



UNIVERSITY OF
LIVERPOOL

The Role of Self-Concept in the Transition to Motherhood

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6th June 2016

Submitted in partial fulfilment of the Doctorate in Clinical Psychology,

University of Liverpool

Acknowledgments

I have learnt so much through this process, from how to undertake complex multivariate analysis through to simply how to draw a curved arrow in Publisher. At times it was an uphill struggle, with time pressures and competing demands being a challenge. The support I have received has been invaluable; I would not have been able to complete this project without it.

I have so many people to thank. First, I would like to express my sincere gratitude to both my supervisors Professor Pauline Slade and Professor Bill Sellwood, whose advice and guidance has been priceless. They both have a huge wealth of knowledge, and incredible attention to detail, that I can only aspire to. I would also like to thank Dr Philip Powell, whose assistance surrounding the statistical analysis was incredible. I would also like to thank the entire department of Clinical Psychology staff, who have always been willing to help, especially Tom Green.

I would like to thank Christine Healey, at Action on Postpartum Psychosis, for her feedback regarding the information sheets and consent forms. I would also like to thank Emma's Diary; David Castle for agreeing to support the project, Emily Taylor-Callingham for creating the advert and most importantly Lauren Johnstone who facilitated the recruitment process. Thank you to my wonderful friend, colleague and course-mate Amy Waugh, who willingly reviewed and quality assessed the papers in my systematic review. I am so sorry that you had more work to do than I did. Thank you to my sister, Sarah. I have constantly appreciated the opportunity to draw on your knowledge as a midwife. Thank you for reading, checking and re-reading my survey, even when you had your own children to think about. Thank you to all my friends and family, who have been so understanding and accepting when I have been so busy. Importantly, thank you to all my participants, who took time out of their busy days and caring for their babies to take part in my research. This project only happened because of you.

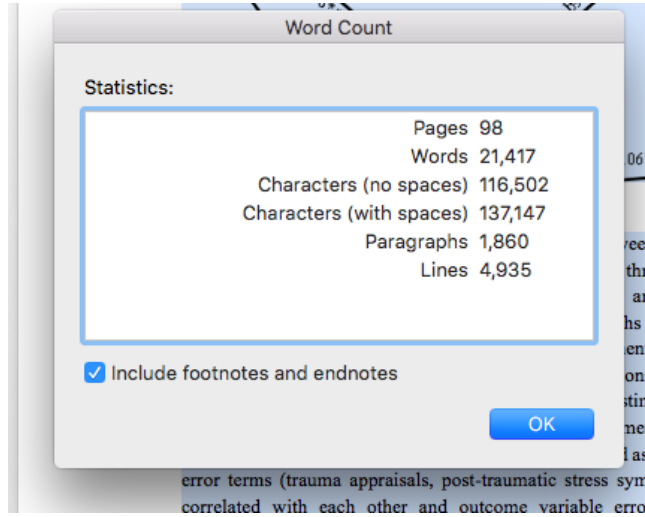
Finally, thank you to my partner James. I could not have done this without you. Thank you for all the morning cups of tea, the dinners and the cleaning. Thank you for reading all my drafts and putting up with occasional tears. Thank you for knowing what I needed. Thank you for being amazing; finally, we will get our weekends back.

Lyndsey

Word count (including figures and excluding references): 25318

(Please note the final word count is comprised of 21,417 words, plus 3,901 words for Appendix

A: Mixed Methods Appraisal Tool).



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Thesis Overview

This thesis focuses on the transition to motherhood. It contains two separate papers, a mixed-methods systematic review and a cross-sectional empirical paper. Both papers have common themes, specifically in relation to self-concept (“the totality of an individual’s thoughts and feelings, with reference to himself as an object”; Rosenberg, 1979, p.7).

Chapter 1, the paper titled ‘Self-Concept in the Transition to Motherhood: A Mixed-Methods Systematic Review’, explores how women’s self-concepts change when they become mothers and if there are any predictors of change. This paper draws upon the dynamic self-concept (Markus & Wurf, 1987) which proposes self-concept is one part of the cognitive-affect system, which also includes intra and inter-personal process, and is comprised of a variety of self-representations. The paper synthesises 16 studies deemed to fulfil the inclusion criteria (studies investigating self-concept, from conception, in primigravida mothers aged 13 and above), by two independent reviewers; six quantitative, seven qualitative and three mixed methods. The main finding, that self-concepts change as women become mothers but changes experienced are different for individuals, is discussed in the context of the dynamic self-concept and other research. Due to the lack of prospective studies included in the review, it was difficult to draw firm conclusions regarding predictors of self-concept change. However, there were themes throughout the studies that corresponded to the dynamic self-concept; intra-personal processes such as seeking information from other people and from resources such as books, inter-personal process such as quality and quantity of relationships, and cognitive-affect processes in terms of self-worth and feeling competent as a mother. Given the limitations of the review, and research to date, it is suggested that further prospective studies examining the implications of self-concept change may be advisable.

Future research surrounding the implications of self-concept changes corresponds with chapter 2; ‘The Role of Birth Experiences, Trauma Responses and Self-Concept in Postpartum Psychotic-Like Experiences’. This empirical paper aimed to explore the consequences of self-concept changes, within the early postpartum period. It focused on the effects of disruption to self-concept clarity (SCC); the extent to which a person’s beliefs about themselves are well-defined, confidently held, internally coherent, stable and cognitively accessible (Campbell et al., 1996). Disruption to SCC

were consider in relation to psychotic-like experiences (PLEs) (hallucination and delusion proneness). However, SCC is only one variable that could be associated with PLEs during this life phase. Therefore, the study aimed to understand the relationships between birth experiences, trauma appraisals, post-traumatic stress symptoms, adjustment to motherhood, SCC and PLEs by testing three competing path models. A large sample of first time mothers ($N = 1,393$) were recruited via *Emma's Diary* (www.emmasdiary.co.uk); an online resource for mothers that women are signposted to by their NHS clinician. The findings indicated that PLEs may be more common than previously thought, with 93.58% of the sample reporting at least one PLE in the first two months postpartum. However, this high percentage may have been due to a self-selection bias and therefore this finding is interpreted cautiously. A variety of pathways predicted the occurrence of PLEs; (a) birth experience directly predicted delusions (b) post-traumatic stress symptoms and SCC directly predicted hallucination and delusion proneness (c) trauma appraisals and adjustment to motherhood indirectly predicted hallucination and delusion proneness via SCC. This paper concludes that SCC is an important factor previously unexplored in the context of distress in the early post-natal period. It is recommended that further prospective studies explore these findings, whilst learning from the limitations of the current research. Additionally, it is suggested that public health interventions aimed at normalising these experiences may be pertinent.

The appendices provide supplementary information that was not deemed essential to be included in either of the chapters. This includes the author guidelines for the empirical paper target journal, along with the information sheets and consent forms. Of particular note is Appendix F, which outlines the alternative path models tested in the empirical paper.

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Self-Concept in the Transition to Motherhood: A Mixed- Methods Systematic Review

Chapter 1: Systematic Review

Lyndsey Holt

Abstract

Self-concept has been defined as the totality of an individual's thoughts and feelings, with reference to themselves as an object. The dynamic self-concept model proposes that self-concept changes in concordance with intra and inter-personal behaviour and social circumstance. A mixed-methods systematic review, which examined papers that explored self-concepts for first time mothers from conception onwards, was undertaken. Databases Medline, PsychINFO, PsychArticles, CINAHL plus, Scopus and Web of Science were searched in October 2015, with 3,753 articles screened. Sixteen papers fulfilled the inclusion criteria; six quantitative, seven qualitative and three mixed-methods. Findings indicated that self-concepts change when women become mothers, and a process of reprioritisation takes place, which may vary across individuals. There were no clear predictors of change. However, seeking information from others and resources (such as books), levels of self-esteem and mothering competence, along with having close relationships and feeling supported by others may all be factors that correspond to change. Dynamic self-concept is a useful model to understand this life transition, further research surrounding the implications of self-concept changes may be pertinent.

Introduction

Understanding self-concept has been the focus of research for decades in the context of mental distress, with a variety of definitions, models and theories being developed (see Markus & Wurf, 1987). This paper draws on one key model; the dynamic self-concept (Markus & Wurf, 1987). Unlike other models and theories, for example self-concept as a self-theory (Epstein, 1973) and dialogical self (Hermans, 2001), this model is especially pertinent with regards to major life events/changes. The model theorises that self-concept is a collection of self-representations that differ in structure and role; ego-tasks, possible selves, self-standards, self-schemas, self-scripts, or self-strategies. The working self-concept is a collection of the self-representations which are accessible at one time. This working subset is activated in line with a person's social circumstance and motivational state. Some self-representations are automatically triggered due to social circumstances (e.g. becoming a mother), whilst others are chosen by an individual to fulfil a purpose (e.g. a wish to maintain positive beliefs about the self). Self-concept is one part of the affect-cognitive system, whilst the working self-concept is the self-representations that currently regulate an individual's behaviours (both intra and inter-personal). Intra and inter-personal behaviours influence the motivational state and social circumstances, that then influence the working self-concept. Self-concept is dynamic, constantly changing and adapting to circumstances. Whilst this model allows us to theorise the function and process of self-concept, it does not allow it to be easily defined. A widely accepted definition of self-concept is "the totality of an individual's thoughts and feelings with reference to himself as an object" (Rosenberg, 1979, p.7). This corresponds with the dynamic self-concept (Markus & Wurf, 1987), as only thoughts and feelings synonymous with the working self-concept will be accessible at a given time.

Self-concept and identity are used interchangeably throughout the literature, however the two are distinct. Whilst self-concept refers to a person's view of themselves as an object (Rosenberg, 1979), identity is the image of the self which one wishes others to see (Markus & Wurf, 1987). In other words, identity is the self which is presented to others, or the cognitive representation an individual believes they are presenting, which is constructed through the interaction of the situation and observing others (Schlenker, 1985).

Consistent with the dynamic self-concept (Markus & Wurf, 1987), self-concept has been found to be disrupted (e.g. difficulties accessing or maintaining clear self-representations) following normal life events such as bereavement (Balk, 1983; Boelen, Keijsers, & van den Hout, 2012) and abnormal life events, such as trauma (Evans, Reid, Preston, Palmier-Claus, & Sellwood, 2015). Disrupted self-concept is associated with psychological difficulties, from low self-esteem (Campbell, 1990) through to unusual experiences (Cicero, Becker, Martin, Docherty, & Kerns, 2013) and psychosis (Evans et al., 2015). Higher clarity of self-concept (e.g. ease of access and maintenance of clear self-representations) is correlated with positive affect and life satisfaction (McCullough, Huebner, & Laughlin, 2000).

Self-concept and the transition to motherhood

The process of becoming a mother is seen as a normal life stage for many women. However, it has also been associated with distress (Barnett & Baruch, 1985) and psychological difficulties, such as post-natal depression (Evans, Heron, Francomb, Oke, & Golding, 2001). Becoming a mother inevitably involves substantial changes from conception onwards (Barclay, Everitt, Rogan, Schmied, & Wyllie, 1997), including those postulated in the dynamic self-concept (Markus & Wurf, 1987). Such changes include changing work roles, inter-personal processes such as developing a relationship with the child, and intra-personal processes such as changing motivational drives. This indicates that becoming a mother may be associated with disruption and/or increased clarity of self-concept, dependent upon inter and intra-personal factors and circumstance.

Self-concept has been found to be a predictor in maternal role behaviours (Mercer, 1985), for example competence in caring for a child. Given that conception through to the first two years of life are critical for child development (Leadsom, Field, Burstow, & Lucas, 2014), and attachment at this time is paramount (Waters, Merrick, Treboux, Crowell, & Albersheim, 2000), disruption of a mothers self-concept may have implications for the child. Knowledge of how self-concept is impacted during the transition to motherhood will facilitate further understanding of this life stage, from the mothers' perspective.

Studies of self-concept through this life transition have used a variety methodologies, for example quantitative longitudinal studies have explored changes in self-concept clarity (SCC) from

the early postpartum period onwards (Mercer, 1986), whilst cross-sectional studies have compared SCC amongst pre-pregnant, pregnant and postpartum participants (Deutsch et al., 1988). Qualitative studies have explored the experience of becoming a mother, and subsequent self-concept changes, for participants through pregnancy (Bailey, 1999) or the postpartum period (Weaver and Ussher, 1997). Additionally, mixed-method approaches have used qualitative methods and repertory grids to explore self-concept changes from conception through to the post-partum period (Smith, 1994).

This review aims to answer several questions in relation to becoming a mother for the first time:

1. Do women's self-concepts change when they become mothers?
2. What changes in self-concepts are experienced by mothers?
3. Are there predictors of self-concept changes?

Method

Databases Medline, PsychINFO, PsychArticles, CINAHL plus, Scopus and Web of Science were searched in October 2015. The search terms used were “change” OR “transition” OR “identity change” OR “life change” AND “Social identity” OR “Self-concept” OR “Identity” OR “Self identity” OR “Self image” OR “Identity formation” OR “Identity development” AND “Mother*” OR “Parent*” OR “Postnatal” OR “Perinatal” OR “Maternal” OR “*natal” OR “Puerperal” OR “Pregnancy”. Publications were restricted to English papers with female participants aged 13 and above. The Web of Science search was restricted for psychology, sociology, women’s studies, social issues and family studies. No restrictions were placed on publication date.

Papers were reviewed in line with predetermined search criteria. Inclusion criteria were (a) primigravida mothers (b) participants aged 13 years upwards (c) studies investigating self-concept from conception (d) general population studies (e)(i) for quantitative studies data collected within two years postpartum (ii) for qualitative studies data collected within five years postpartum. Time frames are in line with memory research; women have been found to accurately recall birth experiences one year postpartum (Waldenström, 2003) however, recollection changes over five years (Waldenström & Schytt, 2009). Suggesting recollections of self-concept may change significantly over five-years. We aimed to increase accuracy of responses in quantitative studies, whilst allowing time for participants in qualitative studies to reflect on their experiences. Despite the focus of our research being on change we included cross-sectional studies, as we hoped this would provide data that could be compared to normative data. Exclusion criteria were (a) male participants (b) adoptive mothers (c) studies investigating self-concept following special circumstances, such as still-birth or neo-natal death (d) studies exploring self-concept in the context of mental health difficulties (e) studies that focused on identity rather than self-concept.

After duplicates were removed, 3753 papers were screened by two independent reviewers. 3673 papers were excluded based on titles and abstracts. The full text of the remaining 80 papers were screened along with seven papers found through references searches of included papers. These papers were independently rated into three categories (i) criteria met (ii) criteria not met (iii) unsure. Discrepancies were discussed, and final decisions surrounding the papers placed in the unsure

category made collaboratively. Full agreement was reached that 16 studies fulfilled the inclusion criteria. The included papers were quality assessed by the two reviewers using the Mixed Methods Appraisal Tool (MMAT) checklist (Pace et al., 2012), with the same process as above being used. Relevant data were summarised in data extraction forms, with results coded in line with the research questions.

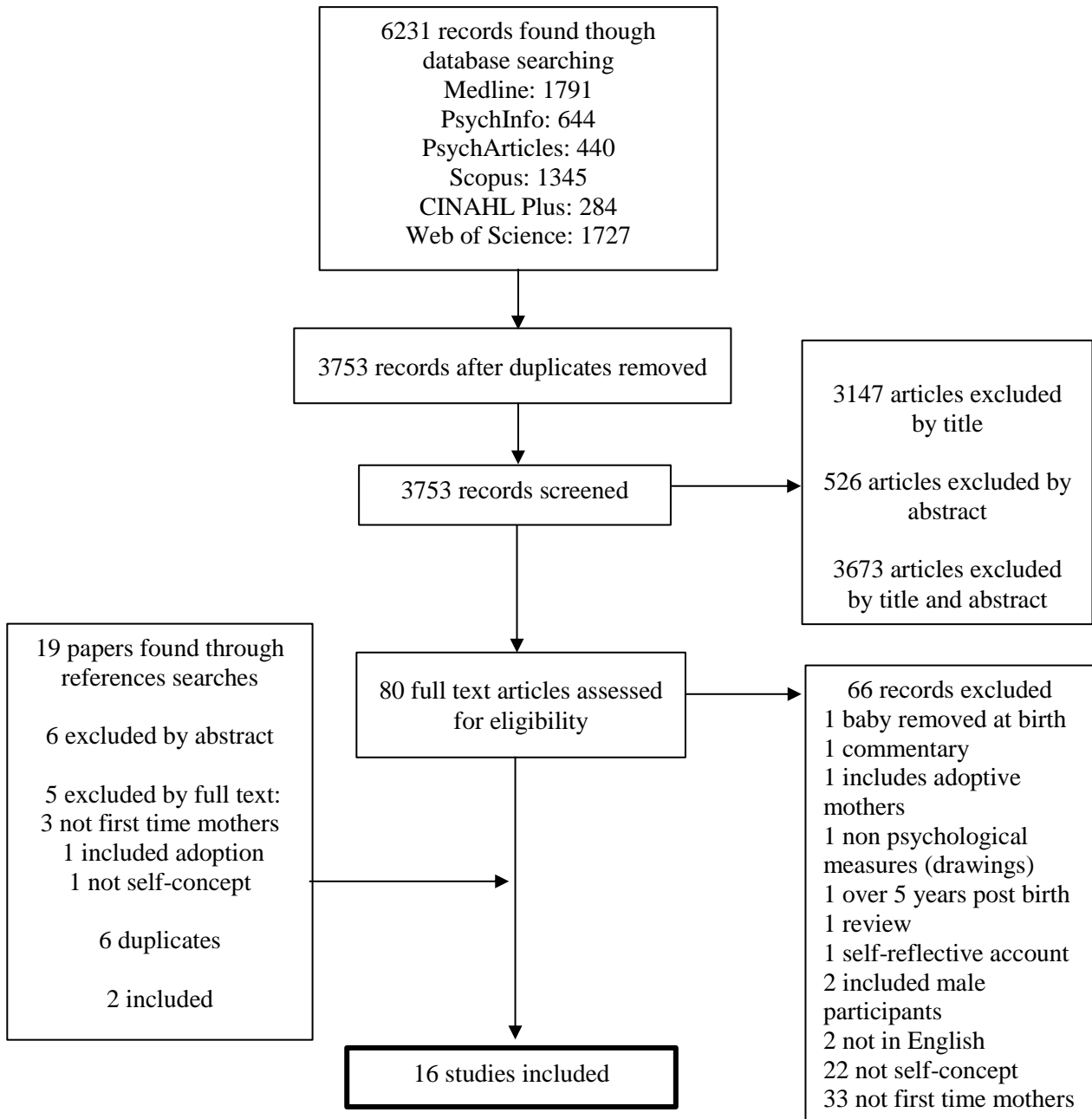


Figure 1. Flow chart for searches and study selection

Results

The quality assessment results are presented in Table 1. Characteristics and findings of the studies have been summarised separately according to their designs (Table 2 quantitative, Table 3 qualitative and Table 4 mixed-methods). Language varied, with self-concept being referred to in different formats from ‘identity’ through to ‘mothering self-concept’. For consistency, the term self-concept will be used throughout this paper.

Three studies provide information on pregnancy only (Bailey, 1999; Lineberger, 1987; Randell, 1993), nine on pregnancy and postpartum (Alpers, 1998; Curry, 1982; Deutsch, Ruble, Fleming, Brooks-Gunn, & Stangor, 1988; Ruble et al., 1990; Seibold, 2004; Smith, 1990, 1991, 1994, 1999) and four on the postpartum period (Keating-Lefler & Wilson, 2004; Ladores & Aroian, 2015; Mercer, 1986; Weaver & Ussher, 1997). Of the six quantitative studies, one was a randomised controlled trial (Curry, 1982), one an observational study (Lineberger, 1987), two cross-sectional (Alpers, 1998; Deutsch et al., 1988), one longitudinal (Mercer, 1986) and one used both longitudinal and cross-sectional methods (Ruble et al., 1990). The seven qualitative studies utilised a range of analytic methods; two discourse analysis (Bailey, 1999; Weaver & Ussher, 1997), one constant comparative (Randell, 1993), one grounded theory (Keating-Lefler & Wilson, 2004), one exploratory pilot (Seibold, 2004), one descriptive phenomenological (Ladores & Aroian, 2015) and one interpretive phenomenological (IPA) (Smith, 1991). The three mixed methods studies consist of repertory grids and either qualitative descriptive or IPA (Smith, 1990, 1994, 1999).

The quantitative studies focused on SCC whilst the qualitative and mixed method studies highlighted other important aspects of self-concept, for example processes surrounding self-concept changes (see changes in self-concept reported). In the quantitative studies (Alpers, 1998; Curry, 1982; Deutsch et al., 1988; Lineberger, 1987; Mercer, 1986; Ruble et al., 1990) two measures of self-concept were used; the Tennessee Self-Concept Scale (Fitts, 1965) and the Maternal Self-Definition Questionnaire (Deutsch et al., 1988). On both measures higher scores indicate higher SCC. As the mixed method studies (Smith, 1990, 1994, 1999) used repertory grids (Tan & Hunter, 2002), comparison with other quantitative data was more difficult. In these studies, elements and constructs

were used. Elements were created by the researcher, selected as they represented important people in the participants life (themselves or others), and constructs were developed from these. Higher scores represent convergence with the constructs.

