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Thesis title: An Investigation Into The Relationships Between Psychological Functioning, Engagement With Obstetric Services, And Prenatal Attachment
Qualification: DClinPsy
Date awarded: 26 November 2010

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This thesis was embargoed until 22 October 2015

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**A LITERATURE REVIEW TO EXAMINE THE ROLE OF
PSYCHOLOGICAL AND RELATIONAL FACTORS IN
PRENATAL ATTACHMENT**

WORD COUNT: 7,749

Abstract

The importance of attachment during the prenatal period has become a well-recognised area of research over the last 30 years. This paper aims to review the role of psychological and relational factors in relation to prenatal attachment over the last decade, with consideration to both typical and more complex pregnancy groups. The findings were evaluated in response to a number of key questions and their methodological strengths. The overall findings support the notion of the significance of psychological and relational factors. A pertinent finding was the importance of relational factors and cognitive appraisals irrespective of pregnancy complications or losses. However, disparities existed across studies in relation to factors measured; this is a likely consequence of differing measurement tools, making conclusions and comparisons across studies problematic. Further research is required to establish causations such as implementing comparative and longitudinal designs. The review highlights the importance of a woman's psychological health and well-being to those working in maternity services providing better outcomes for women.

Introduction

Pregnancy is a significant time of transition, and for most women, it can be both a joyful and an exciting time. Some pregnancies, however, are challenging and can cause stress and anxiety (Rofe, Blittner, & Lewin, 1993). These feelings are often enhanced when a woman feels inadequately supported by those around her (Spoozak, Gotman, Smith, Belanger, & Yonkers, 2009). Poor psychological well-being is detrimental to adjusting to motherhood, (Barnett, Schaafsma, Gusman, & Parker, 1991), the developing foetus (DiPietro, Hilton, Hawkins, Costigan, & Pressman, 2002), and postnatal outcomes such as developing healthy attachments (Möhler, Brunner & Wiebel, 2006). Less is understood with regard to the role of psychological and relational factors that could determine the development of attachment with the foetus during the prenatal phase: this therefore will be the focus of the current review. The review will begin by introducing background literature and will then provide a brief outline of measurement in the area under review and then identifies relevant papers based upon the research question. The main review will evaluate the studies in relation to four main research questions. The conclusion suggests areas of further investigation and implications for clinical practice.

There has been growing recognition of a woman's engagement with the foetus during pregnancy. Cranley coined the expression 'prenatal attachment' in 1981 and defined it as "the extent to which women engage in behaviours that represent an affiliation and interaction with their unborn child" (Cranley, 1981:282). Firstly, it is necessary to discuss the role of attachment as it underpins the concept of prenatal attachment, and research

demonstrates that levels of prenatal attachment can predict postnatal attachment (Siddiqui & Hagglof, 2000).

Attachment theory is used to explain infant and caregiver relationships, defined as the “lasting psychological connectedness between human beings” (Bowlby, 1969, p.194). Attachment is formed by the caregiver’s ability to respond appropriately to the child’s physical and emotional needs, thereby creating a safe environment in which the child can grow (Bowlby, 1969). The intricate rhythm of responses between caregiver and child sets down an internal template through which the child understands and responds to the world.

More recently attachment theorists discuss the importance of ‘maternal reflective functioning’ or ‘mentalisation’. Similar concepts that explain a caregiver’s capacity to mentally represent and understand the mind of another, or more simply to hold them in mind (Grienenberger, Kelly & Slade, 2005). Low maternal reflective functioning within the mother is often a consequence of poor pre- and post-natal attachment (Priel & Besser 2001; Huth-Bocks, Levendosky, Bogat, & von Eye, 2004) although the measurement constructs are similar to those within the current review. They demonstrate the importance of maternal representations of the child, the very nature of prenatal attachment as defined by Cranley (1981), the mother’s ability to represent her foetus in her mind, and to imagine what it may be like to have a growing baby inside her. Based on this premise, attachment and affiliation can begin prenatally, and a woman’s preoccupation with emotional distress is likely to affect prenatal attachment.

Laxton-Kane & Slade (2002) suggest that the few opportunities available for reciprocal interactions between mother and foetus during the prenatal phase mean that the factors affecting the mother are likely to be important for the development of prenatal attachment. For instance, a woman's own attachment pattern within the prenatal period can be a predictor of later postnatal attachment (Fonagy, Steel & Steel 1991). In more extreme cases, low levels of prenatal attachment confounded by a woman's poor attachment patterns and the presence of personality disorder, have been related to adverse effects such as an increased urge to harm their foetus, and engagement with a range of poor health practices throughout pregnancy (Pollock & Percy, 1999).

Research examining prenatal attachment has focused mainly upon the role of demographic and pregnancy factors, something reflected in the four main reviews looking at prenatal attachment over the last decade (Alhusen, 2008; Cannella, 2005; Laxton-Kane & Slade, 2002; Yarcheski, E. Mahon, J. Yarcheski, M. Hanks, & L. Cannella, 2009). Although the role of psychological and relational factors has been considered in a number of the reviews, no single study has examined it exclusively. Cannella's integrative review was restricted to studies using Cranley's definition and measurement of prenatal attachment, whereas Laxton-Kane and Slade, who reviewed studies in a similar timeframe, focused on the implications for the process of care.

Unsurprisingly, both studies found that gestational age was related to prenatal attachment; as the mother progresses through pregnancy, it is likely she feels increasingly attached to her baby. Results regarding psychological factors were inconclusive. There was, however,

more support for the impact of mental health factors which did decrease prenatal attachment. Relational findings were more conclusive demonstrating that when a woman feels supported by those around her, she has a greater capacity to attach to the foetus. Similar findings were found in Alhusen's 2008 review, which demonstrated the importance of family support, psychological well-being and having an ultra sound scan. These were all related to higher levels of prenatal attachment. However, depression, anxiety and substance misuse were found to lower prenatal attachment. Alhusen's review focused upon the cultural implications of the studies under review. More recently using a meta-analysis design, Yarcheski et al. (2009) found that relational factors such as social support were moderate predictors of prenatal attachment, whereas psychological factors such as depression and anxiety had less significant correlations with prenatal attachment. Pregnancy factors such as gestational age and prenatal testing were also shown to have a moderate effect on prenatal attachment.

Previous reviews have been selective, focusing more upon the role of demographic factors with less comprehensive coverage of the role of psychological and relational factors in relation to prenatal attachment. This current review will analyse research completed over the last decade focusing exclusively on the role of psychological and relational factors, and will offer recommendations for improving methodologies in future studies. Due to rapid developments in the area, studies have focused on aspects of the mother's well-being in conjunction with prenatal attachment: evidently further comprehensive research such as this would be beneficial with its implications for therapeutic work and identification of risk factors.

Prenatal attachment, relational, and psychological factors are a common denominator in all pregnancies. However it may be that psychological factors manifest themselves differently in those women who have experienced previous or current difficulties such as complications, previous losses, disability or IVF: this group will be termed ‘complex pregnancy’. Studies where normal maternity samples have been used will be termed ‘typical pregnancy’. Therefore for the purposes of the review, the literature can be categorised in respect of the following questions:

Aims of the Review

- *How are psychological factors associated with prenatal attachment in a typical pregnancy group?*
- *How do psychological factors affect prenatal attachment in ‘complex pregnancies’?*
- *How do relational factors impact on prenatal attachment?*
- *How does relational trauma or disruption in relationships impact upon prenatal attachment?*

Method

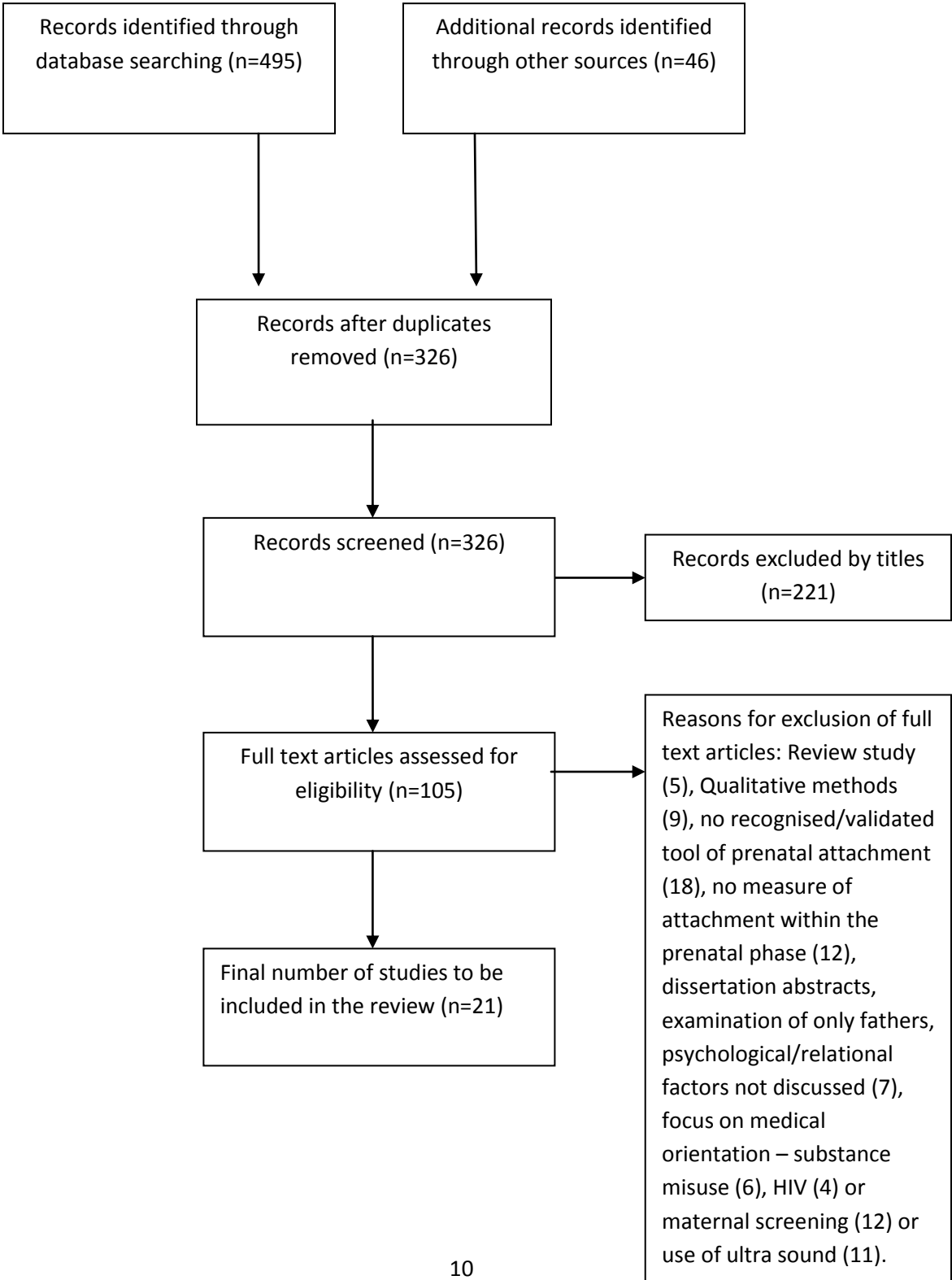
Search Strategy

To identify papers for review the following databases were searched as their scope encompassed the relevant literature in the field: PsycINFO, OvidMEDLINE via OVID and CINAHL. Key words for the first search strategy (1) related to ‘prenatal attachment’ were: ‘maternal fetal attachment’, ‘prenatal/maternal bonding’, and ‘foetal/fetal attachment’: terms were interchanged to optimise results. Key words for the second search (2) were: ‘psych*’, ‘relat*’, ‘mental health’, ‘emotional’, ‘trauma’ and ‘interpersonal’. Databases utilised a combination of subject headings and free text searches. Searches 1 and 2 were combined and executed in each of the selected databases. The search was restricted to the years 2000-2010, journals printed in the English language, and articles that were peer reviewed and empirical. Date restrictions applied as two extensive reviews (Cannella, 2005; Laxton-Kane & Slade, 2002) provided adequate coverage of the area under review up to 2000. The two subsequent reviews in the field of prenatal attachment (Alhusen, 2008; Cannella, 2005) reviewed papers to 2007, but with limited focus upon psychological and relational variables. Further limitations were imposed to ensure that the correct body of literature was under review. The aim was to provide a greater understanding of psychological and relational factors on pre-natal attachment. To focus the search, papers were only included if they examined psychological or relational factors within the hypotheses, but these could be within the context of another mediating variable, as long as this relationship had been examined and discussed. This excluded substance misuse and maternal screening, as extensively covered in medically orientated journals. Papers were

therefore excluded if they had not used a validated and recognised tool of prenatal attachment, and if the measurement did not take place during the prenatal period. Following the aforementioned criteria, 22 papers were subsequently identified.

The diagram below adapted from Moher, Liberati, Tetzlaff and Altman (2009) further illustrates how the papers were identified and excluded at various stages of the search.

Diagram 1. Articles identified and excluded through the search



Definition and Measurement of Prenatal Attachment

Before proceeding to the articles under review, it is important to define ‘prenatal attachment’: it has been built upon the work of a number of researchers from varying professional backgrounds and has therefore been conceptualised and measured in different ways. It is imperative to understand the subtle differences within the measurement tools in order to assess the articles discussed later.

Cranley (1981) developed the first self report measurement tool, termed the ‘Maternal Fetal Attachment Scale’ (MFAS). Cranley further defined prenatal attachment as “the extent to which women engage in behaviours that represent an affiliation and interaction with her unborn child”. The scale aimed to capture this through the following five categories: differentiation of self from foetus, interaction with the foetus, attributing characteristics to the foetus, giving of self, and role taking: the higher the score on the accumulated items on each category, the stronger the attachment. The scale has a high internal reliability (Cronbach’s alpha = 0.85) and is commonly used in the area of prenatal attachment.

Following this, Muller (1992) developed the ‘Prenatal Attachment Inventory’ (PAI) in 1992, in which he describes prenatal attachment as a unique and affectionate bond between the mother and foetus. The scale is focused based upon the relational aspects of prenatal attachment rather than behavioural elements. The PAI is a 21 item self-report measure, which shows high internal reliability (Cronbach’s Alpha = 0.9). Subsequently Condon (1993) developed the ‘Maternal Antenatal Attachment Scale’ (MAAS) in 1993; MAAS is a 19 item, self-report scale. Condon described prenatal attachment as “the emotional tie or

bond, which normally develops between the pregnant parent and her unborn child". MAAS is a two-dimensional scale that attempts to examine 'quality', and 'intensity' of attachment. Quality refers to how close/distant, tender/irritated or positive/negative the mother feels towards the foetus. The intensity subscale is related to the mother's preoccupation with the foetus. The MAAS has a high internal consistency (Cronbach's Alpha = 0.8) and is also frequently used within the field of prenatal attachment research. There are occasions in the review where the aforementioned scales have been adapted or abbreviated, however this is noted when this occurs.

