difficulties in the attachment towards the unborn baby and the mental health of the expectant father.

Research questions

Which variables correlate with paternal-fetal attachment levels in expectant fathers within the UK? More specifically, are there specific correlates of paternal-fetal attachment associated with:

- The demographics and socioeconomic status of the expectant fathers.
- The mental health of the expectant fathers.
- Variables regarding the pregnancy.

Methodology

Outline of Methods section

This section will outline the study design and rationale for the methodological decisions made. By the end of this section, the reader will have a good understanding of the consultations, choices and evaluations made regarding the methodology. My rationale for the measures, recruitment and data collection will be explained. Contacts of the researcher who were expectant fathers were consulted throughout this study to help inform the methodology and procedure of this research. Professional boundaries were maintained throughout this process, balanced with the information gathered being instrumental to the design of this research. Any feedback or changes to the research as a result of the consultations are included in each section of the methodology. Ethical considerations for the research are discussed in line with the feedback from expectant father consultant and previous research findings. Finally, the section finishes with reflections on the methodological process and my relationship to my research.

Design

The study was a quantitative cross-sectional correlational design using non-experimental methodology to investigate the correlates of anxiety, depression and attachment levels towards the unborn baby in expectant fathers. The independent variables included demographic variables of the participants, mental health variables and variables relating to their partners' pregnancy. Dependent variables included standardised measures of depression, anxiety and paternal-fetal attachment which are detailed further in the measures section. Participants were a self-selected sample derived from online recruitment via various parenting websites.

Instruments

Expectant fathers were asked to complete a series of questions that covered demographic features, their attitudes towards pregnancy, pregnancy variables and lifestyle. Symptom measures were initially selected based on previous research conducted in the area of parental mental health. The measures were then sampled and consulted with expectant fathers who gave feedback.

Due to there being an overlap of comorbidity in anxiety and depression symptoms across the pregnancy period (Grigoriadis et al., 2011; Matthey et al., 2003) it was considered important that these two disorders were assessed for separately, using two independent measures for anxiety and depression.

Demographic questions.

A series of demographic questions were asked in order to assess potential variables in the study. Participants were asked about their age, ethnicity, marital status, education level, first language and employment status. These demographic questions were based on previous findings of research and are detailed below. For a full list of the demographic questions please see Appendix D.

Some of the basic demographic questions were included in light of data from the Office of National Statistics (ONS) in order to potentially compare the sample in this current study against the general population. This would enable the data collected to be assessed for the generalisability of the sample.

Relationship satisfaction.

A measure of relationship satisfaction was sampled with a group of expectant fathers. It was considered by the expectant fathers who were consulted with however, this questionnaire was deemed as one too many and the panel of expectant fathers suggested

against the inclusion of this questionnaire. This was a difficulty, particularly as previous findings suggest relationship status appears to be significantly associated with an expectant father's anxiety and depression symptoms (Boyce et al., 2007). The expectant father consultants asked the researcher if this questionnaire could be excluded in order to retain enthusiasm and decrease attrition. As relationship status was not the central aim of this study, this appeared justified feedback from the expectant fathers however given the importance of relationship satisfaction suggested from previous research, it was considered that relationship satisfaction was a potentially relevant question to explore and should still be included as a variable. In light of the feedback from the expectant father consultants, the authors of Relationship Assessment Scale (RAS) were contacted (Hendrick, Dicke & Hendrick, 1988). The authors of the RAS were consulted with regarding what would be the most salient question to use from the measure in order to gauge relationship satisfaction. This resulted in one question 'How satisfied are you with your current relationship' to be used and was then included in the demographic questions. As in the original measure, the question selected was rated on a 0-7 scale with a higher score indicating greater satisfaction. Therefore, although this variable was considered important, it was not a central measure of the present study.

Pregnancy and parenting variables.

A series of questions based on the findings of the literature review were asked about whether the pregnancy was planned or unplanned, the number of weeks into the pregnancy, whether there had been any pregnancy complications, their experience of their partners pregnancy, whether they had attended any pregnancy scans or antenatal appointments, whether they had experienced any previous loss or miscarriages, and whether their partner had received any fertility treatment for the pregnancy. Expectant fathers were also asked apart from this pregnancy, how many other children did they have and what were the ages of these children.

Mental health difficulties.

Expectant fathers were asked if they had experienced any mental health difficulties or whether they had accessed a mental health service prior to the current pregnancy. Expectant fathers were also asked if their partner who was pregnant with their baby was experiencing any current mental health difficulties.

Symptom measures.***Depressive symptoms: Edinburgh Postnatal Depression Scale (EPDS).***

The Edinburgh postnatal depression scale (EPDS, Cox, Holden & Sagovsky, 1987) was used to assess for depressive symptoms in expectant fathers and can be found in Appendix E. The EPDS is a brief self-report questionnaire composed of 10 items scored on a 4 point Likert scale (0–3), with a maximum score of 30 (Cox et al., 1987). In the original measure for women, scores of 12 or higher indicate possible depression (Cox & Holden, 2003). A lower cut off score of 9 to 10 has been validated in the use of fathers (Matthey et al., 2001). Cox et al. (1987) recommended a cut-off score of 10 within a community sample of fathers. A cut off score of 10 has been validated for the use with expectant fathers within the UK (Edmondson, Psychogiou, Vlachos, Netsi, & Ramchandani, 2010). For this reason, this research used the clinical cut-off score of 10 as indicative of high risk of clinical depression in this sample. A score equal to or higher than 10 indicates the need to screen for a major depressive episode with a sensibility of 65% and sensitivity of 96% (Areias, Kumar, Barros & Figueiredo, 1996)

The EPDS is a validated and widely used self-report screening tool to measure depressive symptoms in primary health care settings during the prenatal period (Cox et al., 1987). The measure was chosen as it is the most widely used screening tool for antenatal and postnatal depression in women (Boyd, Le, & Somberg, 2005). The measure has also been

shown to be effective for the measurement of depression in men during the antenatal period (Cox, Holden, & Sagovsky, 1987; Matthey et al., 2001; Buist et al., 2003).

During the prenatal period, the presence of somatic symptoms in fathers such as those found in couvade syndrome or symptoms of anxiety, can often make the differentiation between depression and anxiety challenging (Simpson, Glazer, Michalski, Steiner & Frey, 2014). An advantage of the EPDS unlike other measures, is that it focuses less on somatic symptoms associated with depression which is particularly relevant during pregnancy even for fathers, as they also report associated physical symptoms around the pregnancy period (Ryan, Milis & Misri, 2005).

Cronbach's alpha for the EPDS for men is 0.81 (Cox et al., 1987). This reliability has been replicated in other studies using the tool in relation to fathers (Edmondson et al., 2010; Matthey et al., 2001; Ramchandani, Stein, Evans, O'Connor & ALSPAC Study Team, 2005). This measure also has an additional benefit of being able to screen for probable anxiety symptoms for men and women within some of the questions (Matthey, 2008).

The Generalised Anxiety Disorder (GAD-7).

In order to screen and measure symptoms of anxiety, the GAD-7 scale was used and can be found in Appendix F (Spitzer, Kroenke, Williams & Lowe, 2006). This measure is a brief seven item self-report questionnaire and items range from 0 to 3 with total scores ranging from 0 to 27. Scores of 10 or above indicate the probability of an anxiety disorder (Spitzer et al., 2006). The GAD-7 measure has good internal consistency with a Cronbach's alpha of 0.92 (Löwe, Decker, Müller, Brähler, Schellberg, Herzog, & Herzberg, 2008).

This measure has been widely used in the primary care population (Kroenke, Spitzer, Williams, Monahan, Löwe, 2007). The measure has also been used to measure perinatal anxiety in pregnant women (Goodman et al., 2014) and is the indicated measure to use during

pregnancy in the NICE guidelines (NICE, 2014). The GAD-7 measure has also been found to have particularly good specificity rates and accuracy of detecting anxiety within the perinatal population (Simpson et al., 2014). On this basis, the GAD-7 measure appeared a logical measure to use given its use within many primary care services within the UK which include males and therefore norms could be compared alongside the general UK population.

The GAD-7 measure has a sensitivity of 89% and a specificity of 82% for GAD (Kroenke et al., 2007). The measure is also good at screening other common anxiety disorders such as panic disorder, social anxiety disorder and post-traumatic stress disorder (Kroenke et al., 2007).

Within primary care services, symptoms of depression and anxiety are highly correlated however people who have symptoms of both are more likely to be given the label depression as this label appears to surpass anxiety (Goldberg, Rickels, Downing & Hesbacher, 1976). Therefore, it appeared vital to screen for anxiety and depression disorders separately as the perinatal population may be at risk for symptoms of anxiety being missed (Matthey et al., 2001).

A literature review investigating the prevalence and course of anxiety disorders in men across the pregnancy period concluded there are many variations in the measures used within studies making synthesis of the findings difficult (Leach et al., 2016). Therefore, it was hoped that by using a measure that was already existent within the pregnancy realm (albeit for mothers) the findings would be of use in amalgamating findings in relation to fathers.

The Paternal Antenatal Attachment Scale (PAAS).

The Paternal Antenatal Attachment Scale (PAAS) was used to measure the attachment levels between the father and their unborn baby and can be found in Appendix G

(Condon, 1993). The PAAS is a 16 item measure which can also be divided into two subscales: the quality of the attachment (eight items) and time spent in attachment mode (six items). Scores for global attachment can be obtained by adding the two subscales together as well as the two remaining items. Scores range from 1 – 80 with a higher score indicating a greater level of attachment.

The PAAS measure was developed within an Australian sample and has demonstrated good internal consistency with a Cronbach's alpha of .81 (Condon, 1993). These levels of consistency, have also been replicated in further studies (Habib & Lancaster, 2006; Habib & Lancaster, 2010).

Many studies have found the PAAS to be a valid measure in other cultures such as the Italian and Turkish population (Righetti et al., 2005; Ustunsoz, Guvenc, Akyuz & Oflaz, 2010). The use of the maternal equivalent of the PAAS, the Maternal Antenatal Attachment Scale (MAAS), has also been validated within the Dutch population (Van Bussel, Spitz & Demyttenaere, 2010) and the UK population (Walsh, Hepper, Bagge, Wadehul & Jomeen, 2013).

This study is therefore believed to be original in using the PAAS (Condon, 1993) within the UK expectant father population. As the measure is such that a higher score indicates a higher attachment, its use for the correlation within this design appears justified. As this measure does not state a clinical cut-off, scores do not need to be adapted to a specific UK population and this also supports its use within the current study. This measure would also allow for a comparison of average global scores of expectant fathers within the UK against Australian fathers which may be of interest later in the data analysis due to lack of research in this area, although this is not a central aim of this study.

Consultation on the Measures

Following original consultation with expectant fathers regarding the selection of the measures, expectant fathers were then consulted again in order to practise completing the questionnaires under timed conditions to estimate completion times and to gather any further information about the impact of completing these questionnaires. With the omission of the full version of the RAS (Hendrick, Dicke & Hendrick 1988) completion time was now around ten minutes which was considered to be a reasonable amount of time with achieving a high response rate.

The consultation process revealed that expectant fathers may have responded differently depending on the stage of their pregnancy highlighting this may be a key area to analyse within the data collection. For example, one expectant father commented his responses would have varied significantly prior to seeing the ultrasound scan for his unborn child. It was a coincidence that this variable had already been included but the fact it had been spontaneously mentioned suggested it might be an important variable to consider in the data analysis.

Expectant fathers also emphasised how asking such questions made them think about the prospect of the future and becoming a father. Within the consultation of fathers, they identified their thoughts were mostly positive however, this information highlighted the importance of the consent forms and making sure that signposting of other services and further information was available to those who accessed the survey regardless of whether they completed all the questions.

Following consultation with the expectant fathers, it was suggested that online methods and recruitment of participants were likely to be more accessible for this group. Expectant fathers also suggested they felt expectant fathers were more likely to give honest

answers (as opposed to socially desirable answers) if completing the questionnaires anonymously and away from their partner or any prenatal services. This information was added to the information section of the online questionnaire asking that people completed the survey in a quiet environment and to not discuss their answers with their partner.

Changes or suggestions regarding the measures based on the consultation with expectant fathers were executed prior to starting the data collection.

Rationale for the study design

As this study was to be exploratory within the UK, it was considered to use non-experimental methodology to capture a cross-section of the expectant father population. Due to the lack of existing research for the expectant father within the UK population, this design appeared appropriate. It was also considered that using an experimental design whilst this research for fathers is still in its infancy and manipulating certain variables may interrupt the typical attachment process that was being measured.

By using online methods and self-report questionnaires, it was hoped this would encourage a larger sample size. Although the use of survey methods has advantages and disadvantages, it was considered that having access to a potentially large sample, being cost effective and not arduously time consuming, would outweigh any potential disadvantages such as demand characteristics. Expectant fathers often report that they feel excluded amongst many antenatal services (Genesoni & Tallandini, 2009). This finding is disappointing given that antenatal appointments offer a unique opportunity to engage and involve fathers in their pregnancy experience (Dryden, Williams, McCowan & Themessl-Huber, 2012). In this regard, this research hoped to access a community sample as well as expectant fathers who would not typically access prenatal services as this was the main recruitment method of the studies within the literature review.

Recent research suggests the use of online methods with expectant fathers appears to show more personal responses from fathers rather than traditional face to face methods (Leach, 2015). Furthermore, analysis of expectant father's online blogs appear not only to provide data on fathers' feelings during this transition period, but the authors suggest the act of writing the blogs can also act as a form of intervention (Leach, 2015). Traditionally, findings suggest men are much less likely than women to seek help for physical and mental health difficulties (Galdas, Cheater, & Marshall, 2005; Oliver, Pearson, Coe, & Gunnell, 2005). Expectant fathers seem to be using online methods to request and benefit from social support (Fletcher & StGeorge, 2011). Therefore, online methods may be a way of reducing stigma for expectant fathers and a convenient way of accessing them as participants.

Overall, response rates using online methods are shown typically to be higher than traditional mail surveys (Wright, 2005). Online methods have the advantages of accessing large numbers of participants in a relatively short timeframe. Sample size was of significant importance within this study as a large sample size was needed because of anticipated small effect sizes. The measures used within this research had the benefits of being valid, reliable and quick to administer.

Many previous studies have used self-report questionnaire methods to measure symptoms of anxiety, depression and attachment levels in fathers successfully (Boyce et al., 2007; Condon et al., 2004). A number of variables such as the age of the expectant father, ethnicity, and whether the pregnancy was planned have been shown to influence levels of warmth towards the fetus (Bronte-Tinkew et al., 2007; King, Harris & Heard, 2004; Lamb, 1987). For this reason, exclusion criteria for the study were kept low in order to generate a wider sample of variations amongst the participants.

Procedure

Various sites which had the potential to provide access to expectant fathers were targeted and permission was granted to advertise the study. Participants were asked if they would like to take part in a ten minute online survey regarding their wellbeing and the relationship to their unborn baby. Males whose partners were expecting a baby (expectant fathers) were asked to click on a link if they wished to take part in an online survey which would take around ten minutes to complete. The software Qualtrics (2015) was used to organise and collect the data. The software enables a survey to be built online with an easy to read format which can be used on computers, tablets and mobile phones. Please see appendix H for the presentation of the survey on these devices. The data was kept anonymous but was also securely held on Qualtrics (2015) servers. Only the principal researcher had access to this account by using a unique security code and password.

If participants clicked on the survey link, they were then directed to a participant information sheet. Once participants had read the information, they were then asked for consent by clicking a box saying 'I consent to take part in this research'. Participants were then asked pre-filter questions to ensure eligibility for the study which included: Are you male?, Are you aged over 18? and Is your partner currently expecting a baby? Providing participant completed yes to these questions, then they were then able to continue to the further demographic questions.

To avoid order effects of completion, participants were then randomly allocated to complete three further questionnaires including the GAD-7 questionnaire (Spitzer et al., 2006), EPDS (Cox et al., 1987) and the PAAS (Condon, 1993).

Recruitment methods

All data was collected between October 2017 and February 2018. Data was stopped at this point due to the restrictions of the timeframe to conduct this study.

A purposeful snowball sampling method was used to recruit participants using social media networking sites for expectant parents and National Childbirth Trust (NCT) advertising sites. No incentive for was taking part in the study was offered. It was hypothesised these online groups would directly target expectant parents at a primary care level but also not skew the data sample by targeting those fathers who may have already identified themselves as having difficulties with anxiety, depression or feelings towards their unborn baby.

Research suggests that men are generally skeptical or concerned about attending antenatal classes either due to embarrassment or their focus on women (Shirani, Henwood & Coltart, 2009). Typically, the origins of antenatal classes were to meet the needs of middle class women and attendance rates tend to reflect this (Cliff & Deery, 1997). This was considered in this present study in terms of the sample of participants and how representative the sample would be. An advantage of using online methods however, is that expectant mothers/fathers can join the NCT Facebook page and they do not need to subscribe via a payment or attend the classes.

Given the above considerations, it was hoped that by targeting NCT groups online across the UK it would generate a large and representative sample. The very nature however, of social media is that some participants may 'share' or 'follow' certain groups depending on the individuals' circumstances or number of contacts. For this reason, it is also acknowledged each recruitment channel cannot be wholly accounted for within this study. Recruitment sites targeted were NCT Facebook pages, expectant parent websites as well as pregnancy websites

aimed at father's e.g The dad network. Please see Appendix I for the advert used to gain permission to advertise on these sites.

Inclusion and exclusion criteria

This study aimed to collect data from a wide and diverse population of expectant fathers and so exclusion criteria were low. Participants needed to be male and have a partner who was currently pregnant with their child. No parameters were set around the gestation of pregnancy as it was considered that excluding expectant fathers based on the number of weeks pregnant their partner was, could appear invalidating or upsetting. Due to ethical concerns around gaining consent, the minimum age for completing this survey was eighteen years old.

An exclusion criterion of this study was that participants needed to be living within the UK and consider themselves to be literate in the English language. This criterion was based on the analysis and interpretation of results as the data may be skewed if participants were not proficient in English (in order to understand the measures they were being asked to complete).

All expectant fathers were included in this study whether they were first time fathers or not.

Ethical issues

Ethical considerations were taken into account at every phase of designing, advertising and recruiting for this study. It was considered that expectant fathers who completed the questionnaires regarding their own wellbeing and the attachment to their unborn baby would have required them to think about their child. This may have potentially led them to experience some sadness, worry or anxiety. Whilst it was important to consider these factors when designing and implementing the research, it was not felt by the authors

these factors should prevent the research from being conducted. Expectant fathers who were consulted with suggested these factors were not of any significant concern in relation to themselves. However, in order to account for such potential feelings, a full list of support services for the expectant father and or any feelings about their unborn baby were included at the participant's information section and upon termination of any part within the study.

Any further potential concerns were considered by the group of expectant fathers prior to the study going live. It was considered that by taking part in this research would not cause any further distress about themselves or their unborn baby than they may experience in everyday life. In contrast, the expectant fathers who were consulted reported they found it helpful to be asked about their opinions to their relationship towards their unborn child as services are usually targeted towards mothers. Research appears to support these comments in that fathers feel they are 'not patients but not visitors' with regard to their involvement in perinatal services (Steen, Downe, Bamford & Edozien, 2012). Upon completion of the survey, participants were given information on organisations and support services they could contact (such as the Samaritans), if completing the survey had raised any difficult issues for them.

An information sheet was provided at the start of the survey (See appendix J) followed by an informed consent sheet (See appendix K). Participants were unable to progress onto completing the study without confirming they had read the participants' information sheet and gave their consent to take part in the study. Within the information sheet, details of how participants' data would be kept, stored and deleted were included. Participants were also reminded that they could withdraw from the study at any point by ticking the X in the top right hand corner of their screen which would close the survey. Regardless of when participants' responses indicated they were not eligible or did not wish to

continue the study, the debrief information was presented to all participants including all the contact details of forms of support (See Appendix L).