Nine studies took place in the United States of America (Alpers, 1998; Curry, 1982; Deutsch et al., 1988; Keating-Lefler & Wilson, 2004; Ladores & Aroian, 2015; Lineberger, 1987; Mercer, 1986; Randell, 1993; Ruble et al., 1990; Seibold, 2004), six in the United Kingdom (Bailey, 1999; Smith, 1990, 1991, 1994, 1999; Weaver & Ussher, 1997) and one in Australia (Seibold, 2004). The studies by Smith (1990, 1991, 1994, 1999) have the same author and participants, therefore the studies are often considered together. Deutsch et al. (1988) and Ruble et al. (1990) have the same authors. The studies take place over several decades, with the earliest study published in 1982 (Curry, 1982) and the most recent in 2015 (Ladores & Aroian, 2015).

Table 1. *Quality assessment*

Study reference	Screening		Qualitative				Quantitative randomized				Quantitative non randomized				Quantitative descriptive				Mixed methods			Quality
	Are there clear research questions?	Do the collected data address the research question?	Are the sources of data relevant to address the research question?	Is the process for analyzing data relevant to address the research question?	Is appropriate consideration given to how findings relate to the context?	Is appropriate consideration given to how findings relate to researchers' influence?	Is there a clear description of the randomization?	Is there a clear description of the allocation concealment?	Are there complete outcome data?	Is there low withdrawal/drop-out?	Are participants recruited in a way that minimizes selection bias?	Are measurements appropriate regarding the exposure/intervention and outcomes?	In the groups being compared, are the participants comparable, or do researchers take into account the difference between these groups?	Are there complete outcome data, and an acceptable response rate, or an acceptable follow-up rate for cohort studies?	Is the sampling strategy relevant to address the research question?	Is the sample representative of the population under study?	Are measurements appropriate?	Is there an acceptable response rate?	Is the design relevant to address the qualitative and quantitative research	Is the integration of qualitative and quantitative data relevant to address the	Is appropriate consideration given to the limitations associated with this integration?	
Alpers (1998)	Y	Y								Y	Y	N	N									**
Bailey (1999)	Y	Y	Y	N	Y	Y																***
Curry (1982)	Y	Y					Y	Y	Y	N												***
Deutsch et al. (1988)	Y	Y									Y	N	Y	Y								***
Keating-Lefler and Wilson (2004)	Y	Y	Y	Y	N	N																**
Ladores and Aroian (2015)	Y	Y	Y	Y	Y	N																***
Lineberger (1987)	Y	Y									Y	Y	Y	Y								****
Mercer (1986)	Y	Y									Y	Y	Y	Y								****
Randell (1993)	Y	Y	Y	Y	Y	N																***
Ruble et al. (1990)	Y	Y									Y	Y	Y	Y								****
Seibold (2004)	Y	Y	Y	Y	Y	N																***
Smith (1990)	Y	Y	Y	Y	Y	N								N	N	Y	NA	Y	Y	N		*
Smith (1991)	Y	Y	Y	Y	Y	Y																****
Smith (1994)	Y	Y	Y	Y	Y	N								Y	Y	Y	NA	Y	Y	N		***
Smith (1999)	Y	Y	Y	Y	Y	Y								Y	Y	Y	NA	Y	Y	Y		****
Weaver and Ussher (1997)	Y	Y	Y	Y	Y	Y																****

Note. Y = yes, N = no, NA = not applicable, * 25%, ** 50%, *** 75%, **** 100%

Table 2. *Quantitative study design, participant characteristics and findings*

Study	Design and participant characteristics	Outcome measures	Findings pertaining to self-concept	Predictors
Alpers (1998)	Cross-sectional survey comparing teenage mothers with high school and junior high school students. <i>N</i> = 126 Age Range 14 – 19 (<i>M NR</i>) Marital status 14% married, 84% single Ethnicity 90% White, 10% other Religion 40% none, 31% Protestant, 27% Catholic Education/employment 40% completed high school, 45% enrolled in education Conception NR	Tennessee Self-Concept Scale (Fitts, 1965)	Mothers had higher SCC (range 248 – 418, <i>M</i> 337.36, <i>SD</i> 77) in comparison to high school (<i>M</i> 320.63) and junior high school students (<i>M</i> 325.45).	Analysis of variance Age Older mother (19 years) had significantly higher SCC than younger mothers (16 years) School grades Pair-wise comparison found higher school grades predicted higher SCC. School Mothers who attended college had significantly higher SCC. Religion Catholic mothers had significantly higher SCC than those with no religious preference. Social economic status Mothers who received income from government programs had significantly lower SCC.
Curry (1982)	Randomised control trial. Skin to skin contact or control. Measures during pregnancy and three months postpartum. Observation of attachment behaviour at 36 hours and three months postpartum. <i>N</i> = 20 Age NR Marital status 100% married Ethnicity 100% Caucasian Education/employment NR Conception NR	Tennessee Self-Concept Scale (Fitts, 1965)	Repeated measures Antenatal and postnatal SCC was correlated ($r = .89, p < 0.01$). Ten participant's SCC increased by an average of 28 points and ten reduced by an average of 16.8 points.	Skin to skin contact No significant difference between control and experimental groups in antenatal, $t(18) = -.17, p = ns$, or three-month postpartum SCC, $t(18) = -.49, p = ns$.

Deutsch et al. (1988)	<p>Cross-sectional survey comparing pre-pregnant, pregnant and postpartum participants. <i>N</i> = 670</p> <p>Age Range 18 – 42 (<i>M</i> 29.32, <i>SD</i> 4.12)</p> <p>Marital status: 100% cohabiting</p> <p>Ethnicity 97.6% White, 2.4% other</p> <p>Religion 22.8% Catholic, 29% Protestant, 22% Jewish, 8.6% other, 17.6% none</p> <p>Education/employment 0.9% some high-school, 26.8% high-school graduate, 35.5% college graduate, 27.9% graduate degree</p> <p>Conception NR</p>	<p>Infant Temperament Scale (Carey & McDevitt, 1978)</p> <p>Information Seeking</p> <p>Maternal Self-Definition Questionnaire</p> <p>Relationship with Mother and Husband</p> <p>Self-Esteem Scale</p>	NR	Multiple regression analyses
		<p>Pregnant group: SCC significantly predicted by information seeking ($F = 6.81, p < .001$), attitude towards information about motherhood ($F = 16.33, p < .001$), relationship with mother ($F = 21.93, p < .001$) and self-esteem ($F = 4.45, p < .05$), $R^2 = .26$.</p> <p>Postpartum group: SCC significantly predicted by self-esteem ($F = 7.42, p < .01$), previous experience with children ($F = 12.53, p < .001$) and infant temperament ($F = 4.39, p < .05$), $R^2 = .37$.</p>		
Lineberger (1987)	<p>Observational study. Participants assigned to parent education programme, pregnant or non-pregnant control group. Measures completed pre and post group. <i>N</i> = 48</p> <p>Age Range 13 – 18 (<i>M</i> NR)</p> <p>Marital status: 100% single</p> <p>Ethnicity 92% Black, 8% White</p> <p>Religion NR</p> <p>Education/employment Low socioeconomic status</p> <p>Conception NR</p>	<p>Self-Rating Depression Scale (Zung, Richards, & Short, 1965)</p> <p>Tennessee Self-Concept Scale (Fitts, 1965)</p> <p>The State Trait Anxiety Inventory (Spielberger, Gorsuch, Lushene, & Press, 1970)</p>	<p>Comparative scores</p> <p>Pregnant participants had lower self-concepts (ns) in comparison to population norms (<i>M</i> 345.57) both pre (intervention group <i>M</i> 318.00 <i>SD</i> 25.18; control group <i>M</i> 309.50 <i>SD</i> 27.95) and post intervention (intervention group <i>M</i> 323.00 <i>SD</i> 32.27, control group <i>M</i> 321.21 <i>SD</i> 38.58). Both pregnant groups had higher self-concepts than non-pregnant controls both pre (<i>M</i> 300.00 <i>SD</i> 90.15) and post intervention (<i>M</i> 310.17 <i>SD</i> 28.85).</p> <p>Repeated measures No significant difference in pre and post measures.</p>	NR

Mercer (1986)	Quantitative longitudinal. Initial testing one to three days postpartum. Battery of instruments at one, four, eight and 12 months postpartum. <i>N</i> = 294 Age: Range 15 – 42 (<i>M</i> NR) Marital status: 67% married, 33% not married Ethnicity: 63% Caucasian, 37% other Religion: NR Education/employment: 15% some high school, 44.4% graduate degree, 40.6% NR Conception: NR	Empathy Scale (Sherman & Maternal Behaviour Scale (Blank, 1964) Maternal Rigidity Scale (Larsen, 1968) Temperament Questionnaire (Thomas, Mittelman, Chess, Korn, & Cohen, 1982) Tennessee Self-Concept Scale (Fitts, 1965)	Repeated measures No significant difference in mean SCC from 3 days to 8 months postpartum $F(2, 235) = .40, p = ns$.	T-tests and correlations Age Age was correlated with SCC ($r = .21, p < .01$). SCC decreased from 3 days to 8 months postpartum for the 30 – 42 group ($n = 87, t = -4.68, p < .001$) and the 20 – 29 group ($n = 113, t = -3.77, p < .001$). Maternal behaviour Higher SCC was correlated with competent maternal behaviour in the 20-29 and 30-42 age groups ($r = .30, p < .01; r = .34, p < .001$). Ethnicity Caucasians had higher SCC than non-Caucasians ($r = .18, p < .01$). Marital status Married women had higher SCC than unmarried women ($r = .22, p < .001$). Education Participants with higher education had higher SCC ($r = -.18, p < .01$).
Ruble et al. (1990)	Cross-sectional and longitudinal comparing pre-pregnant, pregnant and postpartum participants. <i>N</i> = 715 Age: range 18 – 42 (<i>M</i> 29) Marital status: 100% married or cohabiting Ethnicity: 98% Caucasian, 2% other Religion: NR Education/employment: 69% college graduate, 31% other Conception: NR	Childbearing Attitudes Questionnaire Maternal Self Definition questionnaire (Deutsch et al., 1988)	Repeated measures Data on overall SCC change NR. Correlations between pregnancy and three months' postpartum subscales; fun ($r = .56, p < .001$), involved ($r = .78, p < .001$), traditional ($r = .66, p < .001$), protective ($r = .61, p < .001$) and knowledgeable ($r = .65, p < .001$). Cross-sectional Involved mum was found to significantly increase over time, $F(2, 662) = 6.65, p < .01$, as was protective, $F(2, 661) = 12.10, p < .001$. Fun decreased over time $F(2, 622) = 3.59, p < 0.05$.	Correlations Self-confidence SCC correlated with self-confidence ($r > .30$). Identification with motherhood SCC correlated with identification with motherhood ($r < .30$). Subscales Involved mum subscale correlated with identification with pregnancy ($r = .41$), self-confidence ($r = .35$) and feelings about children ($r = .37$). Fun mum subscale correlated with negative self-image ($r = -.34$) and self-confidence ($r = .35$).

Note: Higher self-concept scores indicate higher SCC. Lack of reference for measures denotes measure designed by the paper author. Lack of statistical information/details are due to lack of information within the paper. NR = *not reported*

Table 3. *Qualitative study design, participant characteristics and findings*

Study reference	Design and participant characteristics	Summary of themes related to self-concept
Bailey (1999)	<p>Discourse analysis. Semi-structured interviews during pregnancy. <i>N</i> = 30 Age Range 25 – 38 (<i>M</i> NR) Marital status 97% cohabiting, 3% single Ethnicity 100% White Religion NR Education/employment Middle class Conception 20% unplanned</p>	<p>Main theme Self-concept became refracted rather than changed completely.</p> <p>Subthemes Self-identity and mothering identity Change involved positive change of status. Participants apprehensively chose mothering self-concepts regardless of pregnancy being planned or unplanned. Uncertainty about impact on previous self-concepts. Pregnancy permits psychological readjustment.</p> <p>The body and the self Bodily changes served as physical markers of inner self-concept changes.</p> <p>The working person Pregnancy challenged working identity. Professional women may have advanced in their careers as surrogate men; self-concepts which pregnancy may force them to give up. Continuity between conceptualisation of mothering self and working self.</p> <p>Through the looking glass Themes amounted to different elements of refracted self-concepts. Participants effected change by entering a new world with different rules.</p> <p>Women excused Opportunity for change. ‘Excused’ from need to stand by old narrative of self-concept.</p>
Keating-Lefler and Wilson (2004)	<p>Grounded theory. Interviews at one, two and three months’ postpartum. <i>N</i> = 20 Age Range 19 – 35 (<i>M</i> 23) Marital status: 10% partnered, 90% single Ethnicity 75% Caucasian, 25% African American Religion NR Education/employment 15% some high school, 60% high school graduate, 20% some college, 5% college graduate. 100% unemployed. Conception 100% unplanned</p>	<p>Main theme: Grieving multiple losses Multiple losses, emotional and practical, led to a loss of past and future self-concept. Participants struggled with losing their self-concepts and found the process of redefining their self-concepts difficult.</p> <p>Main theme: Reformulating life Multiple losses led participants to reformulate life. Participants tried to rediscover an equilibrium that they had felt before becoming pregnant.</p> <p>Subthemes Submerging self in the mother role Focusing on the baby led to life being reformulated. Participants immersed themselves in the mother role and this was incorporated into self-concepts.</p> <p>Development of a new self- definition, identity, and future Participants believed in themselves as mothers, allowing new self-concepts to develop.</p> <p>Risking a new life course and attempting new roles When participants were ready to consider returning to college or work they incorporated these roles into their new self-concepts.</p>

Ladores and Aroian (2015)	<p>Descriptive phenomenological. Two face to face interviews during the first three years postpartum. <i>N</i> = 12 Age Range 27 – 43 (<i>M</i> 33.33, <i>SD</i> 4.98) Marital status 100% married Ethnicity 100% White Religion NR Education/employment 17% some college, 50% college degree, 33 graduate degree Conception 100% planned</p>	<p>Main theme: Lingering Identity as Infertile Participants described lingering self-concepts as infertile, despite becoming mothers. Subtheme Feeling unprepared for the role of mother Participants linked their infertility to feeling unprepared for motherhood because of anxiety related to losing the pregnancy. However, participants embraced the lingering self-concepts as positive. Infertility was part of their self-concepts that did not go away. Main theme: Gratitude for the gift of motherhood Participants described delivering their infants as euphoric; their infertile self-concepts made them feel more gratitude. Subtheme Needing to be the perfect mother. Infertile self-concepts were linked with self-imposed breast feeding demands. As unnatural methods were used for conception participants wished to use natural methods postpartum.</p>
Randell (1993)	<p>Constant comparative. Semi-structured interviews around 13 weeks pregnant. <i>N</i> = 18 Age: Range 30 – 42 (<i>M</i> 34) Marital status: 100% married Ethnicity: 100% Caucasian Religion: NR Education/employment: 35% college degree, 58% graduate degree, 23% not reported. 84% employed Conception: 94% planned</p>	<p>Main theme: Balancing Brought the long-held view of the self as not pregnant into harmony with the pregnant self. Subthemes Unreal Lack of physical pregnancy signs leads to a dissonance between expectations and reality. Ambivalent Participants past wish to not be pregnant led to the inability to see themselves as pregnant. Labile Self-concept change was associated with emotional liability and increased vulnerability. Participants feared the loss of their future self-concepts. Fluctuation between disbelief and reality Past self-concepts competed with the pregnant self-concepts. Participants feared the pregnancy not lasting and the non-pregnant self-concepts triumphing. Main theme: Buffering Participants pre-pregnant self-concepts did not hold maternal values. Buffering helped find a way for mothering self-concepts to co-exist with pre-pregnant self-concepts. Subthemes Responsible/irresponsible The contradiction between the need to be responsible and the urge to be self-centered formed a core dichotomy between self-concepts as not mothers and as potentially mothers. Real me The pre-pregnant and pregnant self-concepts remained separate, to accept the pregnant self-concepts meant giving up the past self.</p>

Seibold (2004)	<p>Exploratory descriptive pilot. Two face-to face semi-structured interviews at 25 weeks pregnant and seven weeks postpartum, followed by a telephone interview six month postpartum.</p> <p><i>N</i> = 5</p> <p>Age Range 17- 23 (<i>M NR</i>)</p> <p>Marital status: 20% partnered, 80% single</p> <p>Ethnicity NR</p> <p>Religion: NR</p> <p>Education/employment: 40% students, 40% employed, 20% unemployed.</p> <p>Conception: 100% unplanned</p>	<p>Main theme: Discourses of pregnancy</p> <p>Subthemes</p> <p>Constructing and maintaining identity Preparing for and engaging in motherhood whilst retaining their old self-concepts. The pregnancies were not at an optimum time, however participants did not see becoming a mother as the end of their previous self-concepts, e.g. in terms of their careers. Participants described how pregnancy changed them in a positive way, feeling like they had grown into adults.</p> <p>Adjusting to pregnancy and impending motherhood Adjusting to pregnancy and the new self-concept was facilitated by support from others, especially family members and mothers.</p> <p>Responding to bodily changes Bodily changes represented the growing baby ensuring its presence was felt.</p>
Smith (1991)	<p>IPA case study. Interviews at three, six, nine months pregnant and five months postpartum. Diary kept throughout.</p> <p><i>N</i> = 1</p> <p>Age 29</p> <p>Marital status Married</p> <p>Ethnicity NR</p> <p>Religion NR</p> <p>Education/employment: Employed</p> <p>Conception: Planned</p>	<p>Main theme: The interpersonal construct of identities</p> <p>Subthemes</p> <p>Self in relation to others Self-concept developed in relation to key others during pregnancy.</p> <p>Towards childbirth: Changing roles As birth approaches self-concept changes, she is one person, but also two (incorporating the unborn child) and three (incorporating her husband).</p> <p>Through the transition: Continuity and discontinuity of self Postpartum the participant highlighted the importance of maintaining her individual self-concept, in order to care for her child. However, she cannot ever separate herself entirely from her child. The importance of autonomy comes from how stretched her self-concept became during pregnancy and early postpartum. Self-concept is both the same and different from before.</p>
Weaver and Ussher (1997)	<p>Discourse analysis. A semi-structured interview one to three years' postpartum.</p> <p><i>N</i> = 13</p> <p>Age Range 26 – 34 (<i>M NR</i>)</p> <p>Marital status:</p>	<p>Main theme: Real me</p> <p>Participants were contradictory in describing their self-concepts, sometimes highlighting they had not changed then describing they had. When change was recognised, core self-concepts remained. Participants described circumstances had changed around them, highlighting that changes to their self-concepts were a result of others perceptions. Some participants</p>

100% married
Ethnicity:
100% White British
Religion:
NR
Education/employment:
Employed
Conception:
NR

experienced conflict between their self-concepts and the changes that had occurred in their lives. Maintaining their self-concepts throughout motherhood was difficult.

Note. NR = not reported

Table 4. *Mixed method design, participant characteristics and findings*

Study reference	Design and participant characteristics	Changes in self-concept					Qualitative themes related to self-concept
Smith (1990)	Qualitative and repertory grid. Grids and interviews at three, six, nine months pregnant and five months postpartum <i>N</i> = 1 Age: 29 Marital status: Married Ethnicity: NR Religion: NR Education/employment: Employed Conception: Planned	Changes in ratings of self ^a Construct	3 months	6 months	9 months	Post partum	Contrast
		1) Responds to pressure	5	3	3	3	Free from social pressure
		2) Control of responsibility	8	7	3	0	Constant responsibility
		3) Resilient	8	8	7	8	Less resilient
		4) Can laugh at self	8	8	7	9	Inability to laugh at self
		5) Indecisive	8	3	3	2	Decisive
		6) Progressive	8	7	7	6	Traditional
		7) Sees ambiguities	9	7	5	7	Sees things in black and white
		8) Money tied up	3	3	4	8	Comfortably off
		Correlations					
		Constructs					
		Three months pregnant					
		Positive; <i>p</i> < .05 between 1 and 4/6, 2 and 8, 4 and 6.					
		Negative; <i>p</i> < .05 between 5 and 7.					
		Six months pregnant					
		Positive; <i>p</i> < .01 between 1 and 3, 3 and 4/6, 4 and 6, <i>p</i> < .05 between 1 and 4/6, 3 and 5.					
		Nine months pregnant					
		Positive; <i>p</i> < .01 between 1 and 3/4/6, 3 and 4/6, 4 and 6, <i>p</i> < .05 between 1 and 5, 2 and 8, 3 and 5, 5 and 6.					
		Postpartum					
		Positive; <i>p</i> < .01 between 1 and 3/4, 2 and 8, 3 and 4/6, 4 and 6, <i>p</i> < .05 between 1 and 6, 6 and 7.					
		Three months' retrospective ^b					
		Positive; <i>p</i> < .01 between 1 and 3/4, 3 and 4/6, <i>p</i> < .05 between 1 and 6, 6 and 7.					
		Negative; <i>p</i> < .05 between 5 and 7.					
		Nine months' retrospective ^b					
		Positive; <i>p</i> < .01 between 1 and 3, 3 and 4/6, 4 and 6, <i>p</i> < .05 between 1 and 4/6.					
		Elements					
		1) Me on my own		2) Me at a meal		3) Myself at 12	
		4) My ideal self		5) Me as I expect to be in one year		6) My mother	
		7) My father		8) My partner		9) Somebody I dislike	
		Three months pregnant					
		Positive; <i>p</i> < .05 between 1 and 2, 4 and 8.					