Table 1. Summary of studies in the order they appear in the review

First Author/Date	Area of study in conjunction with Prenatal Attachment (PA)	Location	Data collection/ Tools used	Sample population and demographics	Main Findings
Hart (2006)	Mood state and adjustment to pregnancy	Australia	Edinburgh Postnatal Depression Scale (EPDS), State-Trait Anxiety Inventory, Maternal Attitudes Questionnaire, Childbearing Attitudes Questionnaire & MAAS.	n=54, 20-38 weeks gestation, mean age 27, first time mothers, normal maternal sample.	Higher levels of anxiety (state & trait) were related to lower levels of quality of attachment on the MAAS. Depression was not correlated with the MAAS.
Seimyr (2009)	Depression at the end of pregnancy	Sweden	Demographic, psychosocial factors, EPDS & Maternal/Prenatal-Fetal Attachment Scale (MFAS/PFA)	n=298 women and 274 partners, 30-32 week gestation, mean age = 29, normal maternal sample.	Woman's dislike for her body and experience of her changing body shape as measured by the MFA/PFA correlated with higher levels of depression.
Haedt (2007)	Depression and body image	USA	Demographics, Body Shape Questionnaire (BSQ-R-10), EPD & MFAS.	n=204, 2-40 weeks gestation, mean age = 28.75. Normal maternity sample.	PA was found to increase with gestation, moderated by body dissatisfaction (BD), whereby BD increased with gestation. There was no association between depression and PA.
Lewis (2008)	Creating a multi-	USA	Prenatal Nurturance Scale	n=99, third	Gestational age was found to be the

	factor model to predict PA		(PNS), Alcohol Use Disorder and Associated Disability Interview Schedule (AUDADIS), Depression Scale (CES-D), Relationship Assessment Scale (RAS), multidimensional Scale of Perceived Support (MSPSS) & MFAS.	trimester gestation, mean age = 25.8. Normal maternity sample.	only significant predictor of PA. All other variables including: PNS, depression, relationship assessment and MSPSS were not significant in relation to PA.
Lindergren (2001)	Depression and health practices	USA	Demographics, Depression Scale (CES-D), Health Practices Questionnaire (HPQ) & MFAS.	n=252, 20-40 weeks gestation, mean age = 29.5. Assessed over 5 maternity sites.	Higher levels of depression were related to lower scores on the MFAS, which resulted in more negative health practices.
Lindergren (2003)	Health practices of woman from urban and inner city communities	USA	Demographics, CES-D, HPQ & MFAS.	n=252, 20-40 weeks gestation, mean age = 29.5.	Women living in the inner city scored lower on the MFAS than women in living in urban areas. Depression was correlated with poorer health practices irrespective of where women resided.
Honjo (2003)	Depression	Tokyo	Zung's Self-rating Depression Scale (ZSDS) & Antenatal Maternal	n=216, 3-6 months gestation, 20 years and over.	There was no correlation found between PA and depression.

Attachment Scale (AMAS)					
Hus (2001)	Stressful life event	Taiwan	Demographics, Pregnancy Stress Rating Scale, Assessment Chart for stressful Events about Adult Life, PAI and a modified version of the MFAS.	n=150, over 28 weeks gestation, 21-38 years old.	A negative correlation between stressful life events and PA, specifically the appraisal of stress.
Sjogren (2004)	Personality factors	Sweden	Karolinska Scales of Personality (KSP), Anxiety proneness scale, extraversion scales, aggression-hostility scales & MFAS.	n=100, 13, 35/36 weeks gestation, mean age = 26.7.	A correlation was found between the MFAS and specific personality factors, such as anxiety and emotional detachment decreased scores on the MFAS, whereas somatic anxiety, guilt and social desirability enhanced scores on the MFAS. Scores on the MFAS were significantly higher at 36 weeks gestation.
Brandon (2008)	Depression in women hospitalised for obstetric risk	USA	EPDS, Dyadic Adjustment Scales (DAS), Structured clinical Interview for DSM-IV (SCID) & MAAS	n=129, 7-38 weeks gestation, mean age = 28.2, hospitalised for obstetric risk.	Higher lower levels of depression and lower levels of relationship satisfaction were related to lower levels of PA, this was irrespective of obstetric risk.
White (2008)	Appraisals of risk,	UK	Demographics, State-Trait	n=87, 18-42 weeks	A positive relationship was found

	coping in women hospitalised for obstetric risk.		Anxiety Inventory (STAI), Hospital Anxiety and Depression Scale (HADS), Prenatal Distress Questionnaire (PDQ), Prenatal Coping Inventory (PCI), Short Form Social Support Questionnaire (SSQ6), Maternal risk appraisal & MAAS.	gestation, mean age = 30.	between how a woman appraised her risk and PA rather than the levels of risk itself.
Tsartsara (2006)	Perinatal loss	UK	Pregnancy outcome Questionnaire (POQ) includes a measure of anxiety & MAAS.	n=35 of which 10 had experienced miscarriage, surveyed during first and third trimester, mean age 30.4	Women with a miscarriage history scored significantly lower in anxiety and prenatal attachment in the first trimester, but there was no difference in the first trimester.
Armstrong (2002)	Perinatal loss	USA	EPDS, STAI & PAI.	n=130 divided into 3 groups: previous loss group, no loss & women expecting their first child	The loss group scored higher in depression and anxiety, the groups did not differ in levels of prenatal attachment.
Lewis (2005)	Custody loss	USA	Demographic/social data &	n=67, 9 had	Women who had experienced

			MFAS	experienced prior custody loss & 58 non loss group, 28 weeks gestation, mean age 32.	previous custody loss scored significantly higher on the MFAS than those who had not. The 'custody loss' group were also more likely to misuse substances and be single.
Zimmerman (2003)	Prenatal attachment and disability	Canada	Demographic Questionnaire, The Interpersonal Reactivity Index (IRI) & MAAS.	n=233, split into 3 groups: expecting fist child (n = 171), subsequent child after normal pregnancy (n = 50) had a child with Down Syndrome (n = 12). Gestational age 12-38 weeks Age = 21-41.4 years.	Woman experiencing their first child scored significantly higher on the MAAS, there was no difference in the MASS regarding disability.
Helmstedt (2006)	Psychological factors and IVF	Sweden	The Spielberger Anxiety Inventory, Karolinska scales of personality, EPDS, Marital relationship scale (Barnett scale), Emotional Responses to Pregnancy Scale (ERPS) & PAI.	n= 56 IVF group and 41 in the control group 13, 26, 36 weeks mean age 32.3.	Marital satisfaction was higher at 26 weeks in both groups and correlated with higher levels on the PAI. At 36 weeks the detachment personality variable was related to lower levels of prenatal attachment, irrespective of group. Depression, anxiety and

					IVF did not correlate with PA.
Wilson (2000)	Family dynamics and infant temperament	USA	Family Dynamics Measure (FDM), Infant Temperament Questionnaire & (MFA/PFA).	n=156, third trimester and 8-9 months postnatal, mean age 24 years	Higher levels of mutuality, defined as emotional closeness, was related to higher levels of prenatal attachment.
Siddiqui (2000)	Memories of childhood	Sweden	Own memories of child rearing scale (EMBU) & PAI.	n=161, third trimester, 21-50 years.	Women who reported more warmth from their mothers and those who reported rejection from their fathers scored higher in the PAI.
Feldman (2007)	Effect of social support expectations	USA	Support Expectations Index (SEI), Rosenberg Self-Esteem Scale (RSES), Child's Attitude towards Mother (CAM) & PAI.	n=129, 3-40 weeks gestation, 13-19 years.	The perception of support rather than support itself was related to higher levels of prenatal attachment. In addition they found increased gestation, higher levels of self esteem, lower levels of stress and a planned pregnancy were predictive of higher levels of prenatal attachment.
Schwerdtfeger (2007)	Transmission of trauma	USA	Traumatic Events Questionnaire (TEQ), Trauma Symptom Checklist-40 (TSC-40), Prenatal Bonding	n=41, 12-41 weeks gestation & 22.9 years old.	Interpersonal trauma such as sexual abuse/rape but not general traumatic events were related to PA.

Instrument (PBI) & MAAS.					
Quinlivan (2005)	Domestic violence, drug abuse and infant temperament	Australia	Demographic questionnaire, Exposure to Domestic Violence (EDV) social support index, EPDS, Short infant temperament scale & MAAS.	n=136, 40 exposed to domestic violence & 96 not exposed, mean age 16.3. Surveyed during second/third trimester and 3 months post birth.	Women experiencing domestic violence and misusing substances had lower PA and infants had significantly poorer temperament at 3 months.

Results

The following section will review each of the studies in relation to the research aims stated at the end of the introduction. A summary of the studies under review can be found in the table in Table 1, providing details on sample, measurement tools, and key findings. The studies are laid out in the order they appear in the review.

- *How do psychological factors impact on prenatal attachment in a low risk pregnancy group?*

This section seeks to provide clarity on whether psychological processes are associated with levels of prenatal attachment in a low risk maternity sample. To this end, nine articles were identified and will be evaluated in turn.

Mental Health variables

Most recently a study by Hart & McMahon (2006) examined depression, anxiety, and prenatal attachment in the context of women's adjustment to pregnancy. They surveyed 54 low obstetric-risk Australian women, between 20 and 38 weeks gestation, using the MAAS as a measure of prenatal attachment. They found that the women's levels of anxiety, but not depression, were significantly related to lower levels of quality of prenatal attachment. Quality of attachment is one of the two subscales within the MAAS and relates to the quality of the relationship rather than intensity, which relates to preoccupation and time spent thinking about the foetus. The study found a significant relationship between a

woman's level of anxiety and her psychological adjustment to pregnancy, such as maladaptive cognitions about motherhood and maternal worry.

This suggests that clinicians should be alert to the content of the anxiety, in this instance, the transition to motherhood. A limitation of this study is that the women ranged considerably in gestational age, a strong correlate of prenatal attachment (Berryman & Windridge, 1996). Although no association was found between gestation and the main predictor variables, a partial correlation could have aided control of impact. Other factors known to impact adjustment in pregnancy, for instance pregnancy related factors, such as IVF, obstetric complications and psychosocial factors, were not examined in great detail. If controlled, they may have accounted for some of the variance between mood states and prenatal attachment, in addition the small and highly educated sample limited the broader applicability of the findings.

Seimyr, Sjogren, Welles-Njstrom & Nissen (2009) also sought to examine the impact of depression on prenatal attachment, with a larger sample and a more restricted gestation age. They sampled 291 women in their final trimester. Their findings indicated that depression was correlated to specific aspects of prenatal attachment as measured by the maternal/prenatal attachment scale MFA/PAI. This scale is an adapted version of the PAI and the MAAS. It comprises of 24 items and has been validated. They found a woman's experience of her body shape, for example, dislike of her body during pregnancy and low scores on the foetal experience subscale, were related to depressive moods. The foetal experience subscale shows a woman's awareness of her developing baby inside her, and

aims to measure the level of rapport between the two. It may be that women who feel depressed may feel ambivalent towards their pregnancy and therefore resentful about the changes to their body and feeling the foetus move. This study provides guidance for midwives and sonographers to be alert when women are distressed by changes to their body shape, when foetal movements are problematic, and when women are low in mood as this may be indicative of poor prenatal attachment.

This study found a correlation between specific items on a prenatal attachment scale rather than the total score. Therefore it cannot be concluded that depressive mood at the end of pregnancy and prenatal attachment are statistically related. This study supports the powerful contribution of gestation, for example as a woman progresses through her pregnancy she becomes increasingly attached to her foetus. It may be that depression could be correlated with prenatal attachment in the first or second trimester, and by measuring it at two points in time, the question could be better addressed. This research combined two prenatal attachment scales, which may compromise the psychometric properties of the scale and weaken the underlying constructs being measured.

It is probable that a woman's self esteem and self image are likely to relate to low mood, consequently impacting upon levels of prenatal attachment. Haedt and Keel (2007) measured levels of body dissatisfaction, depression, and prenatal attachment as measured by the MFAS in 169 women throughout their pregnancy (gestation ranged across the trimesters). In line with previous research, they also found that prenatal attachment increased with gestation. Moreover they found that the relationship between gestation and

prenatal attachment was moderated by body dissatisfaction, but that there was no direct association between depression and prenatal attachment. It may simply be that as a woman progresses through pregnancy, not only does her attachment to the foetus become stronger, but also her acceptance of her changing body shape. Women's bodies undergo a great transition throughout pregnancy and whilst women will likely report dissatisfaction with their changing shape, women who are less attached to their foetus may find this more problematic. The study's design could be enhanced by a longitudinal design examining attachment and depression during the postnatal phase, whereby a woman's body shape is likely to have changed.

One study that has attempted to utilise a model for understanding prenatal attachment is Lewis (2008) who used an 'interaction model' to examine the impact of varying factors such as demography, environment, and a woman's own internal world. To this end, Lewis (2008) recruited 99 New York women with a mean gestational age of 33.4 weeks. A woman's internal world has strong links with attachment and psychoanalytic theory and is depicted as an internal template set down as a consequence of her own attachment history. In this study this was measured using the Parental Nurturance Scale (PNS), which examines a woman's perception of the nurturing received from her mother. All predictors were entered into a regression model concluding that gestational age and foetus gender were the strongest predictors of prenatal attachment. The strength of this study is that it draws upon a number of factors known to impact on prenatal attachment. It is limited however by its select sample of women, the majority of whom were depressed and from a low socio-economic background, making the findings less generalisable. In addition, a high

proportion of the sample were Spanish-speaking and the authors recognised that the measurement tools may have been difficult for the woman to understand, reducing the reliability of the findings. Lastly, in some instances modified versions of the scales were used which further limited the generalisability and comparability of these findings.

Continuing with the theme of mental health factors, Lindgren (2001) examines depression and pre-natal attachment in the context of women's health practices. Within this study health practices are measured using a 34 item self report measure, examining how a woman engages with health practices whilst pregnant, for example diet, smoking etc. Using MFAS, they surveyed 252 women between 20–40 weeks gestation across five different US maternity sites. After controlling for demographic factors, they found depression negatively correlated with prenatal attachment, and that higher levels of depression and lower levels of prenatal attachment resulted in poorer health practices. This study clearly illustrates that if a woman struggles with low mood and poor attachment to her foetus she is less likely to behave in activities that enhance care of herself and her foetus. This has important implications for health care, whereby women with low mood may need further support. Whilst this study aids health care it is not possible to determine causation between the measured variables. Although depression and health behaviours are linked, we cannot predict causation, such as, do poor health practices contribute towards low mood? This has implications for the finding in relation to prenatal attachment, for example, is this a consequence of low mood, or do low levels of prenatal attachment contribute to low mood? A further longitudinal design would aid in predicting causation in such studies.

A similar study also by Lindgren (2003) focuses upon women living in more deprived areas with less access to health care, and who are more vulnerable to poor pregnancy outcomes. Lindgren (2003) compared the health practices, levels of depression and prenatal attachment in women living in the inner city (55) and in an urban area (197). As predicted, women living in the inner city had lower levels of prenatal attachment. They found depression to be negatively associated with health practices irrespective of where women resided. This shows the importance of supporting women at risk of poorer health outcomes by providing better access to services and helping them to bond with their unborn child. This study employs a cross-sectional design making it impossible to clarify the significant contributors and assess causation. The small number of women within the inner city group make comparisons across groups problematic. In addition, the social changes that exist within the inner city group, such as deprivation, mean there are likely to be a number of confounding variables.

The studies under review do not reflect a consensus on the impact of psychological factors such as depression and social support. Honjo, Arai, Kaneko, Ujiie, Murase & Sechiyama, (2003) measured depression and prenatal attachment in a sample of 216, low obstetric risk, Japanese women during their first and second trimester. An adapted version of MFAS was used in order to make it suitable for women who had not detected foetal movement. They found no relationship between depression and prenatal attachment. Interestingly, women with more sources of support such as supportive partners, had higher levels of prenatal attachment. This finding highlights the importance of social support during pregnancy. An explanation of the non-significant finding between prenatal attachment and depression may

have been due to the timing of prenatal attachment within the study. Prenatal attachment is known to increase with gestation and in this study, many of the women completed the measures during the later stage of their pregnancy when the strength of the attachment may have been stronger, so reducing the impact of depression. Cultural differences existed in this study, which may have caused ambiguities, for example Japanese maternity practices are known to differ from those in Europe and the USA. Additionally, the adapted version of the MFAS rendered the study incomparable with others, lowering its generalisability. Although the authors did validate the new measure, the changes went against the premise of the tool: for example it was validated on women once they had foetal movements, therefore it is not certain whether this study measures the underlying construct of prenatal attachment.