The British Psychological Society (BPS, 2013) guidelines for conducting internet based research were also followed to ensure the study was ethically acceptable. Firstly, the NHS Research Authority decision tool was used which concluded that NHS ethical approval was not required for this study (Please see Appendix M for confirmation).

Ethical approval was then sought from the University of Hertfordshire Health and Sciences department. The study was reviewed by the department and approval was granted within two weeks of the application and an ethical reference number was provided (See appendix N). One amendment was made to this study in terms of timing to start the data collection as ethical approval was granted earlier than anticipated. Overall, the risk for this study was deemed low.

Participants

Sample Size and effect size

Cohen (1988) suggested Cohen's d values to be 0.2 for small, 0.5 for medium and 0.8 for large effect sizes. Cohen (1988) cautioned these figures were to be applied loosely. A *priori* power analysis was performed to enable detection of small to medium effect sizes. It was hoped around 90 participants would be recruited. This would allow for a medium effect size of 0.5 (Cohen, 1988) to be found with 80% power at the 0.05 significance level. The G*Power (Version 3.1.9) software was used to calculate the number of participants needed for small, medium and large effect sizes (Buchner, Erdfelder, Faul & Lang, 2009). These can be found in Table 3 below.

Table 3

Table of Participants needed for Effect Sizes.

Effect size (Cohen's d)	Power		
	70%	80%	90%
0.5	23	29	37
0.4	37	46	61
0.3	67	84	112

A total of 296 participants initially opted-in to the survey. Data collection was stopped at this point due to the limited timescales of the project. A large number of respondents (n=82) did not continue beyond the participants information and consent pages (24.2%). This appears higher than previous findings of psychological research conducted online in which 10% of participants tend to drop out immediately (Hoerger, 2010). Beyond the 214 participants that continued to the survey, 2 people did not consent to take part once they had read the information, 1 participant was not aged 18 or over, 2 participants did not consider themselves to be male and 12 were not expectant fathers, leaving 197 participants remaining.

Of the 197 participants that continued with the survey, 31 participants did not complete all the questions. Therefore, a total number of 166 participants completed all questions asked within the survey. This gives a dropout rate of 17.1% of those who continued beyond the consent pages, were eligible for the study and began the survey. In terms of attrition for an opt-in online survey, this is considered to be relatively low (Callegaro & DiSogra, 2008).

All data analysis herein will therefore be based on the number of participants (n=166) who fully completed all the questions within the survey.

Demographics.

As many of the participants who initially opted-in to the survey but did not complete beyond the informed consent and participants' information pages, it was not possible to collect demographic data for those who did not complete beyond this point. It was also not possible to collect data for the people who started the survey but did not meet the criteria for the eligibility questions. Participants who started but did not complete the study (by clicking out of the survey), were treated as withdrawals (as stated on the consent form) and therefore the data from these individuals cannot be reported.

Participants included in the final analysis (N=166) were males aged between 21 and 41 years of age. Gestation of the expectant father's partner's pregnancy ranged from 5 to 40 weeks. These demographics are discussed fully in the next chapter.

Data Analysis

All statistical data was analysed using quantitative methodology. The data was assessed in order to check if it met the assumptions for parametric testing. This is discussed in detail within the next chapter. However, due to concerns about ensuring all the data met the requirements for using parametric testing, further analysis using non parametric testing was conducted to ensure that the appropriate statistical tests were undertaken and could be sufficiently justified. The relationship between anxiety, depression and attachment levels was analysed using correlational and multiple regression analysis.

The *Statistical Package for the Social Sciences* (SPSS) version 24 was used for all the data analysis conducted. The detailed analysis of the data can be found in the next chapter.

Reflections

My relationship to the population of expectant fathers has developed through the process of data collection. The more I viewed and researched into online communities of

expectant fathers, I realised how potentially relevant my research might be. Many expectant fathers reported feeling they needed to support their pregnant partners and that their needs were secondary. The social and gender stereotypes of fathers needing to be ‘strong’ and ‘be there’ for their partners who were carrying the baby appeared to invalidate any feelings of anxiety or low mood they had due to them not physically carrying the child. After talking with expectant fathers, I felt hopeful that using an online methodology would enable ‘real’ perceptions and presentations during their partner’s pregnancy to come to light. I hoped that the anonymity of being online and not engaging in face-to-face interactions would aid this process and lessen the stigma about being less able to be resilient during a time of uncertainty.

The process of choosing measures felt challenging. Consultation with expectant fathers highlighted how important it was to capture this developing relationship between them and their unborn infants. Self-report measures have the advantage of being less costly, less time consuming and easily applied to large samples but I also considered what effect demand characteristics would have on my sample and results. Even with the anonymity of being online, would fathers actually report their true feelings based on what I had read and discovered so far? This led me to consider how my passion and enthusiasm to give a voice to fathers about pregnancy may have been curtailed by my choice of measure. I wondered what experiences I may have gained through more qualitative methods?

In light of my proposed recruitment methods, I also considered the homogeneity of my sample. Would expectant fathers scoring low on attachment or high on anxiety or depression be the types of fathers who would take part in my research? I had to have faith in what I had read so far and accept that expectant fathers’ experiences were likely to vary but I had to start somewhere. This research was therefore likely to be the start of a very long journey.

Results

Outline of results chapter

This section will include full quantitative data analysis for the total 166 participants who completed all the questions. This chapter will present the results for the overarching research question but will be divided into subsections; sociodemographic variables, mental health variables and pregnancy variables followed by additional findings of interest. The chapter will begin by presenting the summary statistics for each of the hypotheses. The justification and reasoning for the statistical testing used will be presented. The results of the analysis will be presented in written, table and graphical form. The results chapter will then be summarised which will include a section on my reflections of what can be concluded from the data.

Data exploration

Justification of parametric testing.

In order to assess if the data meets parametric assumptions for testing, four assumptions are considered (Field, 2013) which are:

- Normality: The data is normally distributed
- Homogeneity of Variance: The data from multiple groups has similar variance
- Linearity: The data has a linear relationship
- Independence: The data is independent of other data

The assumption of normality.

There are several tests which can be used to test for normality (Field, 2013). A common test used for such analysis is the Kolmogorov-Smirnov (K-S) test (Massey, 1951) or the Shapiro-Wilk test (Shapiro & Wilk, 1965) which compare the scores in the data to a normally distributed set of scores with the same mean and standard deviations. As this data

set is considered relatively large (>40) the sampling distribution is likely to be normal and therefore it is suggested that visual inspection of the data can be a sufficient method of checking for normality (Ghasemi & Zahediasl, 2012).

Based on this postulation the statistics from the skewness and kurtosis tests and visual inspections of the data were used rather than formal tests of normality. Acceptable levels for the skewness and kurtosis for this data were between +2 and -2 (George & Mallery, 2016). The statistics produced in this study suggested that the majority of total scores were mostly within these standards, although there are some exceptions. These are identified accordingly in the results section and justification of the statistical testing for all the research questions can be found in Appendices O-T.

The assumption of homogeneity of variance.

Homogeneity of variance statistical testing is not required in this study as the data set only involves one group of participants being compared to themselves. In this dataset only one score is being compared to the null hypothesis of no relationship, therefore the assumption of homogeneous variances can be assumed (Field, 2013).

The assumption of linearity.

The variables within the study were largely continuous. For continuous variables in the study, assumptions for linearity were assessed using visual methods such as scatterplots. This method would enable a visual examination of the variables within the data to assess whether they relate in a linear fashion. For variables that have a Likert scale, these are considered as interval based data and therefore the assumptions of linearity is met (Field, 2013). For variables that were not continuous, non-parametric testing was used.

The assumption of independence.

Participants in this study completed the data anonymously and independently online. It is therefore presumed that participants did not confer with other participants or influence other participants' answers in any other way. On this basis, the assumption of independence is met.

Violations of assumptions.

Where assumptions of normality or linearity have not been met, non-parametric tests will be considered. As this study is looking at correlations and has a relatively large sample size, non-parametric methods appear more appropriate than other methods such as transforming the data (Field, 2013). This is particularly the case for this dataset as transforming the data could have implications such as changing the constructs of the original measures used (Grayson, 2004, cited in Field, 2013). Full justifications for each testing used can be found in the Appendices O-P.

Research Questions

This study has an overarching main research question; which variables correlate with paternal-fetal attachment levels in expectant fathers within the UK? These can be broken down into three subsections of, what are the specific correlates of paternal-fetal attachment associated with:

- The sociodemographic variables of the expectant fathers.
- The mental health variables of the expectant fathers.
- The variables regarding the pregnancy.

Due to the nature of some of the categorical variables, it was more appropriate to use a between-group analysis and therefore comparisons as well as correlations are included.

Statistical testing

All statistical testing used was based on the data exploration methods mentioned above. The data considerations for statistical testing can be found in the relevant appendices related to the research question and the reader is directed to these throughout. The dependent variable throughout these results was the paternal-fetal attachment measure which was a continuous variable and met parametric assumptions (See Appendix O). Other continuous variables such as age, anxiety symptoms, depression symptoms and relationship satisfaction were also assessed alongside each research question to see if they met parametric assumptions (See appendix P). As these were continuous variables, depending on parametric assumptions being met, the relevant Spearman's r and Pearson's r correlations were used to test for associations amongst these variables.

The remaining independent variables were categorical. As these variables did not meet parametric assumptions due to the data distribution, non-parametric testing of comparisons were used. For the independent variables that had three or more categories, Kruskal-Wallis statistical testing was used. A Mann-Whitney U test was conducted to compare two groups (or levels) within the data. The minimum sample size for statistical analysis in a Kruskal-Wallis or Mann Whitney-U test is five, otherwise the significance value (p) can be unreliable (Kruskal & Wallis, 1952). Where the number of participants were lower than this, groups were pooled with other responses (Field, 2013). Where some variables had a large number of categories with very small sample sizes (e.g. ethnicity) the pooling method was also adopted rather than using exact tests (i.e. Fisher exact test) as the fewer number of degrees of freedom would increase the power for the test (Field, 2013). These exceptions are stated where applicable. The considerations, justification and statistical outputs for each research question can be found in the corresponding appendices and the reader is directed to these throughout.

Reliability testing of Measures

Cronbach's alpha was acceptable for the PAAS (0.71). Reliability for the measures of anxiety (GAD-7) was acceptable ($\alpha = 0.85$) as was the measure for depression (EPDS, $\alpha = 0.82$). These alpha levels were considered 'good' in terms of internal reliability (Field, 2013).

Research Question 1: Which demographic and socioeconomic variables correlate with paternal-fetal attachment levels in expectant fathers within the UK?**Sociodemographic variables.**

The sociodemographic characteristics of the sample are summarised in Table 4 below.

Table 4

Sociodemographic Characteristics of the Sample.

	Count (N=166)	Percentage %
Age (years) <i>M (SD)</i>	31.20 (4.04)	100%
First Language		
English First Language	156	94%
English Not first language	10	6%
Ethnicity		
White English/Welsh/Scottish/Northern Irish/British	125	75%
White Irish	6	4%
White gypsy or traveller	2	1%
White-polish	11	7%
Mixed/Multiple ethnic- White and Black Caribbean	1	1%
Mixed/Multiple ethnic-White and Black African	2	1%
Mixed/Multiple ethnic- White and Asian	4	2%
Asian- British	5	3%
Asian Indian	6	4%
Asian Chinese	3	2%
Black African	1	1%
Education Level		
Postgraduate qualification	54	33%
Undergraduate qualification	77	46%
A-levels and equivalent	17	10%
GCSE/O level equivalent	5	3%
Other Qualifications	7	4%
No qualification	6	4%
Employment Status		
Full time employment (35+ hours per week)	153	92%
Part time employment (-35 hours per week)	5	3%
Unable to work	2	1%
Full time homemaker	2	1%
Unemployed	3	2%
Student	1	1%
Relationship status		
In a relationship with mother of child	28	17%
Married to the mother of my child	138	83%
Relationship Satisfaction		
Extremely satisfied	128	77%
Moderately satisfied	35	21%
Slightly satisfied	2	1%
Slightly dissatisfied	1	1%
Fatherhood status		
First time father	152	92%
Second time or again father	14	8%

Correlations amongst sociodemographic variables and attachment scores.

The Pearson's product-moment correlation found no significant correlation between the age of expectant fathers and fetal attachment levels, $r(166) = -.121, p = 0.120$. A significant positive relationship was found between relationship satisfaction and fetal attachment levels, $r(166) = .258, p = .001$ (Please see Appendix Q).

Comparisons amongst sociodemographic variables and attachment scores.

Ethnicity was pooled into six categories based on some of the groups having sample sizes less than five. The remaining ethnic categories ($n=13$) were combined.

Kruskal-Wallis tests found there was not a statistically significant difference in fetal attachment levels between ethnicity, $X^2(5) = 4.455, p = 0.486$, with a mean rank score of 81.02 for White British people, 106.92 for White Irish people, 79.0 for White Polish people, 89.90 for Asian British people, 114.50 for Asian Indian people and 83.62 for the remaining ethnicities combined which was a broad group consisting of Mixed ethnic-White and Black Caribbean, Mixed ethnic White and Black African.

No statistical differences were found in fetal attachment levels between education level, $X^2(6) = 4.550, p = 0.473$, with a mean rank score of 82.56 for postgraduate qualifications, 81.62 for undergraduate qualifications, 90.76, for A-level qualifications, 121.80 for GCSE qualifications, 66.93 for other qualifications and 82.83 for no qualifications.

No statistically significant differences were found in fetal attachment levels between employment status $X^2(2) = 3.820, p = (0.148)$ with a mean rank score of 84.78 for those who were employed full time, 42.20 for those who were employed part time and 84.75 for the rest

of the employment groups combined ($n=8$) which included unable to work, fulltime homemaker, unemployed and student.

Mann-Whitney U tests indicated there were no significant differences in fetal attachment levels for people where English was their first language ($Mdn = 58.0$) than people for whom English was not their first language ($Mdn = 58.0$), $U = 768.5$, $p = 0.93$, $ES = 3.7$. No significant differences were found in attachment levels for expectant fathers who were married to their pregnant partner ($Mdn = 58.0$) than people who were in a relationship with their pregnant partner ($Mdn = 57.0$), $U = 1824.0$, $p = 0.64$, $ES = 0.1$ or for expectant fathers who were first time fathers ($Mdn = 58.0$) than second time or again fathers ($Mdn = 56.0$), $U = 827.0$, $p = 0.16$, $ES = 0.1$ (Please see Appendix R).

Research question 2: Which mental health variables correlates with paternal-fetal attachment levels in expectant fathers within the UK?

The mental health characteristics of the sample are summarised in Table 5 below.

Table 5
Mental Health Characteristics of the Sample

	Count (n=166)	Percentage
GAD-7 <i>M (SD)</i>	4.45 (4.00)	100%
EPDS <i>M (SD)</i>	5.19 (4.13)	100%
EPDS- Risk of depression		
Low risk of depression	126	76%
High risk of depression	40	24%
GAD-7 caseness		
Normal	95	57%
Mild	55	33%
Moderate	9	5%
Severe	7	4%
Accessed Mental health services		
Yes	48	29%
No	118	71%
Experienced mental health difficulties		
No	77	46%
Yes-Minor difficulties	71	43%
Yes-Major difficulties	18	11%

Note: GAD-7 = Generalised Anxiety Disorder-7 measure, EPDS= Edinburgh Postnatal Depression Scale.

Correlations amongst mental health variables and fetal attachment.

A significant positive correlation was found between anxiety and depression scores $r(166) = .697, p=.001$. However, no significant correlations were found amongst depression and fetal attachment scores $r(166) = -.136, p=.80$, or anxiety and fetal attachment scores, $r(166) = 0.063, p=.418$ (Please see Appendix S).

Comparisons of mental health variables and fetal attachment.

Tests of comparisons were conducted amongst the remaining categorical variables related to mental health and the attachment scores (Please see Appendix T).

Mann Whitney U tests found no significant differences between fetal attachment levels for expectant fathers at high risk of depression ($Mdn = 58.0$) and those at low risk of depression ($Mdn = 58.0$), $U = 1871.0$, $p = 0.623$, $r = 0.1$. No significant differences were found between fetal attachment scores for those who had previously accessed mental health services ($Mdn = 58.0$) and those who had not previously accessed mental health services ($Mdn = 57.0$), $U = 2802.5$, $p = 0.916$, $r = 6.7$.

Kruskal-Wallis tests indicated there were no significant differences in fetal attachment scores and the anxiety measure (GAD-7) caseness range $X^2(3) = 1.874$, $p = 0.599$, with a mean rank score of 74.07 for those with a high level of symptoms, 97.94 for those with medium level of symptoms, 87.61 for those with low levels of symptoms and 80.45 for those within the normal range of symptoms.

A further Kruskal-Wallis test found there was a statistically significant difference in fetal attachment level scores between fathers with previous mental health experiences $X^2(2) = 6.358$, $p = 0.042$ with a mean rank score of 87.23 for those who did not have any previous experience of mental health difficulties, 74.27 for those who had experienced minor mental health difficulties and 103.94 for those who had experienced major mental health difficulties. A Kruskal-Wallis test is able to detect a statistical difference between scores, but it does not tell us which variables this applies to. Therefore, further Mann-Whitney U tests were conducted on the groups of previous mental health experience (e.g. none, minor and major). Mann Whitney tests showed there was a statistically higher difference in fetal attachment scores from those fathers who had experienced major mental health difficulties ($Mdn = 60.00$) than those fathers who had experienced previous minor mental health difficulties ($Mdn=56.00$), $U = 432.000$, $p = 0.034$, $r = 0.1$.

Research Question 3: Which variables regarding the pregnancy correlate with paternal-fetal attachment levels of expectant fathers within the UK?

The pregnancy variables for the sample are summarised in Table 6 below.

Table 6
Pregnancy variables for sample.

	Count (N=166)	Percentage (%)
Gestation (weeks) <i>M (SD)</i>	24.12 (10.12)	100%
Pregnancy trimester		
1	31	19%
2	72	43%
3	63	38%
Planning of pregnancy		
Actively planned	120	72%
Not actively planned	32	19%
Not planned	14	8%
Fertility status		
Received fertility treatment	19	11%
Not received fertility treatment	147	89%
Antenatal scans status		
Attended scans	158	95%
Not attended scans	8	5%
Antenatal appointment status		
Attended antenatal appointments	144	87%
Not attended antenatal appointments	22	13%
Fathers experience of pregnancy		
Easy	119	72%
Difficult	32	19%
Don't know	15	9%
Pregnancy complication status		
Pregnancy complications	27	16%
No pregnancy complications	139	84%
Experience of previous loss or miscarriage status		
Yes	33	20%
No	133	80%

Note: A full term pregnancy is considered between 37 and 42 weeks.

Correlations amongst the pregnancy variables and fetal attachment.

A Pearson's r correlation found a positive significant relationship between gestation of the fetus (in weeks) and fetal attachment levels $r(166) = .232, p = .003$ (Please see Appendix U).

Comparisons amongst the pregnancy variables and fetal attachment.

Kruskal-Wallis tests indicated there were no statistical differences in fetal attachment scores and the expectant fathers' experiences of pregnancy $\chi^2(2) = 0.676, p = 0.713$, with a mean rank score of 84.90 for expectant fathers who in their own experience perceived the pregnancy as easy, 82.64 for those who experienced it as difficult and 74.20 for those who did not know.

No statistical differences were found for fetal attachment levels between the planning of pregnancy $\chi^2(2) = 0.271, p = 0.873$, with a mean rank score of 84.56 for those who had actively planned the pregnancy, 81.86 for those who had not actively planned the pregnancy and 78.14 for those who had not planned the pregnancy.