6 months pregnant
 Positive; $p < .01$ between 1 and 2/4, 2 and 4, $p < .05$ between 4 and 6/8, 7 and 9.
 Negative; $p < .05$, between 2 and 7, 7 and 8.

9 months pregnant
 Positive; $p < .01$ between 1 and 2/8, 2 and 4/6/8, 4 and 6, $p < .05$ between 1 and 4, 3 and 9.
 Negative; $p < .05$ between 4 and 9.

Postpartum
 Positive; $p < .01$ between 1 and 1, 1 and 4, 2 and 8, 3 and 4, 3 and 6, 4 and 6, $p < .05$ between 1 and 6, 6 and 7.

Three months' retrospective ^b
 Positive; $p < .01$ between 1 and 3, 1 and 4, 3 and 4, 3 and 6, $p < .05$ between 1 and 6, 6 and 7.
 Negative; $p < .05$ between 5 and 7.

Nine months' retrospective ^b
 Positive; $p < .01$, between 1 and 3, 3 and 4, 3 and 6, 4 and 6, $p < .05$ between 1 and 6, 1 and 4.

Element relations with self (correlations with element 1 over time)
 Strong convergence ($r > .7$) with 2, 4, 5, and 8. Convergence followed by divergence with 6
 No change with 7 and 9. Erratic convergence with 3.

Smith (1994)	IPA and repertory grid. Grids and interviews at three, six, nine months pregnant and five months postpartum $N = 4$ Age: Range 25 – 29 (M NR) Marital status: 100% partnered Ethnicity: NR Religion: NR Education/employment: Employed Conception: NR	Correlations Constructs (participant 2) 1) inward/inner self 2) unknown 3) open 4) has humour 5) self-confident 6) patience 7) care free 8) mature Three months pregnant Positive; $p < .05$ between 1 and 4, 2 and 8, 3 and 4, 5 and 6. Negative; $p < .05$ between 7 and 8. Postpartum Positive; $p < .05$ between 1 and 3/6, 3 and 4/5/6/7/8, 4 and 5/6/7/8, 5 and 6, 6 and 7/8, 7 and 8. Three months' retrospective ^b Positive; $p < .05$ between 1 and 3/4/5/6, 3 and 4/5/6, 4 and 5/6, 5 and 6.	Reconstructing narratives of pregnancy Self-concepts different postpartum compared to pregnancy. The self-postpartum looked like the self-prior to pregnancy and this signified that inside participants were the same person. During pregnancy participants developed different self-concepts. See Smith (1991) for other themes.
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Smith (1999)	IPA and repertory grid. Grids and interviews at three, six, nine months pregnant and five months postpartum <i>N</i> = 4 Age: Range 25 – 29 (<i>M NR</i>) Marital status: 100% partnered Ethnicity: NR Religion: NR Education/employment: Employed Conception: NR	Data in graphical form, therefore information could not be extracted.	Middle pregnancy Participants withdrew from work and became closer to family. These changes facilitated psychological preparation and led to self- concept changes, due to intense convergence with others. Late pregnancy One participant voiced that leaving work led to that part of her self-concept being taken away. She felt less confident about who she was, and what she had to offer. Model of changing self-concept: Pregnancy is a time of adjustment which can lead to self-reflection. Facilitates psychological preparation and the focus to shift from the public to the family world. These circumstances influence the way a woman conceptualises herself, facilitating the discovery of her mother role. See Smith (1991) for other themes.
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Note: ^aMeasured on a 0-10 scale, higher scores represent convergence with the construct variable. ^bParticipants were asked postpartum to report what they thoughts their responses were during pregnancy. NR = *not reported*

Does Becoming a Mother Lead to Changes in a Woman's Self-Concept?

Of the studies included in this review, 15 reported changes in self-concepts, significant differences amongst pregnant and non-pregnant groups, or changes amongst particular participants, the exception being Lineberger (1987). However, the changes or differences reported within the other 15 studies are not consistent, and neither is the quality.

In the quantitative papers, one relatively poor study (Alpers, 1998) highlighted SCC was elevated in comparison to the normal population (although it was not stated if these differences were significant) and one high quality study (Ruble et al., 1990) highlighted that SCC increased throughout pregnancy and postpartum. However, Mercer (1986), in their robust study, found SCC reduced for participants over 30 years old. Another relatively robust study, Curry (1982) reported an increase in SCC for some participants and a decrease for others (it was also not reported if these changes were significant). Deutsch et al. (1988) did not report any information on purely self-concept change.

The qualitative and mixed method studies, which vary from very high quality to very poor quality, share a consistent theme of altered self-concepts whilst maintaining a sense of the previous self (Bailey, 1999; Randell, 1993; Seibold, 2004; Smith, 1990, 1991, 1994, 1999; Weaver & Ussher, 1997). However, in Keating-Lefler and Wilson (2004) there is a strong theme of loss of self-concepts throughout pregnancy, and a complete reformulation of new self-concepts postpartum.

Regardless of the quality of the study, there is a suggestion that a women's self-concepts change as they become mothers, however changes experienced may be dissimilar.

Changes in Self-Concept Reported

Pregnancy only.

Lineberger (1987) in their high quality observational study, where participants were assigned to a parent education programme or control group, found no changes in SCC post intervention and comparatively to controls. The other two papers, (Bailey, 1999; Randell, 1993) differ in their findings. Bailey (1999) highlighted that becoming pregnant was positive for participants self-concepts, whilst (Randell, 1993) found the period was associated with competing identities; where the pre-pregnancy self-concepts competed with the pregnant self-concepts. Interestingly Bailey

(1999) found that becoming a mother was about progress. Pregnancy was seen as a period of introspection, and participants felt becoming a mother brought them level with other adults. The competing self-concepts Randell (1993) describes led to a sense of dissonance; to accept the mothering self-concepts meant participants needed to discard the pre-pregnancy self-concepts, and therefore the two remained mutually exclusive. This dissonance led to fear for the loss of the pregnancy and mothering self-concepts, whilst also fear for the loss of the past self-concepts, which in turn led to increased emotionality and irritability.

Pregnancy and Postpartum.

The data surrounding change through the pregnancy and postpartum period is contradictory. Some studies indicated SCC increased over time (Ruble et al., 1990) or was elevated in comparison to females who were not mothers (Alpers, 1998). Whilst other studies showed an increase for some participants and a decrease for others (Curry, 1982). Mercer (1986) found that across all participants there was no change in SCC, however scores reduced for certain groups (see predictors). One study described self-concepts as being lost during pregnancy and new self-concepts developed (Keating-Lefler & Wilson, 2004). Conversely, the majority of studies highlighted that self-concepts became altered. This alteration was experienced as core self-concepts remaining intact, but new elements of the self being developed (Ladores & Aroian, 2015; Seibold, 2004; Smith, 1990, 1991, 1994, 1999; Weaver & Ussher, 1997). These contradictory findings do not seem to be dependent upon the quality of the studies.

Self-concept changes seem to occur in the context of other changes. Six studies, most of which were relatively good quality (Ladores & Aroian, 2015; Seibold, 2004; Smith, 1990, 1991, 1994, 1999), found that pregnancy focused on developing relationships with others (e.g. partner and child), and self-concepts adapt to incorporate them. Weaver and Ussher (1997), in their robust study, highlighted that self-concepts changed in relation to others perceptions. In several studies, pregnancy was seen as a time of preparation prior to birth, for example through seeking information from sources such as books (Deutsch et al., 1988), antenatal classes, parents or midwives (Seibold, 2004). Other preparations came in the form of changing priorities, with the focus facing inwards and away

from other commitments such as work (Keating-Lefler & Wilson, 2004; Smith, 1990, 1991, 1994, 1999). This preparation seemed to facilitate the reformulation of future plans. Later in pregnancy, and once the child is born, information is sought directly from the child (Deutsch et al., 1988) and priorities such as work may be reincorporated (Keating-Lefler & Wilson, 2004; Seibold, 2004; Smith, 1990, 1991, 1994, 1999).

Predictors of Self-Concept Changes

Given that some of the studies are cross-sectional, predictors of change cannot be directly inferred. Therefore, only data from prospective studies, or qualitative studies which consider predictors, are discussed.

Age.

Mercer (1986) found that mean SCC for participants aged 20 - 42 decreased significantly from three days to eight months postpartum, whilst approximately 30% of participants experienced an increase. Older women were found to experience similar fragmentation of self-concept, as younger women (Randell, 1993; Seibold, 2004). Given that all these studies are relatively high quality (Mercer, 1986; Randell, 1993; Seibold, 2004), age may not predict self-concept change.

Information seeking.

Three relatively good quality studies investigated information seeking (Deutsch et al., 1988; Lineberger, 1987; Seibold, 2004). Seibold (2004) found information was actively sought in preparation for motherhood, and this paralleled self-concept changes. Whilst Deutsch et al. (1988) found that information seeking predicted SCC during pregnancy. However, Lineberger (1987) did not find any differences between pregnant participants that attended a parent education programme or control group. Information seeking may influence self-concepts, but only during pregnancy. Also, it could be that more information is sought about the mothering role, as a consequence of changes to self-concepts.

Conception.

Studies where pregnancy was unplanned (Keating-Lefler & Wilson, 2004; Seibold, 2004) differed in changes in self-concepts. Where pregnancy was planned, the participants in Ladores and

Aroian (2015) were previously infertile and longed for children, whilst those in Randell (1993) had spent much of their lives not wishing for a child. Both struggled initially to accept their new self-concepts, taking their old self-concepts with them. The studies where self-concepts became altered (Ladores & Aroian, 2015; Randell, 1993; Seibold, 2004), rather than changed (Keating-Lefler & Wilson, 2004) are of higher quality, indicating that planning of pregnancy does not predict self-concept changes.

Relationships.

Deutsch et al. (1988) found that self-concepts were predicted by relationships with women's own mothers during pregnancy, with those who felt supported by their mothers having higher SCC. Seibold (2004) highlighted that mothers were used as important sources of information, that shaped self-concepts. Smith (1990, 1991, 1994, 1999) highlighted self-concepts changed to incorporate others, for example the unborn child. However, skin to skin contact during the early hours postpartum did not predict SCC three months postpartum (Curry, 1982). SCC was higher amongst married women (Mercer, 1986), whilst those not in relationships experienced the most disruption (Keating-Lefler & Wilson, 2004). Previous experiences with children were found to predict SCC, as was the temperament of the child (Deutsch et al., 1988). Submerging the self in the mother role facilitated incorporating motherhood into self-concepts (Keating-Lefler & Wilson, 2004). Two studies highlighted that external bodily changes evident to others related to self-concept changes (Bailey, 1999; Seibold, 2004) and displayed the developing relationship with the child. Given that all the studies, apart from Keating-Lefler and Wilson (2004); Smith (1990), are of relatively high quality we can infer that relationships predict self-concept changes. However, specific interventions may be less important than wider relational systems.

Self-worth.

It was found that participants who actively chose their mothering self-concepts increased their self-worth (Bailey, 1999; Seibold, 2004). Additionally, feeling competent (Mercer, 1986; Ruble et al., 1990) predicted SCC. Increasing self-esteem also facilitated the development of a new self-concepts

(Keating-Lefler & Wilson, 2004). Regardless of the quality of the study findings are consistent, suggesting self-worth and self-concept may be parallel processes.

Social economic status and work.

Of women with similar social-economic status (SES), those who experienced greater challenges, e.g. losses, experienced more self-concept disruption (Keating-Lefler & Wilson, 2004) compared with those with fewer challenges (Seibold, 2004). Women who valued work as part of their self-concepts found pregnancy challenged this (Bailey, 1999; Keating-Lefler & Wilson, 2004; Seibold, 2004; Smith, 1999). Given that Keating-Lefler and Wilson (2004) is comparably poor quality, we cannot make inferences surrounding SES as a predictor of self-concept change. However, women who value work may be more likely to experience self-concept disruption.

Discussion

This review aimed to establish if women's self-concepts do change as they become mothers, to explore what changes are experienced and to establish if there are predictors of changes. Findings indicate that self-concepts change when women become mothers. However, the changes experienced vary. Self-concepts become altered, with core self-concepts remaining intact. Findings suggest that past self-concepts compete with (Ladores & Aroian, 2015; Randell, 1993) or exist alongside (Seibold, 2004; Smith, 1990, 1991, 1994, 1999) new self-concepts. This alteration is experienced positively, for example where SCC increases (Ruble et al., 1990), or when changes are welcomed (Bailey, 1999; Seibold, 2004). Whilst it can be challenging when experienced in the context of difficult life events (Keating-Lefler & Wilson, 2004), changes can be experienced both positively and negatively by individuals (Ladores & Aroian, 2015), highlighting the process as complex and varied. Changes seem to facilitate the development of new elements of self-concepts, for example in terms of incorporating the child and important others (Smith, 1990, 1991, 1994, 1999), investing in the role of mother (Keating-Lefler & Wilson, 2004; Seibold, 2004) or stepping away from past priorities (Bailey, 1999). Later, elements of self-concepts that used to be important, for example work, are reincorporated. It appears there is a process of reprioritisation.

This reprioritisation corresponds with the dynamic self-concept (Markus & Wurf, 1987). The finding that self-concepts become altered indicates that there may be some changes to self-representations, for example in terms of schemas or scripts. This is known to occur following traumatic life events (Janoff-Bulman, 1989), and has been suggested to occur following becoming a mother (Taubman-Ben-Ari, 2014). As theorised, it seems that the intra and inter-personal and social circumstance changes facilitate, or are facilitated by, changes to the working self-concept. Past elements of self-concepts being reincorporated indicates that they were always present, but not accessible in the working self-concept.

Few predictors of self-concept change have been identified, but there are consistent themes, which also correspond to the dynamic self-concept (Markus & Wurf, 1987). Information-seeking is pertinent to the information processing element of intra-personal behaviour, whilst the importance of

relationships corresponds with inter-personal behaviour. Self-concepts developing in parallel with self-worth is consistent with previous research (Campbell, 1990), which corresponds with the theory that self-concepts are one part of the reciprocal affect-cognitive system.

Strengths of the Studies

Thirteen of the 16 included studies received an overall quality rating of 75% or above, indicating that the studies are acceptable. All the studies had clear research questions, collected relevant data and clearly stated the number of participants and methodology used. It is a strength that the data were collected over four subsequent decades, and in many different countries, and consistent themes were found. Additionally, as data were collected from early conception (13 weeks) to late postpartum (three years), information across the transition to motherhood could be synthesised. The use of validated outcome measure in the quantitative papers, and theory driven methods in the qualitative studies, also lends validity to the findings.

Limitations of the Studies

Not all studies gave full and clear demographic information, which limited the ability for predictors to be assessed. Where it is reported, the majority of participants were White or Caucasian. One study indicated SCC was higher among Caucasian's in comparison to other ethnic groups (Mercer, 1986), however SCC is higher among African-American compared to Caucasian-American children (Singh, Chang, & Dika, 2010). Therefore, the information surrounding ethnic differences is unclear. Additionally, the majority of the studies took place in the United States. Culturally the attitude towards becoming a mother is different in comparison to the UK and Australia, let alone across more varied ethnic groups which potentially limits the applicability of the results.

The sample sizes of the studies varied, from 715 (Ruble et al., 1990) to two case studies (Smith, 1990, 1991). The studies with smaller samples were qualitative or mixed methods, therefore the findings need to be treated with caution as both the sizes of the samples and the methods indicate lack of generalisability. Four of the studies (Smith, 1990, 1991, 1994, 1999) had the same participants and similar subsequent findings and so should be collapsed and considered as a single small study.

Within specific papers it is not clear if results are reliable. Alpers (1998) found SCC to be higher amongst pregnant and parenting teens in comparison to a normative group. However, details were given surrounding the normative population. The only study that did not report any significant results was Lineberger (1987). This intervention study took measures only six weeks apart, possibly accounting for the lack of significance. Amongst the quantitative and mixed method papers a variety of measures of self-concept were used. These scales may not be comparable, and possibly are not accessing the working self-concept, as we would hope. Finally, as the majority of the studies were not prospective designs we can only infer change (e.g. in comparison to normative groups).

Strengths of this Review

Throughout the paper selection and quality assessment stages, two reviewers were used. This method reduces selection bias and human error. The mixed-method approach allowed a variety of data sources and information to be used. The variety of methodologies allowed for a richness of data, that may not have been found within a purely quantitative review.

Limitations of this Review

Despite attempts being made to synthesise the mixed-methods data in a clear and coherent way, this is a challenge due to varying information, sample sizes and methods. Due to the different types of studies included it is difficult to give appropriate weighting to individual studies, as would take place in a meta-analysis. Although a quality assessment measure was used, this itself has many limitations, for example it does not consider participant numbers and power in detail. Therefore, this may have skewed the quality rating attributed to each of the studies. Additionally, the quality ratings may be problematic, as studies may be given an overall high score whilst having substantial limitations in a particular area. For example, Deutsch et al. (1988) scored 75% however the measures were not deemed appropriate.

Despite use of a definition of self-concept, the selection of papers based on this criterion was problematic. Given that self-concept is referred to in different ways throughout the literature there is a possibility, despite extensive searches, that relevant papers may have been missed during initial

search stages. However, few papers were identified via searching reference lists, which suggests that this is not likely to have been a problem.

The review questions may not have been fully answered. It was indicated that participants retrospective accounts of self-concepts differed in comparison to contemporaneous accounts (Smith, 1990, 1994). Recent studies have found that participants with elevated SCC are less likely to scrutinise autobiographical memories than those with disrupted self-concepts (Berna et al., 2016). This seems to correspond with the dynamic self-concept (Markus & Wurf, 1987), as only certain autobiographic information that corresponds with the working self-concept may be accessible at one time. If self-concepts are disrupted this may inhibit the ability to organise past information. Therefore, some of the findings in this review may be representative of retrospective sense making, rather than actual changes to self-concepts.

Implications and Future Research

Expectations on western women in the transition to motherhood are substantial. For example, in terms of maintaining their working (possibly professional) life whilst being a new mother. Maintaining roles, which may clash, during this phase of changing self-concept may account for the relatively high levels of depression and anxiety in this population (Heron et al., 2004). Especially as self-concept disruption has been associated with psychological difficulties, such as psychotic-like experiences (Cicero et al., 2013), anxiety and depression (Higgins, Klein, & Strauman, 1985). Given that rates of breast-feeding are higher amongst women with elevated SCC (Britton & Britton, 2008), it seems change could also influence the child and the attachment relationship.

Studies that investigate both contemporaneous and retrospective changes would be recommended. This would provide further information regarding the process of self-concept changes. Larger studies with prospective designs following women from conception through to postpartum, with participants from a variety of backgrounds may provide more representative data. Longitudinal studies of self-concept change in mothers would allow exploration of the role of change in life circumstances, and if change in self-concepts predicts mental health difficulties. Finally, exploring the implications for the child and attachment relationship would be pertinent.

Conclusion

There is substantial evidence to suggest that women's self-concepts change when they become mothers. Although these changes may be experienced differently for each woman, it seems that they correspond to the dynamic self-concept (Markus & Wurf, 1987). Therefore, change corresponds to social circumstance and both intra and inter personal processes, and parallels a period of re-prioritisation. The implications of such changes are yet to be understood, studies investigating this are recommended.

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The Role of Birth Experiences, Trauma Responses and Self- Concept in Postpartum Psychotic-Like experiences

Chapter 2: Empirical Paper

Lyndsey Holt

For submission to Archives of Women's Mental Health (Author Guidelines in Appendix A)

Abstract

The frequency of psychotic-like experiences (PLEs) amongst new mothers is beginning to be explored; the mechanisms underlying such experiences are yet to be understood. First time mothers ($N = 10,000$) receiving maternity care via the NHS were contacted postnatally via *Emma's Diary*, an online resource for mothers. Measures assessed birth experience, trauma appraisals, post-traumatic stress symptoms, adjustment to motherhood, self-concept clarity and PLEs (in the form of hallucination and delusion proneness). There was a 13.93% response rate ($N = 1,393$) and 1,303 participants reported experiencing at least one PLE (93.58%). Three competing nested path models were analysed. A more difficult birth experience directly predicted delusional proneness, but not hallucination proneness. Post-traumatic stress symptoms directly predicted the occurrence of all PLEs. Trauma appraisals and adjustment to motherhood indirectly predicted PLEs, via self-concept clarity. PLEs in first time mothers seem to be more common than previously thought and may cause distress. There are multiple direct and indirect pathways that predicted the occurrence of PLEs, with self-concept clarity being an important predictor not previously recognised. Recognising factors that may influence the development of PLEs in new mothers may be helpful in postnatal care, as would public health interventions aimed at reducing the stigma surrounding such experiences.