Non-mental health variables

Having considered pure mental health variables, it is important to examine studies that addressed non-mental health variables, such as the one undertaken by Hsu and Chen (2001), which looked at the relationship between stressful events and prenatal attachment in the context of demographic variables. They surveyed 150 Chinese women at over 28 weeks gestation using a combination of PAI and a modified version of MFAS. Interestingly, they found that it was women's *appraisal* of the stressful event, rather than the *severity* of the event, that impacted upon levels of prenatal attachment. This study illustrates the function of cognitions in the role of prenatal attachments. In addition women in this study who attended maternity classes had higher levels of prenatal attachment compared to those who had not. Given the correlation between stress and levels of prenatal attachment it would be

conceivable that a woman's personality would play a role in prenatal attachment. Sjogren, Edman, Widstrom, Mathiesen, & Uvnas-Moberg, (2004) measured anxiety, and personality factors in 100 Swedish women at 13 weeks and 36 weeks gestation. They found that prenatal attachment was significantly higher at 36 weeks than at 13 weeks. The study found that specific personality variables impacted upon levels of prenatal attachment, for example, anxiety and emotional detachment decreased levels of prenatal attachment, but somatic anxiety, guilt, social desirability and inhibited aggression enhanced prenatal attachment. These studies highlight the role of psychological processes such as personality and stress, rather than purely diagnostic labels more relevant for women in normal maternity settings.

From the studies under review within the typical pregnancy group, there was more of a consensus over the role of anxiety and prenatal attachment in terms of mental health variables. It is important to note that studies relating to depression utilised differing measurement tools, making comparisons problematic and therefore the findings remained equivocal. Body image was shown to be an important factor within two studies demonstrating that poor body image was related to decreased levels of prenatal attachment. Personality was examined in one of the studies, whereby specific personality factors were shown to impact upon prenatal attachment.

- *How do psychological factors affect ‘complex pregnancies’ prenatal attachment such as when a woman is experiencing or has experienced problems through her pregnancy?*

During pregnancy, women who have previously experienced, or are experiencing difficulties are likely to be more vulnerable and it may be that psychological factors are likely to manifest themselves in different ways. Seven studies were identified which examine prenatal attachment in the context of medical complications, previous losses, and IVF. This may lead to disruptions in relational or psychological processes, subsequently impacting upon a woman’s ability to attach to her developing baby. Understanding prenatal attachment in this context is increasingly important, as these women are likely to utilise services more frequently, requiring the attention of health professionals.

Obstetric Risk

It may be that women who have been hospitalised for obstetric risks are more vulnerable to poorer prenatal attachment. Brandon, Pitts, Robinson & Stringer (2008) examined depression, relationship satisfaction, and prenatal attachment measured by the MAAS within 129 women hospitalised for obstetric risk. Over half the women scored at a clinically significant level for depression, yet levels of depression were unrelated to the severity of the obstetric risk. Women with lower levels of depression and relationship satisfaction reported higher levels of attachment to their foetus. This study demonstrated that level of obstetric risk was not as critical in developing prenatal attachment amongst women experiencing medical complications as relationship satisfaction and depression.

Although this study does not show how relationship satisfaction and obstetric risk moderated the relationship between depression and prenatal attachment. In order to assess causation and draw firmer conclusions, multivariate rather than univariate statistics should have been employed. This study suggests that supportive relationships help prevent poor prenatal attachments at such a challenging time. To enhance this study a measure of anxiety could have been included to assess if uncertainty caused by medical complications was a contributing factor.

Continuing with the idea of obstetric risk, a further study demonstrated the importance of cognitions in hospitalised women. White, McCorry, Scott-Heyes, Dempster, & Manderson, (2008) examined cognitive appraisals, coping strategies and prenatal attachments. They sampled 87 women who had been hospitalised for at least 48 hours employing the MAAS as a measure of prenatal attachment. This study found that it was the woman's coping style especially that of positive appraisal, which was more predictive of the quality of prenatal attachment rather than the medical rating of risk. The strongest predictors of intensity of attachment were a woman's positive appraisal style, her anxiety score, and whether the pregnancy had been planned. Intensity of attachment relates to preoccupation and the time spent thinking about the developing baby. This study demonstrates the importance of meta-cognitions on prenatal attachment. Moving from mental health variables, it provides a focus upon possible psychological mechanisms involved in prenatal attachment. Here, cognitive appraisals appear to enhance prenatal attachment above levels of anxiety in a high-risk group of women. It would be of interest to examine whether positive cognitive appraisals bolster prenatal attachment within a normal maternity population.

Previous Loss

It may not be just the presence of obstetric risk, but also previous negative experiences during pregnancy that impact upon psychological and relational factors, such as adding a strain on existing relationships. Tsartsara & Johnson (2006) examined the role of anxiety and prenatal attachment in the context of 35 Australian women, 10 of whom had previously experienced a miscarriage/s. Women completed the MAAS attachment scale and a pregnancy specific anxiety scale in their first and third trimester. Those who had a previous history of miscarriage scored significantly higher on anxiety measures and lower on levels of prenatal attachment within the first trimester, than women who had not experienced a miscarriage. However, by their third trimester, anxiety within the miscarriage group had decreased and levels of prenatal attachment had increased, resulting in no difference between the two groups. This study illustrates that women are able to recover from distressing events such as miscarriage, and that the progression of pregnancy may itself provide resolution, demonstrating the powerful impact of gestation. This study emphasises the importance of timing in the measurement of prenatal attachment within pregnancy. It may have been that the non-significant finding during the third trimester could be down to low statistical power as the miscarriage group comprised only of 10 women.

In contrast, Armstrong (2002) found no difference in levels of anxiety, depression, and prenatal attachment in couples who had an experience of perinatal loss, and those who had not. Their sample consisted of 103 couples split into three groups: those who had an experience of previous prenatal loss, those with no experience of loss during pregnancy, and those expecting their first child. They used the PAI as a measure of prenatal

attachment, standardised measures for depression and a specific pregnancy anxiety measure. Couples in the group that had experienced previous perinatal loss had higher levels of depression and pregnancy specific anxiety than those in the other groups, but there was no significant difference between prenatal attachments across the three groups. This again may be due to the timing of the measurement, whereby women completed the measures during their third trimester. Tsartsara & Johnson (2006) found that prenatal attachment in situations of previous miscarriage, had increased by the third trimester. This may also be due to a difference in measurement tools as PAI was utilised in this study, whereas Tsartsara and Johnson (2006) used the MAAS. Interestingly, higher levels of anxiety and depression were more prevalent within those women who had experienced perinatal loss but this did not lower prenatal attachment, as established in previous studies. This may have been a consequence of other mediating factors such as social support that were not examined within the studies.

Continuing with the theme of loss, the following study focused on women who had previously undergone custodial loss. Lewis (2005) looked at mental health factors, social support, drug use, wider demographic factors, and prenatal attachment as measured by the MFAS. The author compared a group of women who had experienced previous custody losses (loss group n=9) and those who had not had children removed (non-loss group n=58). Women were of 28 weeks gestation and were recruited from an obstetric neighbourhood clinic in New York which predominately served women of African descent. Contrary to expectations they found that previous custody loss was the only significant predictor of prenatal attachment amongst the variables examined, demonstrating that

women who had experienced a previous custody loss had significantly higher levels of prenatal attachment.

One potential weakness of this study is that women may not have completed the measures accurately, fearing potential loss due to the possible threat of having the subsequent child removed. Closer examination of the composition of the loss group is also interesting; women were more likely to misuse substances, be single, and 66% of the sample were separated from their mother before the age of 18. It may be that these factors had a confounding effect on levels of prenatal attachment, for examples, women separated from their mothers probably did not experience positive attachments or positive experiences of parenting. In this case there could be an expectation that the foetus may fill their attachment needs. The loss group reported less social support, a factor previously found related to lower levels of prenatal attachment. Due however to the complexity of the factors measured, it is not possible to infer if social support negatively affected prenatal attachment more than custody loss. Further research is required to determine which factors impact on prenatal attachment. An additional measure of women's attachment patterns may enhance our understanding of why women at threat of losing a child may have increased levels of prenatal attachment.

Disability

Previous perinatal loss and disability can be viewed as interrelated as they both involve loss; miscarriage may involve actual loss but having a child with a disability means that the loss of having a normal and healthy child may be experienced. Zimmerman et al (2003)

looked at prenatal attachment in the context of having a subsequent child where a previous child had a disability. To this end the authors recruited three groups: first time mothers (171), mothers with a typical child (50) and mothers who had a child with Down Syndrome (12). They measured stressful life events, interpersonal relationships, empathy (cognitive and emotional), general demographic factors, and prenatal attachment using the MAAS. They found that there were lower levels of prenatal attachment in both groups of mothers having a subsequent child, irrespective of whether they had a child with a disability. Examination of the sub-scores within the attachment measure showed that the total score of attachment as measured by intensity and preoccupation was more likely for a woman with fewer children to consider. This study demonstrates that the novelty of being a new mother predicts higher levels of prenatal attachment, higher than the impact of having children with disabilities. Further understanding into the meaning of being a new mother and levels of prenatal attachment is required.

Conception following IVF

Women who have had difficulties with conception and required IVF may respond differently to pregnancy. Helmstedt, Widstrom, & Collins (2006) were primarily interested in psychological correlates for women who had conceived using IVF compared to those who had conceived naturally. Their sample included 56 women who had undergone IVF and a control group, comprising of 41 women. Both groups were sampled at 26 and 36 weeks of gestation on a range of psychological measures including: depression, personality, anxiety, social support, and emotional responses to pregnancy. They found that there was no difference in the levels of prenatal attachment at either of the time points. However, they did find marital satisfaction as 26 weeks was predictive of prenatal attachment in both

groups. At 36 weeks, women higher in ambivalence about the pregnancy and the detachment personality variable showed lower levels of prenatal attachment in both groups. This study found that depression and anxiety were not correlated with prenatal attachment, and this may be because research into prenatal attachment and IVF is in its infancy. Further research is required to validate prenatal attachment measures in this sample. This study demonstrates that relationship variables are more pertinent within early stages of pregnancy, but intrinsic factors such as personality played a role in prenatal attachment in the later stages of pregnancy.

It was predicted that women experiencing, or women who had experienced difficulties in previous pregnancies, may have higher levels of psychological distress and subsequently lower levels of prenatal attachment. This did not seem true in the reviewed studies; for instance women hospitalised for obstetric risk experienced higher levels of anxiety and depression. However Brandon. et al (2008) & White et al (2008), did not find that depression was due to the risk and therefore it was not this that impacted on lower levels of prenatal attachment. In both studies involving women hospitalised for obstetric risk (Brandon et al., 2008; White, et al 2008), it was their appraisal of their own risk that affected prenatal attachment, rather than the risk itself. In the same way depression was also caused by their appraisal of the risk, and not the risk itself.

For women who had experienced previous losses such as miscarriage, depression was more prevalent in one study; however this was not associated with lower levels of prenatal attachment. Or the relationship between anxiety and prenatal attachment disappeared by

the third trimester. Previous loss through custody differed whereby women who had experienced previous loss had higher levels of prenatal attachment. This was confounded by the potential threat of loss and more complex demographic factors. Having a previous child with a disability did not impact upon levels of prenatal attachment or IVF, however these studies did show the importance of social support. It may be that relational factors rather than psychological factors such as anxiety and depression are more important when women are experiencing difficulties in their pregnancy.

- *How do relational factors impact on prenatal attachment?*

Previous studies have mentioned the role of relational factors assisting with prenatal attachment. If a woman is supported through pregnancy she is likely to have more emotional stability, she may feel safer and more secure, therefore more able to focus on the development of her baby. This next section reviews studies where the main focus has been relational factors in conjunction with prenatal attachment. It also includes family dynamics and upbringing as relational processes. Four studies were identified within this section.

Family is likely to be the main source of support for a woman throughout her pregnancy. Wilson et al (2000) examined the impact of family cohesion on prenatal attachment, and whether this could predict later infant temperament. To this end both women and their partners were sampled during the pre- and post-natal phase. The findings showed that after controlling for demographic variables, mutuality, which is defined as emotional closeness, was linked to prenatal attachment. They found that in the case of family dynamics, aside from some expected conflict, family roles remained stable from the pre- to post-natal

period. The correlation between emotional closeness in the family and attachment to the foetus may simply be that individuals whom feel closeness within their family can extend this to their foetus. Furthermore this may be indicative of an underlying personality construct of a secure attachment and safe base. They also found that infant temperament in the postnatal period could be predicted by higher levels of prenatal attachment. These findings are tentative as the study does not account for any potential environmental confounding variables likely to impact upon infant temperament.

It is likely that the support a woman has received from her own family will impact upon how she is able to develop regarding her foetus. Siddiqui, Hagglof, & Eisemann (2000) look at developmental and attachment perspectives, focusing on women's reflections on their own upbringing. They measured 161 women's perceptions of their upbringing and prenatal attachment as measured by the PAI in the third trimester. Those women who reported they experienced more warmth from their mothers had higher levels of prenatal attachment. Unexpectedly, they found that women who reported their father had rejected them scored higher in levels of prenatal attachment. This supported findings that women with higher levels of role differentiation between them and the foetus see the baby as a separate identity, which shows that they may have had an expectation about what the child could offer them. This study illustrates the intergenerational nature of attachment and how early significant relations contribute to a woman's ability to attach to her developing foetus.

Studies including a measure of social support have been sparse in literature over the last decade although one study by Feldman (2007) examined support expectations in a group of

129 adolescents undergoing an intervention to support adolescent pregnancies. Their findings showed that it was the expectation of support rather than the support itself that related to higher levels of prenatal attachment. They also found that lower levels of stress, higher self-esteem, a planned pregnancy, and gestation were the best predictors of prenatal attachment. This study illustrates the importance of perceived peer relationships during pregnancy for adolescents which is particularly pertinent, as 93% of the sample were single and therefore partner support was not available. Perhaps this group had lower expectations regarding level of support: these findings are tentative and may not be true for non-adolescent groups. It would be interesting to see if a measure of mental health was included to examine the impact of mood states in this sample.

Studies focusing on relational factors showed differing results in relation to prenatal attachment. Cohesion of the family and women who had experienced warmth from their own mother heightened prenatal attachment. Interestingly it was the perception of support, rather than support itself, which resulted in higher levels of prenatal attachment. These studies demonstrate the importance of relational factors on prenatal attachment.

- *How does relational trauma or disruptions in relationships relate to prenatal attachment?*

If support is shown to predict prenatal attachment then it is likely that more severe disruption in relationships will be determinant. Two studies were identified regarding relational trauma. Schwerdtfeger & Goff (2007) looked specifically how a woman's trauma

history may impact on the development of prenatal attachment. The authors sampled 41 women in a Texas USA clinic that served women from low socioeconomic backgrounds seeking prenatal care. They measured trauma using a traumatic events questionnaire and a trauma symptom checklist. These assessed a wide variety of possible trauma including both interpersonal and environmental events and the impact of these events. They measured prenatal attachment using the MAAS. They found specifically that interpersonal trauma decreased levels of prenatal attachment but not general levels of trauma. However, those whom had experienced interpersonal trauma had also witnessed more traumatic events. It may have been that the severity of the trauma or the way it is experienced or perceived may have more of an impact on prenatal attachment. It is likely that women who had experienced interpersonal trauma, such as rape or sexual abuse, may be more cautious of others and do not feel supported by those around them. This may be more indicative of wider relational or attachment difficulties not assessed in the study. Therefore further analysis is required to disentangle the level and specific type of interpersonal trauma involved. It may be that the small and specific sample restricted the findings.

Quinlivan & Evans (2005) examined relational trauma in the context of domestic violence and the impact on pre- and post attachments through a longitudinal design. They recruited 151 women, with and without a history of domestic violence, through an ante-natal clinic. These women completed measures for prenatal attachment, depression, drug use, and other demographic factors in their second or third trimester. They were assessed again at 3 months post-birth where the prenatal attachment scale was substituted for an infant temperament measure. Results showed that women who had experienced, or were

experiencing domestic violence, and those misusing drugs had significantly lower levels of prenatal attachment. Domestic violence and drug abuse were also significantly related to poorer infant temperament 3 months post-birth. Similarly to other studies that have examined women from lower socio-economic circumstances there were a number of confounding factors such as drug misuse. Women were more likely to be single and feel socially isolated, and were part of a programme delivering intervention through health care professionals: therefore results at 3 months may have been, in part, due to the effects of treatments. Drug use was a powerful predictor of infant temperament at 3 months, but it may be the reason why the women are using drugs, such as poor emotional control, and these elements that are impacting prenatal attachment. Therefore further analysis is required to deal with these likely confounding factors. It is hard to know which factor precedes the other: is it the poor levels of prenatal attachment whereby women feel less attached and so increases their destructive behaviour or is the presence of this behaviour which enhances poor prenatal attachment?