Mann-Whitney U-tests showed no statistical differences in fetal attachment levels between those who had received fertility treatment ($Mdn = 57.0$) and those who had not received fertility treatment ($Mdn = 58.0$), $U = 1387.0, p = 0.962, r = 1.4$. No statistical differences were found in fetal attachment levels between expectant fathers who had attended antenatal scans ($Mdn = 58.0$) and those who had not attended antenatal scans ($Mdn = 56.0$), $U = 512.0, p = 0.365, r = 0.1$ or expectant fathers who had attended antenatal appointments ($Mdn = 58.0$) and those who had not attended ($Mdn = 57.0$), $U = 1566.00, p = 0.932, r = 4.5$. No statistical differences were found between fetal attachment levels and those who had pregnancy complications ($Mdn = 58.0$) and those who did not ($Mdn = 56.0$), $U = 1604.5, p = 0.233, r = 0.1$. No statistical differences were found between attachment scores in expectant

fathers who had experienced previous loss or miscarriage ($Mdn = 58.0$) and those who had not ($Mdn = 58.0$), $U = 1999.5$, $p = 0.429$, $r = 0.1$. (Please see appendix V).

Research question 4: Which variables in expectant fathers will predict the paternal-fetal attachment to the unborn child

In order to check the justification of using linear regression modelling, visual and statistical methods were considered as part of the initial correlational testing (See appendix O & P). Parametric assumptions for the data were met and therefore regression analysis appeared justified.

Both linear and multiple stepwise regression analysis was conducted to examine the associations between the dependant variable- the paternal-fetal attachment (as measured by the global PAAS score) and the independent sociodemographic, mental health and pregnancy variables. The attachment subscales were not tested in the regression analysis as results can become unreliable when the independent variables are strongly inter-correlated (Pallant, 2013).

The first step of this analysis was based on the previous significant correlations found. Linear modelling was used in order to predict the variables which had a linear relationship between the dependant variable (PAAS total) and the other variables. The significant variables derived from the linear regression modelling were then entered simultaneously into a forward stepwise multiple regression in order to establish the best fit predictive model for expectant father's fetal attachment levels. The model summary for the Regression Analysis can be found in Table 7 below.

Table 7

Model Summary of Regression Analysis for variables predicting paternal-fetal Attachment.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.282a	0.079	0.074	5.6778	0.079	14.147	1	164	0
2	.381b	0.145	0.135	5.4882	0.066	12.53	1	163	0.001
3	.403c	0.163	0.147	5.4487	0.017	3.369	1	162	0.068
4	.423d	0.179	0.159	5.4109	0.017	3.272	1	161	0.072

a Predictors: (Constant), Relationship Satisfaction

b Predictors: (Constant), Relationship Satisfaction, Weeks Pregnant

c Predictors: (Constant), Relationship Satisfaction, Weeks Pregnant, Age

d Predictors: (Constant), Relationship Satisfaction, Weeks Pregnant, Age, Ethnicity

Note: The dependant variable is the Paternal Antenatal Attachment Scale (PAAS).

Table 8

Coefficients summary of Stepwise forward Multiple Regression Analysis for PAAS total

Model		Unstandardized Coefficients		t	Sig.
		B	Std. Error		
1	(Constant)	60.88	1.123	54.196	0.001
	Relationship Satisfaction	-3.087	0.821	-3.761	0.001
2	(Constant)	57.56	1.435	40.112	0.001
	Relationship Satisfaction	-3.319	0.796	-4.17	0.001
3	Weeks Pregnant	0.15	0.042	3.54	0.001
	(Constant)	63.36	3.466	18.278	0.001
	Relationship Satisfaction	-3.266	0.791	-4.129	0.001
4	Weeks Pregnant	0.157	0.042	3.713	0.001
	Age	-0.193	0.105	-1.835	0.068
	(Constant)	62.863	3.453	18.204	0.001
	Relationship Satisfaction	-3.299	0.786	-4.2	0.001
	Weeks Pregnant	0.154	0.042	3.663	0.001
	Age	-0.194	0.105	-1.855	0.065
	Ethnicity	0.281	0.155	1.809	0.072

Note: The dependant variable is the Paternal Antenatal Attachment Scale (PAAS).

The results of the regression analysis indicated that after all other variables have been entered into the regression model, relationship satisfaction and the number of weeks pregnant (Model 2) was the most significant model for predicting paternal-fetal attachment scores, $\beta = -3.319$, $t(4.17)$, $p=0.001$. Model 2 which included relationship satisfaction and the number of weeks pregnant gave the most significant model for explaining the variance in paternal-fetal attachment scores as measured by the PAAS, $R^2=0.079$, $F(2, 164) = 13.836$, $\beta = -3.299$, $t(-4.200)$, $p=0.001$. The multiple correlation coefficient in this model was .57, which could explain approximately 8% of the variance of the PAAS $R^2=0.179$, $F(4,161) = 8.789$, $p=0.001$.

Further in depth analysis of borderline results were also considered such as age of father ($p=0.065$) and ethnicity ($p=0.072$) which is demonstrated in Model 4 of Table 8, $\beta = -3.299$, $t(-4.200)$, $p=0.001$. The multiple correlation coefficient in this model was .62, which increased the variance of the PAAS score which could be explained by this model to approximately 17%. $R^2=0.179$, $F(4,161) = 8.789$, $p=0.001$.

Additional Analysis of Interest

During the correlational analysis for research question one, significances were noted for relationship satisfaction and fetal attachment levels. A further correlation was considered to see if relationship satisfaction was correlated with anxiety and depression scores. Visual and statistical methods were considered and the data for relationship satisfaction did not meet parametric assumptions, therefore a Spearman's correlation was used (Please see Appendix W). A significant negative relationship was found between relationship satisfaction for both anxiety, $r(166) = -0.209$, $p=0.007$) and depression scores, $r(166) = -0.205$, $p=0.008$ (Please see Appendix X).

Summary of Results

Research Question 1: Which demographic and socioeconomic variables correlate with paternal-fetal attachment levels in expectant fathers within the UK?

Significant correlations were found between relationship satisfaction and paternal-fetal attachment levels.

Research Question 2- Which mental health variables correlate with paternal-fetal attachment levels in expectant fathers within the UK?

Anxiety and depression scores were found to be significantly correlated to each other however they did not correlate with fetal attachment levels. When the fetal attachment score was divided into the two attachment subcomponents, anxiety was found to have a positive correlation with the amount of time expectant fathers spent in attachment mode and depression scores were found to have a negative correlation with the quality of attachment.

Research Question 3: Which variables regarding the pregnancy correlate with paternal-fetal attachment levels of expectant fathers within the UK?

The gestation of pregnancy in weeks was significantly correlated with fetal attachment levels.

Research Question 4: Which variables in expectant fathers will predict the paternal-fetal attachment to the unborn child?

Regression analyses indicated the best predictors for fetal attachment levels were relationship satisfaction and number of weeks pregnant, which could explain approximately 7.9% of the variance in the PAAS scores.

Additional findings of interest.

Relationship satisfaction was found to significantly correlate with both anxiety and depression levels in expectant fathers.

Post Hoc Power calculation

A post hoc power calculation was run on G*Power (Version 3.1.9) package to see if the power had been achieved within this study based on the sample size. This analysis produced a ρ H1= 0.7 with a 0.05 error probability. This meant the study achieved 70% power with a medium effect size for the dependant variable (paternal-fetal attachment measure). The statistical output and visual model of this analysis can be found in Appendix Y.

Consultation of results with expectant fathers

The preliminary results were discussed with expectant fathers who had consulted on the study so far. Expectant fathers felt relationship satisfaction was a key element in the relationship with their unborn child. They commented if they were enjoying the relationship, they were likely to enjoy the pregnancy more, seeing the baby as an extension of the mother. Equally, the expectant fathers (some of whom by this point were fathers) commented on how having a baby put their relationship to the test and if this was unsteady, this was likely to impact on their experience of fatherhood.

Many of the expectant fathers (who at this point of writing were now fathers) commented on how their feelings towards the baby grew throughout the pregnancy and how they felt more anxious as the birth became more imminent. Many of these fathers said they spoke to other males who were fathers about this, but few shared these worries with their partners. In light of this, the expectant fathers consulted with were not surprised that anxiety

or depression appeared to not significantly impact on the relationship to the unborn baby. They commented if they had concerns that they may be anxious or depressed, they would want better for their child's future and therefore this could heighten their feelings of attachment (although this was not indicated in the results).

When explaining that the overall sample had relatively few fathers who scored clinically for anxiety or depression, many of the fathers were surprised as the questionnaire was anonymous. Some expectant fathers did however comment that they felt low at times when things felt out of their control regarding the pregnancy, particularly if there were concerns regarding the health of their unborn baby or their partner.

Reflections

As my participant numbers increased, my assumptions that expectant fathers would be 'too busy' to complete such questionnaires was challenged. My assumption appeared to fit with stereotypical views that fathers were the breadwinners, earning for their families and perhaps I had a subconscious bias that fathers would not be interested in completing questionnaires about pregnancy. The number of responses challenged my assumptions about how much involvement fathers would have around pregnancy.

As recruitment progressed, I was so surprised with the response rate. I wondered about the expectant fathers completing the survey and how many of my sample were 'anxious' first time fathers. These thoughts again challenged my thinking, presuming that anxiety may be a driving force in taking part in such research as opposed to fathers who were simply keen to learn about their upcoming role. My presumptions were likely to be reflective of those of other people which in turn has led to perinatal services to be devised towards women. Many fathers who completed my survey passed on the survey to other fathers and commented they were glad research during pregnancy was being looked at for them. There

appeared a sense of community. I was so touched at their willingness to help, but also felt a sense of responsibility that my research could represent the views of expectant fathers and challenge pre-existing stereotypes.

Analysis of the data however, was initially disappointing for me. The lack of significant correlations amongst my variables and paternal-fetal attachment levels left me somewhat deflated. I found myself feeling more frustrated that I had not included more variables in my initial design thinking 'I must have missed something' and running further tests which took a significantly longer than I had anticipated. I wanted my analysis to be honest, but also to 'feel' like I had discovered something new or novel.

Due to my disappointment in the lack of significant correlations amongst the psychological variables, I noticed my motivation for writing appeared to slow upon discovery of my findings. This may be in part due to my relationship with statistics in general, but I wonder how much this discovery impacted on the overall writing of this chapter? At times it felt very procedural writing this chapter, very different to my other chapters which I enjoyed writing which felt easier.

Upon liaising with expectant father consultants and thinking about what these results meant clinically, I wondered about the expectant fathers who had not completed or dropped out of my study. In hindsight, I wished I had incorporated a way of capturing some of these demographics before participants had dropped out. I wondered what these results said about the participants who started but did not complete.

The lack of significant findings between the mental health variables and attachment forced me to reflect on my perceptions that fathers who may be struggling with mental health difficulties are able to put these feelings aside for their upcoming baby. This finding did not wholly fit with my clinical experiences of working with parents over the years. Instead, my

results indicated the biggest predictor for fetal attachment levels appeared to be relationship satisfaction with their partner. Systemically, this did makes sense, however the process made me question my epistemological position of capturing such complex feelings within a quantitative methodology.

Discussion

Outline of discussion section

This study aimed to investigate the correlates of anxiety, depression and the paternal-fetal attachment towards the unborn baby in expectant fathers. The aim of this chapter is to re-orientate the reader to these aims of this study and discuss the results in turn. The study had an overall aim with three subsections and these are discussed in order of the findings. Additional findings of interest will also be discussed. The findings will then be discussed in terms of synthesising the existing literature and relevant psychological theory.

This study will also be evaluated in terms of quality using the CASP criteria used within the main body of this study. This will lead into highlighting the strengths and limitations of this study which will be explored in detail. The discussion will then consider the clinical implications of this study and recommendations for future research. Finally, a summary of my reflections on this section will be presented.

Discussion of findings

Research questions

The overall aim of this study was to investigate which variables correlate with paternal-fetal attachment levels in expectant fathers within the UK. More specifically, are there particular correlates or levels of fetal attachment associated with the sociodemographic variables of the fathers' mental health variables of the fathers or variables related to the pregnancy.

Research question 1- Which demographic and socioeconomic variables correlate with paternal-fetal attachment levels in expectant fathers within the UK?

Age.

Within this study, age of the expectant father did not appear to significantly correlate with fetal attachment levels. This finding appears consistent with previous research as the scores of the PAAS during pregnancy within this study were comparable to an Australian sample which had similar participants in terms of age (Habib & Lancaster, 2006; 2010). Possible explanations for the lack of association amongst age and attachment levels may be due to attributes that come with age, will vary for individuals. For example, the fathers within this study were mostly married and were highly educated and presumably more financially stable and therefore less socially disadvantaged. However, the age at which men achieve their education and financial stability will vary for individuals. This assertion has been supported in findings of teenage fathers when compared to control groups of non-teenage fathers which showed a higher number of unplanned pregnancies and greater social disadvantage (Quinlivan & Condon, 2005). In contrast, studies suggest older fathers are more likely to be highly involved during pregnancy and older fathers also report less unwanted pregnancies (Cooksey & Craig, 1998; (Pulley, Klerman, Tang, & Baker, 2002). The group of fathers in this study were largely similar in terms of being married and levels of education and accordingly although these attributes this can vary with age, it did not appear to be associated with fetal attachment levels.

Relationship satisfaction.

A significant positive correlation was found between relationship satisfaction and paternal-fetal attachment levels. It should be noted however, this finding should be treated with caution as only one question was used from the RAS which is likely to have reliability and validity implications. The correlation found within this study does however appear to support with previous findings from outside the UK which suggest that relationship

satisfaction plays a significant role within the attachment relationship to the unborn child (Ahlqvist-Björkroth et al., 2016; Condon 2007; Condon et al., 2004; Condon et al., 2013). This finding also appears consistent with research that suggests expectant fathers who have conflicts in their relationships can have difficulties in developing their role as a father and have an adverse impact on the attachment towards their infant (Genesoni & Tallandini, 2009). Theoretically, this is explained by the dynamics of the marital relationship and the quality of this relationship being important for the construction of the coparental relationship (McHale, 1995). Therefore, those with a good marital relationship are likely to be more attached to their child. Although this finding appears suggestive of relationship satisfaction being an area of potential importance, the conclusions which can be drawn are limited due to relationship satisfaction being reduced to a single question. Use of the full RAS measure in future studies will add to the reliability and validity of this finding.

Luz et al. (2017) found paternal attachment was strongly predicted by marital quality, attachment to their own parents and maternal antenatal attachment. Although the maternal antenatal attachment or adult attachment was not measured in this study, the synthesis of the indication that relationship satisfaction may be important within this study alongside other research appears to support the notion that the paternal-fetal attachment may be intergenerational based on individual (our own attachments to parents) and dyadic attachment (relationship quality) processes based on the underlying mechanisms of relationship attachments in general (Luz et al., 2017). Further longitudinal research is needed into these processes prior, during and after pregnancy using the full RAS measure.

Ethnicity.

Fetal attachment scores were not found to differ significantly amongst the ethnicity groups within this study. It should be noted however, 75% of the sample in this study were White British and low numbers in the remaining groups may have been unlikely to show a statistical difference. Therefore, this finding needs to be treated with caution. Previous research suggests parenting can vary amongst different ethnicities and cultures (Hofferth, 2003; King et al., 2004). The PAAS scores within this study were comparable to those conducted outside of the UK (Condon et al., 2004; Habib & Lancaster, 2010).

Education and employment.

Fetal attachment levels were not found to differ significantly by reference to the education and employment variables of expectant fathers. In relation to previous studies, some studies have found higher 'involvement' in their infants amongst fathers who have higher levels of education (Volling & Belsky, 1991). In parallel, fathers who have low poverty status and are unemployed have been found to have decreased levels of paternal involvement (Pleck, 1997). These studies were however conducted postnatally, so it is unclear of their impact prenatally. It is noted that the sample within this study were a homogenous group of well-educated and employed expectant fathers and therefore the lack of findings could also be explained by a lack of variability within the data sample.

First Time fathers.

No significant difference was found between first time fatherhood status and attachment levels. This finding is in keeping with previous research which also found no significant differences in attachment scores between first time and again fathers (Ferketich & Mercer, 1995). Explanations for this finding are likely to be due to a father's relationship

with their children being unique to the individual child but not dissimilar for those fathers who had already experienced a previous pregnancy. It should be noted however, only 8% of the sample were second time fathers in this study therefore the nonsignificant findings could be explained by small sample numbers and should be treated with caution.

Research Question 2: Which mental health variables correlate with paternal-fetal attachment levels in expectant fathers within the UK?

Anxiety, depression and attachment.

Within this study, no significant associations were found between attachment levels and anxiety or depression levels. No significant differences were found in fetal attachment levels amongst anxiety and depression caseness when the variables were categorised into high or low or normal to severe categories either. These findings suggest within this study that neither anxiety nor depression were found to significantly associate or differentiate with fetal attachment scores. This finding was contrary to previous research which suggests fetal attachment levels can be negatively influenced by depression and anxiety (Condon & Corkindale, 1997, Hart & McMahon, 2006). It is also contrary to findings that lower anxiety and depression levels are associated with higher prenatal attachment (Vreeswijk, Maas, Rijk & Bakel, 2013). There are two possible explanations for these findings.

Firstly, only 10% of the sample scored within the moderate or severe range for anxiety and only 24% were considered at high risk of depression. This suggests the majority of participants within this sample were not within the clinical range for anxiety or depression. Therefore, the lack of association between anxiety/depression scores may be due to these variables not being clinically high and therefore not showing an association with the fetal attachment bond. The data did suggest a slight negative correlation between depression scores and attachment levels but this was not significant at the 0.05 level. A significant

amount of psychological adjustment is required during pregnancy as men prepare to become fathers. During this process, psychological effort is required and therefore anxiety or depression can interfere with the process (Matthey, Barnett, Ungerer & Waters, 2000). It has been shown in studies of mothers who have high levels of perinatal anxiety or depression that they tend to hold more negative cognitive biases towards their infant (Pearson, Lightman, & Evans, 2011). Therefore within this study, because symptoms of anxiety or depression were relatively low, this was not found to be significantly associated with fetal attachment levels.

Anxiety and depression levels seem to peak at mid pregnancy (Buist et al., 2003; Condon et al., 2004). The majority of this sample (n=72) completed the survey during this period (2nd trimester) which according to research is the most vulnerable time in terms of mental health difficulties. Therefore, it would appear of the sample of expectant fathers who took part in the research, if they were clinically significant in terms of their anxiety and depression levels, this would have shown.

The findings of no significant correlation between anxiety and depression and fetal attachment levels may be supported by the significant association found in this study between relationship satisfaction and attachment levels. Previous research has suggested that partner support may act as a buffer to symptoms of anxiety or depression and hence the adjustment process (van den Berg & Simmon 2009). Therefore within this sample, because relationship satisfaction was found to correlate with fetal attachment levels, this may suggest the high level of relationship satisfaction may have acted as a form of protective factor for anxiety and depression levels.

Anxiety and depression comorbidity.

Consistent with previous findings, this study showed anxiety and depression levels were significantly correlated in the perinatal population (Field, Diego, Hernandez-Reif,

Schanberg, Kuhn, Yando & Benell, 2003; Heron, O'Connor, Evans, Golding & Glover, 2004; Meades & Ayers, 2011; Littleton, Breitkopf & Berenson, 2007; Austin, Tully & Parker, 2007). The global impact of anxiety and depression during the prenatal period has also been shown for fathers (Boyce et al., 2007; Matthey et al., 2003).

Equally, the high correlation amongst anxiety and depression levels is consistent with research outside of the pregnancy window (Kennedy, Schwab, Morris & Beldia, 2001). As this study did not include a baseline measure of these symptoms prior to pregnancy, it could be argued that fathers are not at greater risk of mental health difficulties within the pregnancy period than any other.

Conversely, the overlap of anxiety and depression symptoms in pregnancy as found in this study has also been reported as a risk factor for postnatal depression (Heron et al., 2004). Therefore, although a significant correlation was not found in this study towards anxiety and depression levels and attachment levels towards the unborn child, for those who did score highly on the anxiety and depression measures prenatally, they are likely to be at greater risk for mental health difficulties after the baby is born. Further longitudinal studies are needed in relation to expectant fathers to substantiate this finding. This finding of comorbidity between anxiety and depression highlights the importance for screening fathers as well as mothers, but also for using separate measures as symptoms can overlap.