Keywords: Psychosis, postnatal, trauma, self-concept, adjustment.

Introduction

The transition to becoming a mother is a risk period for a number of psychological difficulties, including postnatal depression (Evans et al. 2001) and anxiety (Wenzel et al. 2005). Until recently, experiences of postnatal psychosis have been thought to be extremely rare, with just one to two in every thousand women being diagnosed with postpartum psychosis (Valdimarsdóttir et al. 2009). However, it seems that the occurrence of psychotic-like experiences (PLEs), experiences similar to psychosis but in a diminished form that do not reach a clinical level (Cicero et al. 2013), are more common (Mannion and Slade 2014). The mechanisms underlying such experiences are yet to be understood; doing so may enable us understand how to support women during this critical life stage.

The continuity hypotheses for psychosis (Johns and Van Os 2001) postulates that psychosis exists on a spectrum within the population, from no psychotic experiences or symptoms through to clinical levels of psychosis. In other words the vast majority of people on this spectrum do not require clinical input, although longitudinal studies indicate that people who have experienced PLEs may be more at risk of experiencing a clinical episode of psychosis (Poulton et al. 2000). Given that it is estimated around five percent of the population will experience PLEs in their lifetime (Van Os et al. 2009), attempts have been made to understand the development of PLEs and clinical levels of psychosis, and what may cause a transition from PLEs to psychosis. Those experiencing clinical levels of psychosis have been found to have higher levels of social adversity and lower psychosocial functioning than people with PLEs (Peters et al. 2016). A variety of childhood traumas are associated with PLEs and psychosis in adulthood (Peters et al. 2016; Read et al. 2008; Varese et al. 2012b). Certain traumas are related to specific psychotic symptoms (Bentall et al. 2014) and these relationships seem to be mediated by a variety of factors including dissociation (Varese et al. 2012a), attachment style (Sitko et al. 2014) and maternal communication (de Sousa et al. 2013). A further potential mediating factor is self-concept clarity (SCC). This is the extent to which a person's beliefs about themselves are well-defined, confidently held, internally coherent, stable and cognitively accessible (Campbell et al. 1996). SCC has been found to be reduced in people with a diagnosis of schizophrenia (Cicero et al. 2015) and in those vulnerable to PLEs (Cicero et al. 2013). This is also the case for those with early episode psychosis, where SCC mediates the relationship between childhood traumas and psychosis (Evans et al. 2015).

Given that PLEs and psychosis can be regarded as being on the same continuum (Van Os et al. 2009), the implication is that difficult life events and low SCC play key roles in the development of both PLEs and psychosis.

Relevance to new mothers

Two studies suggest that PLEs may occur in mothers as result of childbirth (Barratt 2012; Mannion and Slade 2014). Despite childbirth being a normal life event for many women, almost half of women experience birth as traumatic (O'Donovan et al. 2014), and between three and 15 percent meet the criteria for post-traumatic stress disorder (PTSD) (Ayers et al. 2016; Grekin and O'Hara 2014). Women meeting criteria for PTSD postpartum are five times more likely to have experienced childhood sexual abuse (Wosu et al. 2015). There is evidence to suggest that childbirth can be seen to re-traumatise women who have these difficult life experiences (Daphna-Tekoaha et al. 2015). Both fearful birth experiences (Mannion and Slade 2014) and a traumatic birth (Barratt 2012) seem to be associated with increased risk of PLEs. Given that birth can be experienced as traumatic and lead to post-traumatic stress symptoms (PTSS) and becoming a mother entails substantial life adjustments, which in turn may affect self-concept (Holt 2016), the occurrence of PLEs might be further investigated in this group.

This study aimed to further understand the relevance and relationships between birth experience and trauma, adjustment to motherhood, SCC and PLEs in first time mothers. Specifically, we aimed to test three competing hypotheses (see figure 1). Each model hypothesised that birth experience would directly predict the occurrence of PLEs, as has been found previously (Mannion and Slade 2014). We hypothesised that birth experience would predict trauma appraisals, PTSS and adjustment to motherhood; birth experiences has been found to predict PTSS (Edworthy et al. 2008), trauma appraisals and PTSS are associated (Ehlers and Clark 2000), whilst the relationship between birth experience and adjustment to motherhood is yet to be established. We also hypothesized that trauma appraisals, PTSS and adjustment to motherhood would in turn predict SCC, as they are part of the cognitive affect system that corresponds to self-concept (Holt 2016; Markus and Wurf 1987). SCC would then predict PLEs, in accordance with the general psychosis literature (Cicero et al. 2013). As the association between PTSS and PLEs has been established (Alsawy 2015; Hamner 1999) we

included this relationship throughout the models. However, we were uncertain whether both trauma appraisals and adjustment to motherhood would directly predict PLEs, therefore these paths were removed in two of the models. We also wished to test whether birth experience directly predicted SCC in one of the models, as this relationship is yet to be established.

Therefore, our predictions within each of the models were:

- 1) (a) birth experience, trauma appraisals, PTSS, adjustment to motherhood and SCC would significantly predict the occurrence of PLEs.
(b) PTSS, trauma appraisals and adjustment to motherhood would mediate the relationship between (i) birth experience and SCC (ii) birth experience and PLEs.
(c) the relationships between trauma appraisals, PTSS, adjustment to motherhood and PLEs would be mediated by SCC.
- 2) (a) birth experience, PTSS and SCC would significantly predict the occurrence of PLEs. However, trauma appraisals and adjustment to motherhood would not
(b) PTSS, trauma appraisals and adjustment to motherhood would mediate the relationship between birth experience and SCC. Only PTSS would mediate the relationship between birth experience and PLEs.
(c) the relationships between birth experience trauma appraisals, PTSS, adjustment to motherhood and PLEs would be mediated by SCC.
- 3) (a) birth experience, PTSS and SCC would significantly predict the occurrence of PLEs. However, trauma appraisals and adjustment to motherhood would not
(b) trauma appraisals, PTSS and adjustment to motherhood would mediate the relationship between birth experience and SCC. Only PTSS would mediate the relationship between birth experience and PLEs.
(c) the relationships between trauma appraisals, PTSS, adjustment to motherhood and PLEs would be mediated by SCC.

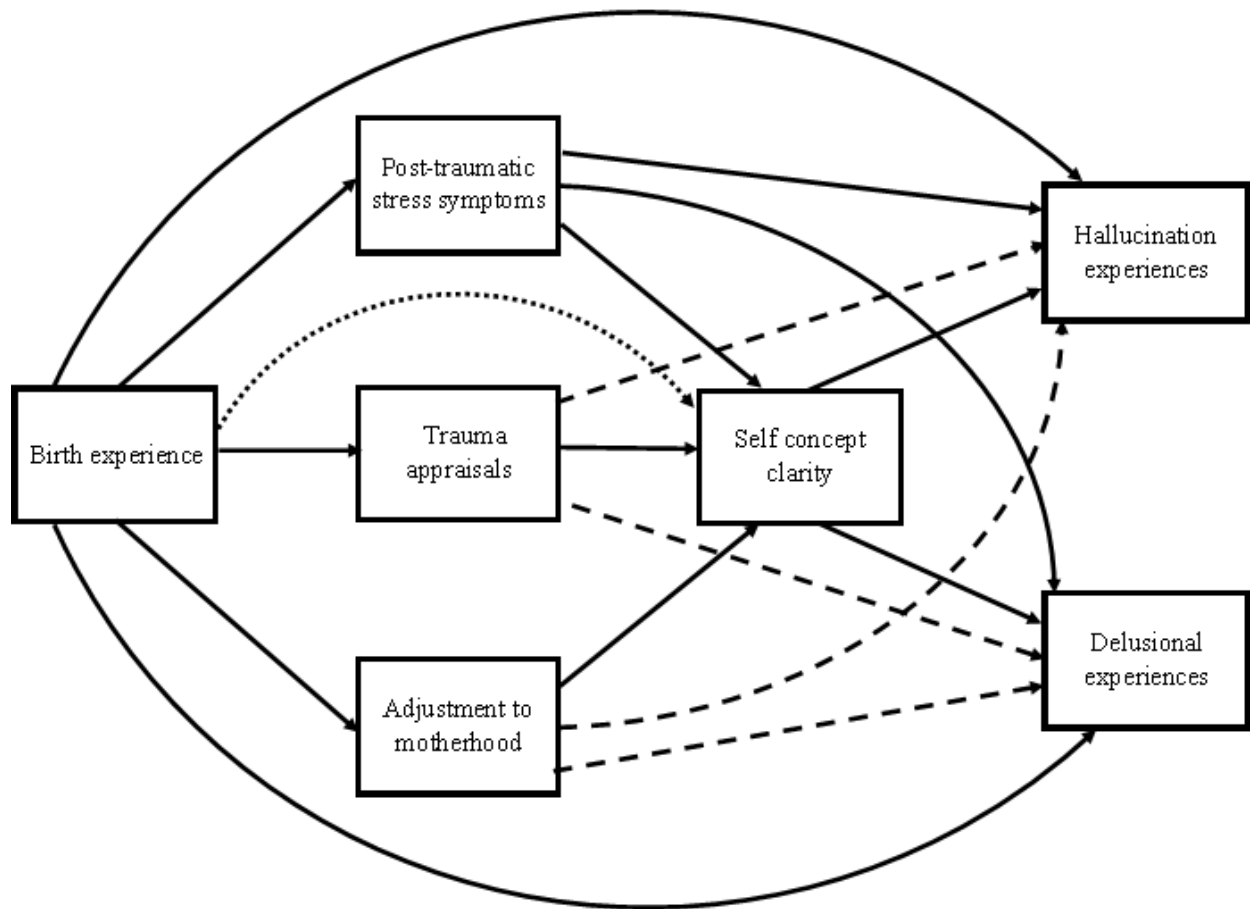


Figure 1 Three nested competing path models exploring the relationship between birth experience and psychotic like experiences (hallucination and delusional experiences) through two stages of mediating variables (i) trauma appraisals, post-traumatic stress symptoms and adjustment to motherhood (ii) self-concept clarity

- — — — Pathways included in Model 1 only
- Pathway included in Model 2 only
- Pathways included in Model 1, 2 and 3

Method

Participants

Women aged 16 – 50 and proficient in English, who gave birth to their first child two to six months prior to recruitment, were included. Participants who disclosed a history of psychosis or having had input from a perinatal mental health team were excluded. We aimed to understand the mechanisms underlying PLEs in the general population of first time mothers; these criteria minimised the risk of including women with prior experience of psychosis, or other serious enduring mental health problems, requiring clinical input.

Procedure

Ethical approval was granted by The University of Liverpool ethics committee prior to data collection. Recruitment took place via *Emma's Diary* (www.emmasdiary.co.uk), an online resource dedicated to mothers, which offers information surrounding pregnancy, birth and babies. It is standard practice for information about Emma's Diary to be supplied to pregnant women by their NHS general practitioner or midwife. Women who register with Emma's Diary are required to enter personal demographic information and have the option to choose to be involved in relevant research projects. An emailed invitation was sent to 10,000 website registrants who, according to Emma's Diary's database, met the inclusion criteria. Scales were administered via Qualtrics (www.qualtrics.com); 2,870 participants commenced the survey, 77 participants were excluded (35 past history of psychosis, 42 input from the perinatal mental health team, 9 both) and 1,400 did not complete the data set. 1,393 participants completed the survey (13.93% response rate), see Figure 2.

Participants were asked to retrospectively report on the first two months postpartum, apart from for questions on depressive symptoms (which we asked participants to report currently), as PLEs are expected to occur in the early months following childbirth. This enabled participants to accurately reflect on their experiences, and allowed us to gather data encompassing the theorised period of risk, which contemporaneous recruitment would not have allowed. Additionally, we were able to control for current levels of depression in the analysis. Participants had the opportunity to enter a prize draw for their time.

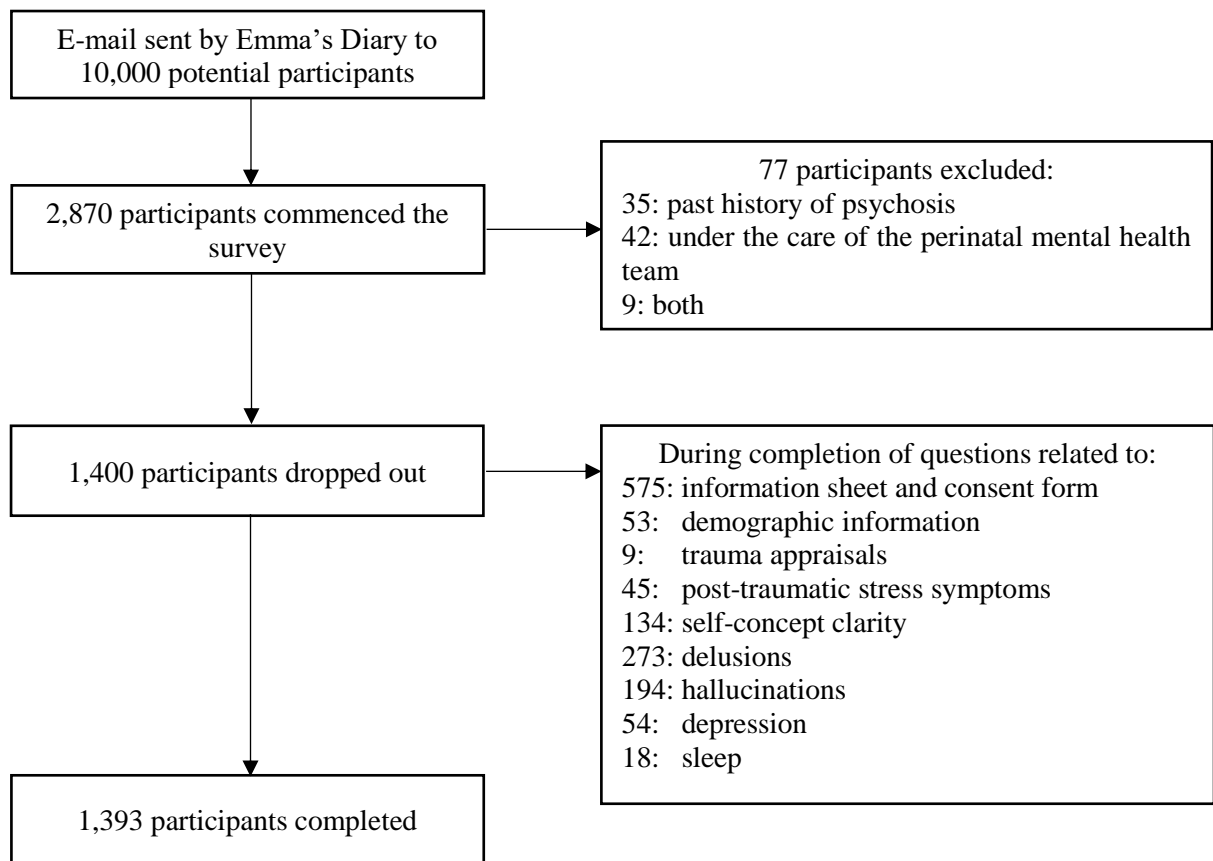


Figure 2 Participant recruitment flowchart

Measures

Demographic data

Demographic information including age, ethnicity, marital status, employment status, mode of birth, education level and number of babies delivered was collected.

Birth experience: The Wijma Delivery Experience Questionnaire (Version B; Wijma et al. 1998).

Participants answered 33 questions related to labour and delivery surrounding their experience, how they felt, what they felt, what happened and fantasies they had. Questions were on a 6-point Likert scale (e.g. 0 = *extremely fantastic*, 5 = *not at all fantastic*; 0 = *extremely safe*, 5 = *not at all safe*) and targeted cognitive appraisals of the birth experience, with higher scores indicating higher fear. This scale demonstrated excellent internal consistency for this sample ($\alpha = .94$), and has been found to have excellent internal consistency ($\alpha = .92$) and split-half reliability ($r = .92$) in primiparous women five-weeks postpartum (Wijma et al. 1998).

Trauma appraisals

Appraisals of childbirth were measured through questions based upon the *The Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; DSM-IV-TR; American Psychiatric Association 2000). Participants were asked if at any time during childbirth they (a) thought that their or their babies' life was at risk or at risk of serious injury (a)(i) if so, was this for themselves, their baby or both of them (b) experienced intense fear, helplessness or horror. Responses were scored on a binary scale (0 = *no*, 1 = *yes*). The internal consistency was acceptable ($\alpha = .69$) for the present sample.

Post-traumatic stress symptoms: The Impact of Event Scale - Revised (Weiss 2007).

Widely used in trauma research with excellent internal consistency amongst Vietnam veterans, $\alpha = .93$ (Creamer et al. 2003), participants rated their responses to 22-items on a 5-point Likert scale (0 = *not at all*, 4 = *extremely*). Questions include "any reminder brought back feelings about it" and "pictures about it popped into my mind". Three subscales investigate arousal, intrusions and avoidance, with higher scores indicating higher symptoms. The scale showed excellent internal consistency ($\alpha = .93$) for the present sample.

Adjustment to motherhood: The Being a Mother Scale (BaM-13; Matthey 2011).

Participants answered 13 questions surrounding how they have experienced adjusting to being a mother, on a 4-point Likert scale (0 = *no, rarely or never*, 3 = *yes, most or all of the time*). The scale covers topics including social isolation, regret, coping and guilt. Three subscales explore the mothers experience of the child, her own experience and bonding. Questions included "I found it hard to cope when my baby cries" and "I worried I was not as good as other mothers"; higher scores indicate greater difficulty adjusting to motherhood. In a sample of mothers up to one year postpartum this scale has been found to have moderate test-retest reliability over six weeks ($r = .52$) and good internal consistency ($\alpha = .79$) (Matthey 2011). Good internal consistency ($\alpha = .87$) was found in the present sample.

Self-concept clarity: The Self-Concept Clarity Scale (Campbell et al. 1996)

Measured the extent to which participants' self-concepts were clear, confidently held, internally consistent, stable and cognitively accessible. Participants answered 12 questions on a 5-point Likert scale (1 = *strongly agree*, 5 = *strongly disagree*). Items include "my beliefs about myself often conflict

with one another” and “in general, I have a clear sense of who I am and what I am”, with higher scores indicating higher clarity. The scale showed excellent internal consistency in undergraduate students, $\alpha = .86$ (Campbell et al. 1996) and in the present sample, $\alpha = .90$.

Hallucination experiences: Launay Slade Hallucination Scale (LSHS; Launay and Slade 1981).

Participants answered 12 questions on a binary scale (0 = *false*, 1 = *true*). Questions included “I often hear a voice speaking my thoughts aloud” and “in the past I have heard the voice of god speaking to me”. The scale has four subscales; vivid thoughts, vivid day dreams, auditory hallucinations and visual hallucinations. It has been shown to have good internal consistency in non-clinical samples (KR 20 = .08; Lipp et al. 1994). We intended to use only the subscales auditory and visual hallucinations in the analysis, in order to identify only *pure* hallucinatory experiences (as opposed to other phenomena such as vivid day dreams). However, the reliability was inadequate ($\alpha = .28$). Therefore, the full scale was used, which showed acceptable internal reliability ($\alpha = .66$).

Delusional experiences: The 21-item Peters et al. Delusion Inventory (PDI-21; Peters et al. 2004)

Participants answered 21 questions on a binary scale (0 = *no*, 1 = *yes*). Questions included “do you ever feel as if there is a conspiracy against you” and “do your thoughts ever feel alien to you in some way”. If participants answer yes further questions were presented surrounding how distressing and intrusive the delusions are, along with how much they believe them to be true. Only data surrounding occurrence of delusional experiences was included in the analysis, however descriptive data on distress, intrusions and belief was included for discussion. The scale has been shown to have good internal consistency in non-clinical samples, $\alpha = .82$ (Peters et al. 2004), and in the present sample, $\alpha = .73$.

Depressive symptoms: The Edinburgh Postnatal Depression Scale (EPDS; Cox et al. 1987).

Participants answered 10 questions related to symptoms of depression on a 4-point Likert scale (0 = *no not at all*, 3 = *yes most of the time*). Questions included “I have felt sad or miserable” and “I have been so unhappy that I have been crying”. The scale is widely used and many validation studies have been undertaken (Eberhard-Gran et al. 2001), it also showed good internal consistency in the present sample, $\alpha = .86$.

Sleep: Pittsburgh Sleep Quality Index (PSQI; Buysse et al. 1989).