Conclusions and Recommendations

This review has provided more comprehensive coverage of the role of psychological and relational factors in relation to prenatal attachment across a range of maternity samples. The studies cover a range of aspects and samples, some of which show disparities across groups. This is due to the differing tools and research designs used, making conclusions and effective comparisons problematic. The review has built on the work of Alhusen (2008), Cannella (2005), Laxton-Kane & Slade (2002) and Yarcheski, Mahon, Yarcheski, Hanks, Cannella (2009) by continuing to demonstrate the powerful role of demographic factors, particularly that of gestational age. A limitation is that despite the recognition of these factors, many studies failed to control for their effect. Mental health factors such as depression and anxiety were most commonly examined across high and low risk groups; the presence of anxiety rather than depression was shown as more of a threat to the development of prenatal attachment. Findings regarding depression were equivocal, and in addition, relational factors were shown to be an important aspect across the studies irrespective of contextual factors. In addition, small sample sizes make generalising the findings of many studies under review problematic.

Of particular interest were the comparisons between the typical and complex groups. Studies that considered psychological factors, e.g. pregnancies that were, or had been problematic, showed that psychological factors relating to prenatal attachment did not seem to be dependent upon the context of women's previous experiences. For example, both studies examining psychological factors in a sample of women hospitalised for obstetric risk (Brandon, Pitts, Robinson, & Stringer, 2007; White, et al 2008) showed the level of

risk was not the contributing factor that impacted upon prenatal attachment, but rather the perception that they were unable to cope, thus demonstrating the importance of psychological factors. Similarly, studies found that women who had experienced precious losses (Armstrong, 2000; Tsartsara & Johnson, 2006) had heightened levels of depression and anxiety, but no change to levels of prenatal attachment by the final stage of pregnancy.

Non-mental health factors were significant in relation to prenatal attachment such as increased stress and personality. Other psychological mechanisms relating to prenatal attachment in the context of mental health factors were identified within these studies, e.g. body image, self esteem, personality, and stress levels. The role of appraisal was critical as discussed in relation to prenatal attachment, not only in women hospitalised (White, et al 2008), but in relation to social support where again, it was the perception of support rather than the support itself that was critical. Further research is required to understand more fully the psychological mechanisms in both typical and complex pregnancies and further distinguish between mental health factors and psychological mechanisms.

Interestingly there was a link between women's recollection of their own experiences of being parented, and prenatal attachment. It is likely that a woman's attachment style is impacting upon her ability to facilitate attachments prenatally. However, in order to draw firmer conclusions regarding the role of attachment, more studies are required with a formal measure of attachment.

An attachment-based approach may help explain a number of key findings within this review, particularly around relational factors and enhanced attachment in certain situations of adversity. Two studies demonstrated that custody loss and rejection from the father enhanced prenatal attachment. For example a poor attachment may lead to expectations about what the baby can offer. Further research within high risk samples are needed to firmly establish these findings.

Social factors were examined in a few of the studies, and interestingly, factors such as low economic status had more of a detrimental effect on prenatal attachment than difficulties faced during pregnancy, although the two may correlate. In these instances, it is demonstrably difficult to unravel what is impacting on prenatal attachment and assess causation. Further comparative designs are required to address this issue. This particular group of women are of definite interest and warrant further examination in order to aid a deeper understanding of the processes at work.

Longitudinal designs would enhance understanding of how these factors manifest within the postnatal phase, addressing the question about the cyclical nature of attachments, providing support of Bowlby's original work on the development of attachment within the prenatal period. Researchers must build upon the evidence base by assimilating previous findings into controls; for example, gestational age is now an established predictor of prenatal attachment, although many studies have not accounted for this within their research design.

Implications for clinical practice and antenatal care

This review highlights the need for identification and further assessment during the prenatal period to check for psychological and relational factors. Development of a diagnostic tool that could incorporate differing factors would be of benefit, enabling psychological ideas and well-being to sit within a medical framework, ensuring a bio-psychosocial approach to woman's care in this phase.

It would seem that irrespective of difficult pregnancies with complications, the most common factor was the presence of support and women's appraisals. This is useful within the context of developing interventions; however a further evidence base is required to research the effectiveness of such interventions. Studies showed the detrimental effect of relational trauma on prenatal attachment. This supports the need for specific intervention to women following any relational trauma during or prior to pregnancy. It may be that therapies that require activation of previous trauma etc. may be less beneficial than short-term focused interventions, however, again this would need to be supported by further evidence. The studies under review also examined social factors and health practices demonstrating that women from more socially deprived areas have poorer health practices and consequently less attachment to their developing foetus. Therefore enhanced support to women deemed at risk due to adverse social circumstances require enhanced support during their pregnancy.

The review has demonstrated that psychological and relational factors are critical in varying ways when a woman is attaching to her developing baby, illustrating clearly that these

relationships are rarely simple and are often confounded by other factors, proving an established need for further research.

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**AN INVESTIGATION INTO THE RELATIONSHIPS
BETWEEN PSYCHOLOGICAL FUNCTIONING,
ENGAGEMENT WITH OBSTETRIC SERVICES, AND
PRENATAL ATTACHMENT.**

RESEARCH REPORT

WORD COUNT: 11,983

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PSYCHOLOGICAL FUNCTIONING, ENGAGEMENT WITH OBSTETRIC
SERVICES, AND PRENATAL ATTACHMENT.**

Abstract

Objective: The aim of this study was both to examine the relationship between psychological functioning, adult attachment, and prenatal attachment. An additional aim was to examine women that booked late for their maternity care (post 12 weeks): their general composition, psychological functioning, and prenatal attachment were compared with women who booked early.

Method: 313 pregnant women attending for their 20 week scan completed a questionnaire booklet covering measures of distress tolerance (DT), adult attachment (ECR), borderline personality features (BOR), well-being, prenatal attachment, and relevant demographic factors. The 50 women identified within the sample as booking late became the target for further analysis.

Results: Significant associations were found between the ERC, DT, BOR, well-being and prenatal attachment. Well-being, distress absorption, an avoidant attachment style, and maternal age were the strongest predictors of prenatal attachment. Women who booked late for maternity care were shown to have higher relational difficulties: the most significant predictors of late booking were not planning for the pregnancy, and not being in a relationship with the father of the baby.

Conclusions: These results support the notion that psychological functioning is associated with prenatal attachment, specifically the role of well-being and distress absorption. Demographic factors are equally important in relation to woman who book late for their maternity care.

Introduction

“Pregnancy offers a unique opportunity to engage women from all sections of society, with the right support through pregnancy and at the start of life being vital for improving life chances and tackling cycles of disadvantage” (Department of Health, 2010: p.17). This extract taken from the latest White Paper, “Equality and excellence: Liberating the NHS” supports the notion that adverse circumstances should be dealt with during pregnancy by engaging women in obstetric services. This highlights pregnancy as a critical period in which to intervene and improve lives, specifically the area of psychological health and well-being. When well-being and psychological health are compromised, it can result in poorer outcomes for the developing baby (DiPietro, Costigan & Gurewitsch, 2003; Field, Diego, Hernandez-Reif, Figueiredo, Deeds, Ascencio, Schanberg & Kuhn, 2010), impact upon postnatal outcomes such as the bond between infant and mother (Martins & Gaffan, 2000) and will likely impact upon women’s engagement with obstetric services. When this engagement is delayed, there can be detrimental consequences for the woman and baby (Petrou, Kupek, Vause & Maresh, 2003). When looking at well-being and psychological health, an area instrumental in understanding pregnancy is the role of attachment.

Attachment is defined as the psychological bond between two people (Bowlby, 1969). This theory postulates that infants develop a positive and secure attachment when their caregiver is warm, responsive, and sensitive to their needs, therefore creating a safe base for them (Bowlby, 1969). The nature and intricacy of these early infant to caregiver interactions shape how infants make sense of themselves and the world around them (Ainsworth, 1979);

these relationships are internalised and often remain with the child throughout their life span (Bowlby, 1988). Therefore the quality of attachment received can be predictive of later psychological well-being and personality development (Holmes, 2001). Attachment is therefore an area of much importance to normal psychological development.

Prenatal attachment

The pertinence of attachment in maternity settings is the development of this prenatal bond, often termed ‘prenatal attachment’. Prenatal attachment is conceptualised as the engagement and affiliation a mother feels towards her foetus during pregnancy (Muller & Ferketich 1992), further defined as “the emotional tie or bond which normally develops between the pregnant parent and her unborn child” (Condon & Corkindale, 1997, p.359). Unlike traditional models of attachment concerning reciprocity between infant and caregiver, prenatal attachment focuses on the mother’s ability to internally represent and mentally connect with her foetus (Cranley, 1981) which is central to both pre- and post-natal attachment. It can also bring about positive behaviours which may include eating healthily, preparations such as buying clothes, choosing a name, or attending antenatal classes (Salisbury, Law, Lagasse, & Lester, 2003). Recent conceptualisations of prenatal attachment have involved the dimensions of ‘quality’ and ‘intensity’. In defining the level of quality, a high level denotes the closeness and tenderness a mother feels, as well as her ability to have a clear mental representation of the foetus, and recognise that the foetus is dependent on her. Intensity relates to the amount of time she is preoccupied with, and spends thinking about, the foetus (Condon 1993). Most importantly, research has demonstrated that prenatal attachment has strong links with postnatal attachment (Leifer,

1980; Siddiqui & Hagglof 2000, Huth-Bocks, Levendosky, Bogat, & Von Eye., 2004). For this reason, maternal attachment is vital during pregnancy as it predicts later life developmental outcomes for both baby and mother (Muller, 1996), and therefore warrants further examination.

Recent reviews have also established clearer associations between pregnancy-specific variables and demographic factors with prenatal attachment (Laxton-Kane & Slade, 2002; Alhusen, 2008; Yarcheski, Mahon, Yarcheski, Hanks & Cannella, 2009). For example, attachment is shown to increase as the pregnancy progresses. Berryman & Windridge, (1996) believe it is also linked to increased foetal movement. There is a link between parity and prenatal attachment: when pregnancy is no longer a novel experience, levels of prenatal attachment can be lower (Zimmerman & Doan, 2003). Married women are shown to have significantly higher levels of prenatal attachment than single women (Lindgren, 2001), and other demographic variables such as maternal age, income, education and race have also been examined in a review by Cannella (2004) which illustrated that few studies reveal a clear association, leaving inconsistencies.

Psychological factors, adult attachment, and prenatal attachment

Whilst there is an established frame of reference for demographic factors, relatively little has been carried out in the area of psychosocial variables. A recent meta-analysis showed a mild relationship with psychological factors and a moderate relationship with regards to relational support (Yarcheski et al. 2009). For example, relationships surrounding the pregnant women are of particular importance for well-being during pregnancy and

attachment to the foetus. (Cranley, 1981; Wilson, White, Cobb, Curry, Greene & Popovich, 2000). Mood states have been examined for their effect on prenatal attachment. The presence of depression and anxiety has been shown to exert a negative impact on prenatal attachment (Condon & Corkindale, 1997; Hart & McMahon, 2006). Psychological mechanisms such as stress (Hsu & Chen 2001), personality (Sjogren, Edman, Widstrom, Mathiesen, Uvnas-Moberg, 2004), and appraisals (White, Mccorry, Scott-Heyes, Dempster & Manderson, 2008) have been examined in relation to prenatal attachment, however this is an evolving field and so coverage within the literature is limited.

One area not thoroughly examined in relation to prenatal attachment is well-being. Zachariah (2004) found an association between well-being and prenatal attachment, however findings were limited to a small socially deprived group of women. Well-being is an evolving area of research incorporating a positive approach to psychological functioning, therefore of particular interest in normal maternity populations.

A woman's own attachment pattern is critical in the prenatal phase, whereby women with their own secure attachments have an increased ability to connect to their unborn child and form a healthy attachment to them (Priel & Besser 2001; Raval, Goldberg, Atkinson, Benoit, Myhal & Poulton, 2001; Huth-Bocks et al. 2004; Araneda, Santelices & Farkas, 2010) and are more likely to develop secure postnatal attachments (Fonagy, Steel, & Steel, 1991). It is important to note that the latter studies have utilised an interview method rather than a self report measure commonly used in the measuring of prenatal attachment. Attachment patterns have most commonly been categorised as 'anxious' or 'avoidant'

(Mikulincer, Shaver, & Pereg, 2003). Anxious attachment refers to the fear of interpersonal abandonment, with the excessive need for approval from others, whereas avoidant attachment is defined as the fear of being dependent upon others, and a need to be self-reliant (Wei, Russell, Mallinckrodt & Vogel, 2007). High levels of anxiety and avoidance can be referred to as an insecure attachment, whereas low levels denote a secure attachment (Lopez & Brennan 2000).

Contemporary attachment theorists postulate that in order for secure attachments to develop between infant and caregiver, the caregiver must have the capacity to think about the contents of their own minds as well as the minds of others, a competency dubbed 'mentalisation' (Fonagy, Steele, Steele, Leigh, Kennedy & Mattoon, 1995; 1996, Greenberger, Kelly & Slade, 2005), demonstrating that those who lack this capacity, struggle to form attachments with their children. Although one cannot directly predict in all instances that mothers with poor attachments themselves will continue to have poor attachments with their children, research indicates that mothers with particular attachment styles, or those who have encountered problematic experiences do form poorer attachments to their infants (Huth-Bocks et al. 2004). As attachment patterns are both integral to our development as well as being resistant to change over time, (Beniot & Parker, 1994), it is important that they are examined prenatally. Less is understood regarding the specifics of attachment styles and prenatal attachments.

Borderline Personality Disorder, (BPD), Distress Tolerance and of prenatal attachment.

The studies discussed above demonstrate a link between mood states, attachment styles, and levels of prenatal attachment. One area where psychological functioning, mood states, and patterns of attachment are of particular importance is in the context of BPD, considered by some to be a disorder of attachment (Fonagy, Target, & Gergely, 2000). The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) defines BPD as a “prolonged disturbance of personality function characterised by depth and variability of moods”, including features of: impulsivity, feelings of abandonment, difficulties in relationships, lability of mood, self harm, and chronic feelings of emptiness. A recent review by Agrawal, Gunderson, Holmes & Lyons-Ruth (2004) examined attachment styles in a cohort of subjects with BPD, noting that all relevant existing studies established a link between BPD and insecure attachment patterns.

Research in this area is limited in relation to prenatal attachment. One study by Pollock & Percy (1999) examined the presence of personality disorders, attachment styles and prenatal attachment, did so in the context of investigating foetal abuse. The study showed a link between preoccupied attachment styles and borderline features demonstrating that women with greater BPD features and preoccupied attachment style had a lower quality of attachment to their foetus.

Important in the maintenance of BPD is a construct known as ‘distress tolerance’ (Linehan, 1993) a meta-cognition showing an individual’s ability to tolerate pain and suffering, and

decrease their emotion. Individuals with low levels of distress tolerance find regulating their emotions problematic. It is an important aspect of daily functioning and is therefore applicable to clinical and non-clinical populations. The construct has four main components, 'tolerance' which refers to the ability to tolerate distress; 'appraisal', which refers to how the distress is appraised; 'regulation', which relates to an expectation that distress cannot be tolerated and therefore is avoided; and finally 'absorption', which refers to an individual's tendency to become consumed by the distress, which inhibits thinking and behaviour (Simons & Gaher, 2005).

Moving away from diagnostic criteria and focusing on psychological functioning such as distress tolerance and measuring individual features of BPD as continua, will allow better understanding of a wider range of women. Prevalence of BPD (i.e. the collective features) is likely to be low within a normal maternity population: general community prevalence levels are 5%, however the individual characteristics outlined above can form part of normal functioning.