Previous mental health experience and accessing services.

A significant difference was found in fetal attachment levels was found between expectant fathers who did and did not have previous experience of mental health issues. More specifically, fetal attachment scores were statistically higher amongst those fathers who had experienced major health difficulties, than those fathers who had experienced minor mental health difficulties but not statistically different against fathers who had not previous

mental health experience. This finding is inconsistent with the 'accessed mental health services' variable within this study which showed no statistical difference amongst fetal attachment scores compared to those who had not accessed mental health services.

Interestingly, there was a similarity in those who reported they had previously accessed mental health services (in which we can presume their difficulties will have scored clinically in order to access these services) and the number of fathers scoring clinically for anxiety or depression. This finding for expectant fathers does appear consistent with previous research in that expectant fathers who have previous histories of mental health problems are more vulnerable to experience the same difficulties during the prenatal period (Areias, Kumar, Barros, & Figueiredo, 1996). Additional statistical analysis also supported this finding as fathers within this study who had had experience of mental health difficulties and those who has accessed mental health services had significantly higher scores for both anxiety and depression than those who did not. Despite this finding in the continuity of previous experience of mental health difficulties, this did not appear to be significantly associated with fetal attachment levels.

A possible explanation for this finding is that the term 'experienced mental health issues' was too vague and therefore the variable tells us little about actual clinical (as would be defined by clinical measures) experiences. It is also possible that some fathers may have experienced major difficulties and not accessed services. In addition, there is an under-diagnosis of depression in men due to the language used in the diagnostic tools (Robertson & Baker, 2017). The statistical difference between the 'major' and 'minor' experience however, may warrant further investigation of fetal attachment levels amongst parents who have had severe mental health difficulties that may have required inpatient admission.

Another possible explanation is that the group of fathers who had experienced major mental health difficulties over-reported on their attachment scores. Previous research has noted the attachment construct for fathers is focused on the future of the baby and what their role as a father may be (Seimyr, Sjögren, Welles-Nyström, & Nissen, 2009). This finding, alongside the usually negative stigma attached to mental health, may have caused those fathers who had experienced major mental health difficulties to overcompensate and produce socially desirable scores on the fetal attachment measure.

Although prenatal scores for anxiety and depression have been shown to be the strongest predictor for postnatal scores (Leigh & Morgan, 2008; Paulson & Bazemore, 2011) they do not determine future outcomes (Burgess, 2011). Therefore, previous mental health experience or accessing mental health services may not have been significant in fetal attachment amongst this group of expectant fathers. Matthey et al. (2003) found no correlation amongst men who had a history of mental health problems and the development of postnatal depression in men. Although this study was correlational, and looked at prenatal effects, it does suggest there may not be a relationship between men's previous mental health difficulties and mental health during the pregnancy period. The findings of this current study appear to concord with Matthey et al. (2003) findings as previous mental health experience (or current as measured by the EPDS and GAD-7 in this study) were not found to significantly relate to fetal attachment levels.

Research Question 3- Which variables regarding the pregnancy correlates with paternal-fetal attachment levels of expectant fathers within the UK?

Gestation.

A significant positive correlation was found between fetal attachment levels and the gestation (weeks) of the pregnancy. This finding is consistent with previous research that

attachment levels increase throughout the pregnancy (Habib & Lancaster, 2010). The increase in attachment scores appears to be explained by fathers becoming increasingly focused on their unborn child by the third trimester (May, 1982). This pattern is consistent with fathers' reported experiences throughout the pregnancy which suggest ambivalence during the first trimester and the pregnancy becoming 'real' approaching the birth (Lemmer, 1987). Cognitively therefore, fathers may conceptualise the fetus as becoming human closer to the birth and hence the increase in attachment.

Planning of pregnancy and fertility status.

Fetal attachment levels did not differ significantly depending on the whether the pregnancy was planned, left to chance or not planned. This suggests regardless of the planning of pregnancy, fetal attachment levels were similar. Bouchard (2011) reported in planning of pregnancy appeared to benefit fathers in terms of prenatal attachment however, this was not shown in the present study. In terms of pregnancy planning demographics, the proportion of planned, left to chance and unplanned pregnancies were similar to that in Condon et al. (2013) study suggesting this sample was not unusual.

In keeping with planning of pregnancy, the mode of conception (fertility status) did not appear to be significantly associated with attachment levels suggesting that fathers showed similar attachment levels to their infants that were conceived naturally or via IVF. This finding is consistent with previous studies which also concluded that the mode of conception was not associated with prenatal attachment scores (Hjelmstedt et al., 2006; McMahon, Ungerer, Beaurepaire, Tennant & Saunders, 1997). It should be noted, however, that some authors have argued parents of IVF babies may experience elevated attachment towards their babies (Lind, Pruitt & Greenfeld, 1989). Explanations for this appear to be due to the pregnancy being actively planned and perhaps after unsuccessful attempts there is a high psychological investment towards the baby (Lind et al., 1989). The low percentage of

expectant fathers whose child were conceived via IVF in this study (11%) would have been unlikely to show such distinctions.

One may assume that planned babies or babies conceived via IVF have already been considered by the parents as being part of the future family unit. For pregnancies where babies are unplanned, one could argue this may extend or heighten the process of adjustment that occurs throughout pregnancy as they have not planned the transition from the outset. Overall, as planning of pregnancy or mode of conception did not appear significant in terms of fetal attachment levels, these findings would appear to support the assertion that once a pregnancy is confirmed, fathers scores similarly in terms of prenatal attachment regardless of how the child was conceived or whether the pregnancy was planned (Habib & Lancaster, 2010).

Attending antenatal scans and appointments.

No significant differences were found in fetal attachment scores between those fathers who did or did not attend antenatal appointments or scans. This finding is consistent with previous research that ultrasound examinations do not appear to enhance fetal attachment for fathers (Righetti et al., 2005). Prenatal involvement such as attending scans or antenatal appointments may indicate fathers have an interest in their child and the desire to become a father (Mann, 1995). Despite this assertion, no significant differences were found in fetal attachment levels regardless of the father's prenatal involvement within this study. This finding appears to support research which suggests the links between prenatal behaviours and prenatal attachment are mixed (Abma & Mott, 1994). It would appear attending scans may serve a function for fathers in terms of enhancing their transition to fatherhood and aiding with the adjustment process (Draper, 2002). In terms of attachment however, this does not

appear to show a statistical difference and does support the finding that attachment remains relatively stable throughout the pregnancy period (Condon et al., 2004).

This finding does appear surprising given the consultation with expectant fathers who reported their feelings towards their unborn child changed after the scan and antenatal appointments. It was noted that 19% of the sample in this study were in the first trimester, of which antenatal and scan appointments are not offered. When the statistical analysis was re-done excluding the first trimester as a variable, the results of no significant comparisons between these variables and attachment remained the same.

Experiences of pregnancy and complications.

No statistical differences were found between fetal attachment levels based on the fathers' own experiences of pregnancy. Qualitative studies of the experiences of expectant fathers report feelings of exclusion regarding the pregnancy and the focus being on the mother (Deave & Johnson, 2008). It is possible therefore that regardless of the fathers' experience of pregnancy, they see their experiences as being detached in comparison to the mother and therefore not affecting the attachment with the fetus. These experiences are notably different for mothers during pregnancy as their attachment cognitions are focused on health concerns for the baby which is more likely to influence their attachment (Seimyr, Sjögren, Welles-Nyström, & Nissen, 2009).

No statistical differences for fetal attachment scores were found between fathers who did or did not report any complications during the pregnancy. This finding contrasts with previous research which showed a difference in fetal attachment levels of high risk pregnancies (Pisoni et al., 2016). It is recognised that the term 'complications' can be interpreted many ways and some may have answered in relation to the pregnancy itself.

Further statistical analysis found the father's experiences of pregnancy and complication status appeared significant with prenatal behaviours such as attending antenatal appointments rather than attachment. This finding may be explained by previous research that fathers who experience a 'typical' pregnancy in terms of attending scans or appointments have more information about the pregnancy and feel more in control (Diemer, 1997). This process (if no complications are identified by professionals) may signify a straightforward and 'easy' pregnancy to fathers. This assertion is also supported by similar percentages within the sample who reported complications during the pregnancy (16%) those who reported their experience of pregnancy as being difficult (19%) and those who had previous experience of loss or miscarriage (18%).

Previous prenatal loss.

No statistical differences for fetal attachment scores were found between those fathers who had and had not previously experienced any previous prenatal losses. This finding contrasts with previous research which has shown previous loss to impact on the prenatal attachment with their subsequent unborn child (Armstrong, 2004). Furthermore, Armstrong (2004) noted for fathers, the greater the impact of their previous loss, the greater their prenatal attachment to the current pregnancy. Although this study did account for previous loss or miscarriage, it did not measure the nature, frequency or timings of these losses. Previous research on mothers who have experienced multiple previous losses has suggested that prenatal attachment decreases as their anxiety increases which may serve as a form of protection which allows them to distance themselves from the hurt of another potential loss (Armstrong & Hutti, 1998). This may suggest that a father's prenatal attachment levels would vary depending on the nature of previous losses and the timeframe between these losses. Within this study, no differences were found in attachment between those who had

previously experienced loss. The psychological impact however of these losses, is clear within research (Armstrong, 2001; 2004; McMahon et al., 1997). Research into the variables surrounding previous perinatal losses and the potential impact on the developing attachment relationship warrants further investigation.

Research Question 4: Which variables in expectant fathers best predict the paternal-fetal attachment levels to the unborn child?

The results of the stepwise multiple regression analysis suggests relationship satisfaction was the strongest predicting variable in the stepwise regression model. This is consistent with previous studies that have identified this variable as key in the attachment relationship towards the unborn child (Ahlqvist-Björkroth et al., 2016; Condon et al., 2013). Within this study, relationship status and gestation produced the statistically significant model to predict fetal attachment score in expectant fathers which explained 7.9% of the variance. These findings also appear consistent with research that attachment levels increase throughout pregnancy (Habib & Lancaster, 2010).

The quality of the partner relationship and gestation of the pregnancy appear powerful influences in terms of prenatal attachment within fathers. Theoretically, a father's ability to develop the relationship with their unborn child appears associated with the attachment to their partner. This finding appears consistent with the concept of individuals having internal working models of attachments which is informed by the parenting we ourselves received (Bretherton, 1987). Further studies have also shown a clear link between adult attachment classification and the quality of prenatal attachment giving rise to the idea that prenatal attachment is intergenerational (Bouchard, 2011, Luz et al., 2017). This study appears to support these assertions and highlights the important influences of the quality of the partner relationship on fetal attachment levels.

It is noted previous studies have shown that relationship satisfaction can vary amongst partner throughout the pregnancy (Belsky & Rovine, 1990; Cox, Paley, Burchinal & Payne, 1999; Hjelmstedt, Widström, Wramsby, Collins, 2003). Further longitudinal studies designed to measure relationship satisfaction and attachment levels across time points throughout the pregnancy and beyond are likely to substantiate these findings further.

Borderline results within the regression modelling were also considered. It is noted that age and ethnicity were almost statistically significant. It is possible with a greater sample number these would have appeared significant variables for predicting paternal-fetal attachment. Further research into these variables is needed in future studies.

Additional findings.

A significant negative correlation was found between relationship satisfaction for both anxiety and depression levels. This suggested the greater the relationship satisfaction, the lower the scores on the anxiety and depression measures and visa versa. This finding is consistent with previous research which suggests the quality of the partner relationship can have a strong influence on the psychological wellbeing of the expectant father (Condon et al., 2004).

It should be noted however, this association does not conclude that psychological distress is a consequence of poor relationship satisfaction or whether psychological distress contributes to poor relationship satisfaction. As this study did not include baseline measures prior to the pregnancy period, it is also unclear the extent of how pregnancy process may contribute to these variables.

The significant negative correlation between relationship satisfaction and the anxiety and depression measures may also provide suggestions as to why no significant correlations were found amongst these measures and the prenatal attachment in this group of fathers. All

participants in this study were either married to or in a relationship with, the mother carrying their unborn child. Alongside this, there was a low number of expectant fathers scoring clinically for anxiety or depression. Research suggests marriage is associated with improved physical and mental health (Koball, Moiduddin, Henderson, Goesling & Besculides, 2010). In this regard, it could be considered that marriage or being in a stable relationship can act as a protective factor in terms of mental health. Hence, because the majority of fathers in this study considered themselves to be satisfied in their relationships this may have reduced psychological symptoms which did not impact on the fetal attachment and therefore no association was found. Further research is needed amongst expectant fathers who do score clinically for anxiety or depression to substantiate this assertion.

Circumstances around the pregnancy are also likely to impact on these variables. Although causality cannot be inferred due to other circumstances around the pregnancy, given the consistency of findings within this research amongst attachment levels, it appears that relationship satisfaction is a key variable in anxiety, depression and fetal attachment levels and warrants further investigation.

Clinical implications

The findings of this study suggest relationship satisfaction amongst expectant fathers may be an important area to investigate further with regard to fetal attachment levels towards their unborn child. It may be helpful for perinatal services to consider relationship concord when working with mothers and fathers as it may be a potential complication in forming the optimal fetal attachment relationship possible. Further investigation of the marital concord using the full RAS measure would increase the reliability and validity of this finding and

could provide further insight into the association between relationship satisfaction and the paternal-fetal attachment towards the unborn infant. Many interventions for couples' relationship difficulties exist, however the findings of this study suggest these interventions could potentially enhance paternal attachment and improve the long term outcomes for children.

This study highlights midwives need to be asking expectant fathers as well as mothers about their mental health. NICE (2014) guidelines recommend that a general discussion regarding mental health and wellbeing takes place for women throughout their pregnancy and the early postnatal period and yet identification of these difficulties is reported to be as low as 50% (Hearn et al., 1998; NICE, 2014). This finding suggests even when asked, identification of mental health difficulties is either underrepresented or missed. There are currently no NICE guidelines in place to ask about paternal mental health and as a result, neglecting their care may trigger illness for the mother or reduce the effectiveness of treatment (NICE, 2015 briefing paper). Particularly as mothers are more likely to turn to and receive support from their partner than any other individual including medical staff (Holopainen, 2002). This study demonstrated prenatal measures can be used effectively with fathers in order to develop research further into the wellbeing of them and the attachment relationship to their unborn child during their partners' pregnancy.

Although this study did not find an association between anxiety and depressive symptoms and the paternal-fetal attachment relationship, it did demonstrate a high correlation between the two. Therefore, fathers who score clinically for depression, are likely to score for anxiety and visa versa. This study supported findings that separate screening measures should be used to ensure that symptoms are not missed. Particularly as fathers may display depression and anxiety symptoms differently to mothers and therefore wider measures such as alcohol intake should be considered (Waterson, Evans & Murray-Lyon, 1990). Adult

mental health services need to be aware of these factors and routinely asking if males are about to become an expectant father as this may inform the interventions offered.

This sample within this study who scored clinically for anxiety or depression was low. Although this may be the case, this study highlights the potential difficulties in assessing the psychological needs of fathers. Language is a key when discussing mental health with men and professionals need to be aware of how commonly used terms may be interpreted differently for men as opposed to woman (Stein, 2018). This study indicated prenatal measures for psychological wellbeing and attachment can be used effectively with fathers. However, this study also highlighted that expectant fathers may under-report their symptoms or give socially desirable answers and therefore, clinical judgement should be used in conjunction with clinical measures. If attachment and wellbeing measures are used routinely within perinatal services, this will validate and substantiate findings.

In terms of prevention, this study shows the potential for the pregnancy window as an opportunity to intervene in terms of creating positive physical and mental wellbeing outcomes. Fathers who have poor mental health during the antenatal period is consistent with a lack of wellbeing postnatally (Buist et al., 2003; Condon et al., 2013). Therefore, the fathers in this study who did score clinically for anxiety and depression are likely to remain in this classification postnatally and early identification is likely to lessen adverse outcomes. Early identification of these fathers during the pregnancy period is also likely to have wider health benefits as the unborn child is an influential driving force in men's motivations to make lifestyle changes such as stopping smoking (Edvardsson, Ivarsson, Eurenus, Garvare, Nyström, Small & Mogren, 2011). Routine antenatal appointments are commonly directed at mothers, however if father's can be encouraged to attend and complete the measures within this study, the potential benefits are vast.

If more attention can be paid to fathers' mental health in the transition to parenthood, this is likely to benefit the men, their partners and their infants. The impact of father's depression symptoms during pregnancy has been found to correlate with excessive infant crying (van den Berg et al., 2009). Anxiety or depression in mothers during pregnancy can have a significant impact on their unborn child's cognitive and social development (Glover, 2014). With these potential outcomes in mind, the lack of systemic thinking within services appears to miss a unique opportunity to work in parallel to facilitate or protect a mother's mental health by working with and alongside fathers. This study indicates that if fathers are to contribute in preventing adverse outcomes, their own psychological and relationship difficulties should be recognised and met. The findings of the interface between prenatal attachment and quality of partner relationship highlights the need to identify and intervene prenatally for expectant fathers.

Consideration of the quality of the study

The quality of this study was considered using the same CASP (2017a, 2017b & 2017c) evaluation criteria as were used in the literature review. The strengths and limitations of the study can be found in Table 9 below.

Table 9

CASP Quality considerations for this study.

Limitations of this study	Strengths of this study
<ul style="list-style-type: none"> • Self-report measures used only- likely to be subject to social desirability • Relationship satisfaction was measured using only one question from the full RAS measure 	<ul style="list-style-type: none"> • Researchers own position clearly stated and considered throughout the study • Ethical issues were considered and addressed

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- The recruitment sources in which the data was collected was not clear
 - Number of participation refusals noted (although not considered further)
 - Homogeneity of sample, majority was highly educated and in full time employment
 - Some of the analysis effect sizes were small effecting the clinical significance and relevance of the study
 - Anonymous questionnaire design used limits social desirability bias
 - Validated measures used and further testing of the internal consistency of these measures included
 - Analysis included the testing of parametric assumptions.
 - A pre and post power calculation was conducted
 - The extent to which the results can be generalised was considered
 - The clinical implications of the study were considered and recommendations given

Limitations of the study

Following on from the general CASP (2017a, 2017b & 2017c) quality criteria used to assess this study, the limitations of the research were systematically detailed further. As this study is unusual in terms of the focus on expectant fathers within the UK, the results need to be considered within the context of the methodology and the general population.

Firstly, it is noted that the majority of the analysis of the data sample in this study was correlational. This type of data can only demonstrate associations between the variables and it would be dubious to suggest causation. The significant correlation found between relationship satisfaction and paternal-fetal attachment is also limited as this was measured using a single question taken from the full RAS measure (Hendrick, Dicke & Hendrick, 1988) which has implication in terms of the reliability and validity of this finding. The use of the full measure containing all seven questions would have improved this study. It is also possible the associations found in this study are a result of extraneous variables employing influence on both variables at the same time. For example, previous research has shown 33%

variance in mood state could be explained by personality because mood state can be affected by personality (Boyce et al., 2007). Although many sociodemographic, individual and environmental variables were considered in the methodology and results of this research, given the lack of attachment research involving fathers during the antenatal period, further investigations are warranted in this research area.

Secondly, it is acknowledged that the current data sample collected may not be truly representative and the voluntary nature of the recruitment may have led to a selection bias. Overall the participants in this study were a fairly homogenous group of white, well-educated and employed individuals. Expectant fathers who agreed to participate could have been those who presented with fewer anxiety and depression symptoms and were generally more satisfied with the experience of becoming a father compared to those who were particularly vulnerable may not have been likely to participate. Conversely, because the sample was fairly homogenous, this did enable a solid comparison amongst the variables. Further research is needed amongst expectant fathers who fall within the minority groups.

In addition, the cut-off scores for anxiety and depression only indicate the likelihood of a psychological disorder. The use of the categorical terms 'depression' and 'anxiety' when only levels of depressive, anxious and attachment were measured in this study is a limitation. The validity of any self-report measure depends on recalibration for the population under study (Geisinger, 1994). The EPDS has frequently been used within the male population. Although the GAD-7 is the recommended measure in NICE (2014) guidelines, with the exception of measures of pregnancy-specific worries or anxiety, no specific measures of anxiety have been developed for use in perinatal populations for males (Meades & Ayers, 2011).