Participants answered a total of 18 questions relating to timings of sleep, problems with sleeping and impact of sleep difficulties. Questions were answered on a 4-point Likert scale (0 = *not at all*, 3 = *three or more times a week*) and in written text. This scale has been commonly used with postpartum women (Dorheim et al. 2009). The overall scale has a binary outcome (0 = *poor sleep*, 1 = *good sleep*). The scale showed good internal consistency, $\alpha = .76$.

Coding demographic data

The demographic data were simplified and recoded as appropriate. The variables were age, ethnicity (0 = *not White British*, 1 = *White British*), marital status (0 = *not married*, 1 = *married*), employment status (0 = *not employed*, 1 = *employed*), mode of birth (coded in terms of increasing intervention; 1 = *normal delivery*, 2 = *assisted delivery*, 3 = *caesarean section*) and education level (1 = *low education*, 2 = *mid education*, 3 = *high education*).

Data analysis

Descriptive and correlational analyses were undertaken in SPSS v. 21 (IBM Corporation., Armonk, NY, USA) and subsequent path analysis in AMOS v. 22 (IBM Corporation., Armonk, NY, USA). Path analyses were chosen to analyse the data as it allowed for: (i) estimation of direct and indirect (mediation) effects, (ii) multiple endogenous (dependent) variables to be modelled simultaneously, (iii) interdependence of endogenous variables to be accounted for (by correlating error terms), and (iv) analysis of several hypothesised models. Path analysis was chosen in preference to structural equation modelling (SEM) as we had mostly manifest variables, as opposed to multiple indicators of underlying latent constructs. In order to test the three competing path models, the regression weights on the paths not included in each model were constrained to zero. We controlled for variables that were expected to have significant relationships with the endogenous and exogenous variables in the path models: age, ethnicity, marital status, employment status, mode of birth, education levels, levels of depression and sleep difficulties. Although it would have been interesting to include the number of babies delivered as a covariate, this was not included as the number of twins were too small to allow for adequate data analysis.

As the data for both the outcome variables (hallucination and delusion experiences) were positively skewed, parametric assumptions were not met. Therefore bias-corrected bootstrapping was used, as recommended by Hayes and Scharkow (2013). This method produces robust confidence intervals and standard errors for both direct and indirect effects, and is a good alternative to traditional parametric methods (Zhu 1997). As recommended, 10,000 resamples were used (Mallinckrodt et al. 2006). To assess model fit the Bollen and Stine (1992) bootstrap adjusted p value was used in relation to the Chi-square statistic, along with the CFI and RMSEA. After the model was fitted, separate indirect effects via a single mediator were obtained separately, as this is not provided by default in AMOS. This was undertaken by constraining both the correlation between the alternative mediators, and path from the predictor to alternative mediators, to 0 (MacKinnon 2008).

Missing and incomplete data

Due to text input being used for certain questions on the PSQI (bed times, time taken to fall asleep and number of hour spent in bed) data surrounding sleep were missing for 223 participants. Other missing data were minimal (marital status only, see Table 1). To minimise data loss, the PSQI was recoded into three binary contrast variables (unknown sleep, poor sleep and good sleep). Only unknown sleep and good sleep were included in the path models, allowing poor sleep to be a reference category to which good sleep was compared.

Participants were informed via the information sheet that their data would not be used, should they not complete the data set. Therefore, we could not analyse the data of participants who dropped out of the study, or establish if there were any differences between the participants who completed or did not complete the data set.

Sample size and power

It is recommended that a minimum of 10 cases are used per parameter estimated (Kline 2015), therefore we aimed to recruit at least 670 participants. Given our recruitment method this was deemed appropriate.

Results

Participants

As can be seen in Table 1, the age of participants, marital status, ethnicity and mode of birth were comparable to normative data. However, the participants in the sample had higher rates of employment and higher levels of education than the general population.

Table 1 Participant characteristics

	Range	Mean (<i>SD</i>)	Normative mean
Age (years) ^a	16-48	28.9 (5.51)	28.3
		Total n (%)	%
Marital status ^b			
Married		732 (52.5)	53.0
Not married		661 (47.5)	47.0
Missing data		7 (0.50)	-
Educational attainment ^c			
Low education (no qualifications/GCSE's)		184 (13.2)	51.3
Mid education (A Levels/vocational qualifications)		500 (35.9)	21.6
High education (graduate/post graduate)		709 (50.9)	27.2
Pre pregnancy employment ^d			
Employed (full time/part time/self employed)		1263 (90.6)	69.1
Unemployed (out of work/voluntary work/student)		130 (9.4)	30.9
Ethnic origin ^e			
White		1254 (90)	87.1
Other		139 (10)	12.9
Number of babies delivered ^f			
Singleton		1357 (98.7)	99.99
Multiple		18 (1.3)	0.02
Mode of birth ^g			
Normal vaginal delivery		707 (50.8)	47.4
Assisted delivery (e.g. Kiwi, Forceps or Ventouse)		330 (23.7)	24.8
Cesarean section		356 (25.6)	27.8

N = 1393.

^{a, e, f} Data obtained from The Office of National Statistics (2013)

^{b, c} Data obtained from The Office of National Statistics (2011)

^d Data obtained from The Office of National Statistics (2016)

^g Data obtained from The National Perinatal Epidemiology Unit (2014)

Correlations and descriptive statistics

Prevalence of psychotic like experiences

Correlations are presented in Table 2, and descriptive data in Table 3. One thousand and eighty-five participants (77.9%) experienced at least one hallucination experience, whilst 1,217 participants experienced at least one delusion experience (87.4%). The average number of hallucination experiences reported were 2.2 (*SD* 2.04), whilst the average number of delusion experiences were 3.49 (*SD* 2.84). When looking at both hallucination and delusion proneness, 999 participants reported experiencing at least one hallucination and at least one delusion (71.7 %). In order to understand the distribution of PLEs as a whole, the scales were combined; a total of 1,303 participants experienced at least one PLE (93.58%). Distress, conviction and preoccupation associated with delusion experiences were higher than reported by Mannion and Slade (2014). Table 4 presents the items of the LSHS and PDI-21 in order of frequency of endorsement.

Inter-correlations

The number of hallucinations and delusions experienced were significantly correlated ($r = .52, p < .01$). The incidence of both hallucinations and delusions were significantly associated with a more fearful birth experience ($r = .22, p < .01$; $r = .24, p < .01$), appraising birth as traumatic ($r = .21, p < .01$; $r = .22, p < .05$), PTSS ($r = .39, p < .01$; $r = .42, p < .01$), difficulties adjusting to being a mother ($r = .30, p < .01$; $r = .36, p < .01$) and lower SCC ($r = -.40, p < .01$; $r = -.46, p < .01$). In terms of covariates, both hallucinations and delusion experiences were significantly correlated with depressive symptoms ($r = .38, p < .01$; $r = .46, p < .01$) and significantly negatively correlated with good sleep ($r = -.13, p < .01$; $r = -.15, p < .01$), age ($r = -.21, p < .01$; $r = -.20, p < .01$). Significant correlations were also found with marital status ($r = -.13, p < .01$; $r = -.07, p < .05$), employment status ($r = -.12, p < .01$; $r = -.17, p < .001$), and education ($r = -.12, p < .01$; $r = -.07, p < .05$), with incidence of PLEs increasing amongst participants who were not married, not employed or with lower educational attainment. Only delusion experiences were significantly correlated with ethnicity ($r = -.17, p < .001$), with higher delusional experiences being associated with participants who were not White.

Table 2 Inter-correlations of study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Birth experience	-													
2. Trauma appraisals	.64**	-												
3. Post-traumatic stress symptoms	.56**	.47**	-											
4. Adjustment to motherhood	.44**	.28**	.47**	-										
5. Self-concept clarity	-.37**	-.27**	-.41**	-.59**	-									
6. Hallucination experiences	.22**	.21**	.39**	.30**	-.40**	-								
7. Delusional experiences	.24**	.22**	.42**	.36**	-.46**	.52**	-							
8. Depression	.36**	.25**	.44**	.61**	-.63**	.38**	.46**	-						
9. Good sleep	-.22**	-.17**	-.26**	-.30**	.20**	-.13**	-.15**	-.29**	-					
10. Age	.02	-.04	-.06*	-.01	.19**	-.21**	-.20**	-.13**	-.11**	-				
11. Ethnicity	.01	.00	.01	.06*	-.13**	-.00	-.16**	-.03	.00	-.05	-			
12. Employment status	-.02	.00	-.07*	.01	.05*	-.12**	-.15**	-.08**	.00	.23**	.16**	-		
13. Birth method	.33**	.28**	.13**	.03	-.01	-.02	-.03	.03	-.07*	.22**	.00	.06*	-	
14. Marital Status	-.03	-.04	-.06*	.01	.13**	-.13**	-.09**	-.08**	-.03	.33**	-.16**	.11**	.04	-
15. Education	.02	.00	.02	.08**	.12**	-.12**	-.09**	-.06*	-.07*	.37**	-.15**	.11**	.03	.31**

N = 1393. Correlations represent Spearman's *r* or phi ($r\phi$) coefficients.

* $p < .05$; ** $p < .01$

Table 3 Descriptive statistics

Variable	Mean (<i>SD</i>)	Possible ranges of scores
Birth experience	54.25 (28.88)	0-149
Post-traumatic stress symptoms		
Arousal	0.65 (0.72)	0-4
Intrusion	0.62 (0.67)	0-4
Avoidance	0.77 (0.81)	0-4
Total score	14.98 (15.1)	0-88
Trauma appraisal	0.77 (0.85)	0-2
Adjustment to motherhood		
Child	6.03 (3.88)	0-18
Adult	4.60 (3.36)	0-15
Emotional closeness	0.57 (0.95)	0-6
Total score	11.2 (7.02)	0-39
Self-concept clarity	42.36 (9.52)	12-60
Hallucination experiences		
Auditory hallucinations	0.69 (0.84)	0-4
Visual hallucinations	0.04 (0.20)	0-1
Vivid thoughts	0.58 (0.78)	0-2
Vivid day dreams	0.46 (0.81)	0-3
Total score	2.20 (2.03)	0-12
Delusion experiences		
Distress ^a	9.44 (8.86)	0-105
Preoccupation ^b	9.35 (8.61)	0-105
Conviction ^c	12.08 (9.92)	0-105
Total score	3.49 (2.84)	0-21
Composite score	30.46 (29.46)	0-336
Depressive symptoms	7.06 (4.72)	0-30
Average hours of sleep	5.83 (1.61)	1-16
	Frequency (%)	
Quality of sleep		
Good	335 (24.00)	-
Poor	835 (60.00)	-
Unknown	223 (16.00)	-
Trauma appraisals		
Experienced danger	524 (37.60)	-
Danger for self	27 (5.20)	-
Danger for baby	269 (51.30)	-
Danger for self and baby	228 (16.40)	-
Experienced intense fear	557 (40.00)	-
Both criteria met	384 (27.60)	-
Above clinical cut off for PTSD ^d	167 (12.00)	-
Above clinical cut off for depression ^e	172 (12.30)	-

N = 1,393.

^{a, b, c} *n* = 1217, corresponding to number of participants reporting at least one delusion. ^d Score \geq 33, recommended by Creamer et al. (2003). ^e Score \geq 13, recommended by Matthey et al. (2006)

Table 4 Endorsement of items on the Launay Slade Hallucination Scale and the 21-item Peters Delusion Inventory

Scales, subscales and items	Frequency (%)
Launay Slade Hallucination Scale	
No matter how much I try to concentrate on my work unrelated thoughts always creep into my mind	594 (42.6)
Sometimes a passing thought will seem so real that it frightens me	439 (31.5)
I have never been troubled by hearing voices in my head _r	379 (27.2)
Sometimes my thoughts seem as real as actual events in my life	370 (26.6)
The sounds I hear in my daydreams are generally clear and distinct	272 (19.5)
In my daydreams I can hear the sound of a tune almost as clearly as if I were actually listening to it	249 (17.9)
I have never heard the voice of the Devil _r	215 (15.4)
In the past I have had the experience of hearing a person's voice and then found that there was no-one there	159 (11.4)
I often hear a voice speaking my thoughts aloud	141 (10.1)
The people in my daydreams seem so true to life that I sometimes think they are	125 (9)
In the past I have heard the voice of God speaking to me	63 (4.5)
On occasions I have seen a person's face in front of me when no-one was in fact there	58 (4.2)
21-item Peters Delusion Inventory	
Do you ever feel as if some people are not what they seem to be	941 (67.6)
Do you ever feel as if people seem to drop hints about you or say things with a double meaning?	553 (39.7)
Are you often worried that your partner may be unfaithful?	413 (29.6)
Do you ever feel that people look at you oddly because of your appearance?	317 (22.8)
Do you ever feel as if electrical devices such as computers can influence the way you think?	297 (21.3)
Do you ever feel that you are a very special or unusual person?	276 (19.8)
Do you ever feel as if things in magazines or on TV were written for you?	213 (15.3)
Do you ever think people can communicate telepathically?	205 (14.7)
Do you ever feel as if you are, or destined to be someone very important?	186 (13.4)
Do you ever feel that you are especially close to God?	179 (12.8)
Do you ever feel that you have sinned more than the average person?	167 (12.0)
Do you ever feel as if you are being persecuted in some way?	163 (11.7)
Do you believe in the power of witchcraft, voodoo or the occult?	163 (11.7)
Do you ever feel as if you had no thoughts in your head at all?	160 (11.5)
Do you ever feel as if you have been chosen by God in some way?	123 (8.8)
Do your thoughts ever feel alien to you in some way?	113 (8.1)
Do you ever feel as if your own thoughts were being echoed back to you?	83 (6.0)
Do you ever feel as if the world is about to end?	82 (5.9)
Have your thoughts ever been so vivid that you were worried other people would hear them?	76 (5.5)
Do you ever feel as if there is a conspiracy against you?	76 (5.5)
Do you ever feel as if you are a robot or zombie without a will of your own?	71 (5.1)

N = 1,393

_r Reverse scored item

Path models

To test our hypotheses, we analysed three competing theoretical path models (Figure 1). In all hypothesised models, birth experiences were the exogenous predictor variable and there were two stages of mediation (i) trauma appraisals, PTSS and adjustment to motherhood (ii) SCC. Hallucination and delusional experiences were the outcome variables.

Model 1

In model 1, (testing hypotheses 1), the regression weight on the birth experience*SCC interaction term was constrained to 0.

Model 2

In model 2 (testing hypotheses 2), the paths adjustment to motherhood*hallucinations, adjustment to motherhood*delusions, trauma appraisals*hallucinations and trauma appraisals*delusions were constrained to 0.

Model 3

In model 3 (testing hypotheses 3) paths birth experience*SCC, adjustment to motherhood*hallucinations, adjustment to motherhood*delusions, trauma appraisals*hallucinations and trauma appraisals*delusions were constrained to 0.

Table 5 outlines the goodness-of-fit statistics for the competing hypothesised models.

Table 5 Goodness-of-fit statistics for hypothesised models

Model	Comparative model	χ^2	<i>df</i>	<i>p</i> value	χ^2	CFI	RMSEA	$\Delta\chi^2$	Δdf	<i>p</i> value $\Delta\chi^2$
Model 1	-	4.13	1	.042	.999	.047	-	-	-	-
Model 2	Model 1	4.49	4	.344	1.000	.009	0.36	3	.948	
Model 3	Model 2	8.71	5	.121	.999	.023	4.22	1	.040	

$\Delta\chi^2$ = difference in χ^2 values between models; Δdf = difference in number of degrees of freedom between models.

Best fitting model

Model 2 (Figure 3), supporting hypotheses 2, was the best fit to the data. It did not have a significantly worse fit in comparison to model 1, $\Delta\chi^2(3) = 0.36$, $p = .95$, and was a good fit for the data; $\chi^2(4) = 4.49$, $p = .34$; CFI = 1.00, RMSEA = 0.01, 90% CI [0.00, 0.03] $p = .98$. Path and associated maximum

likelihood and bootstrap SEs/CIs are presented in Table 3.

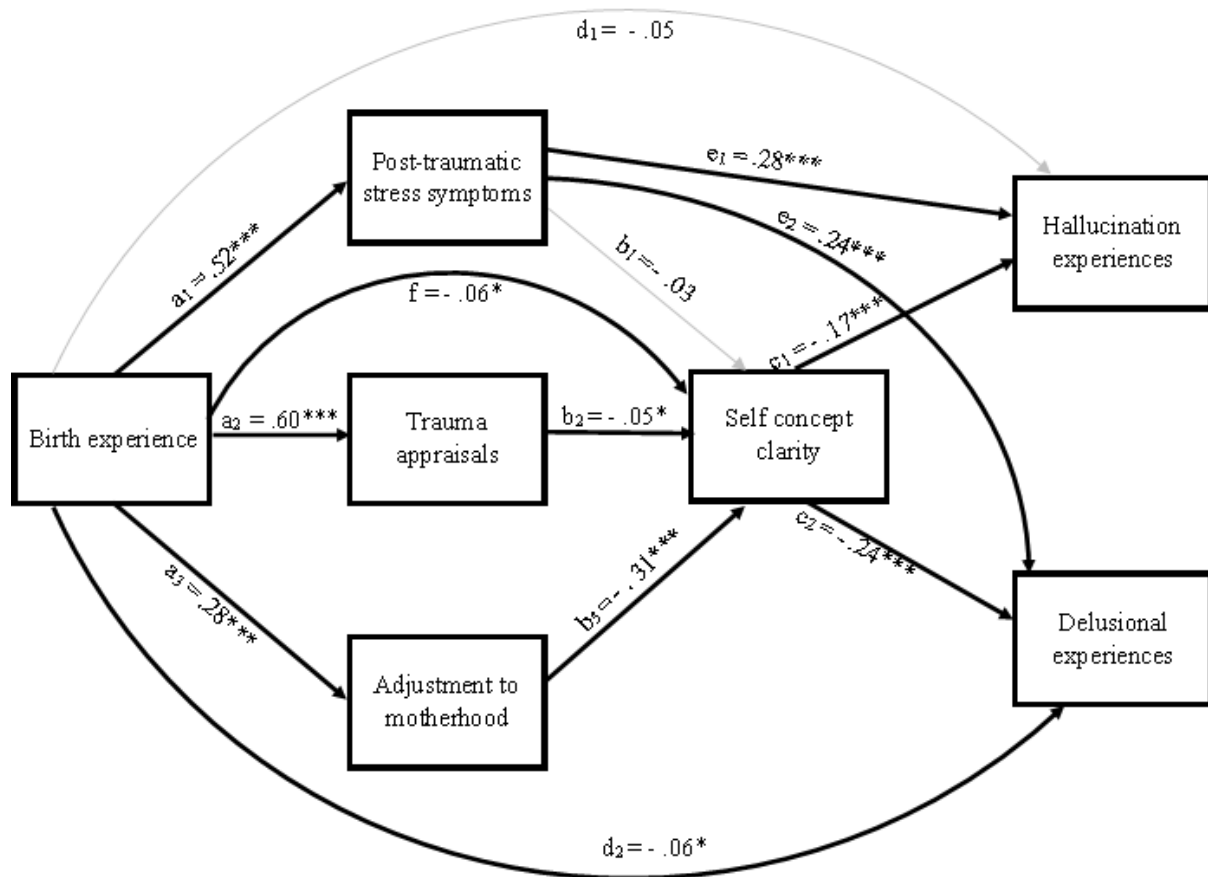


Figure 3 Model 2 exploring the relationship between birth experience and psychotic like experiences (hallucination and delusional experiences) through two stages of mediating variables (i) trauma appraisals, post-traumatic stress symptoms and adjustment to motherhood (ii) self-concept clarity. The regression coefficients for paths trauma appraisals*hallucinations, trauma appraisals*delusions, adjustment to motherhood*hallucinations and adjustment to motherhood*delusions were constrained to 0. For simplicity error terms and control variables have been omitted. Estimates on the endogenous variables were controlled for by age, birth method, education level, employment status, ethnicity, marital status, depression and sleep quality. Error terms were correlated as appropriate, with all stage one mediator error terms (trauma appraisals, post-traumatic stress symptoms and adjustment to motherhood) correlated with each other and outcome variable error terms (hallucination and delusional experiences) correlated with each other. Estimates shown are standardised betas (β). Significance levels were established via bootstrapped CIs (10,000 resamples). A bootstrapped Chi square test indicated a good model fit, $\chi^2(4) = 4.49, p = .34$; CFI = 1.00, RMSEA = 0.01, 90% CI [0.00, 0.03] $p = .98$.