Engagement with services, psychological function, and prenatal attachment

One aspect that has been studied in relation to prenatal attachment is women's health behaviours. Lindgren (2001) has shown a link between negative mood states, such as depression, and adverse health related behaviours during pregnancy. One way of examining a woman's behavioural responses to care for her foetus is in her engagement with maternal services. In extreme cases, those with more features of BPD exhibit low levels of prenatal

attachment, showing poorer engagement with health services, so potentially endangering the foetus.

Engagement can be measured by noting the time it has taken for a woman to book for her prenatal care. Late booking within medical settings is defined as first attendance for prenatal care after 12 weeks gestation. Early booking enables pregnancy risks to be identified promptly, screening for common maternal and foetal conditions to be initiated early, and for positive education on good nutrition and health practices. During pregnancy, women are advised to have regular prenatal checks to monitor their well-being and that of the unborn child, (National Institute of Clinical Excellence, 2008; Confidential Enquiry into Maternal and Child Health, 2007). However statistics reveal that 30% of all UK women either book late or do not attend; poorer health outcomes for both mother and baby have been associated with late bookings. (Raatikainen et al. 2007).

It is important to note that integral to making bookings, is the ability to carry out higher order processes, such as planning, organisation, and implementation of health interventions. These can be regarded as behavioural responses to care. It is also known that women who book late tend to come from more socially deprived or ethnic backgrounds, are younger, and have more children (Rowe & Garcia, (2003). Late booking is of serious concern amongst obstetricians, midwives, social workers and other stakeholders in the provision of maternity services. However, little is known about the psychological predictors of this health related behaviour.

There are grounds to believe that women who present with difficulties with psychological functioning and more insecure attachments may show decreased levels of foetal attachment, which may lead to poorer engagement with obstetric services as defined by the late booking of prenatal care. These processes have rarely been studied and it is plausible that their elucidation may enable the tailoring of services to these women to improve their engagement with care, leading to better outcomes. The rationale for the study is based upon this premise and the absence in the literature regarding psychological functioning, specifically those around BPD, well-being, and distress tolerance in relation to prenatal attachment. The present studies seek to explore these themes in a cohort of women attending a tertiary level maternity service in Sheffield.

Aims and Hypotheses

This study seeks to further examine whether psychological functioning such as features relating to BPD, distress tolerance, well-being and adult attachment style, are related to prenatal attachment. Distress tolerance is a cognitive process; well-being is an emotional state; BPD features relate to both behaviours and emotional states. Together they form a comprehensive set of features relating to psychological functioning and for the purposes of clarity will be referred to as psychological functioning throughout the report. Understanding how these may manifest themselves within a normal maternity population may help predict more subtle changes in well-being and psychological health, and assist the range of professionals who work in maternity settings. This study also examines women's engagement with health services, as determined by booking times for maternity care and additionally examines the composition of this selected group.

On the basis of these aims we hypothesise as follows:

1. Lower levels of psychological functioning measured by distress tolerance (tolerance, appraisal absorption and regulation), well-being and higher levels of BPD features (affective instability, identity problems, negative relationships, and self harm) will be related to lower levels of prenatal attachment.
2. Mothers with an increased insecure attachment pattern (i.e. higher in avoidance and anxiety) will have lower levels of prenatal attachment. A more insecure attachment pattern will also be related to difficulties with psychological functioning.
3. Poorer psychological functioning related to features of BPD, well-being and distress tolerance will be associated with lower levels of prenatal attachment, once demographic factors and attachment patterns have been controlled for.
4. Later booking for prenatal care will be associated with lower levels of prenatal attachment, difficulties with psychological functioning, and an increased insecure attachment pattern.

Method

Participants

The sample is comprised of 313 pregnant women attending their 20-week routine scan at an ante-natal clinic in an urban teaching hospital. Literature suggests that gestational age is a strong correlate for prenatal attachment; by surveying women at the same stage, it allowed gestational age to be controlled. Gestation ranged from 17-22 weeks with a mean of 19.27 and a standard deviation of 0.82. To control for the potential impact of the scan itself, all women were asked to complete the questionnaire booklet prior to their scan (Appendix 1). The mean age of the sample was 29.6 years, ranging from 18-42 with a standard deviation of 6.03. From the 198 (63.3%) women who already had children, 96 of them, (30.7%) had one child, 61 (19.5%) had two children, 21 (6.7%) had three children and 20 (6.3%) had more than four children. Table 1 illustrates more detailed demographic information of the mother and Table 2 details pregnancy related information.

Women were excluded from the study if they were under 18 years old or if they could not read and understand English to the level required for understanding the information sheet. Non-English speakers were excluded as it was not viable for the measures within the questionnaire pack to be translated due to issues of validation. A two-page information sheet (Appendix 2) was included to enable participants to make an informed decision about whether or not they wished to take part in the study. A total of 424 questionnaire booklets were distributed by antenatal clinic reception staff; 36 (8.5%) were returned blank and 4

(1%) did not meet the criteria and 71 (16.7%) were not returned. Questionnaire booklets with missing data (>20%) of any one subscale of a measure were excluded. This occurred in 26 cases. For other missing data the individual's median score for that subscale was entered. This occurred in 4% of the cases. Overall 313 questionnaires met the criteria and were used in the study.

Table 1. Demographic information for the mother.

	N	%
<i>Marital Status</i>		
Married	164	52.4
Cohabiting	96	30.7
Separated/Divorced	5	1.6
Single	46	14.7
Missing cases	2	0.6
<i>Relationship with father of baby</i>		
In a relationship and living together	203	64.9
In a relationship but living apart	34	10.9
Not in a relationship	74	23.6
Missing cases	2	0.6
<i>Ethnicity</i>		
White – British	265	84.7
White – any other background	12	3.8
Black – British	3	1
Black – Caribbean	1	0.3
Black – African	6	1.9
Black – Any other background	3	1
Asian – British	3	1
Asian – Indian	1	0.3
Asian – Pakistani	5	1.6
Asian – Any other background	4	1.3
Chinese	2	0.6

Other	5	1.6
Missing cases	3	1.0
<i>Highest level of education achieved</i>		
Left school before GSCE's/O Level's	18	5.8
GSCE's/O Level's	72	23
A level/Diploma/NVQ	108	34.5
Degree/ Postgraduate	110	35.5
Missing cases	1	0.3
<i>Consulted GP due to problems with sleep or nerves</i>		
Yes	49	15.7
No	259	82.7
Missing cases	5	1.6
<i>Consulted a psychiatrist</i>		
Yes	19	6.2
No	289	92.3
Missing cases	5	1.6
<i>Time elapsed for problems with sleep or nerves (G.P or psychiatrist)</i>		
<i>Within the last year</i>	20	6.4
1-3 years	8	2.6
Over 3 years	16	5.1
Missing cases	5	1.6

In relation to age and ethnicity, these figures are comparable with the internal service audit statistics 2009-2010 for booking information. Table 2 provides pregnancy related details. Where women had consulted their GP for problems with sleep or nerves, or consulted a psychiatrist, the majority detailed depression and anxiety: a full breakdown can be seen in the Appendix (3).

Booking for maternity care was defined by obtaining hand-held records¹. As mentioned, late booking as defined by National institute Clinical Excellence, (2008) and Confidential Enquiry into Maternal and Child Health, (2007) is anything beyond 12 weeks gestation. Within the current sample 258 (84%) booked before 12 weeks, with 50 (16%) therefore classed as booking late; this is further defined as 20 (6%) who booked between 12 and 14 weeks, 19 (6%) who booked between 14 and 16 weeks and 11 (3.5%) who booked at over 16 weeks.

Table 2. About the Pregnancy.

	Yes (%)	No (%)	Missing cases
Pregnancy as a result of IVF	12 (3.8)	300 (95.8)	1 (0.3)
Planned pregnancy	219 (70)	94 (30)	0
Any complications	43 (13.7)	270 (86.3)	0
Parity - Primiparas ²	115 (36.7)	197 (62.9)	1 (0.3)
Multiple Birth	12 (3.8)	300 (95.8)	1 (0.3)
Previous Termination	59 (18.8)	249 (79.6)	5 (1.6)
Previous Miscarriage	80 (25.6)	233 (74.4)	0

Of the 15.6 % that reported complications with their pregnancy, early bleeding was the most commonly reported complication at 47%: a breakdown of women's complications is detailed in the Appendix (4).

¹ Given to women on their first contact with maternity services

² Primiparas defined as woman those who have not carried a baby to term

Procedure

Pilot

During the initial stages of the research a pilot was carried out on a small number of women (5) attending their 20-week scan. This took the form of a focus style group in order to gather feedback on timing and content of the questionnaire booklet. The women provided feedback stating that they felt that anonymity would be crucial due to the sensitive nature of the questions. They took, on average, seventeen minutes to answer the questions in the questionnaires, making them feasible to complete in the allocated waiting period prior to the scan.

All women who fulfilled the criteria at their first 12 week dating scan were invited to take part in the study. The letter of invitation (Appendix 4) from the consultant obstetrician, together with the information sheet, was handed out routinely by the sonographers following confirmation of a viable pregnancy. The invitation letters outlined that involvement in the study would occur during the woman's second (20 week scan) appointment.

All women returning for their 20 week scan, approximately 8 weeks after the initial distribution of the invitation letters (Appendix 5), were asked to take part in the study. This took place over 28 days, in an 11-week period. In total, 424 questionnaire packs were distributed by reception staff at the central checking-in desk of the antenatal clinic. The packs included a re-introduction to the study, a questionnaire booklet and an information sheet. Consent was provided by completion of the questionnaire, as anonymity was

essential: it was made clear to participants that completion of the questionnaire pack would be taken as consent. During the appointment there was approximately 20-30 minutes waiting time prior to the scan, providing an opportunity for the women to complete the questionnaire if they wished. It was made clear on the information sheet that women could return the form blank. There was a collection box at the front desk for completed questionnaires.

Midwives and support staff within the unit were briefed regarding the study. In the event that a woman felt distressed following completion of the questionnaire pack there was the opportunity to discuss this with staff before they left the unit. Ante-natal midwives were able to liaise with the women's community midwife regarding any concerns raised by the study. The information sheet included the researcher's details, where participants could be directed to find further points of support if needed.

Ethical Consideration

Prior to the commencement of the study, ethical and theoretical approval was granted by the South Yorkshire Ethics Committee and the Research Sub-Committee at the University of Sheffield. Clinical governance and research sponsorship was obtained from Sheffield Teaching Hospital. See Appendix (6 & 7) for approval letters.

Design

The study utilised a cross sectional design.

Measures

All of the following questionnaires were compiled into a booklet for participants to complete.

Demographics variables

Demographic variables included: material status, age, level of education, relationship with father of the baby, number of children, miscarriages, terminations, booking time, booking for ante-natal care, experience of mental health problems as defined by GP consultation for sleep or nerves, and pregnancy complications. This allows these variables to be controlled for within the regression analysis. Demographic variables were selected in line with current literature and consultations with obstetric staff, regarding predictors of prenatal attachment. See Appendix 1: Part 1.

The Warwick-Edinburgh Mental Well-being Scale (WEMWBS), Tennant, Hiller, Fishwick, Platt, Joseph, Weich, Parkinson, Secker & Stewart-Brown (2007).

WEMWBS focuses on positive mental health with 14 positively phrased items. The items cover a range of aspects of mental well-being, for example, positive affect (feelings of optimism, cheerfulness, relaxation), satisfying interpersonal relationships, and positive functioning (energy, clear thinking, self acceptance, personal development, competence, and autonomy). Responses were in the form of a likert scale and comprised of, 'None of the time', 'Rarely', 'Some of the time', 'Often' and 'All of the time'. Scores ranged from 14-70, with a higher score reflecting a higher level of mental well-being. The scale has high internal consistency, with a Cronbach's alpha of 0.89 in a student sample and 0.91 in a general UK sample (Tennant, Fishwick, Joseph, Weich, Parkinson, Secker & Stewart-Brown, 2007). This was consistent in the current study with a Cronbach's alpha of 0.92. Questionnaire items can be found in Appendix 1: Part 2.

Maternal Antenatal Attachment Scale (MAAS), Condon, (1993)

The MAAS is a 19 item self-report scale, which measures how the mother feels and behaves towards her foetus. Within the scale there are two sub-scales measuring the ‘intensity’ (8 items) and ‘quality’ (10 items) of the attachment. The ‘quality’ of attachment relates to how close/distant, tender/irritated and how positive/negative the mother feels towards, and conceptualises her foetus. The ‘intensity’ scale relates to the level of feelings, for example, the mother’s preoccupation and time spent thinking about the foetus. Item 7 of the scale does not load on either subscale but only on the total score. Each item has different response options and is coded from 1–5. The scores from both the subscales are summed to provide a global attachment score. The scale is shown to have high levels of internal consistency with a Cronbach’s alpha of over 0.8 (Condon, 1993). The current study found similar alpha levels with a global at 0.81, quality was 0.75 and intensity was 0.67. The MAAS can found in Appendix 1: Part 3.

Personality Assessment Inventory (PAI) – Borderline Features (BOR), Morey (1991)

The PAI-BOR is part of a wider assessment, ‘Personality Assessment Inventory’ (Morey, 1991). The PAI-BOR measures characteristics representative of BPD and consists of four subscales. These are: ‘Affective Instability’ (AI), ‘Impulsivity’ (I), ‘Negative Relationships’ (NR), and ‘Self Harm’ (SH). There are four response categories for each of the questions: 0 = false, 1 = slightly true, 2 = mainly true, 3 = very true. A higher score indicates higher levels of borderline functioning. Typically a raw score of >38 indicates the presence of borderline features. The scale has high levels of internal consistency for both a

clinical and non-clinical sample with a reported Cronbach's alpha of 0.91 and 0.87 respectively (Morley, 2007). Cronbach's alpha for the subscales are slightly lower for the subscales of the PAI-BOR, although are higher within a clinical population. Overall the Cronbach's alpha for the subscales ranges from 0.63 to 0.81. The benefit of this scale is that it does not purely give one diagnostic score, but provides a breakdown of the core features. This measure has been well validated, mainly within clinical samples, but there are norms for non-clinical samples (De Moor, Distel, Trull & Boomsma, D.I. 2009). The Cronbach's alpha in the current study for the total BOR was 0.89 and the associated subscales are as follows: 0.72 negative relationships, 0.64 impulsivity, 0.81 affect regulation and 0.72 self-harm. The items of BOR can be found in Appendix 1: Part 4.

Distress Tolerance Scale, Simons & Gaher (2005)

Distress tolerance is a meta-cognition and related to the appraisal of stresses and the ability to manage distress. The scale itself consists of 16 items and four subscales measuring the following: tolerance, appraisal, absorption and regulation. Tolerance is related to the ability to withhold and tolerate emotional distress (e.g. "I can't handle my feelings when I'm sad or down"). Appraisal of distress is related to the subjective experience of a stressor (e.g. "my feelings of distress or not being upset are not acceptable"). Absorption is related to how affected a person becomes with a negative emotion (e.g. "when I feel distressed or upset, I cannot help but concentrate on how bad the distress feels"). Lastly, regulation relates to how an individual is able to relieve distress (e.g. "when I feel distressed I must do something about it immediately"). Items were rated on a 5-point scale: (5) *Strongly disagree*, (4) *Mildly disagree* (3) *Agree and disagree equally*, (2) *Mildly agree*, (1) *Strongly agree*. High

scores represent high distress tolerance. Cronbach's alphas are as follows; Tolerance, 0.89, Appraisal, 0.90, Absorption 0.95 and Regulation, 0.63. The Cronbach's alpha in the current study for the total distress tolerance score was 0.92 and the sub-scores are as follows: 0.75 Tolerance, 0.83 Appraisal, 0.78 Absorption and 0.79 Regulation. The distress tolerance scale can be found in Appendix 2: Part 5.