At the date of writing, the GAD-7 has not been used in fathers during the prenatal period and was designed for use in generic samples. It does however, have the advantage of

being widely used within the male population which is helpful in terms of the cut-off scores. The GAD-7 data was slightly skewed in terms of distribution however the reliability coefficients were acceptable. The EPDS also has three items that measure anxiety and there was good consistency between these measures. The internal consistency and normality of the data from other questionnaires and the interrelationship between the measures suggested responses were reliable. It is however acknowledged, as with most screening instruments, that the measures of anxiety and depression used could have created a number of false positives (Gibson, McKenzie-McHarg, Shakespeare, Price & Gray, 2009). It is also acknowledged anxiety of depression symptoms may not be unique to the pregnancy period. Longitudinal studies that included baseline measures of these symptoms prior to the discovery of pregnancy would be an advantage.

Thirdly, this study used self-report measures which assumed expectant fathers would report their 'true' feelings. Although the online anonymous methodology has been found in the past to produce less socially desirable responses (Kiesler & Sproull, 1986) this bias cannot be eliminated. As highlighted by Condon, Corkindale and Boyce (2008) reporting negative feelings towards an unborn child is less socially acceptable than positive ones and therefore some fathers may withhold negative feelings. In hindsight, the nature of the study could be viewed as largely a health topic and therefore perhaps particularly vulnerable to socially desirable answers (King & Brunner, 2000). Inspections of the frequency distribution of the anxiety, depression and attachment scores were largely normally distributed suggesting the scores were largely representative for those who took part.

The decision to use self-report measures over more detailed measures such as interviews, was a pragmatic decision due to cost and time considerations of this study. In order to overcome social desirability bias, a social desirability scale could have been included in the questionnaires such as the 33-item Marlowe-Crowne Social Desirability Scale

(MCSDS (Crown & Marlowe 1960). A meta-analysis of 14,275 questionnaire based research studies concluded only 0.2% used a social desirability scale and 43% of the results were found to be influenced by socially desirable responses (van de Mortal, 2008). Although this statistic demonstrates the current study is not in the minority in terms of controlling for social desirability bias, it does demonstrate the potential impact on results.

Strengths of the study

A common criticism of research carried out with fathers is that it is limited because it relies on the mother's accounts of the father's intentions as a by-proxy method (Bronte-Tinkew et al., 2007). This current research was targeted specifically at fathers and they were evaluated in their own right therefore providing a shift in the research focus within the perinatal population.

The sample of this study was a community sample who had homogenous socio-economic status. Whilst this can be a difficulty in terms of overall generalisability with the rest of the population, it does allow for good comparisons within the results.

This study was prospective in design. Previous research with fathers have collected data of their pregnancy experience retrospectively (Hjelmstedt et al., 2003). Hindsight is likely to influence results.

Suggestions for further research

Within this study, measures were only taken at one time point for fathers during their partners' pregnancy. Administering the questionnaires at different points during the pregnancy may yield greater insight into the development of attachment throughout the pregnancy and to what extent the variables impact at critical points.

This study indicated an association between fathers' relationship satisfaction and their attachment towards their unborn baby and therefore this area warrants further investigation in future research. Further literature suggests that father's attachment to their baby is influenced by their own experiences of parenting (Bouchard, 2011). This is further supported by findings of stronger links between marriage and high quality parenting by social father's (i.e. step fathers), than biological fathers suggesting the harmony or discord within the marital relationship is a more significant factor than the biological ties or the attachment of that parent to their own parents (Berger, Carlson, Bzostek & Osborne, 2008).

These findings suggest a parent's capacity to form relationships and the mechanisms underlying these attachment processes in general may be central to the developing fetal attachment towards the next generation. A measure of the parents own attachment patterns would be a welcome addition in future research to substantiate this assertion. This would provide insight into which attachment patterns in fathers are associated with higher or lower fetal attachment levels towards their unborn infants. Theoretically, if an individual experiences difficulty with attachment and forming relationships based on their attachment to their parents, this is likely to continue with their later spouses and later again if they continue to have children (Farnfield, 2007). Future longitudinal research using the full RAS measure, a prenatal attachment measure and an adult attachment measure such as the Adult Attachment Interview (AAI, George, Kaplan & Main, 1985) would allow for analysis of all three of these relationship patterns to be compared alongside each other. This type of study would provide an insight into what extent these past and present attachment relationships may have on the future attachment towards the unborn child.

Although mental health difficulties may impact some father's prenatal attachment, this study suggests their ability to form attachments in general (i.e. to their partner) may be a greater risk factor than mental health. The findings of this study appear to suggest there are

important factors within an expectant couple's relationship and these need to be explored further to help understand the impact of attachment between partners to infants.

In order to examine more covert aspects of the paternal-fetal attachment relationship, biological and neurological variables as well as psychological variables should be studied. Studying these biopsychosocial markers in future research is likely to help in understanding the nature and underlying mechanisms of fetal attachment in expectant fathers further.

Final self-reflection

In writing this discussion section, I have been struck at just how significant relationship concord is to the developing relationship towards the unborn child. Although I felt initially disappointed about the lack of correlation in my data between mental health and fetal attachment due to my expectations, writing this discussion has helped me to conceptualise my findings. I feel pleased that my research has indicated a positive relationship between measures of an expectant father's wellbeing and that of their unborn child. Pregnancy appears to be a turbulent time for couples with emotions ranging from joy to exhaustion but it would appear that having a supportive partner and being happy within your relationship is not only important to the developing relationship with your unborn child but also may be a buffer to experiencing symptoms of anxiety and depression. I do feel however, the findings of my research leave me with many unanswered questions. What about the fathers who do experience poor mental health, how does this impact on their conceptualisation of their emerging role as a father and ultimately on how they develop their relationship to their unborn child? This still leaves me thinking that the fathers who may need support are perhaps unlikely to receive it. If a more global step could be taken (e.g asking fathers about their wellbeing during antenatal appointments just as mothers are) this could be a good start.

Writing this section has fuelled my initial passion for conducting this research. Work with fathers during pregnancy needs to be more inclusive. If we can support fathers in the right way from the outset of fatherhood, this will have significant consequences for our future generations. The pregnancy window appears such an important time to intervene before potential problems occur. This early intervention view appears lost amongst a currently financially-constrained NHS which makes me more passionate to publish my findings to highlight the potential long term clinical and financial benefits towards an early intervention model.

Conclusions

This research has indicated as the gestation of a pregnancy increases so does the fetal attachment relationship in expectant fathers. Anxiety and depression levels were not found to significantly correlate with fetal attachment levels however they were significantly correlated to each other, suggesting if an expectant father has symptoms of anxiety, he may also be likely to have symptoms of depression. Relationship satisfaction was also found to be significantly associated with paternal-fetal attachment levels suggesting fathers who are more satisfied with their relationship have a higher fetal attachment with their unborn child.

As there is very little research into the attachment relationship of expectant fathers towards their unborn baby during the prenatal period, these findings are important. Risk factors identified during pregnancy are often prevalent post birth therefore the implications of intervening prenatally appear vast (Buist et al., 2003; Condon et al., 2013).

The significant variables within this study have highlighted how perinatal services should be asking fathers about their relationship status and mental health in order to intervene early. This research has also shown evidence of the practicality of using self-report measures for father during the antenatal period in order to assess the attachment towards their unborn child. Given that relationship satisfaction was significant in terms of attachment, by antenatal

services addressing these difficulties with fathers during the prenatal period, this may not only improve outcomes for fathers but mothers and their infants also.

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Appendices

Appendix A: Search terms and Criteria used for each Database.

Pubmed= 264

((((paternal fetal attachment[Title/Abstract]) OR paternal fetal bonding[Title/Abstract]) OR paternal attachment[Title/Abstract]) OR parental attachment[Title/Abstract]) OR antenatal attachment[Title/Abstract]

CINHAL plus= 83

Paternal fetal attachment OR paternal fetal bonding OR paternal attachment OR parental attachment OR prenatal attachment OR antenatal attachment

Limiters - Peer Reviewed; English Language; Human

Search modes - Find all my search terms

Psych info= 46

Title: paternal fetal attachment *OR* **Title:** paternal fetal bonding *OR* **Title:** paternal attachment *OR* **Title:** parental attachment *OR* **Title:** antenatal attachment

Medline = 145

Paternal fetal attachment OR paternal fetal bonding OR paternal attachment OR parental attachment OR prenatal attachment OR antenatal attachment

Limiters - English Language; Human

Search modes - Find all my search terms

Scopus= 186

(TITLE-ABS-KEY (paternal AND fetal AND attachment) OR TITLE-ABS-KEY (paternal AND fetal AND bonding) OR TITLE-ABS-KEY (paternal AND attachment) OR TITLE-ABS-KEY (antenatal AND attachment)) AND DOCTYPE (ar) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SUBJAREA , "PSYC") OR LIMIT-TO (SUBJAREA , "SOC") OR LIMIT-TO (SUBJAREA , "NURS")) AND (LIMIT-TO (EXACTKEYWORD , "Human")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j")) AND (EXCLUDE (SUBJAREA , "ARTS") OR EXCLUDE (SUBJAREA , "BIOC") OR EXCLUDE (SUBJAREA , "PHAR") OR EXCLUDE (SUBJAREA , "AGRI") OR EXCLUDE (SUBJAREA , "BUSI") OR EXCLUDE (SUBJAREA , "COMP") OR EXCLUDE (SUBJAREA , "ECON")) AND (LIMIT-TO (SUBJAREA , "MEDI")))

Science Direct= 117

Journal search with words in abstract, title or keywords:

Paternal fetal attachment OR paternal fetal bonding OR paternal attachment OR parental attachment OR antenatal attachment.

Article types= Research articles

Appendix B: The results of inclusion and exclusion considerations of the 22 articles included in the review of the literature

(Note: articles in grey were those excluded after the CASP analysis).

Author	Article Title	Publication date
Ahlqvist-Björkroth, S., Korja, R., Junttila, N., Savonlahti, E., Pajulo, M., Riih�, H., & Aromaa, M.	Mothers' and fathers' prenatal representations in relation to marital distress and depressive symptoms	2016
Armstrong, D.	Emotional distress and prenatal attachment in pregnancy after Perinatal Loss	2002
Armstrong, D.	Impact of Prior Perinatal loss on subsequent pregnancies	2004
Beck, C. T.	Available instruments for research on prenatal attachment and adaptation to pregnancy	1999
Boyce, P, Condon, C, Barton, J, Corkindale, C.	First-time Fathers' study: Psychological distress in expectant fathers during pregnancy	2007
Bouchard, G.	The role of psychosocial variables in prenatal attachment: an examination of moderational effects	2011
Condon, J. T.	The parental-foetal relationship -a comparison of Male and female expectant parents	1985
Condon, J., Corkindale, C., Boyce, P., & Gamble, E.	A longitudinal study of father-to-infant attachment: antecedents and correlates	2013
de Cock, E. S., Henrichs, J., Vreeswijk, C. M., Maas, A. J., Rijk, C. H., & van Bakel, H. J.	Continuous feelings of love? The parental bond from pregnancy to toddlerhood	2016
Ferketich, S. L., & Mercer, R. T.	Paternal-Infant Attachment Of Experienced and Inexperienced Fathers During Infancy.	1995
Habib, C., & Lancaster, S.	Changes in identity and paternal-foetal attachment across a first pregnancy	2010
Hjelmstedt, A., Widstr�m, A. M., & Collins, A.	Prenatal attachment in Swedish IVF fathers and controls.	2007
Luz, R., George, A., Vieux, R., & Spitz, E.	Antenatal Determinants of parental attachment and parenting alliance: How do Mothers and Fathers Differ?	2017
Pisoni, C., Garofoli, F., Tzialla, C., Orcesi, S., Spinillo, A., Politi, P., ... & Stronati, M.	Complexity of parental prenatal attachment during pregnancy at risk for preterm delivery	2016

Righetti, P. L., Dell'Avanzo, M., Grigio, M., & Nicolini, U.	Maternal/paternal antenatal attachment and fourth-dimensional ultrasound technique: A preliminary report	2005
Schodt, C. M.	Parental-fetal attachment and couvade: a study of patterns of human-environment integrality.	1989
Seimyr, L., Sjögren, B., Welles-Nyström, B., & Nissen, E.	Antenatal maternal depressive mood and parental-fetal attachment at the end of pregnancy	2009
van Bakel, H. J., Maas, A. J. B., Vreeswijk, C. M., & Vingerhoets, A. J.	Pictorial representation of attachment: measuring the parent-fetus relationship in expectant mothers and fathers.	2013
Vreeswijk, C. M., Maas, A. J., Rijk, C. H., & van Bakel, H. J.	Fathers' experiences during pregnancy: Paternal prenatal attachment and representations of the fetus.	2014
Weaver, R. H., & Cranley, M. S.	An exploration of paternal-fetal attachment behavior	1983
Winter, C., Van Acker, F., Bonduelle, M., Van Berkel, K., Belva, F., Liebaers, I., & Nekkebroeck, J.	Depression, pregnancy-related anxiety and parental-antenatal attachment in couples using preimplantation genetic diagnosis.	2016
Yu, C. Y., Hung, C. H., Chan, T. F., Yeh, C. H., & Lai, C. Y.	Prenatal predictors for father-infant attachment after childbirth.	2012

Appendix C: Results of 22 papers assessed using CASP (2017 a, b & c) checklists

Author(s) and publication date	Negatives of research methodology	Positives of research methodology
Ahlqvist-Björkroth, S., Korja, R., Junttila, N., Savonlahti, E., Pajulo, M., Rähkä, H., & Aromaa, M. (2016)	<ul style="list-style-type: none"> • Turkish sample which may limit the generalisability of results • Fairly large sample size given the interview methodology. • Recruitment of participants clear. • Inclusion of the study was based on a self-report measure which may have produced socially desirable responses. • Study used measure that had a lack of validity criteria for use with fathers. 	<ul style="list-style-type: none"> • Research aims and hypothesis were clear. • Inclusion and exclusion criteria was clear. • Analysis strategy of the results was clear and detailed. • Interviews were videotaped and blind coded to reduce bias and interrater reliability results were given. • Clinical implications and recommendations given.
Armstrong, D.S. (2002)	<ul style="list-style-type: none"> • Kentucky sample only • Limited description of demographics • Attachment measure used for fathers was modified (but internal consistency was considered) 	<ul style="list-style-type: none"> • Mixed method methodology used • Recruitment methods clear • Good description of sample characteristics • External factors taken into account • Post hoc analysis included
Armstrong, D.S. (2004)	<ul style="list-style-type: none"> • Sample was self-selecting and not diverse, therefore generalisability may be limited • Data assumptions not stated. • Environmental variables not accounted for 	<ul style="list-style-type: none"> • Research aims clear • Recruitment methods clear • Validated questionnaires used • Internal consistency considered
Bouchard, G. (2011)	<ul style="list-style-type: none"> • Canadian sample only • Sample may not have been representative as they were recruited from a prenatal class. • Display of correlations in results does not clearly 	<ul style="list-style-type: none"> • Recruitment methods clear • Data analysis was performed separately for men and woman to account for non-independence.

	<p>define differences amongst expectant mothers and fathers.</p> <ul style="list-style-type: none"> • Findings of study focuses on the clinical implications for mothers. 	<ul style="list-style-type: none"> • Visual and statistical methods were considered prior to data analysis. • Results accounted and controlled for moderation variables within the analysis.
Condon, J. T. (1985)	<ul style="list-style-type: none"> • Australian sample only • Fathers were recruited via mothers which is likely to have created a sampling bias. • Information of those who dropped out of the study were not included • A power calculation was not included 	<ul style="list-style-type: none"> • Clear focused research question. • Factor analysis used was clear and detailed in findings section • Results of the study significantly contributed to the field of prenatal attachment in mothers and fathers
Condon, Corkindale, Boyce & Gamble (2013)	<ul style="list-style-type: none"> • Australian sample only • Samples only used first time fathers-therefore results may not been generalisable to fathers with multiple children. • Recruitment methods not clear as part of a wider study. • Justifications for statistical analysis not stated 	<ul style="list-style-type: none"> • Longitudinal study that covered pre and post birth outcomes. • Aims clearly stated • Large study • Objective and widely validated questionnaires used in the study • Detailed analysis of findings. • Clinical implications considered and recommendations for clinical practise given.
de Cock, E. S., Henrichs, J., Vreeswijk, C. M., Maas, A. J., Rijk, C. H., & van Bakel, H. J. (2016)	<ul style="list-style-type: none"> • Recruitment methods for participants were not clear • Instruments used for mothers and fathers contained different items • Self-report questionnaires were used which have led to socially desirable answers. 	<ul style="list-style-type: none"> • Research goals were clear • Objective measures were used. • Follow up of subjects was a sufficient time period in relation to the research question. • The statistical analysis and justifications for tests used was clear.
Ferketich, S. L., & Mercer, R. T. (1995)	<ul style="list-style-type: none"> • Aims of the study were not clear. 	<ul style="list-style-type: none"> • The attrition rate for the study was stated and reasons for dropout given.

	<ul style="list-style-type: none"> • Recruitment of participants was not clear. • Findings were based on self-report measures which may have biased results due to socially desirable responses. • Pregnancy variables were not accounted for in the results. • Optimal variable-to-subject ratios were not met within the regression analysis which limits the validity of the findings. 	<ul style="list-style-type: none"> • Psychological and environmental cofounding variables were accounted for in the design of the study.
<hr/> <p>Habib, C., & Lancaster, S. (2010)</p>	<ul style="list-style-type: none"> • Australian sample which may bias the results culturally. • Only included first time fathers-therefore results may have limited generalisability. • Recruitment was based on fathers who attended the antenatal clinics (self-selecting sample) which may have bias results. • Baseline measures of identity were not taken prior to pregnancy limits the conclusions of the study. 	<ul style="list-style-type: none"> • Study focuses specifically on fathers. • Research aims and hypothesis were clear. • Questionnaires were completed within hospital and antenatal settings which may have biased results and a social desirability measure was not included. • Analysis of data was detailed and effect sizes were stated in results.
<hr/> <p>Hjelmstedt, Widstrom & Collins, (2007)</p>	<ul style="list-style-type: none"> • Participants were Swedish which may limit generalisability of the results. • A power calculation for the sample size was not included (sample size was fairly small) 	<ul style="list-style-type: none"> • Aims of the study were clearly stated • Psychological and environmental factors were accounted for in the design • Selection criteria of participants was clear • A control group was included <hr/>

		<ul style="list-style-type: none"> • Reasons for non-participation and drop out were given. • All participants completed the same measures. • Data analysis and results section appeared logical and justified.
Luz, R., George, A., Vieux, R., & Spitz, E. (2017)	<ul style="list-style-type: none"> • French sample only • Participation in the study was voluntary which is likely to lead to a sampling bias • Author used a combined measure of anxiety and depression this often overlooks symptoms • Self-report measures were used 	<ul style="list-style-type: none"> • Research aims clearly stated • Explanations were given for those who dropped out of the study. • All participants completed the same measurements • Confounding variables were considered in the design and analysis. • Data assumptions were reported and clear justification for the statistical testing used • Clinical recommendations given based on the findings of the results
Righetti, Dell'Avanzo, Grigio & Nicolini (2005)	<ul style="list-style-type: none"> • Italian sample only • Psychological variables not accounted for in design • Self-report questionnaires' used 	<ul style="list-style-type: none"> • Clear research question • Control group included • Validated measures used • Pregnancy variables taken into consideration in design • Clinical implications considered

Seimyr, L., Sjögren, B., Welles-Nyström, B., & Nissen, E. (2009)	<ul style="list-style-type: none"> • A cut off score of four (instead of five used in the original measure) was used in one of the measures which may have biased the results. • The measure used for paternal attachment may no longer be valid due to technological advances around pregnancy therefore the findings may be limited. 	<ul style="list-style-type: none"> • Demographic, psychosocial and obstetric variables were accounted for in the design of this study. • Objective and valid measures were used in the study. • Justifications for statistical tests used was clear • Clinical implications for the findings were given.
van Bakel, H. J., Maas, A. J. B., Vreeswijk, C. M., & Vingerhoets, A. J. (2013)	<ul style="list-style-type: none"> • Fathers were recruited via their pregnant partners • No data was provided for participants who did not complete the study. • Order completion of the questionnaires was not control for which may have biased results. • Psychological and social support were not accounted for which may have biased results. 	<ul style="list-style-type: none"> • Research aims were clear • The distribution of the data was reported and rational for the statistical analysis was clear • Experimental measure being tested was triangulated alongside other measures to ensure consistency of findings
Vreeswijk, C. M., Maas, A. J., Rijk, C. H., & van Bakel, H. J. (2014)	<ul style="list-style-type: none"> • Dutch sample therefore the findings of the study may be limited • No information was given about participants who did not complete the study. 	<ul style="list-style-type: none"> • Large community based sample. • Recruitment methods were clear • Multidimensional methods to measure attachment were used in the design. • Psychological and social confounding variables were accounted for in the design and analysis

Weaver, R. H., & Cranley, M. S. (1983)	<ul style="list-style-type: none"> • Fathers were recruited via childbirth classes which is likely to limit the generalisability of the results. • Recruitment of fathers was limited to 100 but no rationale given as to why. • Data was collected in third trimester of pregnancy but not rationale given as to why this time point. • Confounding variables such as psychological, environmental and social support was not accounted for. 	<ul style="list-style-type: none"> • Results of the study are supported by more recent evidence and findings. • Clinical recommendations based on the findings of the study were given.
Winter, Van Acker, Bonduella, Van Berkel, Belva, Liebaers & Nekkebroeck (2016)	<ul style="list-style-type: none"> • Multiparous couples were included within the sample due to time pressure, however they were not classified in the results which may have biased results. • The anxiety measure used had not previously been used on fathers and some of the items were reformulated which may have resulted in measurement bias. • Overall sample was relatively small and a post hoc power analysis was not conducted. • Couples who conceived naturally were selected from a university hospital which offered specialist care for invasive prenatal testing therefore the sample may not be representative of the general pregnant population. 	<ul style="list-style-type: none"> • Clear and focused research question. • Recruitment methods, inclusion criteria and the research protocol for participants was clear. • Longitudinal prospective design which included mothers and fathers. • Prior power analysis was conducted. • Data was checked for any violations of assumptions. • Coping and adult attachment style were controlled for as moderators in the data analysis.