———— Significant path ———— Non-significant path

Table 6 Path estimates for model 2 (Figure 2)

Path	Estimate		SE of b		Bootstrap 95% CIs b		Bootstrap 95% CIs β	
	b	β	ML	Bootstrap	Lower	Upper	Lower	Upper
Direct path estimates								
a ₁	0.27***	.52	.01	.02	.24	.30	.47	.57
a ₂	0.02***	.60	.00	.00	.02	.02	.56	.64
a ₃	0.07***	.28	.01	.01	.06	.08	.23	.32
b ₁	- 0.02	- .03	.02	.02	- .05	.01	- .08	.02
b ₂	- 0.56*	- .05	.28	.28	- 1.11	.00	- .10	.00
b ₃	- 0.42***	- .31	.04	.04	- .49	- .35	- .36	-.28
c ₁	- 0.04***	- .17	.01	.01	- .05	- .02	- .23	-.11
c ₂	- 0.07***	- .24	.01	.01	- .09	- .05	- .30	-.18
d ₁	0.00	- .05	.00	.00	- .01	.00	- .11	.13
d ₂	- 0.01*	- .06	.00	.00	- .01	.00	- .12	.00
e ₁	0.04***	.28	.00	.00	.03	.05	.21	.34
e ₂	0.05***	.24	.01	.01	.03	.06	.18	.30
f	- 0.02*	- .06	.01	.01	- .04	.00	- .12	.00
Indirect path estimates								
a ₁ b ₁	.00	.00	-	.00	- .01	.00	- .04	.01
a ₁ e ₁	.01***	.16	-	.00	.01	.01	.12	.19
a ₁ e ₂	.01***	.14	-	.00	.01	.02	.11	.18
a ₂ b ₂	- .01*	- .03	-	.01	- .02	.00	- .06	.00
a ₃ b ₃	- .03***	- .09	-	.00	- .04	- .02	- .11	- .07
b ₁ c ₁	.00	.01	-	.00	.00	.00	.00	.01
b ₁ c ₂	.00	.01	-	.00	.00	.00	- .01	.02
b ₂ c ₁	.02*	.01	-	.01	.00	.05	.00	.02
b ₂ c ₂	.03*	.01	-	.02	.00	.08	.00	.02
b ₃ c ₁	.02***	.05	-	.00	.01	.02	.03	.07
b ₃ c ₂	.03***	.07	-	.01	.02	.04	.05	.10
a ₁ b ₁ c ₁	.00*	.01	-	.00	.00	.00	.00	.01
a ₁ b ₁ c ₂	.00*	.02	-	.00	.00	.00	.01	.02
a ₂ b ₂ c ₁	.00**	.01	-	.00	.00	.00	.01	.01
a ₂ b ₂ c ₂	.00**	.01	-	.00	.00	.00	.01	.02
a ₃ b ₃ c ₁	.00***	.02	-	.00	.00	.00	.01	.02
a ₃ b ₃ c ₂	.00***	.02	-	.00	.00	.01	.02	.03
fc ₁	.01*	.01	-	.00	.01	.02	.14	.02
fc ₂	.02*	.01	-	.00	.01	.02	.14	.03

$N = 1393$. ML = maximum likelihood estimation. Probability values determined on bootstrapped CIs (10,000 resamples)

* $p < .05$; ** $p < .01$; *** $p < .001$

Direct relationships

A more difficult birth experience significantly predicted trauma appraisals ($\beta_{a2} = .60, p < .001$), PTSS ($\beta_{a1} = .52, p < .001$), poorer adjustment to motherhood ($\beta_{a3} = .28, p < .001$), SCC ($\beta_f = -.06, p < .05$), delusion proneness ($\beta_{d2} = -.06, p < .05$) but not hallucination proneness ($\beta_{d1} = -.05, p = .105$). Both trauma appraisals ($\beta_{b2} = -.05, p < .05$) and adjustment to motherhood ($\beta_{b3} = -.31, p < .001$), significantly predicted SCC, however PTSS did not ($\beta_{b1} = -.03, p = .260$). Hallucination and delusion experiences were significantly predicted by PTSS ($\beta_{e1} = .28, p < .001$; $\beta_{e2} = .24, p < .001$) and SCC ($\beta_{c1} = -.17, p < .001$; $\beta_{c2} = -.24, p < .001$).

Mediated relationships

When investigating the stage one mediators there was a significant indirect effect of birth experience on SCC via trauma appraisal ($\beta_{a2b2} = -.02, p < .05$), a non-significant indirect effect of birth experience on SCC via PTSS ($\beta_{a1b1} = -.02, p = .266$) and a significant indirect effect of birth experience on SCC via adjustment to motherhood ($\beta_{a3b3} = -.09, p < .001$). It was found that the indirect effect of birth experience through the stage one mediator PTSS was significant for both hallucination experiences ($\beta_{a1e1} = .16, p < .001$) and delusional experiences ($\beta_{a1e2} = .14, p < .001$). This indicates that trauma appraisal and adjustment to motherhood partially mediated the relationship between birth experience and SCC, however PTSS did not. Also, PTSS fully mediated the relationship between birth experience and hallucination proneness and partially mediated the relationship between birth experience and delusion proneness.

In relation to the stage two mediator, the indirect effect of birth experience through SCC was significant for both hallucination experiences ($\beta_{fc1} = .01, p < .05$) and delusion experiences ($\beta_{fc2} = .01, p < .05$). The indirect effect of trauma appraisals on the outcome variables via SCC was significant for hallucination experiences ($\beta_{b2c1} = .01, p < .05$) and delusion experiences ($\beta_{b2c2} = .01, p < .05$). There were however, non-significant indirect effects of PTSS via SCC on both hallucinations and delusion proneness ($\beta_{b1c1} = .00, p = .232$; $\beta_{b1c2} = .01, p = .260$). Finally, the indirect effect of adjustment to motherhood via SCC was significant for both hallucination ($\beta_{b3c1} = .05, p < .001$) and delusion experiences ($\beta_{b3c2} = .07, p < .001$). This indicates that SCC fully

mediated the relationship between birth experience and hallucinations, and partially mediated the relationship between birth experience and delusion experiences. Also, SCC fully mediated the relationship between trauma appraisals and both delusion and hallucination experiences. However, SCC did not mediate the relationship between PTSS and both hallucination and delusion experiences. Finally, SCC fully mediated the relationship between adjustment to motherhood and both hallucination and delusion proneness.

When indirect effects of both the stage one and two mediators were investigated there were significant indirect effects of birth experience on both hallucination and delusion proneness via (a) trauma appraisals and SCC ($\beta_{a_2b_2c_1} = .01, p < .01; \beta_{a_2b_2c_2} = .01, p < .01$), (b) PTSS and SCC ($\beta_{a_1b_1c_1} = .01, p < .05; \beta_{a_1b_1c_2} = .02, p < .05$), (c) adjustment to motherhood and SCC ($\beta_{a_3b_3c_1} = .02, p < .001; \beta_{a_3b_3c_2} = .02, p < .001$). This indicates that when these mediators are considered in combination, both the stage one mediators (trauma appraisals, PTSS and adjustment to motherhood) and the stage two mediator (SCC) fully mediated the relationship between birth experience and hallucination experiences, and partially mediated the relationship between birth experience and delusion experiences.

Discussion

This is the first study to explore the role of predictive and mediating variables, in particular SCC, in relation to PLEs in a large sample of first time mothers ($N = 1,393$). Using a targeted approach, we recruited first time mothers registered for NHS care, and gathered data on the early postpartum period within an appropriate contemporaneous time frame. Despite education and employment levels being slightly higher amongst this group of women, they were representative of the general population in terms of age, marital status, ethnicity, number of babies delivered and mode of birth. There was a high prevalence rate of PLEs within the sample (93.58%). Assuming that the 86.07% of participants who did not complete the survey did not experience any PLEs, 13.03% of all the invited participants experienced at least one PLE over the short postnatal time frame specified. This is substantially higher than the five percent lifetime prevalence rate in the general population (Van Os et al. 2009). This emphasises that PLEs are not uncommon within this population, during this time frame. The importance of previously unexplored factors such as SCC (the extent to which beliefs about the self are well-defined, confidently held, internally coherent, stable and cognitively accessible; Campbell et al. 1996) have been highlighted.

We achieved our primary aim of investigating the potential mechanisms underlying the occurrence of PLEs in first time mothers, with findings supporting both hypotheses and Model 2. This model was a better fit to the data than both Models 1 and 3. This model demonstrated that birth experience predicted delusion proneness, but not hallucination proneness (as was the case across all the models). As expected in all models birth experience predicted trauma appraisals, PTSS and adjustment to motherhood, with the relationship between birth experience and adjustment to motherhood being a novel finding. However, in Model 2 as opposed to 1 and 3, both trauma appraisals and adjustment to motherhood predicted SCC, whilst PTSS did not. As expected in all models SCC and PTSS directly predicted PLEs, corresponding to past research (Alsawy 2015; Cicero et al. 2013; Hamner 1999). The importance of SCC as a mediator was highlighted by neither trauma appraisals or adjustment to motherhood predicting PLEs directly (including in Model 1, where paths between these variables and the outcomes were not constrained to 0). It is interesting to note that in Model 2, birth experience was found to directly predict SCC.

Becoming a mother is a major phase of transition in life, with intra and inter-personal changes occurring, along with changes in social circumstance (Holt 2016). As these changes theoretically correspond to changes in self-concept (Markus and Wurf 1987), and SCC has been shown to be in flux during the early postnatal period (Smith 1999), the finding that SCC predicted PLEs is important and consistent with studies in other populations (Cicero et al. 2013; Evans et al. 2015). Therefore, we could infer that PLEs may be temporary and correspond to this period of fluctuating SCC.

Not all our predictions were accurate. Prediction 2(a) that birth experience, PTSS and SCC would significantly predict the occurrence of PLEs, however, trauma appraisals and adjustment to motherhood would not, received partial support. It was surprising that birth experience did not predict hallucination experiences, as Mannion and Slade (2014) found that fear during childbirth significantly predicted both hallucinations and delusions. However, in the Mannion and Slade study, the measures used were specific questions related to fear and not birth experience as a whole, participants were both primi and multiparous and other possible indicators were not investigated. Also, given the high association between birth experience and PTSS, we could deduce that this shared variance may have accounted for the lack of significant findings. As expected, PTSS predicted all PLEs, which is comparable to research in the general population (Morrison et al. 2003) and data from Barratt (2012).

The finding that trauma appraisals and adjustment to motherhood were mediating factors between birth experience and SCC, but PTSS were not, is noteworthy. This suggests that experience (e.g. appraising birth as traumatic or difficulties with adjustment) rather than symptoms are important in the occurrence of SCC disruption. As expected, PTSS mediated the relationship between birth experience and both hallucinations and delusion experiences. However, given that this was full mediation for hallucinations and partial mediation for delusions, there may be other important factors in the birth experience and delusion proneness relationship that we did not investigate. It also suggests that the mechanisms underlying these PLEs may differ.

In relation to prediction 2(c) most of our hypotheses were confirmed, as SCC was a key mediator in all predicted relationships, apart from between PTSS and PLEs. It also shows that there may be a variety of causal pathways that predict the development of PLEs.

Outside of our main hypotheses there were some interesting additional findings. In comparison to both Barratt (2012) and Mannion and Slade (2014) studies, the reported occurrence of PLEs were higher. Possibly, this is due to data being collected anonymously online, as the women had the opportunity to honestly reflect on their experiences whilst not having to fear any repercussions following disclosure. This is especially pertinent given that mothers have been found to fear being perceived as unable to cope, and experience feelings of shame surrounding disclosure of psychological difficulties (Slade et al. 2010). However, it could also be due to problems with retrospective accounts, or because the participants self-selected based upon personal experience relevant to the study. Although participants were comparable on age, marital status and mode of delivery, they seemed to be from a slightly higher socio-economic backgrounds than the general population. Given that psychosis in the general population (Johns and Van Os 2001) and postnatal psychosis (Valdimarsdóttir et al. 2009) have been found to be associated with lower socio-economic status, we may have found higher prevalence rates if the sample were more representative, so our estimates may be conservative.

The correlation between hallucinations and delusions suggests high comorbidity, as in the general population (Johns and Van Os 2001). Distress associated with delusion experiences were high in comparison to the Mannion and Slade (2014) study, but lower than in the general population (Peters et al. 2004). The significant two stage mediation pathways highlight the importance of indirect relationships between birth experience and PLEs. It was unexpected that PTSS did not predict SCC, and the relationship between fear during childbirth and SCC is a novel finding. This emphasises the importance of experience (e.g. fear, appraisals of trauma, difficulties with adjusting) over and above symptoms in the prediction of SCC. Clinically this is important as women whose birth does not go as planned are more likely to experience birth as traumatic (Soet et al. 2003) and 34% of first time mothers birth experiences are worse than expected (National Perinatal Epidemiology Unit, 2014). In line with self-concept theory's (Markus and Wurf 1987) we can infer

that these experiences that are not concurrent with expectations impact upon a women's SCC, in terms of fundamental assumptions about herself. For example, women who prior to birth believe themselves to be competent, organised and in control may have difficulties making sense of an experience where they feel out of control, inept and a failure. This is particularly important as first time mothers are more likely to feel out of control than multiparous women (Green and Baston 2003).

Limitations

The main limitation of this study is the design. As Maxwell and Cole (2007) highlight, mediation models imply a sequence of time, however this was a cross-sectional sample and theoretical inferences were made to decide upon levels of mediation. Therefore we need to be extremely cautious when interpreting the findings, especially given that cross-sectional mediation models have been found to generate substantially biased estimates of longitudinal mediation parameters (Maxwell and Cole 2007). Consequently, we are aware that our final model may not reflect true causal mediation pathways, and the comments made throughout this discussion must be interpreted with this in mind. This is especially applicable to the relationship between trauma appraisals and PTSS; usually the first is seen to proceed the latter (Ehlers and Clark 2000). Additionally, there are substantial limitations related to the trauma appraisal measure itself. As this was created for this study there is a lack of prior validation. We may not have been accurately measuring the trauma appraisals that we wished to access.

As we were unable to use the auditory and visual hallucination items of the LSHS (Launay and Slade 1981) separately, as we did not wish to compromise the psychometric properties of the scale, we need to be cautious when interpreting results related to this outcome. When looking at these sub-scales, the incidence of hallucination experiences is lower (48.6% rather than 77.9%), whilst endorsements of individual items of these subscales were still relatively high (range 4.2% - 27.2%; see Table 4). It could also be argued that items of the PDI-21 (Peters et al. 2004) may be compromised in this population, or not accessing true delusional experiences (e.g. are you often worried that your partner may be unfaithful?).

Despite the breadth of data collected there may be predictors not included in the model. In the general population, dissociation (Varese et al. 2012a) and anxious attachment (Sitko et al. 2014) have been found to mediate the relationship between sexual abuse and hallucinations. Additionally, as becoming a mother inevitably involves caring for a child and subsequent life changes, factors surrounding this may be important. As data surrounding the exact duration from birth were not collected we could not control for this. Therefore, we cannot be certain that recall from participants two months postpartum differed significantly from those six months postpartum; although memory surrounding childbirth is not affected during the first 12 months postpartum (Waldenström 2003). Given that childbirth has been found to promote re-traumatisation in women with histories of sexual abuse (Daphna-Tekoaha et al. 2015) and PLEs have been found to be associated with childhood trauma (Peters et al. 2016), it could have been helpful to control for past traumatic experiences.

Implications

PLEs in first time mothers may be more common than previously known. These phenomena have been found to be associated with a higher levels of distress than previously thought, both in terms of distress directly related to delusions, and subsequent depressive symptoms ($r = .38$ and $r = .46$ with hallucination and delusion experiences respectively). There are probably multiple pathways, both direct and indirect, that predict the occurrence of PLEs with a variety of underlying mechanisms. The model suggests that PTSS predict the occurrence of PLEs, whilst SCC is critical for women who have appraised birth as traumatic and have difficulties adjusting to motherhood. Indeed, the process of incorporating changes (e.g. intra and inter-personal changes) into the self-concept postpartum may be much more important than previously thought. Given this, SCC is an important factor that should be considered by health care professionals. The same is true for both trauma appraisals and adjustment to motherhood. This is especially pertinent given that these factors are less likely to be as overt as other difficulties, such as PTSS, and many women who are in distress may be overlooked. This also implies that appraisals of trauma are important, despite this being removed from the most recent version of the DSM (5th ed. DSM-5 American Psychiatric Association 2013) criteria for PTSD.

Future research

Given the problems associated with cross-sectional mediation models (Maxwell and Cole 2007), and how cautiously we must interpret these findings, further research is needed to fully understand the mechanisms underlying development of PLEs. In particular, longitudinal studies that sequentially test the predictors are needed to validate the findings, whilst including other possible variables such as dissociation and factors related to the child. Studies beginning antenatally may be the most helpful in understanding the development of PLEs in first time mothers, especially given that Mannion and Slade (2014) found the occurrence of PLEs were higher during pregnancy than postpartum. Additionally, as different underlying mechanisms have been implicated in the development of hallucinations and delusions in the general population, further research into these as separate entities seems important. A further key matter to address is the self-selection issue. Future studies should aim to prospectively recruit from clinics with the aim of gaining representative cohorts. Despite the co-morbidity found amongst the two outcome variables, different population groups may be more prone to particular experiences. Future studies using different outcome measures would be advised, as the measures used may not be appropriate for this population. Finally, it is possible that delusional ideas may be specific to the baby, and that this may be a particular source of distress which requires further investigation (Barratt 2012).

Conclusion

This study suggests that PLEs in first time mothers are not uncommon and may be associated with distress. Several factors may be important in the development of PLEs. As suggested by past research, PTSS directly predicted the occurrence of PLEs. However, other pathways exist and there may be a group of women who are less likely to present with clinical symptoms as their difficulties surround trauma appraisals, adjustment to motherhood or SCC. SCC seems to be an important factor previously unaddressed. It is imperative for health care professionals to recognise the development of PLEs and understand the experiences of these women. Public health interventions that reduce the stigma surrounding these experiences, whilst also improving knowledge and understanding may be important.

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Appendix A: Mixed Methods Appraisal Tool



Mixed Methods Appraisal Tool (MMAT) – Version 2011

For dissemination, application, and feedback: Please contact pierre.pluye@mcgill.ca, Department of Family Medicine, McGill University, Canada.

The MMAT is comprised of two parts (see below): criteria (Part I) and tutorial (Part II). While the content validity and the reliability of the pilot version of the MMAT have been examined, this critical appraisal tool is still in development. Thus, the MMAT must be used with caution, and users' feedback is appreciated. Cite the present version as follows.

Pluye, P., Robert, E., Cargo, M., Bartlett, G., O'Cathain, A., Griffiths, F., Boardman, F., Gagnon, M.P., & Rousseau, M.C. (2011). *Proposal: A mixed methods appraisal tool for systematic mixed studies reviews*. Retrieved on [date] from <http://mixedmethodsappraisaltoolpublic.pbworks.com>. Archived by WebCite® at <http://www.webcitation.org/5tTRTc9yJ>

Purpose: The MMAT has been designed for the appraisal stage of complex systematic literature reviews that include qualitative, quantitative and mixed methods studies (mixed studies reviews). The MMAT permits to concomitantly appraise and describe the methodological quality for three methodological domains: mixed, qualitative and quantitative (subdivided into three sub-domains: randomized controlled, non-randomized, and descriptive). Therefore, using the MMAT requires experience or training in these domains. E.g., MMAT users may be helped by a colleague with specific expertise when needed. The MMAT allows the appraisal of most common types of study methodology and design. For appraising a qualitative study, use section 1 of the MMAT. For a quantitative study, use section 2 or 3 or 4, for randomized controlled, non-randomized, and descriptive studies, respectively. For a mixed methods study, use section 1 for appraising the qualitative component, the appropriate section for the quantitative component (2 or 3 or 4), and section 5 for the mixed methods component. For each relevant study selected for a systematic mixed studies review, the methodological quality can then be described using the corresponding criteria. This may lead to exclude studies with lowest quality from the synthesis, or to consider the quality of studies for contrasting their results (e.g., low quality vs. high).

Scoring metrics: For each retained study, an overall quality score may be not informative (in comparison to a descriptive summary using MMAT criteria), but might be calculated using the MMAT. Since there are only a few criteria for each domain, the score can be presented using descriptors such as *, **, ***, and ****. For qualitative and quantitative studies, this score can be the number of criteria met divided by four (scores varying from 25% (*) -one criterion met- to 100% (****) -all criteria met-). For mixed methods research studies, the premise is that the overall quality of a combination cannot exceed the quality of its weakest component. Thus, the overall quality score is the lowest score of the study components. The score is 25% (*) when $QUAL=1$ or $QUAN=1$ or $MM=0$; it is 50% (**) when $QUAL=2$ or $QUAN=2$ or $MM=1$; it is 75% (***) when $QUAL=3$ or $QUAN=3$ or $MM=2$; and it is 100% (****) when $QUAL=4$ and $QUAN=4$ and $MM=3$ (QUAL being the score of the qualitative component; QUAN the score of the quantitative component; and MM the score of the mixed methods component).