Experience in Close Relationship Inventory – Short Version, Wei, Russell, Mallinckrodt & Vogel (2007)

The 'Experiences in Close Relationships Inventory – Short Form', (Wei et al., 2007) is a 12 item measure based upon a longer 18 item scale by Brennan, (1998). This scale has been used to measure adult attachments. The 12 items are those most highly correlated with the 18/36 items in the original measure. This measure consists of two subscales; attachment avoidance which has a Cronbach's alpha of 0.84, and attachment anxiety with a Cronbach's alpha of 0.78, which is slightly lower than the 18 item scale of 0.93 and 0.92. Elevated scores of attachment avoidance relate to an individual's discomfort with closeness, where they often avoid intimacy, being fearful of dependence. Attachment anxiety relates to concerns of abandonment, often needing excessive reassurance from partners. Participants are asked to respond on a 7-item scale from 'strongly disagree' to 'strongly agree'. High scores on both are concurrent with an insecure attachment pattern and low scores are indicative of a secure attachment pattern. For the current study, a Cronbach's alpha of 0.76 was found for the total ECR, 0.76 for avoidance and 0.67 for anxiety. The ERC can be found in Appendix 1: Part 6.

Power Analysis

Prior to commencement of the research a power analysis was performed on the predicted analysis. Assuming a 'medium' effect size of $R^2 = .13$ a significance level of $\alpha = 0.05$, with 14 main theoretical predictors and 10 demographic controlled for in block two predictors within a regression analysis, G-power states that 136 participants are required for sufficient power.

Analyses

The statistical package for social scientists (SPSS) was used to compute and analyse all data. In relation to hypotheses 1 and 2, the following statistical tests were used; independent sample t-tests, analysis of variance (ANOVA) and Pearson's moment correlations. Furthermore non-parametric equivalent tests were performed when the data did not meet the assumptions of parametric tests.

A hierarchical multiple regression analysis was used in relation to the hypothesis 3 regarding whether psychological functioning, as measured by the BOR distress tolerance and well-being scale were significant predictors of prenatal attachment above and beyond significant demographic and pregnancy factors. Subscales of all the scales were used, not the total scores. Significant demographic and pregnancy factors, identified as significant in univariate analysis, were controlled for in block one, and adult attachment style in block two. The main theoretical predictors were entered in block three.

To test hypothesis 4 concerning engagement in health services, Chi-square and Fisher's exact analysis were used to explore demographic and pregnancy variables in relation to late and early booking. T-tests were performed to examine if there were any differences in psychological functioning and adult attachment in relation to booking. In order to predict booking a logistic regression was carried out with significant demographic factors in block one, adult attachment in block two, and psychological functioning in block three.

Results

Table 3 illustrates the mean scores and standard deviations for how the sample scored across the measures.

Table 3. Mean scores and standard deviations for the current sample on the study measures.

	Mean (SD)	Range of scores
Quality of attachment	45.38 (3.8)	30-50
Intensity of attachment	28.07 (4.6)	15-40
<i>Global attachment*</i>	78.6 (7.7)	56-95
Absorption	10.79 (3.12)	3-15
Appraisal	22.60 (5.3)	5-25
Tolerance	9.63 (3.15)	3-15
Regulation	9.71 (3.14)	3-15
<i>Distress Tolerance – Total</i>	52.73 (12.57)	15-75
Impulsivity	4.84 (3.01)	0-15
Negative relationships	5.54 (4.13)	0-16
Effect Regulation	6.13 (3.78)	0-17
Self-Harm	3.58 (3.02)	0-15
<i>BOR- Total</i>	20.09 (11.37)	
Avoidance	12.82 (6.26)	6-37
Anxiety	19.44 (6.40)	6-40
<i>ERC-Total</i>	32.26 (10.27)	13-67
<i>Well-being</i>	50.51 (9.31)	24-70

**Item 7 does not load on intensity of quality but only on the total score*

Distribution of Questionnaire Scores

The Kolmogorov-Smirnov and Shapiro-Wilk test was performed to assess for normality of distributions within the scales. The results showed a significant departure from normality across all the scales, both totals and sub-scores. In samples > 100 Tabachnick and Fidell (1996) suggest that visual inspection of the histogram can override statistical tests of normality; this approach was utilised. In relation to the main outcome variable, prenatal attachment, significant departure from normality only occurred for the quality subscale within the MAAS which was slightly negatively skewed. Distress tolerance and well-being total scores appeared normally distributed according to the histogram. The distress tolerance subscales were positively skewed. The BOR and ECR are normally employed in clinical populations, which accounts for the negatively skewed distribution. No data transformations were viable; in these instances non-parametric equivalent tests were used as a comparison check for the quality subscale, which consistently yielded the same results. Therefore parametric scores are illustrated for the sake of consistency, in relation to prenatal attachment.

Outliers were present within the sample across the measures (6%); these were closely examined to ensure participants had understood the task. As the outliers just comprised of those scoring high on the measures, these were kept in the analysis.

Associations between women's demographic and pregnancy variables and prenatal attachment (MAAS)

To explore the relationship between women's demographic and pregnancy variables a number of one-way ANOVA's, independent t-tests and Pearson's correlation coefficient were performed. This would enable significant results to be controlled for in later multivariate analysis. One-way ANOVAs were carried out to compare prenatal attachment³ with the following demographics: marital status, age, a woman's relationship with father of the baby, and the highest level of education achieved. There was no significant difference between the groups on levels of prenatal attachment for woman's marital status and level of education: means, F values and significant levels are displayed in Table 4.

There was a significant main effect between the three groups in the category of relationship with the father of the baby (in a relationship and living together, in a relationship and living apart and not in a relationship), and the quality of attachment subscale $F(2,308) = 3.850 < 0.05$. Tukey's post-hoc analysis showed that women not in a relationship with the father of the baby had significantly higher levels of quality of prenatal attachment ($p < 0.05$) than women in a relationship, or in a relationship and living apart from the father of the baby; means are reported in Table 4.

Women who had consulted their G.P. for problems with sleep or nerves showed significantly lower levels of quality of prenatal attachment than those who had not. There

³ Unless specified, within the results section prenatal attachment refers also its associated subscores: Global, Quality and Intensity

was no significant difference between those who had consulted a psychiatrist and those who had not regarding levels of prenatal attachment. Using Pearson's moment correlation and the non-parametric equivalent for the quality subscale women's age was found to be positively correlated with global, quality, and intensity of prenatal attachment.

There was a significant relationship between a woman's global prenatal attachment and age ($r = .149$, $n = 312$, $p < 0.05$) and intensity ($r = -.194$, $n = 312$, $p < 0.01$) but not for quality ($r = .070$, $n = 312$, $p > 0.05$). Demonstrating a positive correlation between age and prenatal attachment.

There was no significant difference in levels of prenatal attachment between those women who booked late for their maternity care. No analysis was performed in relation to woman's ethnicity due to small numbers in individual groups.

Pregnancy variables and prenatal attachment (MAAS)

Independent sample t-tests were used to compare prenatal attachment and pregnancy variables: planned pregnancy, complications, IVF, previous miscarriages, previous termination, single or multiple birth, first pregnancies and number of previous pregnancies: the means, standard deviations and t values are in Table 5. Prenatal attachment was significantly higher for primiparous than multiparous women. Women who had planned for their pregnancy had significant levels of global and quality attachment compared with women who had not planned. Women expecting a multiple birth scored higher on global attachment than women expecting a single birth. All other pregnancy related factors were shown to be non-significant.

Table 4. Associations between demographic factors and prenatal attachment

<i>Demographic Factors</i>	<i>Global</i>			<i>Quality</i>			<i>Intensity</i>			
	<i>N</i>	<i>Mean(SD)</i>	<i>F(df)</i>	<i>P-Sig</i>	<i>Mean(SD)</i>	<i>F(df)</i>	<i>P-Sig</i>	<i>Mean(SD)</i>	<i>F(df)</i>	<i>P-Sig</i>
<i>Marital status</i>										
Married	164	78.32(7.09)	.72(3)	.54	45.66(3.45)	.78(3)	.50	28.04(4.48)	1.13(3)	.36
Cohabiting	96	77.77(8.53)			45.11(4.38)			28.04(4.61)		
Single	46	77.98(7.80)			44.87(3.82)			28.54(4.59)		
Separated/Divorced	5	73.40(9.29)			44.60(4.03)			24.60(5.81)		
<i>Relationship with father of baby</i>										
In Relationship & Living Together	203	77.44(7.90)	2.84(2)	.06	45.13(4.01)	3.85(2)	.02*	27.73(4.54)	1.67(2)	.19
In Relationship & Living Apart	34	77.44(7.16)			44.50(3.60)			28.38(4.14)		
Not in Relationship	74	79.86(7.05)			46.36(3.17)			28.82(7.76)		
<i>Highest level of education</i>										
Left School before GCSEs	18	77.94(8.29)	1.27(5)	.28	45.56(3.73)	1.35(5)	.24	27.72(5.00)	1.37(5)	.23
GCSE/O level	72	78.24(8.10)			45.08(4.21)			28.58(4.74)		
A level	36	79.39(6.76)			45.56(3.20)			29.11(4.68)		
Diploma/NVQ	72	78.15(7.32)			45.53(3.70)			28.01(4.16)		
Degree	71	78.37(7.42)			45.97(3.44)			27.79(4.53)		
Post Graduate	40	75.33(8.25)			44.13(4.27)			26.68(4.76)		

Title 4 Continued

Demographic Factors Cont.	<i>Global</i>				<i>Quality</i>			<i>Intensity</i>		
	N	Mean(SD)	t(df)	P-Sig	Mean(SD)	t(df)	P-Sig	Mean(SD)	t(df)	P-Sig
Consulted a GP										
Yes	49	76.96(9.12)	-.92(306)	.36	44.12(4.68)	-2.09(59)	.04*	28.35(4.94)	.45(306)	.65
No	259	78.24(7.45)			45.59(3.62)			28.02(4.57)		
Consulted a Psychiatrist										
Yes	19	76.79(6.96)	-.72(306)	.47	44.37(3.45)	-1.2(306)	.25	27.79(4.14)	-.27(306)	.78
No	289	78.11(7.79)			45.43(3.86)			28.09(4.66)		
Booking Time										
Early	258	78.01(7.82)	-.44(306)	.68	45.35(3.83)	-.29(306)	.77	28.06(4.69)	-.57(306)	.57
Late	50	78.54(7.05)			45.52(3.76)			28.46(4.11)		

Table 5. Associations between pregnancy factors and prenatal attachment

<i>Pregnancy Factors</i>	<i>Global</i>			<i>Quality</i>			<i>Intensity</i>			
	<i>N</i>	<i>Mean(SD)</i>	<i>t(df)</i>	<i>P-Sig</i>	<i>Mean(SD)</i>	<i>t(df)</i>	<i>P-Sig</i>	<i>Mean(SD)</i>	<i>t(df)</i>	<i>P-Sig</i>
Parity										
Primigravida	115	79.41(7.476)	2.35(310)	.02**	45.57(3.76)	.65(310)	.51	29.19(7.23)	3.28(310)	.001**
Multigravida	197	77.30(7.75)			45.28(3.84)			27.45(4.70)		
Birth										
Multiple	12	80.92(8.0)	-1.31(311)	.19	45.33(4.29)	.04(311)	.97	30.67(4.36)	-2(311)	.05*
Single	301	77.94(7.68)			45.38(3.8)			27.97(4.59)		
IVF Pregnancy										
Yes	12	78.17(8.34)	.029(310)	.98	45.59(3.29)	.16(310)	.87	27.92(5.0)	-.13(310)	.90
No	300	78.10(7.66)			45.40(3.80)			28.09(4.6)		
Planned Pregnancy										
Yes	219	78.82(7.25)	2.71(311)	.07**	46.02(3.27)	4.12(136)	.01**	28.22(4.6)	.85(311)	.40
No	94	76.28(8.48)			43.88(4.54)			27.73(4.7)		

Table 5 Continued

<i>Pregnancy Factors Cont.</i>	<i>Global</i>			<i>Quality</i>			<i>Intensity</i>			
	<i>N</i>	<i>Mean(SD)</i>	<i>t(df)</i>	<i>P-Sig</i>	<i>Mean(SD)</i>	<i>t(df)</i>	<i>P-Sig</i>	<i>Mean(SD)</i>	<i>t(df)</i>	<i>P-Sig</i>
<i>Complications</i>										
Yes	43	78.40(7.06)	.309(311)	.78	45.44(3.47)	.12(311)	.91	28.30(4.42)	.35(311)	.73
No	270	78.0(7.81)			45.37(3.87)			28.04(4.64)		
<i>Termination</i>										
Yes	59	77.81(8.38)	-.195(306)	.86	44.73(4.4)	-1.26(78)	.21	28.61(4.54)	1.08(306)	.28
No	249	78.03(7.58)			45.51(3.67)			27.89(4.63)		
<i>Miscarriage</i>										
Yes	80	78.46(8.57)	.544(311)	.59	45.4(4.12)	.062(311)	.95	28.39(5.05)	.70(311)	.49
No	233	77.92(7.40)			45.37(3.72)			27.97(4.44)		

Relationship between distress tolerance, BOR, well-being, ERC and prenatal attachment

In order to test the initial hypothesis relating to the relationship between psychological functioning and prenatal attachment, a Pearson's correlation coefficient was performed. The associated p values are displayed in Table 6. Higher scores on the BOR total and sub scores – effective instability and negative relationships – were significantly correlated with lower levels of global prenatal subscales. Higher scores on the BOR total and all subscales were significantly correlated with lower levels of quality of attachment, but not with intensity of attachment. Similar relationships were found in relation to distress tolerance score and the attachment subscales. Higher levels of distress tolerance, all subscales and the total, were significantly correlated with higher quality of attachment, and all except regulation were related to global attachment. Significant correlations were also found between intensity of attachment, regulation and absorption distress tolerance subscales. Higher levels of the total ERC and avoidance were significantly related to lower levels of prenatal attachment (global, quality, and intensity). A significant negative correlation also occurred between the anxiety subscale and global prenatal attachment and intensity. Higher levels of well-being were significantly related to higher levels of prenatal attachment.

Table 6. Prenatal attachment and psychological functioning

	<i>Global</i>	<i>Quality</i>	<i>Intensity</i>
BOR-Self Harm	-.09	-.15*	-.02
BOR- Impulsivity	-.11	.20**	.00
BOR-Negative Relationships	-.18**	-.25**	-.07
BOR-Affective Instability	-.19**	-.28**	-.07
<i>BOR-Total</i>	-.17**	-.27**	-.04
DT-Tolerance	.21*	.13*	.09
DT-Absorption	.25**	.27**	.17**
DT-Appraisal	.14*	.19**	.06
DT-Regulation	.07	.12*	.01*
<i>Distress Tolerance (DT)-Total</i>	.18**	.21**	0.10
ECR-Avoidance	-.28**	-.32**	-.20**
ECR-Anxiety	-.13*	-.19**	-.05
<i>ECR-Total</i>	-.26**	-.31**	-.16**
Well-being	.37**	.46**	.20**

* Significance at $p < 0.05$; **Significance at $p < 0.001$

Relationship between women's attachment style (ERC) and distress tolerance, BOR and well-being

In order to test the relationship between a woman's attachment style as related to other psychological functioning, Spearman's correlation was used and results are displayed in Table 7. It was predicted that women with a less secure attachment pattern as measured by the ERC would show poorer levels of psychological functioning. The results show significant correlations across the measures, however the majority of the correlations between the variables are modest which may be a consequence of the large sample. The

direction of the results illustrate that women with less secure attachments have poorer psychological functioning.

Table 7. ECR and psychological functioning

	<i>ERC</i>	<i>ERC</i>	<i>ERC</i>
	<i>Total</i>	<i>Anxiety</i>	<i>Avoidance</i>
BOR-Self Harm	.42**	.35**	.32**
BOR- Impulsivity	.48**	.41**	.35**
BOR-Negative Relationships	.65**	.53**	.50**
BOR-Affective instability	.47**	.44**	.31**
<i>BOR-Total</i>	.64**	.56*	.48**
DT-Tolerance	-.51**	-.37**	-.22**
DT-Absorption	-.47**	-.44**	-.31**
DT-Appraisal	-.51**	-.45**	-.38**
DT-Regulation	-.33**	-.29**	-.25**
<i>Distress Tolerance (DT)-Total</i>	-.51**	-.47**	-.36**
Well-being	-.52**	-.44**	-.41**

* Significance at $p < 0.05$; **Significance at $p < 0.001$

Further correlations were performed between the sets of psychological functioning which measured both total and sub scores. This showed that there was some degree of association between the measures, however not to the extent that Multicollinearity occurred (Appendix 9).