-
- Although stated, the study received funding from a pharmaceutical firm which may have produced a conflict of interest.
-

Appendix D: Demographic questions asked

Demographic questions:

Pre filter questions:

- Are you male?
- Are you an expectant father? (e.g. is your partner currently pregnant)
- Are you over the age of 18?

Please note if you have answered no to any of the above questions, you are not eligible to complete this study. Thank you for your interest.

What is your age in years

Is English your first language? *(please select as appropriate)*

- Yes
- No

How would you describe your ethnic group? *(please select as appropriate)*

- White:
 - English / Welsh / Scottish / Northern Irish / British
 - Irish
 - Gypsy or Irish Traveler
- Mixed / Multiple ethnic groups:
 - White and Black Caribbean
 - White and Black African
 - White and Asian
- Asian:
 - British
 - Indian
 - Pakistani
 - Bangladeshi
 - Chinese
- Black:
 - British
 - African
 - Caribbean
- Other ethnic group:
 - Arab
 - Any other ethnic group, please describe below:

What is the highest educational qualification you have achieved? (e.g. None, NVQ level 2, GCSE), *(please select the highest level you have achieved)*

- Postgraduate Qualification
- Undergraduate degree or vocational equivalents
- A levels, vocational level 3 and equivalents
- GCSE/O Level, vocational level 2 and equivalents
- Other qualifications (*please specify*): _____
- No qualifications

Please choose the answer which best describes your current employment:

(*Please select as appropriate*)

- Full time employment (at least 35 hours per week)
- Part time employment (less than 35 hours per week)
- Apprenticeship Scheme
- Contract work/variable hours
- Unable to work due to injury/disability
- Full time homemaker
- Currently unemployed
- Student
- Other (*please specify*): _____

What is your current status: (*please select as appropriate*)

- Single (*please go to question 8*)
- In a relationship with the mother of your child
- Married to the mother of your child
- In a relationship with a partner who is not the mother of your child
- Married to a partner who is not the mother of your child
- Separated/divorced
- Widowed
- Prefer not to answer
- Other (*please specify*): _____

How satisfied are you with your current relationship? (*Please rate on the scale below*).

0-----1-----2-----3-----4-----5-----6-----7
 Extremely unsatisfied Extremely satisfied.

Have you ever accessed a mental health service prior to this current pregnancy?

- Yes
- No

Have you experienced any mental health difficulties prior to this current pregnancy (e.g. depression, anxiety, addiction or self-harm)

- No

- Yes- Minor Difficulties
- Yes- Major Difficulties

Is your partner who is currently pregnant experiencing any mental health difficulties (e.g. depression, anxiety, addiction or self-harm): *(please select as appropriate)*

- None
- Yes- Minor Difficulties
- Yes- Major Difficulties

Approximately how many weeks into the pregnancy is your partner?

Was this pregnancy planned? *(please select as appropriate)*

- Definitely planned
- Not actively planned
- Not planned

Did your partner receive fertility treatment for this pregnancy? *(please select as appropriate)*

- Yes
- No

Have you attended any of the pregnancy scans for your unborn baby? *(please select as appropriate)*

- Yes
- No

Have you attended any of the antenatal appointments for your unborn baby? *(Please select as appropriate)*

- Yes
- No

From your own perspective would you describe your experience of this pregnancy as: *(please select as appropriate)*

- Easy
- Difficult
- Don't know

Has your partner who is pregnant with your developing baby experienced any complications during this pregnancy? *(please select as appropriate)*

- Yes
- No

Apart from this pregnancy, how many other children do you have?

- 0 (If none, please go to question 18)

- Please insert the number of children you have here

Has your current partner experienced losses or miscarriages in previous pregnancies?

- Yes
- No
- Prefer not to say

Appendix E: The Edinburgh Postnatal Depression Scale (Cox, Holden & Sagovsky, 1987)

Edinburgh Postnatal Depression Scale (EPDS) Form*											
Name _____	Address: _____										
Your Date of Birth _____	_____										
Baby's Date of Birth: _____	Phone: _____										
<p>SAMPLE QUESTION: As you are pregnant or have recently had a baby, we would like to know how you are feeling. Please check the answer that comes closest to how you have felt IN THE PAST 7 DAYS, not just how you feel today. Here is an example, already completed.</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;"><input type="checkbox"/> I have felt happy</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Yes, all the time</td> <td></td> </tr> <tr> <td><input checked="" type="checkbox"/> Yes, most of the time</td> <td>This would mean: "I have felt happy most of the time" during the past week.</td> </tr> <tr> <td><input type="checkbox"/> No, not very often</td> <td>Please complete the other questions in the same way.</td> </tr> <tr> <td><input type="checkbox"/> No, not at all</td> <td></td> </tr> </table>		<input type="checkbox"/> I have felt happy		<input type="checkbox"/> Yes, all the time		<input checked="" type="checkbox"/> Yes, most of the time	This would mean: "I have felt happy most of the time" during the past week.	<input type="checkbox"/> No, not very often	Please complete the other questions in the same way.	<input type="checkbox"/> No, not at all	
<input type="checkbox"/> I have felt happy											
<input type="checkbox"/> Yes, all the time											
<input checked="" type="checkbox"/> Yes, most of the time	This would mean: "I have felt happy most of the time" during the past week.										
<input type="checkbox"/> No, not very often	Please complete the other questions in the same way.										
<input type="checkbox"/> No, not at all											
<p>In the past 7 days:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top; padding-right: 20px;"> <p>1. I have been able to laugh and see the funny side of things</p> <input type="checkbox"/> As much as I always could <input type="checkbox"/> Not quite so much now <input type="checkbox"/> Definitely not so much now <input type="checkbox"/> Not at all</td> <td style="width: 50%; vertical-align: top;"> <p>*6. Things have been getting on top of me</p> <input type="checkbox"/> Yes, most of the time I haven't been able to cope at all <input type="checkbox"/> Yes, sometimes I haven't been coping as well as usual <input type="checkbox"/> No, most of the time I have coped quite well <input type="checkbox"/> No, I have been coping as well as ever</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;"> <p>2. I have looked forward with enjoyment to things</p> <input type="checkbox"/> As much as I ever did <input type="checkbox"/> Rather less than I used to <input type="checkbox"/> Definitely less than I used to <input type="checkbox"/> Hardly at all</td> <td style="vertical-align: top;"> <p>*7. I have been so unhappy that I have had difficulty sleeping</p> <input type="checkbox"/> Yes, most of the time <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> Not very often <input type="checkbox"/> No, not at all</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;"> <p>*3. I have blamed myself unnecessarily when things went wrong</p> <input type="checkbox"/> Yes, most of the time <input type="checkbox"/> Yes, some of the time <input type="checkbox"/> Not very often <input type="checkbox"/> No, never</td> <td style="vertical-align: top;"> <p>*8. I have felt sad or miserable</p> <input type="checkbox"/> Yes, most of the time <input type="checkbox"/> Yes, quite often <input type="checkbox"/> Not very often <input type="checkbox"/> No, not at all</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;"> <p>4. I have been anxious or worried for no good reason</p> <input type="checkbox"/> No, not at all <input type="checkbox"/> Hardly ever <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> Yes, very often</td> <td style="vertical-align: top;"> <p>*9. I have been so unhappy that I have been crying</p> <input type="checkbox"/> Yes, most of the time <input type="checkbox"/> Yes, quite often <input type="checkbox"/> Only occasionally <input type="checkbox"/> No, never</td> </tr> <tr> <td style="vertical-align: top; padding-right: 20px;"> <p>*5. I have felt scared or panicky for no very good reason</p> <input type="checkbox"/> Yes, quite a lot <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No, not much <input type="checkbox"/> No, not at all</td> <td style="vertical-align: top;"> <p>*10. The thought of harming myself has occurred to me</p> <input type="checkbox"/> Yes, quite often <input type="checkbox"/> Sometimes <input type="checkbox"/> Hardly ever</td> </tr> </table>		<p>1. I have been able to laugh and see the funny side of things</p> <input type="checkbox"/> As much as I always could <input type="checkbox"/> Not quite so much now <input type="checkbox"/> Definitely not so much now <input type="checkbox"/> Not at all	<p>*6. Things have been getting on top of me</p> <input type="checkbox"/> Yes, most of the time I haven't been able to cope at all <input type="checkbox"/> Yes, sometimes I haven't been coping as well as usual <input type="checkbox"/> No, most of the time I have coped quite well <input type="checkbox"/> No, I have been coping as well as ever	<p>2. I have looked forward with enjoyment to things</p> <input type="checkbox"/> As much as I ever did <input type="checkbox"/> Rather less than I used to <input type="checkbox"/> Definitely less than I used to <input type="checkbox"/> Hardly at all	<p>*7. I have been so unhappy that I have had difficulty sleeping</p> <input type="checkbox"/> Yes, most of the time <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> Not very often <input type="checkbox"/> No, not at all	<p>*3. I have blamed myself unnecessarily when things went wrong</p> <input type="checkbox"/> Yes, most of the time <input type="checkbox"/> Yes, some of the time <input type="checkbox"/> Not very often <input type="checkbox"/> No, never	<p>*8. I have felt sad or miserable</p> <input type="checkbox"/> Yes, most of the time <input type="checkbox"/> Yes, quite often <input type="checkbox"/> Not very often <input type="checkbox"/> No, not at all	<p>4. I have been anxious or worried for no good reason</p> <input type="checkbox"/> No, not at all <input type="checkbox"/> Hardly ever <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> Yes, very often	<p>*9. I have been so unhappy that I have been crying</p> <input type="checkbox"/> Yes, most of the time <input type="checkbox"/> Yes, quite often <input type="checkbox"/> Only occasionally <input type="checkbox"/> No, never	<p>*5. I have felt scared or panicky for no very good reason</p> <input type="checkbox"/> Yes, quite a lot <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No, not much <input type="checkbox"/> No, not at all	<p>*10. The thought of harming myself has occurred to me</p> <input type="checkbox"/> Yes, quite often <input type="checkbox"/> Sometimes <input type="checkbox"/> Hardly ever
<p>1. I have been able to laugh and see the funny side of things</p> <input type="checkbox"/> As much as I always could <input type="checkbox"/> Not quite so much now <input type="checkbox"/> Definitely not so much now <input type="checkbox"/> Not at all	<p>*6. Things have been getting on top of me</p> <input type="checkbox"/> Yes, most of the time I haven't been able to cope at all <input type="checkbox"/> Yes, sometimes I haven't been coping as well as usual <input type="checkbox"/> No, most of the time I have coped quite well <input type="checkbox"/> No, I have been coping as well as ever										
<p>2. I have looked forward with enjoyment to things</p> <input type="checkbox"/> As much as I ever did <input type="checkbox"/> Rather less than I used to <input type="checkbox"/> Definitely less than I used to <input type="checkbox"/> Hardly at all	<p>*7. I have been so unhappy that I have had difficulty sleeping</p> <input type="checkbox"/> Yes, most of the time <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> Not very often <input type="checkbox"/> No, not at all										
<p>*3. I have blamed myself unnecessarily when things went wrong</p> <input type="checkbox"/> Yes, most of the time <input type="checkbox"/> Yes, some of the time <input type="checkbox"/> Not very often <input type="checkbox"/> No, never	<p>*8. I have felt sad or miserable</p> <input type="checkbox"/> Yes, most of the time <input type="checkbox"/> Yes, quite often <input type="checkbox"/> Not very often <input type="checkbox"/> No, not at all										
<p>4. I have been anxious or worried for no good reason</p> <input type="checkbox"/> No, not at all <input type="checkbox"/> Hardly ever <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> Yes, very often	<p>*9. I have been so unhappy that I have been crying</p> <input type="checkbox"/> Yes, most of the time <input type="checkbox"/> Yes, quite often <input type="checkbox"/> Only occasionally <input type="checkbox"/> No, never										
<p>*5. I have felt scared or panicky for no very good reason</p> <input type="checkbox"/> Yes, quite a lot <input type="checkbox"/> Yes, sometimes <input type="checkbox"/> No, not much <input type="checkbox"/> No, not at all	<p>*10. The thought of harming myself has occurred to me</p> <input type="checkbox"/> Yes, quite often <input type="checkbox"/> Sometimes <input type="checkbox"/> Hardly ever										
<p>Administered/Reviewed by _____ Date _____</p>											
<p>*Source: Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression: development of the 10-item Edinburgh Postnatal Depression Scale. <i>Br J Psychiatry</i>. 1987;150:782-786. Users may reproduce the scale without further permission providing they respect copyright by quoting the names of the authors, the title, and the source of the paper in all reproduced copies.</p>											

Appendix F: The GAD-7 (Spitzer, Kroenke, Williams & Lowe, 2006).

Generalized Anxiety Disorder 7-item (GAD-7) scale

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all sure	Several days	Over half the days	Nearly every day
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it's hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3
<i>Add the score for each column</i>	+	+	+	
Total Score (<i>add your column scores</i>) =				

If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?

- Not difficult at all _____
 Somewhat difficult _____
 Very difficult _____
 Extremely difficult _____

Source: Spitzer RL, Kroenke K, Williams JBW, Lowe B. A brief measure for assessing generalized anxiety disorder. *Arch Intern Med.* 2006;166:1092-1097.

Scoring

- 0- 4= Indicates scores are within the normal range
- 5- 9= Indicates scores are within the mild range for depression
- 10-14= Indicates scores are within the moderate range for depression
- 15-21- Indicates scores are within the severe range for depression.

Appendix G: The Paternal Antenatal Attachment Scale (Condon, 1993)

Archived at Flinders University: dspace.flinders.edu.au

PATERNAL ANTENATAL ATTACHMENT

These questions are about your thoughts and feelings about the developing baby.
Please tick one box only in answer to each question.

- 1) Over the past two weeks I have thought about, or been preoccupied with the developing baby:

- almost all the time
 very frequently
 frequently
 occasionally
 not at all

- 2) Over the past two weeks when I have spoken about, or thought about the developing baby I got emotional feelings which were:

- very weak or non-existent
 fairly weak
 in between strong and weak
 fairly strong
 very strong

- 3) Over the past two weeks my feelings about the developing baby have been:

- very positive
 mainly positive
 mixed positive and negative
 mainly negative
 very negative

Archived at Flinders University: dspace.flinders.edu.au

- 4) Over the past two weeks I have had the desire to read about or get information about the developing baby. This desire is:

- very weak or non-existent
- fairly weak
- neither strong nor weak
- moderately strong
- very strong

- 5) Over the past two weeks I have been trying to picture in my mind what the developing baby actually looks like in my partner's womb:

- almost all the time
- very frequently
- frequently
- occasionally
- not at all

- 6) Over the past two weeks I think of the developing baby mostly as:

- a real little person with special characteristics
- a baby like any other baby
- a human being
- a living thing
- a thing not yet really alive

Archived at Flinders University: dspace.flinders.edu.au

- 7) Over the past two weeks when I think about the developing baby my thoughts:
- are always tender and loving
 - are mostly tender and loving
 - are a mixture of both tenderness and irritation
 - contain a fair bit of irritation
 - contain a lot of irritation
- 8) Over the past two weeks my ideas about possible names for the baby have been:
- very clear
 - fairly clear
 - fairly vague
 - very vague
 - I have no idea at all
- 9) Over the past two weeks when I think about the developing baby I get feelings which are:
- very sad
 - moderately sad
 - a mixture of happiness and sadness
 - moderately happy
 - very happy

10) Over the past two weeks I have been thinking about what kind of child the baby will grow into:

- not at all
- occasionally
- frequently
- very frequently
- almost all the time

11) Over the past two weeks I have felt:

- very emotionally distant from the baby
- moderately emotionally distant from the baby
- not particularly emotionally close to the baby
- moderately close emotionally to the baby
- very close emotionally to the baby

12) When I first see the baby after the birth I expect I will feel:

- intense affection
- mostly affection
- affection, but I expect there may be a few aspects of the baby I will dislike
- I expect there may be quite a few aspects of the baby I will dislike
- I expect I might feel mostly dislike

Archived at Flinders University: dspace.flinders.edu.au

- 13) When the baby is born I would like to hold the baby:
- immediately
 - after it has been wrapped in a blanket
 - after it has been washed
 - after a few hours for things to settle down
 - the next day
- 14) Over the past two weeks I have had dreams about the pregnancy or baby:
- not at all
 - occasionally
 - frequently
 - very frequently
 - almost every night
- 15) Over the past two weeks I have found myself feeling, or rubbing with my hand, the outside of my partner's stomach where the baby is:
- a lot of times each day
 - at least once per day
 - occasionally
 - once only
 - not at all

Archived at Flinders University: dspace.flinders.edu.au

16) If the pregnancy was lost at this time (due to miscarriage or other accidental event) without any pain or injury to my partner, I expect I would feel:

- very pleased
- moderately pleased
- neutral (ie neither sad nor pleased; or mixed feelings)
- moderately sad
- very sad

Factor structure

() denotes reverse scoring. Scoring is 1 (low attachment) to 5 (high attachment)

Quality of attachment: (1) 2 (3) (7) 9 11 (12) 16

Time spent in attachment mode: 4 (5) (8) 10 14 (15)
(or intensity of preoccupation)

Items (6) and (13) do not load on either factor strongly enough for inclusion on subscales

Appendix H: Sample screen shot of the Qualtrics survey that participants completed

What is the highest educational qualification you hold? *(Please select the **highest** level you have achieved)*

Postgraduate qualification

Undergraduate degree or vocational equivalent

A-Levels, vocational level 3 and equivalents

GCSE/O Level, vocational level 2 and equivalents

Other qualification

No qualifications

Please choose the answer which best describes your current employment:

Full time employment (at least 35 hours per week)

Part time employment (less than 35 hours per week)

Apprenticeship scheme

Contract work/variable hours

Figure 3: Computer version

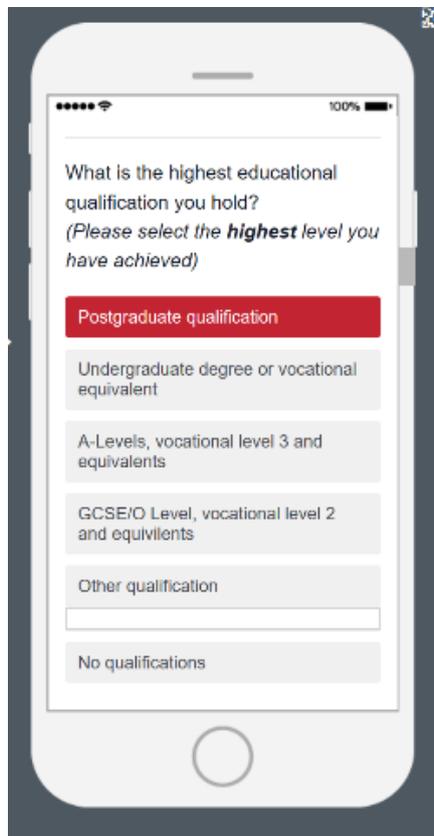


Figure 4: Phone or tablet version

Appendix I: Advert gaining permission to advertise

Dear Sir/Madam,

I am writing to ask for your permission to use your website to advertise my research. I am a third year doctoral student at the University of Hertfordshire and I am conducting research into expectant fathers. The study hopes to identify a possible relationship between father's mental wellbeing and the relationship to their developing baby. I would be grateful if you could post the link below which will then activate the online survey.