Rationale: There are general criteria for planning, designing and reporting mixed methods research (Creswell and Plano Clark, 2010), but there is no consensus on key specific criteria for appraising the methodological quality of mixed methods studies (O'Cathain, Murphy and Nicholl, 2008). Based on a critical examination of 17 health-related systematic mixed studies reviews, an initial 15-criteria version of MMAT was proposed (Pluye, Gagnon, Griffiths and Johnson-Lafleur, 2009). This was pilot tested in 2009. Two raters assessed 29 studies using the pilot MMAT criteria and tutorial (Pace, Pluye, Bartlett, Macaulay et al., 2010). Based on this pilot exercise, it is anticipated that applying MMAT may take on average 15 minutes per study (hence efficient), and that the Intra-Class Correlation might be around 0.8 (hence reliable). The present 2011 revision is based on feedback from four workshops, and a comprehensive framework for assessing the quality of mixed methods research (O'Cathain, 2010).

Conclusion: The MMAT has been designed to appraise the *methodological quality* of the studies retained for a systematic mixed studies review, not the quality of their *reporting* (writing). This distinction is important, as good research may not be 'well' reported. If reviewers want to genuinely assess the former, companion papers and research reports should be collected when some criteria are not met, and authors of the corresponding publications should be contacted for additional information. Collecting additional data is usually necessary to appraise *qualitative research and mixed methods studies*, as there are no uniform standards for reporting study characteristics in these domains (www.equator-network.org), in contrast, e.g., to the CONSORT statement for reporting randomized controlled trials (www.consort-statement.org).

Authors and contributors: Pierre Pluye¹, Marie-Pierre Gagnon², Frances Griffiths³ and Janique Johnson-Lafleur¹ proposed an initial version of MMAT criteria (Pluye et al., 2009). Romina Pace¹ and Pierre Pluye¹ led the pilot test. Gillian Bartlett¹, Belinda Nicolau⁴, Robbyn Seller¹, Justin Jagosh¹, Jon Salsberg¹ and Ann Macaulay¹ contributed to the pilot work (Pace et al., 2010). Pierre Pluye¹, Émilie Robert⁵, Margaret Cargo⁶, Alicia O'Cathain⁷, Frances Griffiths³, Felicity Boardman³, Marie-Pierre Gagnon², Gillian Bartlett¹, and Marie-Claude Rousseau⁸ contributed to the present 2011 version.

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PART I. MMAT criteria & one-page template (to be included in appraisal forms)

Types of mixed methods study components or primary studies	Methodological quality criteria (see tutorial for definitions and examples)	Responses			
		Yes	No	Can't tell	Comments
Screening questions (for all types)	<ul style="list-style-type: none"> Are there clear qualitative and quantitative research questions (or objectives*), or a clear mixed methods question (or objective*)? Do the collected data allow address the research question (objective)? E.g., consider whether the follow-up period is long enough for the outcome to occur (for longitudinal studies or study components). 				
	<i>Further appraisal may be not feasible or appropriate when the answer is 'No' or 'Can't tell' to one or both screening questions.</i>				
1. Qualitative	1.1. Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?				
	1.2. Is the process for analyzing qualitative data relevant to address the research question (objective)?				
	1.3. Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?				
	1.4. Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?				
2. Quantitative randomized controlled (trials)	2.1. Is there a clear description of the randomization (or an appropriate sequence generation)?				
	2.2. Is there a clear description of the allocation concealment (or blinding when applicable)?				
	2.3. Are there complete outcome data (80% or above)?				
	2.4. Is there low withdrawal/drop-out (below 20%)?				
3. Quantitative non-randomized	3.1. Are participants (organizations) recruited in a way that minimizes selection bias?				
	3.2. Are measurements appropriate (clear origin, or validity known, or standard instrument; and absence of contamination between groups when appropriate) regarding the exposure/intervention and outcomes?				
	3.3. In the groups being compared (exposed vs. non-exposed; with intervention vs. without; cases vs. controls), are the participants comparable, or do researchers take into account (control for) the difference between these groups?				
	3.4. Are there complete outcome data (80% or above), and, when applicable, an acceptable response rate (60% or above), or an acceptable follow-up rate for cohort studies (depending on the duration of follow-up)?				
4. Quantitative descriptive	4.1. Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?				
	4.2. Is the sample representative of the population understudy?				
	4.3. Are measurements appropriate (clear origin, or validity known, or standard instrument)?				
	4.4. Is there an acceptable response rate (60% or above)?				
5. Mixed methods	5.1. Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?				
	5.2. Is the integration of qualitative and quantitative data (or results*) relevant to address the research question (objective)?				
	5.3. Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results*) in a triangulation design?				

Criteria for the qualitative component (1.1 to 1.4), and appropriate criteria for the quantitative component (2.1 to 2.4, or 3.1 to 3.4, or 4.1 to 4.4), must be also applied.

*These two items are not considered as double-barreled items since in mixed methods research, (1) there may be research questions (quantitative research) or research objectives (qualitative research), and (2) data may be integrated, and/or qualitative findings and quantitative results can be integrated.

PART II. MMAT tutorial

Types of mixed methods study components or primary studies	Methodological quality criteria
<p>I. Qualitative</p> <p>Common types of qualitative research methodology include:</p> <p>A. Ethnography The aim of the study is to describe and interpret the shared cultural behaviour of a group of individuals.</p> <p>B. Phenomenology The study focuses on the subjective experiences and interpretations of a phenomenon encountered by individuals.</p> <p>C. Narrative The study analyzes life experiences of an individual or a group.</p> <p>D. Grounded theory Generation of theory from data in the process of conducting research (data collection occurs first).</p> <p>E. Case study In-depth exploration and/or explanation of issues intrinsic to a particular case. A case can be anything from a decision-making process, to a person, an organization, or a country.</p> <p>F. Qualitative description There is no specific methodology, but a qualitative data collection and analysis, e.g., in-depth interviews or focus groups, and hybrid thematic analysis (inductive and deductive).</p> <p>Key references: Creswell, 1998; Schwandt, 2001; Sandelowski, 2010.</p>	<p>1.1. Are the sources of qualitative data (archives, documents, informants, observations) relevant to address the research question (objective)?</p> <p>E.g., consider whether (a) the selection of the participants is clear, and appropriate to collect relevant and rich data; and (b) reasons why certain potential participants chose not to participate are explained.</p> <hr/> <p>1.2. Is the process for analyzing qualitative data relevant to address the research question (objective)?</p> <p>E.g., consider whether (a) the method of data collection is clear (in depth interviews and/or group interviews, and/or observations and/or documentary sources); (b) the form of the data is clear (tape recording, video material, and/or field notes for instance); (c) changes are explained when methods are altered during the study; and (d) the qualitative data analysis addresses the question.</p> <hr/> <p>1.3. Is appropriate consideration given to how findings relate to the context, e.g., the setting, in which the data were collected?*</p> <p>E.g., consider whether the study context and how findings relate to the context or characteristics of the context are explained (how findings are influenced by or influence the context). "For example, a researcher wishing to observe care in an acute hospital around the clock may not be able to study more than one hospital. (...) Here, it is essential to take care to describe the context and particulars of the case [the hospital] and to flag up for the reader the similarities and differences between the case and other settings of the same type" (Mays & Pope, 1995).</p> <p>The notion of context may be conceived in different ways depending on the approach (methodology) tradition.</p> <hr/> <p>1.4. Is appropriate consideration given to how findings relate to researchers' influence, e.g., through their interactions with participants?*</p> <p>E.g., consider whether (a) researchers critically explain how findings relate to their perspective, role, and interactions with participants (how the research process is influenced by or influences the researcher); (b) researcher's role is influential at all stages (formulation of a research question, data collection, data analysis and interpretation of findings); and (c) researchers explain their reaction to critical events that occurred during the study.</p> <p>The notion of reflexivity may be conceived in different ways depending on the approach (methodology) tradition. E.g., "at a minimum, researchers employing a generic approach [qualitative description] must explicitly identify their disciplinary affiliation, what brought them to the question, and the assumptions they make about the topic of interest" (Caeli, Ray & Mill, 2003, p. 5).</p>

*See suggestion on the MMAT wiki homepage (under '2011 version'): Independent reviewers can establish a common understanding of these two items prior to beginning the critical appraisal.

Types of mixed methods study components or primary studies	Methodological quality criteria
<p>2. Quantitative randomized controlled (trials)</p> <p>Randomized controlled clinical trial: A clinical study in which individual participants are allocated to intervention or control groups by randomization (intervention assigned by researchers).</p> <p>Key references: Higgins & Green, 2008; Porta, 2008; Oxford Center for Evidence based medicine, 2009.</p>	<p>2.1. Is there a clear description of the randomization (or an appropriate sequence generation)?</p> <p>In a randomized controlled trial, the allocation of a participant (or a data collection unit, e.g., a school) into the intervention or control group is based solely on chance, and researchers describe how the randomization schedule is generated. "A simple statement such as 'we randomly allocated' or 'using a randomized design' is insufficient".</p> <p><i>Simple randomization:</i> Allocation of participants to groups by chance by following a predetermined plan/sequence. "Usually it is achieved by referring to a published list of random numbers, or to a list of random assignments generated by a computer".</p> <p><i>Sequence generation:</i> "The rule for allocating interventions to participants must be specified, based on some chance (random) process". Researchers provide sufficient detail to allow a readers' appraisal of whether it produces comparable groups. E.g., blocked randomization (to ensure particular allocation ratios to the intervention groups), or stratified randomization (randomization performed separately within strata), or minimization (to make small groups closely similar with respect to several characteristics).</p>
	<p>2.2. Is there a clear description of the allocation concealment (or blinding when applicable)?</p> <p><i>The allocation concealment protects assignment sequence until allocation.</i> E.g., researchers and participants are unaware of the assignment sequence up to the point of allocation. E.g., group assignment is concealed in opaque envelopes until allocation.</p> <p><i>The blinding protects assignment sequence after allocation.</i> E.g., researchers and/or participants are unaware of the group a participant is allocated to during the course of the study.</p>
	<p>2.3. Are there complete outcome data (80% or above)?</p> <p>E.g., almost all the participants contributed to almost all measures.</p>
	<p>2.4. Is there low withdrawal/drop-out (below 20%)?</p> <p>E.g., almost all the participants completed the study.</p>

Types of mixed methods study components or primary studies	Methodological quality criteria
<p>3. Quantitative non-randomized</p> <p>Common types of design include (A) non-randomized controlled trials, and (B-C-D) observational analytic study or component where the intervention/exposure is defined/assessed, but not assigned by researchers.</p> <p>A. Non-randomized controlled trials The intervention is assigned by researchers, but there is no randomization, e.g., a pseudo-randomization. A non-random method of allocation is not reliable in producing alone similar groups.</p> <p>B. Cohort study Subsets of a defined population are assessed as exposed, not exposed, or exposed at different degrees to factors of interest. Participants are followed over time to determine if an outcome occurs (prospective longitudinal).</p> <p>C. Case-control study Cases, e.g., patients, associated with a certain outcome are selected, alongside a corresponding group of controls. Data is collected on whether cases and controls were exposed to the factor under study (retrospective).</p> <p>D. Cross-sectional analytic study At one particular time, the relationship between health-related characteristics (outcome) and other factors (intervention/exposure) is examined. E.g., the frequency of outcomes is compared in different population sub-groups according to the presence/absence (or level) of the intervention/exposure.</p> <p>Key references for observational analytic studies: Higgins & Green, 2008; Wells, Shea, O'Connell, Peterson, et al., 2009.</p>	<p>3.1. Are participants (organizations) recruited in a way that minimizes selection bias?</p> <p>At recruitment stage:</p> <p>For cohort studies, e.g., consider whether the exposed (or with intervention) and non-exposed (or without intervention) groups are recruited from the same population.</p> <p>For case-control studies, e.g., consider whether same inclusion and exclusion criteria were applied to cases and controls, and whether recruitment was done independently of the intervention or exposure status.</p> <p>For cross-sectional analytic studies, e.g., consider whether the sample is representative of the population.</p> <p>3.2. Are measurements appropriate (clear origin, or validity known, or standard instrument; and absence of contamination between groups when appropriate) regarding the exposure/intervention and outcomes?</p> <p>At data collection stage:</p> <p>E.g., consider whether (a) the variables are clearly defined and accurately measured; (b) the measurements are justified and appropriate for answering the research question; and (c) the measurements reflect what they are supposed to measure.</p> <p>For non-randomized controlled trials, the intervention is assigned by researchers, and so consider whether there was absence/presence of a contamination. E.g., the control group may be indirectly exposed to the intervention through family or community relationships.</p> <p>3.3. In the groups being compared (exposed vs. non-exposed; with intervention vs. without; cases vs. controls), are the participants comparable, or do researchers take into account (control for) the difference between these groups?</p> <p>At data analysis stage:</p> <p>For cohort, case-control and cross-sectional, e.g., consider whether (a) the most important factors are taken into account in the analysis; (b) a table lists key demographic information comparing both groups, and there are no obvious dissimilarities between groups that may account for any differences in outcomes, or dissimilarities are taken into account in the analysis.</p> <p>3.4. Are there complete outcome data (80% or above), and, when applicable, an acceptable response rate (60% or above), or an acceptable follow-up rate for cohort studies (depending on the duration of follow-up)?</p>

Types of mixed methods study components or primary studies	Methodological quality criteria
<p>4. Quantitative descriptive studies</p> <p>Common types of design include single-group studies:</p> <p>A. Incidence or prevalence study without comparison group In a defined population at one particular time, what is happening in a population, e.g., frequencies of factors (importance of problems), is described (portrayed).</p> <p>B. Case series A collection of individuals with similar characteristics are used to describe an outcome.</p> <p>C. Case report An individual or a group with a unique/unusual outcome is described in details.</p> <p>Key references: Critical Appraisal Skills Programme, 2009; Draugalis, Coons & Plaza, 2008.</p>	<p>4.1. Is the sampling strategy relevant to address the quantitative research question (quantitative aspect of the mixed methods question)?</p> <p>E.g., consider whether (a) the source of sample is relevant to the population under study; (b) when appropriate, there is a standard procedure for sampling, and the sample size is justified (using power calculation for instance).</p> <p>4.2. Is the sample representative of the population understudy?</p> <p>E.g., consider whether (a) inclusion and exclusion criteria are explained; and (b) reasons why certain eligible individuals chose not to participate are explained.</p> <p>4.3. Are measurements appropriate (clear origin, or validity known, or standard instrument)?</p> <p>E.g., consider whether (a) the variables are clearly defined and accurately measured; (b) measurements are justified and appropriate for answering the research question; and (c) the measurements reflect what they are supposed to measure.</p> <p>4.4. Is there an acceptable response rate (60% or above)?</p> <p>The response rate is not pertinent for case series and case report. E.g., there is no expectation that a case series would include all patients in a similar situation.</p>

Types of mixed methods study components or primary studies	Methodological quality criteria
<p>5. Mixed methods</p> <p>Common types of design include:</p> <p>A. Sequential explanatory design The quantitative component is followed by the qualitative. The purpose is to explain quantitative results using qualitative findings. E.g., the quantitative results guide the selection of qualitative data sources and data collection, and the qualitative findings contribute to the interpretation of quantitative results.</p> <p>B. Sequential exploratory design The qualitative component is followed by the quantitative. The purpose is to explore, develop and test an instrument (or taxonomy), or a conceptual framework (or theoretical model). E.g., the qualitative findings inform the quantitative data collection, and the quantitative results allow a generalization of the qualitative findings.</p> <p>C. Triangulation design The qualitative and quantitative components are concomitant. The purpose is to examine the same phenomenon by interpreting qualitative and quantitative results (bringing data analysis together at the interpretation stage), or by integrating qualitative and quantitative datasets (e.g., data on same cases), or by transforming data (e.g., quantization of qualitative data).</p> <p>D. Embedded design The qualitative and quantitative components are concomitant. The purpose is to support a qualitative study with a quantitative sub-study (measures), or to better understand a specific issue of a quantitative study using a qualitative sub-study, e.g., the efficacy or the implementation of an intervention based on the views of participants.</p> <p>Key references: Creswell & Plano Clark, 2007; O’Cathain, 2010.</p>	<p>5.1. Is the mixed methods research design relevant to address the qualitative and quantitative research questions (or objectives), or the qualitative and quantitative aspects of the mixed methods question (or objective)?</p> <p>E.g., the rationale for integrating qualitative and quantitative methods to answer the research question is explained.</p> <hr/> <p>5.2. Is the integration of qualitative and quantitative data (or results) relevant to address the research question (objective)?</p> <p>E.g., there is evidence that data gathered by both research methods was brought together to form a complete picture, and answer the research question; authors explain when integration occurred (during the data collection-analysis or/and during the interpretation of qualitative and quantitative results); they explain how integration occurred and who participated in this integration.</p> <hr/> <p>5.3. Is appropriate consideration given to the limitations associated with this integration, e.g., the divergence of qualitative and quantitative data (or results)?</p>

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Appendix B: Author guidelines for Archives of Women's Mental Health

Only essential information is provided here, please see author guidelines for more detail.

Available at <http://www.springer.com/medicine/psychiatry/journal/737>

Types of papers

Original Contributions / Research Articles should be arranged under the following headings:

Abstract:

Not to exceed 150–200 words

Keywords:

Not more than five

Word limit:

There is **no word limit** for Original Contributions.

Introduction:

To include the background literature as well as the objective(s) of the study

Materials and Methods:

Describe the basic study design. State the setting (e.g., primary care, referral center). Explain selection of study subjects and state the system of diagnostic criteria used. Describe any interventions and include their duration and method of administration. Indicate the main outcome measure(s). Specify the dates in which data were collected (month/year to month/year).

Results:

Include the key findings. Give specific data and their statistical significance, if possible (include p value if findings were significant). Subset Ns should accompany percentages if the total N is <100

Discussion and Conclusion:

Sections conforming to standard scientific reporting style.

Text Formatting:

Manuscripts should be submitted in Word.

- Use a normal, plain font (e.g., 10-point Times Roman) for text.
- Use italics for emphasis.
- Use the automatic page numbering function to number the pages.
- Do not use field functions.
- Use tab stops or other commands for indents, not the space bar.
- Use the table function, not spreadsheets, to make tables.
- Use the equation editor or MathType for equations.
- Save your file in docx format (Word 2007 or higher) or doc format (older Word versions).

Headings:

Please use no more than three levels of displayed headings.

Abbreviations:

Abbreviations should be defined at first mention and used consistently thereafter.

Footnotes:

Footnotes can be used to give additional information, which may include the citation of a reference included in the reference list. They should not consist solely of a reference citation, and they should never include the bibliographic details of a reference. They should also not contain any figures or tables.

Footnotes to the text are numbered consecutively; those to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data). Footnotes to the title or the authors of the article are not given reference symbols. Always use footnotes instead of endnotes.

Acknowledgments:

Acknowledgments of people, grants, funds, etc. should be placed in a separate section on the title page. The names of funding organizations should be written in full.

References

Citation:

Cite references in the text by name and year in parentheses. Some examples:

- Negotiation research spans many disciplines (Thompson 1990).
- This result was later contradicted by Becker and Seligman (1996).
- This effect has been widely studied (Abbott 1991; Barakat et al. 1995a, b; Kelso and Smith 1998; Medvec et al. 1999, 2000).

Reference list:

The list of references should only include works that are cited in the text and that have been published or accepted for publication. Personal communications and unpublished works should only be mentioned in the text. Do not use footnotes or endnotes as a substitute for a reference list.

Reference list entries should be alphabetized by the last names of the first author of each work. Order multi-author publications of the same first author alphabetically with respect to second, third, etc. author. Publications of exactly the same author(s) must be ordered chronologically.

Journal article:

Gamelin FX, Baquet G, Berthoin S, Thevenet D, Nourry C, Nottin S, Bosquet L (2009) Effect of high intensity intermittent training on heart rate variability in prepubescent children. *Eur J Appl Physiol* 105:731-738. doi: 10.1007/s00421-008-0955-8

Ideally, the names of all authors should be provided, but the usage of “et al” in long author lists will also be accepted:

Smith J, Jones M Jr, Houghton L et al (1999) Future of health insurance. *N Engl J Med* 341:325–329

Article by DOI:

Slifka MK, Whitton JL (2000) Clinical implications of dysregulated cytokine production. *J Mol Med*. doi:10.1007/s001090000086

Book:

South J, Blass B (2001) *The future of modern genomics*. Blackwell, London

Book chapter:

Brown B, Aaron M (2001) The politics of nature. In: Smith J (ed) The rise of modern genomics, 3rd edn. Wiley, New York, pp 230-257

Online document:

Cartwright J (2007) Big stars have weather too. IOP Publishing PhysicsWeb.

<http://physicsweb.org/articles/news/11/6/16/1>. Accessed 26 June 2007

Dissertation:

Trent JW (1975) Experimental acute renal failure. Dissertation, University of California

Always use the standard abbreviation of a journal's name according to the ISSN List of Title Word Abbreviations. If you are unsure, please use the full journal title.

Tables

All tables are to be numbered using Arabic numerals.

Tables should always be cited in text in consecutive numerical order.

For each table, please supply a table caption (title) explaining the components of the table.