Hierarchical Regression Analysis: Predicting prenatal attachment

In relation to the specified hypothesis relating to which psychological functioning could significantly predict prenatal attachment, above and beyond significant demographic and a woman's attachment style, three hierarchical multiple regressions were performed. Prior to the regressions, tests on the assumptions for linearity, homoscedasticity, and normality were carried out in relation to the three separate outcome variables: global, quality, and intensity. These assumptions were met for quality, and the global and intensity attachment scores. There was a mild degree of heteroscedasticity, but only for the intensity variable; inspection of the histogram showed a reasonable bell curve. Tests for multicollinearity were carried out in the initial bivariate correlations (Appendix 10), which showed no correlation above .7 and were therefore suitable for a regression. The significant demographic and pregnancy factors established in the earlier analysis are entered in block one entry across the regressions. As a woman's attachment style has theoretically been shown to be associated with psychological functioning, particularly the BOR, this will be entered into block two to test whether a woman's attachment style was implicated in the relationship between psychological functioning and prenatal attachment. This will allow the examination of the unique effect of the psychological functioning on prenatal attachment above and beyond demographic and attachment factors. Lastly the psychological functioning subscales will be entered into block three.

Predicting global prenatal attachment.

The following variables have been shown to be correlated with global prenatal attachment: age, planned pregnancy, and parity. In order to control for their effects they were entered into block one of the hierarchical regression. As predicted block one significantly predicted global attachment ($F(3,307) = 8.08, p < .001$); the predictors in block one accounted for 7.3% ($R^2 = 0.073$) of the variance in the outcome variable global prenatal attachment ($R^2 = .073$). The variables entered in block two also accounted for a significant increase ($F(2,305) = 11.72, p < .001$), with the overall variance accounted for in block two (R^2 change = .066). This demonstrates that 6.6% of the variance can be accounted for by a woman's attachment style. Finally block three also showed a significant increase ($F(9,296) = 4.52, p < .001$), and the overall variance accounted for by the predictors in block three was (R^2 change = .103). We can therefore conclude that psychological functioning accounts for 10.3% of the variance. The overall model accounted for 24% of the outcome of variable global prenatal attachment with all 13 predictors included.

With regard to the unique contributors for the separate predictors, the most notable results from block two were avoidant attachment and those results in relation to the emotional variables of absorption and well-being. These results are displayed in table 8.

Table 8. Predicting global attachment: results of the HRA

Model	Variables	Beta	T	P
1	Age	-.203	.31	.001**
	Planned pregnancy	-.226	-3.819	.000**
	Parity	-.074	-1.293	.97
2	Age	-.250	-4.154	.000**
	Planned pregnancy	-.129	-2.124	.034
	Parity	-.034	-.652	.515
	ECR: anxiety	-.065	-1.154	.249
	ECR: avoidance	-.258	-4.252	.000**
3	Age	-.222	-3.597	.000**
	Planned pregnancy	-.109	-1.860	.064
	Parity	-.030	-.556	.579
	ECR: anxiety	.069	1.048	.296
	ECR: avoidance	-.152	-2.381	.018*
	BOR: impulsivity	.138	1.71	.087
	BOR: self harm	-.023	-.367	.714
	BOR:-ve relationships	-.058	-.736	.462
	BOR: affect regulation	-.034	-.427	.670
	DT: absorption	.253	2.703	.007*
	DT: tolerance	-.047	-.605	.546
	DT: appraisal	-.100	-1.166	.245
	BT: regulation	-.041	-.647	.518
	Well-being	.314	4.807	.000**

* Significance at $p < 0.05$; **Significance at $p < 0.001$

Predicating quality of attachment

The following variables have been shown to correlate with quality of prenatal attachment: maternal age, planned pregnancy, consultation with the GP for problems with sleep or

nerve, and relationship with the father of the baby. In order to control for their effects these variables were entered into block one. The category 'relationship with the baby's father' was reduced from the three categories based on an earlier analysis, and in order to meet the assumptions of the analysis, became two categories, those women in a relationship with the father of the baby, and those who were not. As predicted, block one showed a significant contribution to quality of prenatal attachment ($F(4,300) = 10.50, p < .01$), and the variance accounted for by all the predictors in block one (R^2 change = 0.123). This shows that demographic factors account for 12.3% of the variance when predicting global attachment. The variables entered into block two also accounted for a significant increase ($F(2, 298) = 11.44, p < 0.01$) whereby the variance accounted for by all the predictors in block two was (R^2 change = .063). This demonstrates that 6.3% of the overall variance can be accounted for by a woman's attachment style. Finally, block three also showed a significant increase ($F(9,298) = 5.79 p < 0.01$) and the overall variance of the predictors in block one were ($R^2 = .125$). We can therefore conclude that psychological functioning account for 12.5% of the variance with the overall model accounting for 31.5% of the outcome variable, 'quality of attachment'.

With regard to the unique contributors, the most notable results from block two were ECR avoidance attachment in relation to the emotional variables absorption and well-being. Values are displayed in Table 9.

Table 9. Predicting quality of attachment: results of the HRA

Model	Variables	Beta	T	P
1	Age	-.149	-2.575	.011*
	Relationship with Father	.135	2.478	.014*
	Planned pregnancy	-.304	-5.254	.000**
	GP	.086	1.564	.119
2	Age	-.192	-3.390	.001**
	Relationship with Father	.141	2.860	.008*
	Planned pregnancy	-.212	-3.581	.000**
	GP	.038	.703	.483
	ECR- anxiety	.093	-1.652	.100
	ECR-avoidance	-.236	-3.912	.000**
3	Age	-.202	-3.518	.001**
	Relationship with Father	.609	1.341	.181
	Planned pregnancy	-.198	-3.529	.000**
	GP	-.028	-.531	.596
	ECR: anxiety	.064	1.015	.311
	ECR: avoidance	-.096	-1.536	.126
	BOR: impulsivity	.095	1.112	.267
	BOR: self harm	-.036	-.605	.545
	BOR: -ve relationships	-.049	-.636	.525
	BOR: affect regulation	-.069	-.195	.361
	DT: absorption	.216	2.386	.018*
	DT: tolerance	-.077	-1.014	.313
	DT: appraisal	.073	-.875	.382
	BT: regulation	--0.016	-.252	.801
	Well-being	.364	5.581	.000**

* Significance at $p < 0.05$; **Significance at $p < 0.001$

Predicting intensity of attachment

When predicting intensity of attachment, maternal age, parity, and multiple vs single birth were entered into block one due to their significant correlation with prenatal attachment. Demographic factors entered in block one had a significant contribution ($F(3,307) = 7.44$, $p < 0.01$) and the overall variance of the predictors in block one was (R^2 change = 0.68). This shows that demographic factors account for 6.8% of the variable intensity of attachment. Block two accounted for a significant increase ($F(2,305) = 8.09$, $p = 0.01$), with the overall variance of the predictors in block two was (R^2 change = .047). This demonstrates that 4.7% of the variance can be accounted for by a woman's attachment style. Finally, block three showed a significant increase ($F(9,296) = 1.97$, $p < 0.01$), and the overall variance of the predictors in block three were ($R^2 = .49$). We can therefore conclude that psychological functioning account for 4.9% of the variance. The overall model therefore accounted for 16.4% of the variance when predicting intensity of attachment.

With regard to the unique contributors the most notable results from block two were ERC avoidance attachment and those results in relation to the emotional variables absorption and well-being: values are displayed in table 10.

Table 10. Predicting intensity attachment: results of the HRA

Model	Variables	Beta	B	P
1	Age	-.161	-2.795	.006*
	Multiple vs. single birth	.120	2.173	.031
	First pregnancy	-1.33	-2.323	.021*
2	Age	-.225	-3.839	.000**
	Multiple vs. single birth	.113	2.007	.039*
	First pregnancy	-.094	-1.647	.101
	ECR: anxiety	-.022	-.380	.704
	ECR: avoidance	-.219	-3.724	.000**
3	Age	-1.85	-2.934	.004**
	Multiple vs. single birth	.105	1.930	.055
	First pregnancy	-.099	-1.727	.085
	ECR: anxiety	.053	.776	.348
	ECR: avoidance	-.159	-2.419	.016*
	BOR: impulsivity	.157	1.872	.062
	BOR: self harm	-.017	-.262	.793
	BOR: -ve relationships	-.060	-.727	.468
	BOR: affect regulation	.007	.079	.937
	DT: absorption	.227	2.300	.022*
	DT: tolerance	-.012	-.144	.886
	DT: appraisal	-.078	-.858	.392
	BT: regulation	-.061	-.910	.364
Well-being	.182	2.665	.008*	

* Significance at $p < 0.05$; **Significance at $p < 0.001$

Early and late booking

To examine which demographic factors were significantly associated with booking time, (late vs early), a Pearson's Chi-Squared was used. Fishers exact was employed in relation to IVF and multiple births, where there was an expected value less than 5. Percentages and values are displayed in Table 11. The Chi-square analysis shows a significant result with regards to relationship with the father of the baby, where a larger proportion of women booking late were not in a relationship (40%) as opposed to women booking early (21.1%). There was also a significant difference in terms of education and planned pregnancy, where women who booked before, or at 12 weeks, were educated to a higher level, and were more likely to plan their pregnancy.

Table 11. Early vs. Late booking: demographic and pregnancy variables

Demographic Factors	Early Booking n (%)	Late Booking n (%)	Chi (df)	P- Value
Marital Status				
Married	142(55.5%)	21(42%)	.169(2)	>0.05
Cohabiting	77(30.1%)	16(32%)		
Single/Separated/Divorced	37(14.5%)	13(26%)		
Relationship with father of the baby				
In Relationship & Living Together	174 (68%)	25 (50%)	0.16 (2)	<0.05
In Relationship & Living Apart	28 (10.9%)	5 (10%)		
Not in Relationship	54 (21.1%)	20 (40%)		
Highest Level of Education				
Left School before GSCEs	15 (5.9%)	3(6.2%)	0.01 (3)	<0.05
GCSE/O Level	55 (21.5%)	17 (34%)		
A level/Diploma/NVQ	85 (33.2%)	23 (47.9%)		
Degree/Postgraduate	101 (39.5%)	5 (10.4%)		

Consulted a GP				
Yes	40(15.7%)	8(16.7%)	.864(1)	>0.05
No	215(84.3%)	40(83.3%)		
Consulted a Psychiatrist				
Yes	14(5.5%)	5(10.4%)	.197(1)	>0.05
No	241(94.4%)	43(89.6)		
Pregnancy Factors				
Birth:				
Multiple	10(3.9%)	2(4%)	.97(1)	>0.05
Single	248(96.1%)	48(96%)		
IVF Pregnancy				
Yes	11(4.3%)	0	.141(1)	>0.05
No	247(97.9%)	49(100%)		
Planned Pregnancy				
Yes	190(73.6%)	26(52%)	.002(1)	<0.05
No	68(26.4%)	24(48%)		
Complications				
Yes	32(12.4%)	11(22%)	.73(1)	>0.05
No	226(84.6%)	39(78%)		
Termination				
Yes	47(18.4%)	11(22.9%)	.469(1)	>0.05
No	208(81.6%)	37(77.1%)		
Miscarriage				
Yes	66(25.6%)	14(28%)	.721(1)	>0.05
No	192(74.4%)	36(72%)		

Late vs. Early Booking, Psychological Functioning, and Adult Attachment Styles

In order to assess if there were any significant differences in the psychological functioning and attachment styles between late and early booking groups, a number of independent sample t-tests were performed: values are displayed in Table 12. There was a significant difference between the booking group, (early and late), and negative relationship's subscale of the BOR and the ERC-avoidance, demonstrating that women who book late (post 12 weeks) for their maternity care have significantly higher levels of relational difficulties than women who book early (12 weeks or before).

Predicting Late and Early Booking

A logistic regression was employed to examine whether psychological functioning could predict early vs. late booking, above and beyond demographic variables, adult attachment patterns, and to assess the contribution of the demographic predictors. Predictors were decided based upon significant factors identified within the Chi-square analysis these were as follows: education status, relationship with father of the baby, and whether the pregnancy was planned. Level of education and relationship status were reduced into dichotomous predictors, therefore suitable for the regression. Categories were based upon the format of the previous hierarchical regressions, relationship status was categorised according to the woman's relationship with the father of the baby; those who were or were not in a relationship with the father of the baby. Education was reduced to those with a degree, or those without, as these were the most disparate groups within the Chi-square analysis. The following predictors (education status, relationship status and planned

pregnancy) were entered in block one: relationship with father, maternal age, and planned pregnancy, which together significantly predicted booking, $\chi^2(4) = 28.16$, $p < 0.01$. The value of Nagelkerke's pseudo- R^2 was .153, which can be interpreted as indicating 15.3% of the variability in the late and early booking was accounted for by demographic factors alone.

The ERC avoidance and anxiety subscales were entered as predictors in block two and did not significantly predict late and early booking over and above the block one predictors $\chi^2(2) = 2.12$, $p = .346$. The value of Nagelkerke's pseudo- R^2 was .164, and with the added predictors, indicated 16.4% of the outcome variability in the late and early booking.

The variables in block three which included the psychological functioning did not significantly predict late vs. early booking $\chi^2(9) = 8.70$, $p = .466$. The value of Nagelkerke's pseudo- R^2 was .208, with the additional 9 predictors the whole model accounted for 20.8% of the variance in late and early booking. It should be noted the significant predictors in the model were planned pregnancies, education and relationship status.

Table 12 Associations between booking and psychological functioning

	Early Booking (n=258)	Late Booking (n=50)	t (DF)	P
	Mean(SD)	Mean(SD)		
BOR: Self Harm	3.49(2.97)	4.20(3.23)	-1.53 (306)	.15
BOR: Impulsivity	4.74 (2.98)	5.62 (3.06)	-1.90 (306)	.07
BOR: Negative Relationships	4.84 (2.97)	6.06 (3.27)	-2.15 (306)	.02*
BOR: Affective Instability	6.05 (3.87)	6.42 (3.13)	-0.74 (81)	.46
BOR: Total	19.57 (11.49)	22.88 (10.55)	-1.89 (306)	.05
DT: Tolerance	9.58 (3.16)	9.92 (3.16)	-0.69 (306)	.49
DT: Absorption	10.73 (3.16)	11.02 (3.04)	-0.59 (306)	.55
DT: Appraisal	19.15 (4.39)	18.20 (4.68)	1.38 (306)	.19
DT: Regulation	9.77 (3.10)	9.40 (3.34)	0.77 (306)	.47
Distress Tolerance (DT): Total	52.87 (12.54)	51.84 (12.77)	0.53 (306)	.60
ERC: Avoidance	12.38 (6.12)	15.32 (6.71)	-3.06 (306)	.01*
ERC: Anxiety	19.14 (6.49)	20.96 (5.94)	-1.84 (306)	.06
ERC: Total	31.52 (10.19)	36.28 (10.23)	-3.02 (306)	.01*
Well-being	50.63 (8.99)	49.42 (10.82)	0.84 (306)	.46

* Significance at $p < 0.05$; **Significance at $p < 0.001$

Discussion

This study drew upon a large maternity population who were attending for their 20 week scan and aimed to explore the relationship between a woman's psychological functioning, her attachment style, and prenatal attachment. The study showed that psychological functioning, specifically a woman's emotional well-being, absorption of distress tolerance, and an avoidant attachment style, could significantly predict prenatal attachment above and beyond a woman's demographic and pregnancy related factors.

A further aim was to examine a woman's behavioural response to her obstetric care in relation to her prenatal attachment and psychological functioning. This was measured by booking time. An avoidant attachment style and negative relationships, which are both elements related to borderline features, were associated in this study with women who booked late for their maternity care; prenatal attachment, however, was found to be unrelated. The strongest predictor of late booking was a woman's relationship status and her ability to plan pregnancies. These findings will be discussed firstly in relation to psychological functioning but then in relation to a woman's attachment style and her engagement with obstetric services.