This study has been granted ethical approval from the University of Hertfordshire protocol number: LMS/PGR/UH/02953

I would be grateful if you could copy and paste the advert and link below which will then activate the online survey. Thank you

Calling all expectant dads! Is your partner currently pregnant and you are about to become and father for the first time or again? I am conducting research into expectant fathers and my research hopes to identify a possible relationship between father's mental wellbeing and the relationship to their developing baby. If you are over age 18, then I would be grateful if you could complete the survey by clicking on the link below.

If you are aged 18 or over and your partner is currently pregnant, please contribute to my research on expectant fathers. It doesn't matter if you are about to become a father for the first time or again, we would like to hear your experiences. Please click on this link below to complete the survey.

https://herts.eu.qualtrics.com/jfe/form/SV_5hYgxS30bfn2bOd

Appendix J: Information sheet

FORM EC6: PARTICIPANT INFORMATION SHEET

1 Title of study

Correlates of anxiety, depression and the paternal-fetal attachment bond in expectant fathers.

2 Introduction

You are being invited to take part in a study. Before you decide whether to do so, it is important that you understand the study that is being undertaken and what your involvement will include. Please take the time to read the following information carefully and discuss it with others if you wish. Do not hesitate to ask us if anything is not clear or for any further information you would like to help you make your decision. Please do take your time to decide whether or not you wish to take part. The University's regulations governing the conduct of studies involving human participants can be accessed via this link: <http://sitem.herts.ac.uk/secreg/upr/RE01.htm>. Thank you for reading this.

3 What is the purpose of this study?

The research aims to investigate potential correlations of father's wellbeing and the attachment towards your unborn baby.

4 Do I have to take part?

It is completely up to you whether or not you decide to take part in this study. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. Agreeing to join the study does not mean that you have to complete it. You are free to withdraw at any stage without giving a reason. A decision to withdraw at any time, or a decision not to take part at all, will not affect any treatment/care that you may receive (should this be relevant).

5 Are there any age or other restrictions that may prevent me from participating?

Participants need to be aged 18 or over and have a partner who is currently pregnant.

6 How long will my part in the study take?

If you decide to take part in this study, you will be involved in it for about 15 minutes.

7 What will happen to me if I take part?

The first thing to happen will be you will be directed to a link which will take you to an online survey. There will be some filter questions and if you consent, you will have the opportunity to complete the online questionnaire.

8 What are the possible disadvantages, risks or side effects of taking part?

It is not anticipated there will be any disadvantages, risks or side effects by taking part in this study however if you should experience any negative feelings after taking part in this study we will signpost you to some services that will be able to support you.

9 What are the possible benefits of taking part?

There is a growing evidence emerging around father's wellbeing during pregnancy. By taking part in this research, you will be contributing to the field of research in this areas and contributing to the evidence base.

10 How will my taking part in this study be kept confidential?

The online questionnaire will not ask for your name. The questionnaire is completely anonymous and you will not be asked for any identifiable information. If you decide to take part in this research, you will directed to an online consent form in which you will have to read and tick a box to agree your consent to taking part. Your answers to the questionnaires will be stored on a password protected database for two years and will only be made available to the researchers.

12 What will happen to the data collected within this study?

The data collected will be stored electronically, in a password-protected environment, for two years, after which time it will be destroyed under secure conditions.

13 Will the data be required for use in further studies?

The data will not be used in any further studies.

14 Who has reviewed this study?

The University of Hertfordshire Health, Science, Engineering and Technology Ethics Committee with Delegated Authority.

The UH protocol number is LMS/PGR/UH/02953

15 **Factors that might put others at risk**

Please note that if, during the study, any medical conditions or non-medical circumstances such as unlawful activity become apparent that might or had put others at risk, the University may refer the matter to the appropriate authorities.

16 **Who can I contact if I have any questions?**

If you would like further information or would like to discuss any details personally, please get in touch with me by email: a.beesley@herts.ac.uk

Although we hope it is not the case, if you have any complaints or concerns about any aspect of the way you have been approached or treated during the course of this study, please write to the University's Secretary and Registrar.

Thank you very much for reading this information and giving consideration to taking part in this study.

Appendix K: Informed consent sheet**CONSENT FORM FOR STUDIES INVOLVING HUMAN PARTICIPANTS**

Please read the information below. By clicking the 'I Agree' box below, I am confirming that I consent to taking part in this study titled:

Correlates of anxiety, depression and the paternal-fetal attachment bond in expectant fathers and agree to the following:

1 I confirm that I have read a Participant Information Sheet giving particulars of the study, including its aim(s), methods and design, the names and contact details of key people and, as appropriate, the risks and potential benefits, how the information collected will be stored and for how long, and any plans for follow-up studies that might involve further approaches to participants. I have also been informed of how my personal information on this form will be stored and for how long. I have been given details of my involvement in the study. I have been told that in the event of any significant change to the aim(s) or design of the study I will be informed, and asked to renew my consent to participate in it.

2 I have been assured that I may withdraw from the study at any time without disadvantage or having to give a reason.

3 I have been told how information relating to me (data obtained in the course of the study, and data provided by me about myself) will be handled: how it will be kept secure, who will have access to it, and how it will or may be used.

4 I understand that my participation in this study may reveal findings that could indicate that I might require medical advice. In that event, I will be informed and advised to consult my GP. If, during the study, evidence comes to light that I may have a pre-existing medical condition that may put others at risk, I understand that the University will refer me to the appropriate authorities and that I will not be allowed to take any further part in the study.

5 I understand that if there is any revelation of unlawful activity or any indication of non-medical circumstances that would or has put others at risk, the University may refer the matter to the appropriate authorities.

Do you consent to take part in this study?

I agree

I do not agree

(UH Protocol number LMS/PGR/UH/02953)

Appendix L: Debrief information sheet and list of contact details
DEBRIEF FORM

PROJECT TITLE: Correlates of anxiety, depression and the paternal-fetal attachment bond in expectant fathers.

Thank you very much for taking part in this study and for your cooperation.

Previous research has identified that the wellbeing of fathers during the antenatal period can be a good predictor of their wellbeing postnatally. Therefore, the aim of the current study was to explore the potential associations between expectant father's wellbeing, their demographic variables and levels of attachment towards their unborn baby.

It is hoped that in the future this research could be used to identify fathers who may benefit from additional support during the antenatal period.

If taking part in this research project has brought up an issues or concerns for you, please do not hesitate to contact us, using the contact details below:

Name: Amy Beesley

E-mail: a.beesley@herts.ac.uk

Further Sources of Support

Thinking about your experiences may have caused you to feel worried, concerned or upset. This is natural and often passes in a few days. Speaking to friends or family is likely to be the most immediate source of support. However if these feelings continue there are organisations that can help:

- Your Midwife or Health Visitor
- Your local GP

- Family Lives

Family Lives can provide confidential information, advice, guidance and support on any aspect of parenting and family life.

Website: www.familylives.org.uk

Telephone No. 0808 800 2222

- National Childbirth Trust (NCT)

The National Childcare Trust provides one to one support to talk through any questions or concerns.

Website: www.nct.org.uk Telephone

No. 0300 330 0700

- Relate

Relate provides support and information for couples and families Website:

www.relate.org.uk

Telephone No: 0300 100 1234

- The Samaritans

The Samaritans is a helpline which is open 24 hours a day for anyone in need. It is staffed by trained volunteers who will listen sympathetically.

Website: www.samaritans.org Telephone

No: 08457 90 90 90

Appendix M: Authority decision tool outcome



Do I need NHS REC approval?

1 To print your result with title and IRAS Project ID please enter your details below:

Title of your research:
Correlates of anxiety, depression and the paternal fetal-attachment in expectant fathers.

IRAS Project ID (if available):

Your answers to the following questions indicate that you do not need NHS REC approval for sites in England. However, you may need other approvals.

You have answered 'YES' to: Is your study research?

You answered 'NO' to all of these questions:

Question Set 1

- Is your study a clinical trial of an investigational medicinal product?
- Is your study one or more of the following: A non-CE marked medical device, or a device which has been modified or is being used outside of its CE mark intended purpose, and the study is conducted by or with the support of the manufacturer or another commercial company (including university spin-out company) to provide data for CE marking purposes?
- Does your study involve exposure to any ionising radiation?
- Does your study involve the processing of disclosable protected information on the Register of the Human Fertilisation and Embryology Authority by researchers, without consent?
- Is your study a clinical trial involving the participation of practising midwives?

Question Set 2

- Will your study involve research participants identified from, or because of their past or present use of services (adult and children's healthcare within the NHS and adult social care), for which the UK health departments are responsible (including services provided under contract with the private or voluntary sectors), including participants recruited through these services as healthy controls?
- Will your research involve collection of tissue or information from any users of these services (adult and children's healthcare within the NHS and adult social care)? This may include users who have died within the last 100 years.
- Will your research involve the use of previously collected tissue or information from which the research team could identify individual past or present users of these services (adult and children's healthcare within the NHS and adult social care), either directly from that tissue or information, or from its combination with other tissue or information likely to come into their possession?
- Will your research involve research participants identified because of their status as relatives or carers of past or present users of these services (adult and children's healthcare within the NHS and adult social care)?

Question Set 3

- Will your research involve the storage of relevant material from the living or deceased on premises in the UK, but not Scotland, without an appropriate licence from the Human Tissue Authority (HTA)? This includes storage of imported material.
- Will your research involve storage or use of relevant material from the living, collected on or after 1st September 2006, and the research is not within the terms of consent from the donors, and the research does not come under another NHS REC approval?
- Will your research involve the analysis of DNA from bodily material, collected on or after 1st September 2006, and this analysis is not within the terms of consent for research from the donor?

Question Set 4

- Will your research involve at any stage intrusive procedures with adults who lack capacity to consent for themselves, including participants retained in study following the loss of capacity?
- Is your research health-related and involving prisoners?
- Does your research involve xenotransplantation?
- Is your research a social care project funded by the Department of Health?

If your research extends beyond England find out if you need NHS REC approval by selecting the 'OTHER UK COUNTRIES' button below.

OTHER UK COUNTRIES

If, after visiting all relevant UK countries, this decision tool suggests that you do not require NHS REC approval follow [this link for final confirmation and further information.](#)

[Print This Page](#)

NOTE: Printing Internet Explorer please use browser print function.

Appendix N: Confirmation of ethics granted with protocol number



HEALTH SCIENCE ENGINEERING & TECHNOLOGY ECDA

ETHICS APPROVAL NOTIFICATION

TO: Amy Beesley
CC: Dr Emma Karwatzki
FROM: Dr Simon Trainis, Health, Sciences, Engineering & Technology ECDA Chair
DATE: 24th August 2017

Protocol number: LMS/PGR/UH/02953

Title of study: *Correlates of anxiety, depression and the paternal-fetal attachment bond in expectant fathers*

Your application for ethics approval has been accepted and approved by the ECDA for your School and includes work undertaken for this study by the named additional workers below:

This approval is valid:

From: 01/10/17

To: 01/05/18

Additional workers: no additional workers named

Please note:

Approval applies specifically to the research study/methodology and timings as detailed in your Form EC1. Should you amend any aspect of your research, or wish to apply for an extension to your study, you will need your supervisor's approval and must complete and submit form EC2. In cases where the amendments to the original study are deemed to be substantial, a new Form EC1 may need to be completed prior to the study being undertaken.

Should adverse circumstances arise during this study such as physical reaction/harm, mental/emotional harm, intrusion of privacy or breach of confidentiality this must be reported to the approving Committee immediately. Failure to report adverse circumstance/s would be considered misconduct.

Ensure you quote the UH protocol number and the name of the approving Committee on all paperwork, including recruitment advertisements/online requests, for this study.

Students must include this Approval Notification with their submission.

Appendix O: Visual and statistical testing for normality for the dependant variable (PAAS)

Table O1
Descriptive Statistics for dependant variable

	N	Mean	Std. Deviation	Skewness	Std. Error	Kurtosis	Std. Error
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
PAASTOTAL	166	56.994	5.8997	-0.442	0.188	0.325	0.375
Valid N (listwise)	166						

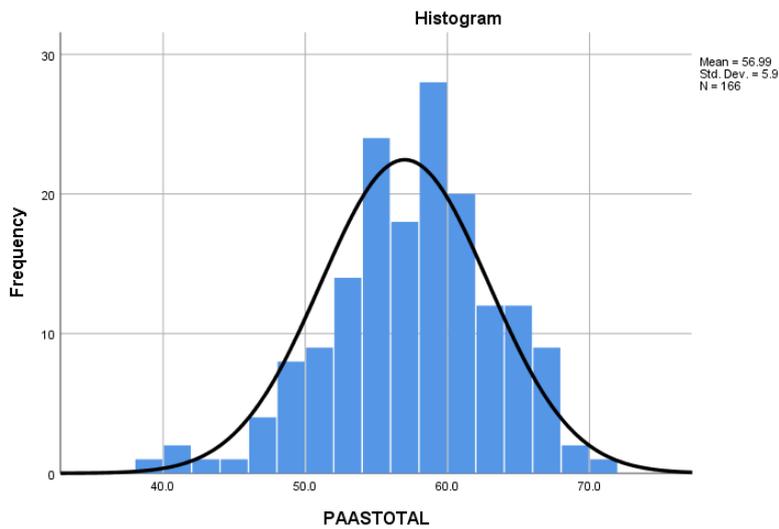


Figure 5: Histogram of dependant variable (PAAS total)

Appendix P: Visual and statistical testing for normality of other continuous variables.

Table P1
Descriptive Statistics for continuous variables

	Mean	Std. Deviation	Skewness	Std. Error	Kurtosis	Std. Error
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
Age	31.21	4.048	-0.012	0.188	-0.068	0.375
relationship satisfaction	6.741	0.53858	-2.942	0.188	13.778	0.375
EPDN Total	5.199	4.1359	0.925	0.188	0.677	0.375
GAD Total	4.458	4.0024	1.432	0.188	2.545	0.375
Valid N= 166 (listwise)						