Identify any previously published material by giving the original source in the form of a reference at the end of the table caption.

Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.

Appendix C: Study advertisement



NEW MUMS WE NEED YOU!

Dear { |Subscriber.FirstName| },

We are looking for first time mothers to take part in a research study.

If you have given birth to your first baby within the last two to six months we would like to invite you to take part in an online survey by clicking the link below. This survey hopes to help us understand thoughts and experiences that can happen postnatally.

Please click the link below for more information and to connect to the survey:

There will be a prize draw for all people who take part.

One £100 and two £50 high street vouchers available

TAKE THE SURVEY

This research is being undertaken at the University of Liverpool by Lyndsey Holt, Trainee Clinical Psychologist. If you have any questions or want to discuss this study then please do not hesitate to contact Lyndsey on: holtiv@liverpool.ac.uk



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LIVERPOOL

Appendix D: Information sheets

Includes initial information sheet, information sheet for participants excluded from the study and debrief sheet.



Understanding thoughts and experiences that can happen postnatally

Name of researcher: Lyndsey Holt

INFORMATION FOR PARTICIPANTS

You are being invited to participate in a research study. Before you decide whether to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and feel free to ask us if you would like more information or if there is anything that you do not understand. Please also feel free to discuss this with your friends, relatives and GP if you wish. We would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.

Thank you for reading this.

What is the purpose of the study?

Having a new baby or babies for the first time can be a difficult time for some mothers. Mothers can be affected in many different ways after having their baby(ies). We want to understand why mothers may have different experiences in their first two months postnatally. In doing so, we hope that we can provide important information that can lead to mothers being provided with better care and support.

Why have I been chosen to take part?

We are asking first time mothers to think back to the first two months after having their baby(ies). We would like you to complete several questionnaires, which ask you to think about how you found this particular time. This is because we want to understand the kinds of experiences mothers have, some of which may have seemed unusual at that time. We want to ask about this as a few studies have looked into this area and they have found that what have assumed to be unusual experiences may be quite common. We are also trying to find out why these experiences happen.

Do I have to take part?

No. Participation is entirely voluntary; it is up to you to decide whether or not to take part. If you decide to take part, then you only need to complete the online questionnaire. You are free to withdraw from the study at any time prior to submitting your responses. However, once you have submitted your responses you will be unable to withdraw from the study, as responses are completely anonymous.

Who can take part?

We are inviting first time mothers who have given birth in the last two to six months, without a history of psychosis and who are not currently under the care of the perinatal mental health team to take part in this study.

Please confirm that you are eligible to take part by answering the questions below:

- | | | |
|---|-----|----|
| Have you ever been treated for psychosis prior, during or after your pregnancy? | YES | NO |
| Are you under the care of the perinatal mental health team? | YES | NO |

If the answer to either of these questions is *yes*, then participants will be unable to continue with the study. This will send them to the additional information sheet for participants excluded from the study.

What will happen to me if I take part?

You will just need to complete the questionnaires. This will take approximately 30 minutes. The questionnaire can be completed over two or more sittings if this is more convenient.

What are the benefits and risks of taking part in the study?

If you take part in the study, it is hoped that the researcher will gain valuable information regarding mothers' experiences during the first two months after having a baby(ies). It is hoped that the information we get will increase our understanding of mothers' experiences during this time so that mothers can be better supported.

It is possible that some of the questions may seem a little unusual and can be sensitive topics so may temporarily highlight any distress. If you find this is the case for you there are various avenues of support available. Please contact your GP or health visitor as they will be able to offer you assistance if you have any concerns about how you are feeling. There are also organisations that offer support to mothers. These include:

PANDA'S (Pre and Post Natal Depression Advice and Support). PANDAs run a helpline which is open 9am-8pm Monday – Sunday on 0843 28 98 401. They also have a website: <http://www.pandasfoundation.org.uk/index.html>

The Birth Trauma Association. The Birth Trauma Association has a website: <http://www.birthtraumaassociation.org.uk> and offer email support via support@birthtraumaassociation.org.uk

Who will know I am participating in the study?

Only the people you tell will know that you have participated in the study. All responses are anonymous and your answers to the questions will be completely confidential. They will only be seen by the research team (i.e. the researcher and their supervisors).

Who will have access to information collected about me during this study?

All the information collected will be kept on a secure data base that only the researcher will be able to access. If you decide to leave your email address this will be kept separately from the rest of the information you provide. The data from the study will be securely disposed of after five years.

What will happen to the results of the research?

After the study is completed, the results will be analysed and written up for the researcher's doctoral thesis in clinical psychology. The researcher also intends to submit them for publication in a scientific journal. Presentations may also be given at scientific conferences.

If you wish to know the outcome of our research, then you will need to leave your email address and confirm that you agree to receive a summary sheet of the results. Following completion of the study, I will then send you this via email.

What if I am unhappy or if there is a problem?

If you are unhappy, or if there is a problem, please contact Lyndsey Holt on 0151 794 5530 and we will try to help. If you remain unhappy or have a complaint which you feel you cannot come to us with then you should contact the Research Governance Officer at ethics@liv.ac.uk. When contacting the Research Governance Officer, please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

Should you be concerned about how you are feeling following taking part in the study please contact your health visitor, health professional and / or GP and tell them about your concerns. You can of course contact me to discuss any difficulties with the study

Expenses and payments

If you decide to take part in this study you will be eligible to enter a prize draw. At the end of the questionnaires you will be asked to enter your email address so we can contact you should you win the prize draw. Your email address will be assigned a number for the prize draw and kept separately from the information you provide via the consent form and questionnaires. Following completion of the study, these numbers will be entered into a draw using a lottery system. The numbers will be drawn at random and winners will be contacted when data collection is completed. The participants entered into the draw will be eligible for one £100, and two £50 vouchers of their choosing. Only participants who complete the entire questionnaire will be eligible to be entered into the prize draw.

Who is organising the research?

The chief investigator of the research is Prof. Pauline Slade from the University of Liverpool. Prof. Bill Sellwood from the University of Lancaster is the additional supervisor. Lyndsey Holt (Trainee Clinical Psychologist) is the researcher conducting the study as part of her qualification to receive a doctorate of Clinical Psychology.

Who has reviewed the study?

The study has been reviewed by members of the University of Liverpool Research Ethics Committee. A Research Ethics Committee is a group of independent people who review research to protect the dignity, rights, safety and well-being of participants and researchers.

If you have any questions or want to discuss this study further either now or later, then please do not hesitate to contact me on:

Lyndsey Holt
Trainee Clinical Psychologist
Doctorate of Clinical Psychology Programme
University of Liverpool
Email: holtly@liverpool.ac.uk

Or you can contact my supervisor:

Prof. Pauline Slade
Doctorate of Clinical Psychology Programme
University of Liverpool
Email: ps1ps@liverpool.ac.uk

Please confirm you have read all the above information by checking this box

Thank you for taking the time to read this information sheet.

Understanding thoughts and experiences that can happen postnatally

Name of researcher: Lyndsey Holt

INFORMATION FOR PARTICIPANTS

Thank you for taking the time to read the participant information sheet and returning it to us. We are sorry but you can't take part in this study.

This is because this study focuses on unusual experiences in women not currently under the care of the perinatal mental health team or women who have not previously experienced psychosis.

Even though you are not taking part in the study we would like to highlight once again the various avenues of support available if you are currently experiencing any difficulties. Please contact your GP or health visitor as they will be able to offer you assistance if you have any concerns about how you are feeling. There are also organisations that offer support to mothers. These include:

PANDA'S (Pre and Post Natal Depression Advice and Support). PANDAs run a helpline which is open 9am-8pm Monday – Sunday on 0843 28 98 401. They also have a website: <http://www.pandasfoundation.org.uk/index.html>

The Birth Trauma Association. The Birth Trauma Association has a website: <http://www.birthtraumaassociation.org.uk> and offer email support via support@birthtraumaassociation.org.uk

What if I am unhappy about this?

If you are unhappy, or if there is a problem, please feel free to let us know by contacting Lyndsey Holt on holtly@liverpool.ac.uk and we will try to help. If you remain unhappy or have a complaint which you feel you cannot come to us with then you should contact the Research Governance Officer at ethics@liv.ac.uk. When contacting the Research Governance Officer, please provide details of the name or description of the study (so that it can be identified), the researcher(s) involved, and the details of the complaint you wish to make.

If you have any questions or want to discuss this study further either now or later, then please do not hesitate to contact me on:

Lyndsey Holt
Trainee Clinical Psychologist
Doctorate of Clinical Psychology Programme
University of Liverpool
Email: holtly@liverpool.ac.uk

Or you can contact my supervisor:

Prof. Pauline Slade
Doctorate of Clinical Psychology Programme
University of Liverpool
Email: ps1ps@liverpool.ac.uk

Thank you for taking the time to read this information

Thank you for taking part

We appreciate the time you have given to contribute to this study.

If you wish to be entered into the prize draw for the chance to win vouchers of your choice (One prize of £100, 2 prizes of £50), please enter your email address into the box below (if you do not wish to be entered into the draw, please leave the box blank):

The draw will take place once the study has closed, and you will be informed whether you have been successful or not via the email address above.

If you wish to receive a copy of the final report, please enter your email address into the box below (if you do not wish to, please leave the box blank):

We hope that taking part in this study has not caused you any concern. However, if you have found yourself distressed there are various avenues of support available. Please contact your GP or health visitor, as they will be able to offer you assistance. There are also charities that offer support to mothers in distress. These include:

PANDA'S (Pre and Post Natal Depression Advice and Support). PANDAs run a helpline which is open 9am-8pm Monday – Sunday on 0843 28 98 401. They also have a website: <http://www.pandasfoundation.org.uk/index.html>

The Birth Trauma Association. The Birth Trauma Association has a website: <http://www.birthtraumaassociation.org.uk> and offer email support via support@birthtraumaassociation.org.uk

Alternatively, the researcher's contact details are at the end of this information sheet. I am happy for you to contact me if you would like to talk to me about any concerns you may have.

Lyndsey Holt
Trainee Clinical Psychologist
Doctorate of Clinical Psychology Programme
University of Liverpool
Email: holtly@liverpool.ac.uk

Or you can contact my supervisor:
Prof. Pauline Slade
Doctorate of Clinical Psychology Programme
University of Liverpool
Email: ps1ps@liverpool.ac.uk

Appendix E: Consent form



Committee on Research Ethics

PARTICIPANT CONSENT FORM

Title of Research Project: Understanding thoughts and experiences that can happen postnatally

Researcher(s): Lyndsey Holt

Please check box

1. I have given birth to my first baby in the last two to six months
2. I confirm that I have read and have understood the information sheet for the above study. I have had the opportunity to consider the information and am aware of the researchers contact details should I wish to ask questions
3. I understand that my participation is voluntary and that I am free to withdraw at any time, prior to submitting my responses, without giving any reason, without my rights being affected.
4. I understand that I do not have to give my name or contact details and that all information will be confidential. I am aware that if I choose to receive a summary of the report I will need to leave my email address at the end of the questionnaire.
5. I understand that the information I submit will be published as a report.
6. I agree for the data collected from me to be used in relevant future research.
7. I understand that I must not take part if I have been treated for psychosis prior, during or after my pregnancy and/or I am under the care of the perinatal mental health team.
8. I understand that my responses will be kept strictly confidential. I give permission for members of the research team to have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research
9. I understand and agree that once I submit my data it will become anonymised and I will therefore no longer be able to withdraw my data
10. I agree to take part in the above study.

Principal Investigator: Prof. Pauline Slade Doctorate of Clinical Psychology Programme University of Liverpool Email: pslps@liverpool.ac.uk	Student Researcher: Lyndsey Holt Trainee Clinical Psychologist Doctorate of Clinical Psychology Programme University of Liverpool Email: holtly@liverpool.ac.uk
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Appendix F: Alternative path models

Diagrammatic representations of alternative hypothesised models; Model 1 and Model 3.

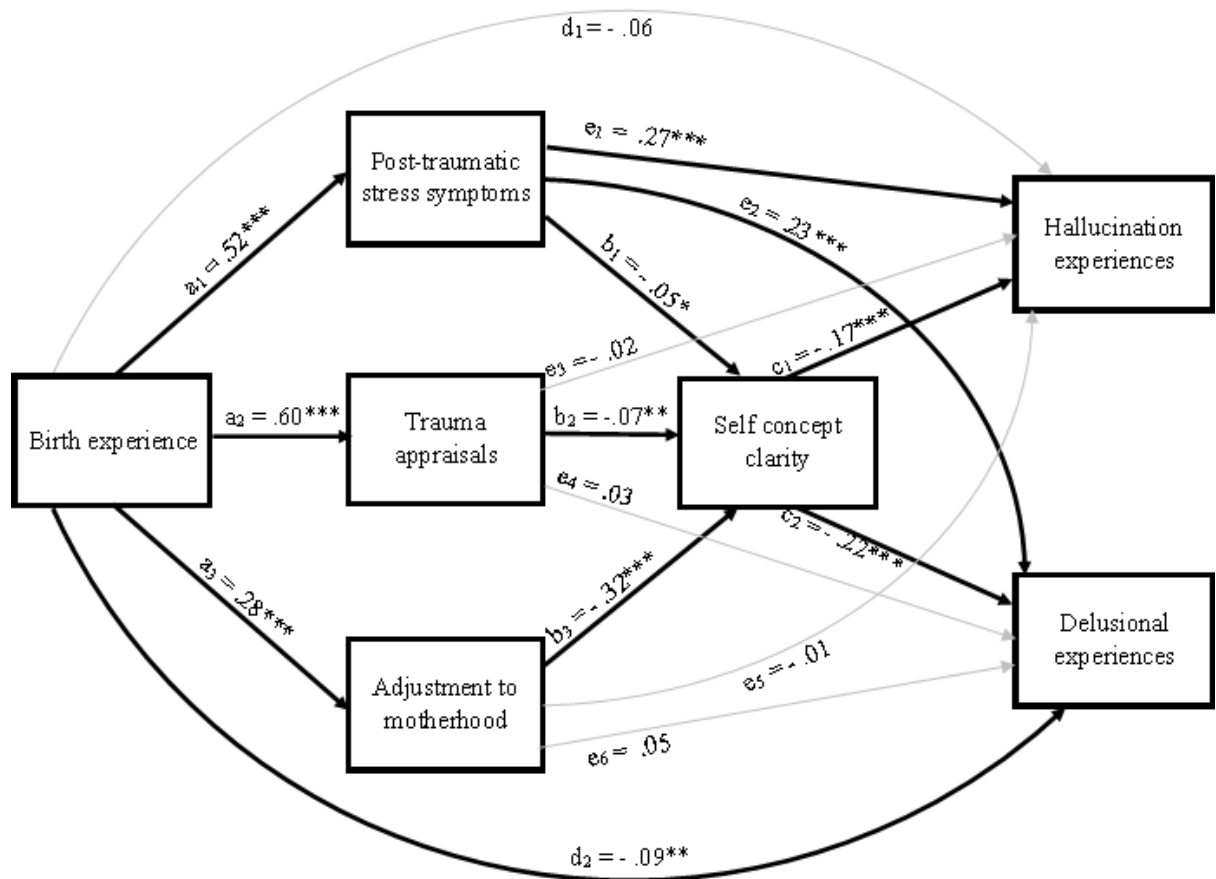


Figure F1. Model 1 exploring the relationship between birth experience and psychotic like experiences (hallucination experiences and delusional experiences) through two stages of mediating variables (i) trauma appraisals, post-traumatic stress symptoms and adjustment to motherhood (ii) self-concept clarity. The regression coefficients for path birth experience*self-concept clarity was constrained to 0. For simplicity error terms and control variables have been omitted. Estimates on the endogenous variables were controlled for by age, ethnicity, marital status, employment status, birth method, education level, depression and sleep quality. Error terms were correlated as appropriate, with all stage one mediator error terms (trauma appraisals, post-traumatic stress symptoms and adjustment to motherhood) correlated with each other and outcome variable error terms (hallucination and delusional experiences) correlated with each other. Estimates shown are standardised betas (β). Significance levels were established via bootstrapped CIs (10,000 resamples). A bootstrapped Chi square test indicated adequate model fit, $\chi^2(1) = 4.13, p = .04$; CFI = 1.00, RMSEA = 0.05, 90% CI [0.01, 0.10] $p = .43$.

———— Significant path ———— Non-significant path

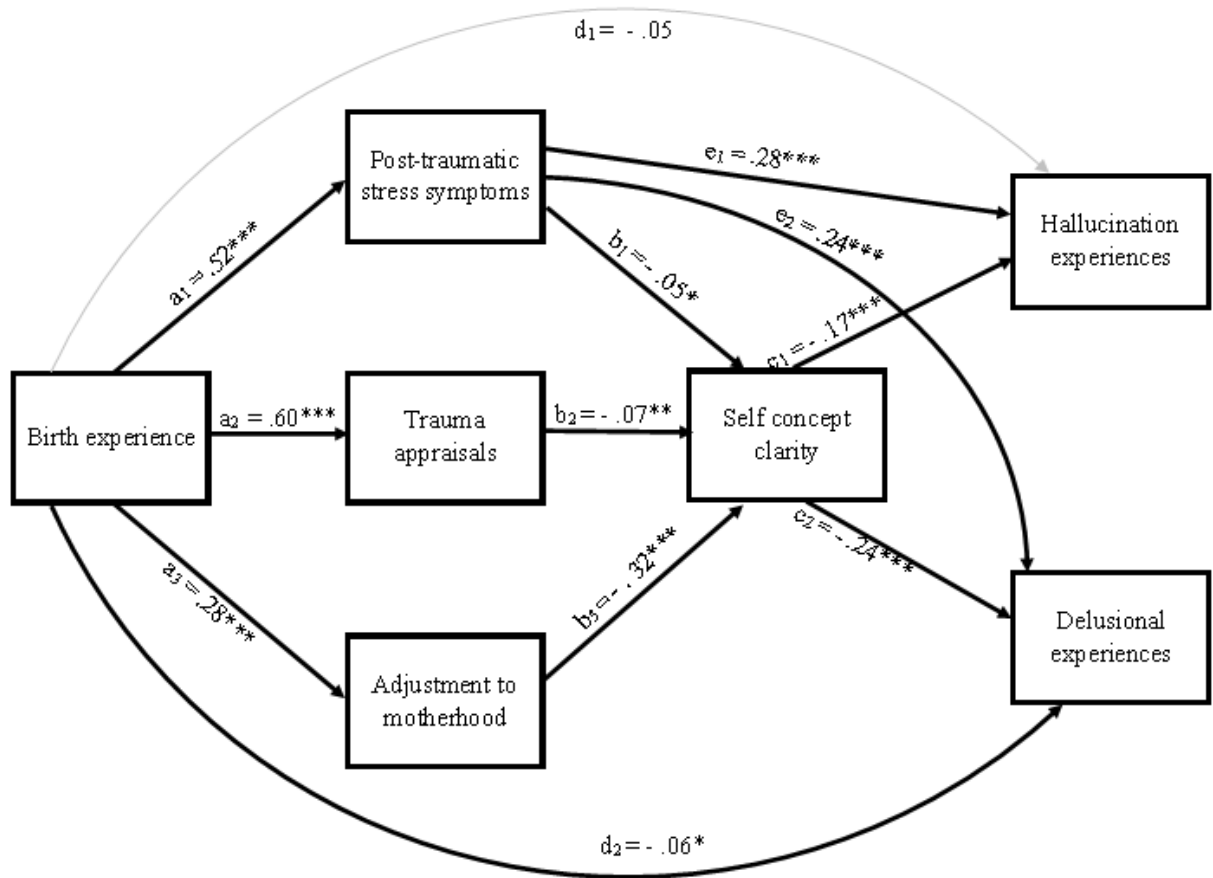


Figure F2. Model 3 exploring the relationship between birth experience and psychotic like experiences (hallucination and delusional experiences) through two stages of mediating variables (i) trauma appraisals, post-traumatic stress symptoms and adjustment to motherhood (ii) self-concept clarity. The regression coefficients for paths birth experience*self-concept clarity, adjustment to motherhood*hallucinations, adjustment to motherhood*delusions, trauma appraisals*hallucinations and trauma appraisals*delusions were constrained to 0. For simplicity error terms and control variables have been omitted. Estimates on the endogenous variables were controlled for by age, ethnicity, marital status, employment status, birth method, education level, depression and sleep quality. Error terms were correlated as appropriate, with all stage one mediator error terms (trauma appraisals, post-traumatic stress symptoms and adjustment to motherhood) correlated with each other and outcome variable error terms (hallucination and delusional experiences) correlated with each other. Estimates shown are standardised betas (β). Significance levels were established via bootstrapped CIs (10,000 resamples). A bootstrapped Chi square test indicated a good model fit, $\chi^2(5) = 8.71, p = .12$; CFI = 1.00, RMSEA = 0.02, 90% CI [0.00, 0.05] $p = .87$.

———— Significant path - - - - - Non-significant path