Psychological functioning and relationships with prenatal attachment

The relationship between psychological functioning and adult attachment style, in conjunction with prenatal attachment, provides support for the initial hypotheses. The majority of subscales were found to be significant in relation to prenatal attachment. For

the sake of clarity, total scores will be discussed initially, followed by the subscales when predicting prenatal attachment. These results suggest that women who are more able to tolerate distress have higher levels of prenatal attachment. In addition, higher levels of well-being were related to higher levels of prenatal attachment. However, women with higher levels of borderline features and a more insecure attachment were shown to have lower levels of prenatal attachment. Although statistically significant a closer examination of the correlations between psychological functioning and prenatal attachment shows that they are modest in size. This may be a consequence of a large sample size and the multiple correlations examined. Therefore these results should be interpreted with some degree of caution. These findings illustrate an association between psychological functioning and prenatal attachment, however, they do not consider the presence of significant demographic and pregnancy factors known to be implicated when predicting prenatal attachment (Alhusen, 2008; Cannella, 2005; Laxton-Kane & Slade, 2002; Yarcheski, et al, 2009).

Demographic factors were not the primary focus of this study. Nevertheless assessing their contribution will enable a clearer evaluation of the role of psychological functioning. For instance, women who are not in a relationship with the father of the baby had higher levels of quality of attachment. This appears to contradict Lindgren (2001, 2003) who found the presence of a partner to enhance prenatal attachment demonstrating a positive association between higher levels of social support and prenatal attachment (Condon and Corkindale 1997). It cannot be assumed however that women in relationships experience support as a result of them, and so the aforementioned findings should not be accepted without question. Women who are not in a relationship with the father of their baby are likely to be a select

group within the sample, and the findings relating to prenatal attachment have not been found in other studies. It is also of significance that the findings relate predominantly to quality not intensity and so they are therefore of particular interest. One possible explanation for this could be that women over-invested in the foetus as a consequence of not being in a relationship with the baby's father. Additionally, it should be noted that the study showed that this relationship with the father of the baby – but not marital status – was a significant predictor of prenatal attachment. It may be that in a contemporary society, living relationships are more important than marital status.

Regarding pregnancy factors, women who were expecting twins or their first child, had higher levels of intensity of attachment. This confirms the findings of (Zimmerman and Doan 2003) who concluded that women expecting their first child had higher levels of prenatal attachment. Women who had planned for their pregnancies and were older also had higher levels of attachment. Women who had consulted a G.P due to problems with sleep or nerves reported lower levels of quality of attachment. This supports findings related to the negative impact of mood states upon prenatal attachment (Hart and McMahon 2006).

It is of interest that factors measured in the study had a stronger relationship with quality of attachment rather than intensity. This discrepancy between a woman's scores on intensity and quality of prenatal attachment has been a feature of previous research in this area. This discrepancy raises an issue of validity of the construct, as these subscales combine to provide a total score of prenatal attachment.

Condon's validation paper of 1993 is worthy of consideration in relation to this issue as it showed higher levels of intensity of attachment compared to the quality of attachment. It is conceivable that with the demands of modern life many working mothers begin their maternity leave a few weeks prior to their due date and this may result in a reduction in their thinking capacity, and subsequently less concentration on the foetus. This may not however affect the quality of attachment. It is supported by the findings that primigravida women had higher levels of intensity of attachment, than multigravida women whose thinking may be divided between the foetus and their other children.

Factors predicting prenatal attachment

The primary aim of the study was to assess whether psychological functioning predicted prenatal attachment above significant demographic factors and a woman's attachment style. It was found from the psychological functioning measured that higher levels of well-being, absorption, and an element of distress tolerance, could significantly predict prenatal attachment. As the regression analysis only accounted for a modest proportion of the variance it is worth considering what other factors may contribute such as levels of social support.

The findings regarding well-being and prenatal attachment support Zachariah (2004) who found a relationship between well-being and prenatal attachment amongst a small group of socially deprived women. These findings have not been shown in relation to a normal maternity population, but they do highlight the importance, as seen in the literature, of the importance of well-being in social functioning. Well-being is subjective since it is reliant

upon the way in which an individual sees the world. Consequently, women with a more positive outlook and a greater sense of well-being have higher levels of prenatal attachment.

Previous research has focused upon the presence of poor psychological functioning such as mood states in relation to prenatal attachment (Condon & Corkendale, 1997; Hart and Macmahon, 2006). It is likely that women with poor mood states, such as those feeling anxiety and depression, may have decreased well-being. This study provides a focus on positive well-being and its consequences. This may suggest that in a normal maternity population, the presence of positive mental health rather than the presence of mental health factors is important when predicting prenatal attachment. Well-being also relates to an individual's perception of their own abilities and therefore this feeling of well-being and capability extends to her attachment to the foetus.

Distress tolerance-absorption was a significant predictor of prenatal attachment. This illustrates that women who absorb distress may lack the mental capacity to deal with further issues such as pregnancy, perhaps explaining their lower levels of prenatal attachment. This finding is unique in relation to previous research. However, it highlights the important role of meta-cognitions in relation to prenatal attachment as supported by White et al. (2008) who found that cognitive appraisal, as part of a coping strategy, was a significant predictor of prenatal attachment in a sample of women hospitalised with obstetric risk. This indicates that the way in which women perceive and manage their distress is an important aspect of the development of prenatal attachment. It may be that if women are struggling to manage

distress, or are overwhelmed by it, they may be unable to facilitate positive attachments to their foetus.

Another key finding when predicting prenatal attachment was the significance of a woman's avoidant attachment pattern. This finding was stronger in relation to quality of attachment, which indicated that an avoidance in close relationships was also related to the woman's capacity to attain closeness to her foetus. This demonstrates that even prior to the birth, a woman's own attachment style significantly impacts on her ability to attach a factor known to be predictive of postnatal outcomes (Siddiqui & Hagglof, 2000) This supports the work of Pollock and Percy (1999) that showed that women with more preoccupied attachment styles were more adversely affected by lower levels of prenatal attachment. It was hypothesised that anxious attachment would predict lower levels of prenatal attachment as research has demonstrated a link between postnatal attachments and women with anxious attachment styles. It was found that anxious attachment, when examined in the context of significant demographic factors, was not a significant predictor of prenatal attachment. If we assess this logically, we can see that anxious attachment relates to the fear of abandonment. Therefore it is clearly not an issue arising during the prenatal phase due to the absence of reciprocity between foetus and mother.

As previously stated, aspects of psychological functioning accounted only for a modest proportion of the variance when predicating prenatal attachment. It is therefore important to consider other factors that may account for the remainder of the variance. Relational factors have been shown to be an important factor in relation to prenatal attachment. However

these were not examined fully within the current study and if examined may have accounted for the variance. Relationship status was also a significant predictor. However the level of support provided by these relationships was not assessed and is worth considering in further research. In addition these findings do not assess causation, for example well-being and prenatal attachment are linked however the study is not able to determine if they are directly linked. It is likely that there are multiple intervening factors that are impacting upon a woman's well being, such as those considered when assessing the remainder of the variance within the analysis.

In line with the initial hypothesis, higher borderline features were associated with lower levels of prenatal attachment. This corroborates the work of Pollock and Percy (1999) who showed that women demonstrating higher levels of borderline traits had lower level of prenatal attachment. However when analysed alongside significant demographic factors within the current study (see later hypothesis), borderline functioning was not a significant predictor of prenatal attachment. The reasons for this discrepancy could be that Pollock & Percy's findings were based upon a more thorough assessment of borderline features. Their analysis was based upon a categorical approach to prenatal attachment (high or low) rather than a continuous approach as used in the current study. It is plausible that the underlying construct of intensity of attachment is problematic in relation to BPD pathology. For example intensity relates to preoccupation and time spent thinking of the baby. A potential hypothesis is that the preoccupation may become unhealthy and become rumination of potential abandonment.

It may be that this is linked to mentalisation impairments, discussed as a consequence of high levels of BPD (Fonagy et al, 1999). Mentalisation requires women to have space in their mind to adequately attach and focus upon their foetus. It may be that where women's levels of intensity of attachment is high it may impact on this process of mentalisation,. Although there was not a significant association between BPD features and prenatal attachment it may be that mentlization is linked to well-being a rather than the presence of pathology, and therefore should not be discounted as a way of understanding the development of attachment. Within a normal population, positive well-being was a more reliable predictor of prenatal attachment.

A further aim of the study was to examine the relationships between adult attachment styles and psychological functioning showing that women with higher levels of insecure attachment struggle with psychological functioning, most commonly in relation to borderline features. This supports previous research as poor attachment forms part of the etiology of BPD (Gunderson, 1996).

Engagement with services, prenatal attachment and psychological functioning

A further facet of the study aimed to examine a woman's engagement with obstetric services as measured by booking time. Booking requires a number of higher order processes: the woman must be aware that she is pregnant – a cognitive response – before planning and actioning the booking. It was predicted that women who booked at a late stage for maternity care would have lower levels of prenatal attachment in line with Lindgren's research (2001, 2003), which found that health practices were related to higher levels of

prenatal attachment. Lindgren also found that another factor was in play, namely the effect of low mood. However prenatal attachment was not found to be associated in the current study, it may be that this study was not able to encapsulate the true late booker and that by the time women completed the questionnaire they had engaged with services. It is conceivable that, prior to booking their maternity care, this group may have considered a termination.

A further aim was to examine the characteristics of this group who booked late, specifically with regards to their psychological functioning, well-being, and attachment style. There was a positive correlation between avoidant attachment and negative relationships, which is one of the psychological functions related to borderline measures. This indicates that relational difficulties are more prevalent in women who book late for maternity care. During pregnancy there is a need for relational support. It is plausible that where this is absent women may have a reluctance to consider their pregnancy and therefore book late maternity care. The presence of an avoidant attachment may also make engagement with the foetus more problematic and therefore result in delayed bookings.

Analysis of demographic factors reveals that these women are twice as likely to be single, and that their pregnancy is more likely to be unplanned. When predicting late booking, relational factors were no longer significant, but the demographic factors such as presence of a partner and planned pregnancy were. This is in line with previous research demonstrating that demographic factors are pertinent for women who book late for their maternity care (Rowe & Garcia, 2003). Although relational factors were shown to be

important the practicalities such as having a partner override this. The association between late booking and planned pregnancy is of interest, as both require a behavioural and cognitive response to care and planning.

Strengths and Limitations

The strength of the study is that it draws upon a large maternity sample including women of varying demographics, for example including varying levels of education and ranging in age. A limitation was the lack of representation with regards to black and minority ethnic groups. However the sample included a significant proportion of women with previous mental health difficulties, such as those who had conceived using IVF, those experiencing complications during pregnancy, and those expecting twins, therefore useful areas of study. In contrast to other research this study has taken into account a large number of potential confounding factors. A common criticism of research in this area is the lack of control of gestational age (Laxton-Kane & Slade, 2002). Sampling women at 20 weeks removed this as a confounding variable. However, the cross-sectional design meant findings could not be compared across the stages of pregnancy, which is possible in other designs. A cross sectional design means that causal direction is open to interpretation to an extent. For example it may have been that attendance at the scan itself enhanced feelings of attachment, even though scanning was controlled for women completing the questionnaire prior to the scan. Therefore findings can only be generalised to women at 20 weeks.

In relation to the measures, using the BOR in a non-clinical population meant that only a small number fell within the clinical range (n=25), therefore conclusions cannot be generalised to those with borderline pathology at a diagnostic level. In addition, one dimension of the ERC-anxiety subscale showed marginally lower internal consistency; therefore results may need to be interpreted conservatively.

The study showed attempts to control for the presence of previous mental health difficulties, by asking women if they had visited their G.P for problems with sleep or nerves. Previous research has shown depression and anxiety to be a predictor of prenatal attachment (Condon and Corkendale, 1997; Hart and Macmahon, 2006). Using a validation tool to measure, such as the 'Hospital Anxiety and Depression Scale', may have more accurately controlled for the effect of mood disorders.

A further strength of this study is that it extends to women's behavioural outcomes as measured by booking for maternity care. It may be that the service imposed cut off point of 12 weeks did not encapsulate the true late booker. Qualitative responses demonstrated that women in this group had legitimate reasons for booking late.

Clinical Implications

This study raises several implications for those working in maternity settings. On the basis that prenatal attachment is known to relate to postnatal attachments, predictive of later outcomes, finding ways to enhance associated factors should be beneficial. Further research is required to substantiate the links between the effects of enhancing well-being on prenatal attachment in order to build an evidence base required to develop an intervention. The well-being scale has commonly been used within health settings (Tennant, et al, 2007) and could simply be incorporated as part of initial maternity appointments, ensuring that women struggling with poor well-being could receive greater support throughout pregnancy. Identifying psychological functioning is likely to aid further research into what interventions are required, targeting psychological interventions during maternity. This

first phase would make a vast impact upon the need for services later in life. It may be that more generally there is a need to enhance psychological thinking within routine midwifery practice, to ensure positive outcomes for all women.

As maternal age was a strong predictor of prenatal attachment it may be that midwives need to pay particular attention to those women who are younger. However this study only sampled women from the age of 18, and did not measure at what age prenatal attachment may be effected.

This research may provide guidance to clinicians working within mental health settings to support women who may be pregnant, for instance within those women who scored within the clinical range. Due to the knowledge that late booking has detrimental health outcomes, the findings regarding predictors of late booking show that those groups who are likely to book late require further support to keep them engaged with services.

Future research

Although this study has showed that well-being is positively related to prenatal attachment, further comparative designs are necessary to establish whether findings are related to the timing of the measurement. In addition, longitudinal designs that examine attachment within the postnatal phase would allow inferences to be made regarding the cyclical role of attachment, for instance, could women's attachment styles predict attachment post-natally? As relational factors were shown to be an important aspect in conjunction with prenatal

attachment, the role of social support could be examined more thoroughly, not only looking at the relationship status of women but specifically the level of support provided.

This study attempted in part to use a model for BPD in order to predict prenatal attachment; measures such as the BOR may provide more predictive power in a clinical sample, and warrant further research in a clinical setting. This study has begun to establish significant psychological functioning, however further research is required to establish appropriate measurement tools in a normal maternity sample. Similarly identifying psychological mechanisms in clinical or high-risk maternity sample may indicate which psychological processes mediate between depression, obstetric risk and levels of prenatal attachment.

Due to the association with health outcomes, further understanding into late booking is required, particularly its relationship with poor health outcomes, however this group are a challenge to conduct research with, and further inventive research designs are required to examine this critical health behaviour.

Conclusions

One main objective of the study was to examine which psychological functioning and attachment styles were related to prenatal attachment, and furthermore which factors could predict prenatal attachment. In initial analysis, results demonstrated that higher levels of distress tolerance and associated subscales were related to higher levels of prenatal attachment, and that lower levels of prenatal attachment were related to more borderline features and a more insecure attachment pattern. Once significant demographic and pregnancy variables had been accounted for well-being and distress tolerance were shown to be significant predictors of prenatal attachment. In addition the MRA showed a woman avoidant of attachment, planning of pregnancy, maternal age and relationship status were significant predictors of prenatal attachment.

These findings are representative of a large maternity population – controlling for a number of potentially confounding variables. The results showed that women scored higher on quality of prenatal attachment over intensity, showing that closeness was more pertinent in relation to the factors under review than that of time spent thinking of the foetus.

A further objective of the study was to examine factors associated with those who booked late; results found that women booking late had more avoidant attachment and scored higher on the negative relationship aspect of borderline features. Further analysis revealed demographic factors were predictive of late booking, for instance those who were single, and had unplanned pregnancies.

This research brings new and relevant findings to the area of prenatal attachment demonstrating that cognitive, behavioural and psychological functioning is important. It also allows increased understanding into the behavioural response to care by late booking, critical due to the implications of booking with poor health outcomes. Further research is required to take this to the next step and develop interventions and an evidence base to see if enhancing levels of absorption and well-being will in turn enhance a woman's attachment to her developing baby.

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