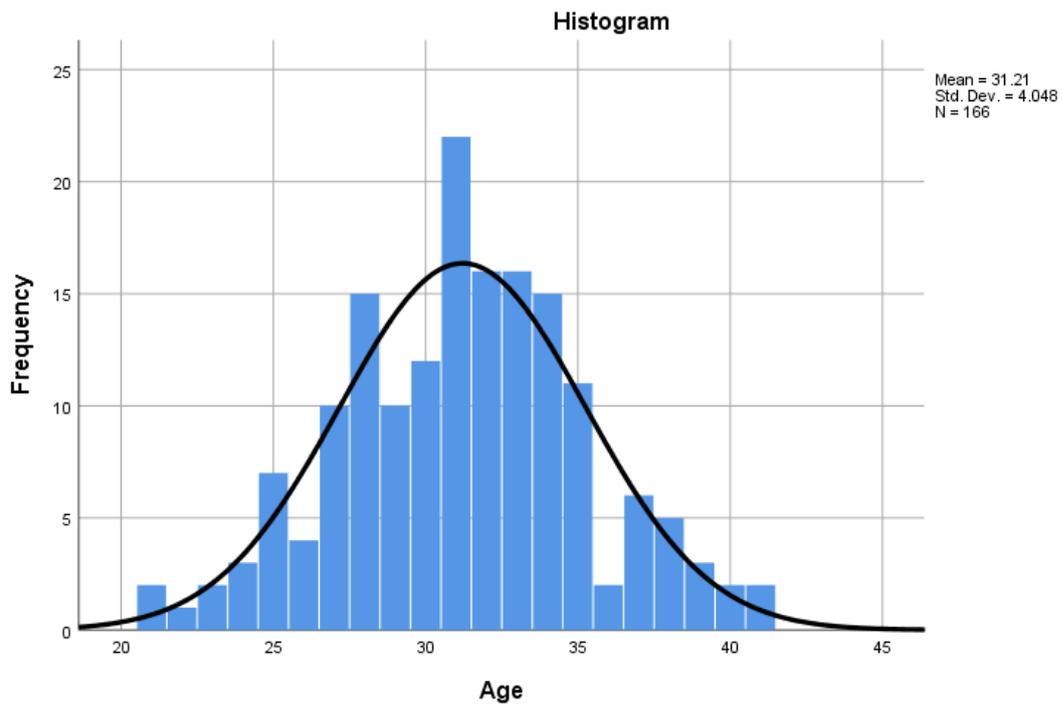


Figure 6: Histogram for age of fathers

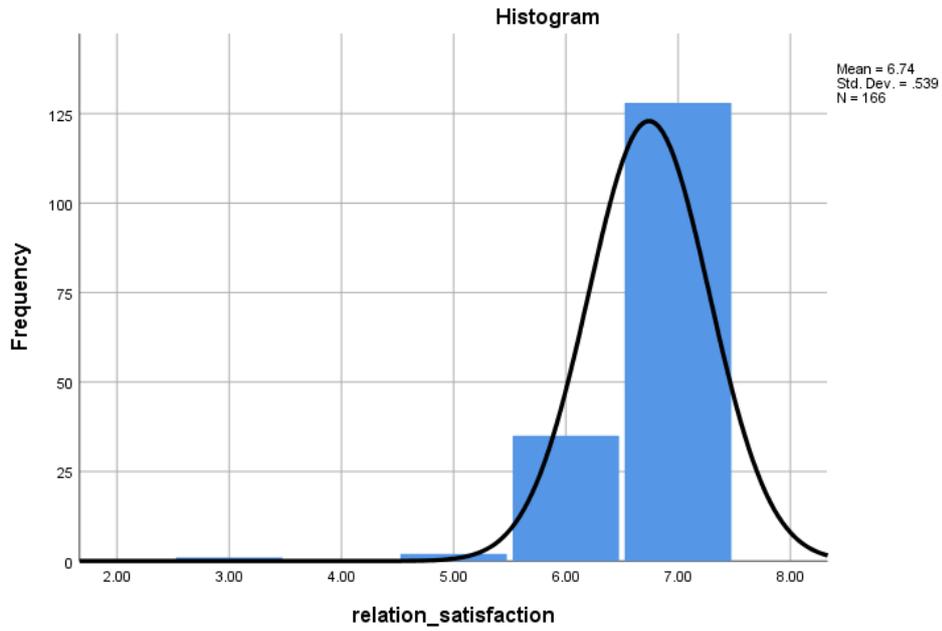


Figure 7 : Histogram of relationship satisfaction

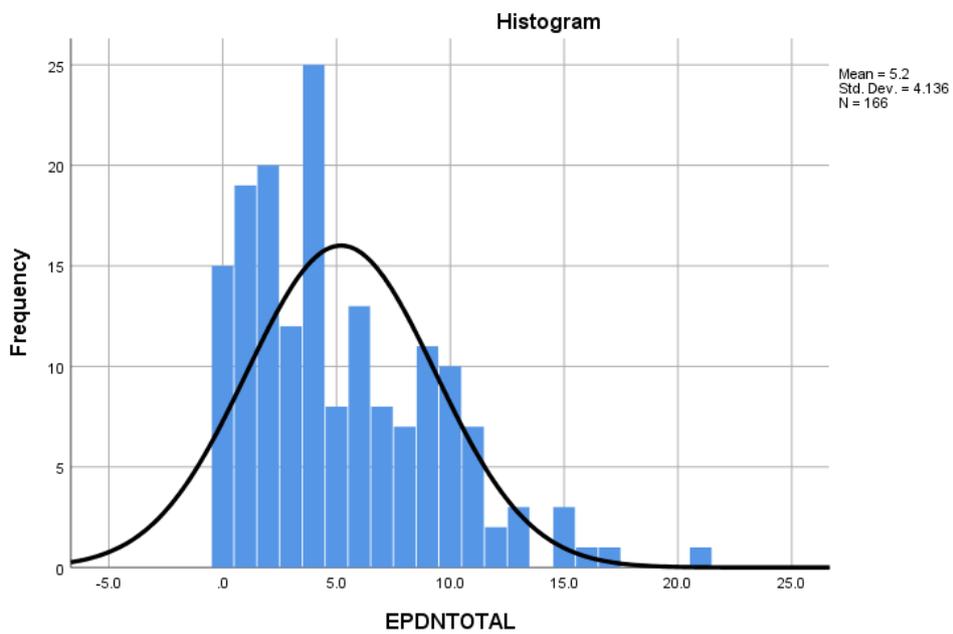


Figure 8: Histogram of EPDS scores

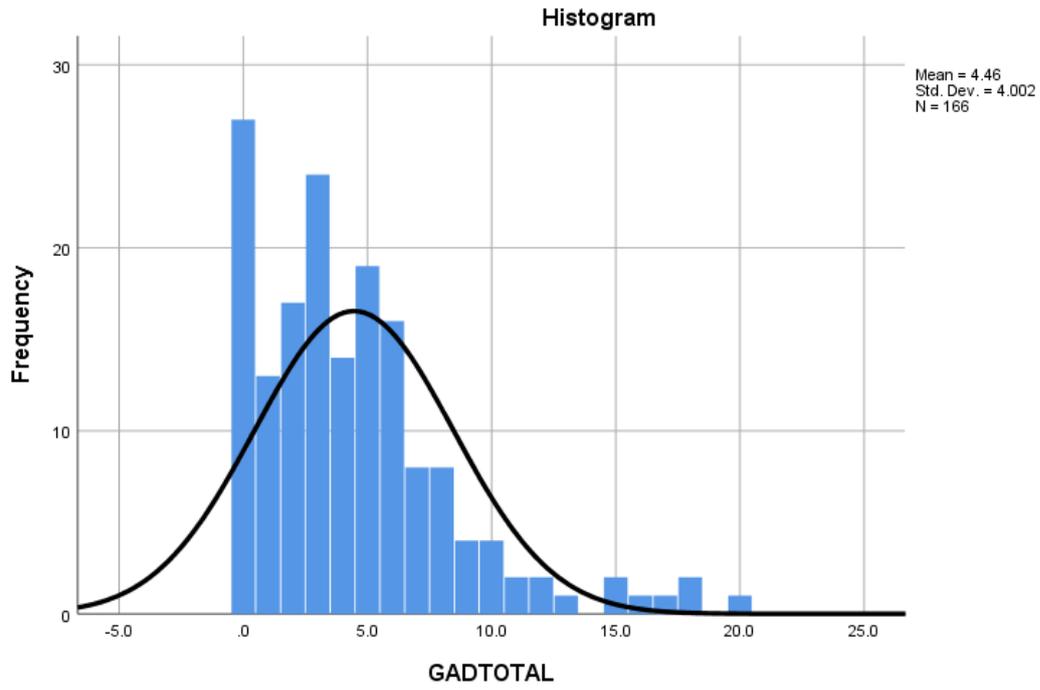


Figure 9: Histogram of GAD -7 scores

Appendix Q: SPSS outputs for the correlations for Research Question 1

Table Q1
Correlations amongst PAAS scores and Age

		Age	PAAS Total
Age	Pearson Correlation	-	-
	Sig. (2-tailed)		-
	N	-	-
PAAS Total	Pearson Correlation	-0.121	-
	Sig. (2-tailed)	0.120	
	N	166	166

Table Q2
Correlations amongst PAAS scores and relationship satisfaction

		PAAS Total	Relationship Satisfaction
Spearman's rho	PAAS Total Correlation Coefficient	-	-
	Sig. (2-tailed)	-	-
	N	-	-
	Relationship satisfaction Correlation Coefficient	.258**	1.000
	Sig. (2-tailed)	0.001	
	N	166	166

** . Correlation is significant at the 0.01 level (2-tailed).

Appendix R: SPSS outputs for between-group comparisons for Research Question1

Ethnicity.

Table R1a
Ranks for Ethnicity

	Ethnicity	N	Mean Rank
PAAS			
Total	White English	125	81.02
	White Irish	6	106.92
	White Polish	11	79
	Asian British	5	89.9
	Asian Indian	6	114.5
	Other ethnic groups combined	13	83.62
	Total	166	

Table R1b
Kruskal-Wallis test for Ethnicity

Test Statistics a,b	
	PAAS Total
Kruskal-Wallis H	4.455
df	5
Asymp. Sig.	0.486

- a. Kruskal Wallis Test
b. Grouping Variable: Ethnicity

Education level.

Table R2a
Ranks for Education Level

	Education Level	N	Mean Rank
PAAS			
Total	Postgraduate Qualification	54	82.56
	Undergraduate Qualification	77	81.62
	A-Levels and equivalent	17	90.76
	GCSE/O Level equivalent	5	121.8
	Other Qualifications	7	66.93
	No qualifications	6	82.83
	Total	166	

Table R2b

Kruskal-Wallis test for Education Level

Test Statistics a,b	
	PAAS Total
Kruskal-Wallis H	4.55
df	5
Asymp. Sig.	0.473
a. Kruskal Wallis Test	
b. Grouping Variable: Education Level	

Employment.

Table R3a

Table of ranks for Employment

	Employment	N	Mean Rank
PAAS Total	Full time employment (35+ hours p/w)	153	84.78
	Part time employment (-35 hours p/w)	5	42.2
	Other groups combined	8	84.75
	Total	166	

Table R3b

Kruskal Wallis testing for Employment

Test Statistics a,b	
	PAAS Total
Kruskal-Wallis H	3.82
df	2
Asymp. Sig.	0.148
a. Kruskal Wallis Test	
b. Grouping Variable: Employment	

Relationship status.

Table R4a

Table of Ranks for Relationship status

	Relationship Status	N	Mean Rank	Sum of Ranks
PAAS Total	In a relationship with the mother of my child	28	79.64	2230
	Married to the mother of my child	138	84.28	11631
	Total	166		

Table R4b
Mann-Whitney U test for Relationship Status

Test Statistics a	
	PAAS Total
Mann-Whitney U	1824
Wilcoxon W	2230
Z	-0.467
Asymp. Sig. (2-tailed)	0.641

a. Grouping Variable: Relationship Status

Fatherhood Status.

Table R5a
Table of ranks for Fatherhood Status

	First Time Father Status	N	Mean Rank	Sum of Ranks
PAAS Total	First Time Father	152	85.06	12929
	Second time or again father	14	66.57	932
	Total	166		

Table R5b
Mann-Whitney U tests for First Time Father Status

Test Statistics a	
	PAAS Total
Mann-Whitney U	827
Wilcoxon W	932
Z	-1.38
Asymp. Sig. (2-tailed)	0.168

a. Grouping Variable: First Time Father Status

Appendix S: SPSS outputs for the correlations for Research Question 2

Table S1
Correlations for GAD-7 and PAAS totals

			PAAS Total	GAD- 7 Total
Spearman's rho	PAAS Total	Correlation Coefficient	-	-
		Sig. (2-tailed)		-
		N	-	-
	GAD- 7 Total	Correlation Coefficient	0.063	1.000
		Sig. (2-tailed)	0.418	
		N	166	166

Table S2
Correlations for EPND and PAAS totals

		PAAS Total	EPDN Total
PAAS Total	Pearson Correlation	-	-
	Sig. (2-tailed)	-	-
	N	-	-
EPDN Total	Pearson Correlation	-0.136	1
	Sig. (2-tailed)	0.080	
	N	166	166

Appendix T: SPSS outputs for between-group analysis for Research Question 2

Risk of Depression.

Table T1a

Table of Ranks for Risk of Depression

	EPDS Risk	N	Mean Rank	Sum of Ranks
PAAS Total	Low Risk	137	82.66	11324
	High Risk	29	87.48	2537
	Total	166		

Table T1b

Mann-Whitney U test for Risk of Depression

Test Statistics a

	PAAS Total
Mann-Whitney U	1871
Wilcoxon W	11324
Z	-0.492
Asymp. Sig. (2-tailed)	0.623

a. Grouping Variable: EPDS High or Low risk

Previously accessed Mental Health Services.

Table T2a

Ranks for accessed Mental Health Services

	Previously accessed Mental Health Services	N	Mean Rank	Sum of Ranks
PAAS Total	No	48	84.11	4037.5
	Yes	118	83.25	9823.5
	Total	166		

Table T2b

Mann-Whitney U test for previously accessed Mental Health Services

Test Statistics a

	PAASTOTAL
Mann-Whitney U	2802.5
Wilcoxon W	9823.5
Z	-0.105
Asymp. Sig. (2-tailed)	0.916

a. Grouping Variable: Accessed Mental Health Services

GAD-7 Clinical cut-off scores.

Table T3a

Table of ranks for GAD-7 clinical cut-off

GAD-7 Clinical Cut-off scores		N	Mean Rank
PAAS			
Total	Normal	95	80.45
	Mild	55	87.61
	Moderate	9	97.94
	Severe	7	74.07
	Total	166	

Table T3b

Kruskal-Wallis H test for GAD-7 Clinical cut-off scores

Test Statistics a,b

	PAAS Total
Kruskal-Wallis H	1.874
df	3
Asymp. Sig.	0.599

a. Kruskal Wallis Test
b. Grouping Variable: GAD-7 Clinical cut off

Previous Mental Health Experience.

Table T4a

Table of ranks for Mental Health Experience

	Previous Mental Health Experience	N	Mean Rank
PAAS			
Total	None	77	87.23
	Minor difficulties	71	74.27
	Major difficulties	18	103.94
	Total	166	

Table T4b

Kruskal-Wallis H test for Previous Mental Health Experience

Test Statistics

a,b

	PAAS Total
Kruskal-Wallis	
H	6.358
df	2
Asymp. Sig.	0.042

a. Kruskal Wallis Test

b. Grouping Variable: Mental Health Experience

Table T4c

Table of ranks for Minor and Major previous Experience

	Previous Mental Health Experience	N	Mean Rank	Sum of Ranks
PAAS Total	Minor	71	42.08	2988
	Major	18	56.5	1017
	Total	89		

Table T4d

Mann-Whitney U test for Minor and Major Mental Health Difficulties

Test Statistics a

	PAAS Total
Mann-Whitney U	432
Wilcoxon W	2988
Z	-2.117
Asymp. Sig. (2-tailed)	0.034

a Grouping Variable: Mental Health Experience

Appendix U: SPSS correlations for Research Question 3

Table U1

Correlations for Number of Weeks pregnant and PAAS scores

		PAAS Total	No of weeks Pregnant
PAASTOTAL	Pearson		
	Correlation	–	–
	Sig. (2-tailed)		
	N	–	–
No of weeks pregnant	Pearson		
	Correlation	.232**	1
	Sig. (2-tailed)	0.003	
	N	166	166

** Correlation is significant at the 0.01 level (2-tailed).

Appendix V: SPSS outputs for between-group comparisons for Research Question 3

Father's experience of Pregnancy.

Table V1a

Table of ranks for father's experience of pregnancy

	Experience of Pregnancy	N	Mean Rank
PAAS			
Total	Easy	119	84.9
	Difficult	32	82.64
	Do not know	15	74.2
	Total	166	

Table V1b

Kruskal-Wallis H test for fathers experience of pregnancy

Test Statistics ^{a,b}	PAAS Total
Kruskal-Wallis H	0.676
df	2
Asymp. Sig.	0.713

a. Kruskal Wallis Test

b. Grouping Variable: Experience of Pregnancy

Planning of Pregnancy.

Table V2a

*Table of ranks for Planning of
Pregnancy*

	Planning of pregnancy	N	Mean Rank
PAAS			
Total	Actively planned	120	84.56
	Not actively planned	32	81.86
	Not planned	14	78.14
	Total	166	

Table V2b
Kruskal-Wallis H test for planning of pregnancy
Test Statistics a,b

	PAAS Total
Kruskal-Wallis H	0.271
df	2
Asymp. Sig.	0.873

a. Kruskal Wallis Test
b. Grouping Variable: Planning of Pregnancy

Fertility Treatment.

Table V3a
Table of ranks for Received fertility treatment

	Received Fertility Treatment	N	Mean Rank	Sum of Ranks
PAAS Total	Yes	19	84	1596
	No	147	83.44	12265
	Total	166		

Table V3b
Mann-Whitney U test for Received Fertility Treatment
Test Statistics a

	PAAS Total
Mann-Whitney U	1387
Wilcoxon W	12265
Z	-0.048
Asymp. Sig. (2-tailed)	0.962

a. Grouping Variable: Received Fertility Treatment

Attended Scans.

Table V4a
Table of ranks for Attended Scans

	Attended Scans	N	Mean Rank	Sum of Ranks
PAAS Total	Yes	158	84.26	13313
	No	8	68.5	548
	Total	166		

NB: Scans usually occur after 12 weeks of pregnancy

Table V4b
Mann-Whitney U test for attended scans

Test Statistics a	
	PAAS Total
Mann-Whitney U	512
Wilcoxon W	548
Z	-0.906
Asymp. Sig. (2-tailed)	0.365

a. Grouping Variable: Attended scans

Attended Antenatal Appointments.

Table V5a
Table of ranks for attended antenatal appointments

	Antenatal appointments	N	Mean Rank	Sum of Ranks
PAAS Total	Attended	144	83.63	12042
	Not attended	22	82.68	1819
	Total	166		

Table V5b
Mann-Whitney U test for attended antenatal appointments

Test Statistics a	
	PAAS Total
Mann-Whitney U	1566
Wilcoxon W	1819
Z	-0.086
Asymp. Sig. (2-tailed)	0.932

a. Grouping Variable: Attended Antenatal Appointments

Pregnancy complications.

Table V6a
Table of ranks for Pregnancy Complications

	Complication Status	N	Mean Rank	Sum of Ranks
PAAS Total	Complications during pregnancy	27	73.43	1982.5
	No complications during pregnancy	139	85.46	11878.5
	Total	166		

Table V6b
Mann-Whitney U test for Pregnancy Complication Status

	PAAS Total
Mann-Whitney U	1604.5
Wilcoxon W	1982.5
Z	-1.192
Asymp. Sig. (2-tailed)	0.233

a. Grouping Variable: Pregnancy Complication Status

Experience of Previous Loss or Miscarriage.

Table V7a
Table of ranks for Previous Experience of Loss or miscarriage

	Experienced loss or miscarriage	N	Mean Rank	Sum of Ranks
PAAS Total	Yes	33	89.41	2950.5
	No	133	82.03	10910.5
	Total	166		

Table V7b
Mann-Whitney U for Experience of Previous Loss or Miscarriage

	PAAS Total
Mann-Whitney U	1999.5
Wilcoxon W	10910.5
Z	-0.79
Asymp. Sig. (2-tailed)	0.429

a. Grouping Variable: Experienced loss or Miscarriage

Appendix W: Visual and statistical testing for Additional Analysis of Interest

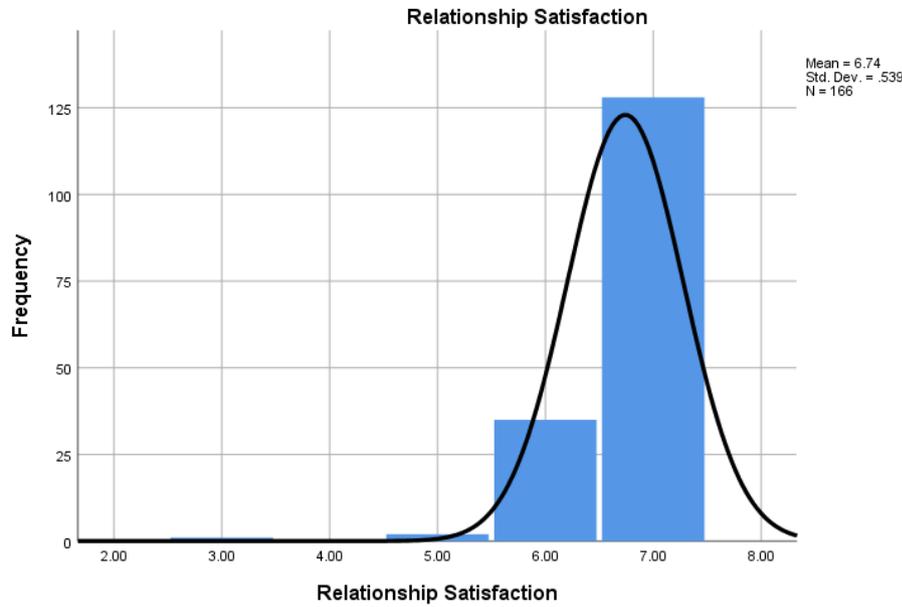


Figure 10: Histogram of Relationship Satisfaction

Table W1

Descriptive Statistics for Relationship Satisfaction

	N	Mean	Std. Deviation	Skewness	Std. Error	Kurtosis	Std. Error
	Statistic	Statistic	Statistic	Statistic		Statistic	Statistic
Relationship Satisfaction	166	6.741	0.53858	-2.942	0.188	13.778	0.375
Valid N (listwise)	166						

Appendix X: Correlations for Additional Findings of Interest

Table X1

Correlations for Relationship Satisfaction and Anxiety and Depression scores

			Relationship satisfaction	EPDS Total	GAD-7 Total
Spearman's rho	Relationship satisfaction	Correlation Coefficient	–	–	–
		Sig. (2-tailed)	–	–	–
		N	166	–	–
	EPDS Total	Correlation Coefficient	-.205**	–	–
		Sig. (2-tailed)	0.008	–	–
		N	166	166	–
	GAD-7 Total	Correlation Coefficient	-.209**	.697**	1
		Sig. (2-tailed)	0.007	0	.
		N	166	166	166

** Correlation is significant at the 0.01 level (2-tailed).

NB: A higher relationship satisfaction score denotes a more satisfied relationship

NB: A higher anxiety or depression score indicates greater distress.

Appendix Y: Post hoc power analysis for data

Table Y1

Post Hoc test power calculation

Exact - Correlation: Bivariate normal model

Options:	exact distribution		
Analysis:	Post hoc: Compute achieved power		
Input:	Tail(s)	=	Two
	Correlation ρ H1	=	0.7071068
	α err prob	=	0.05
	Total sample size	=	166
	Correlation ρ H0	=	0
Output:	Lower critical r	=	-0.1523846
	Upper critical r	=	0.1523846
	Power (1- β err prob)	=	1