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**Individual and cultural differences in experiences of
baby/pregnancy brain.**

A thesis presented in partial fulfilment of the requirements for the
Master of Arts in Psychology at Massey University, Wellington
Campus, New Zealand.

175894 Thesis

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2019

Declaration

I declare that this thesis represents my own work, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualification.

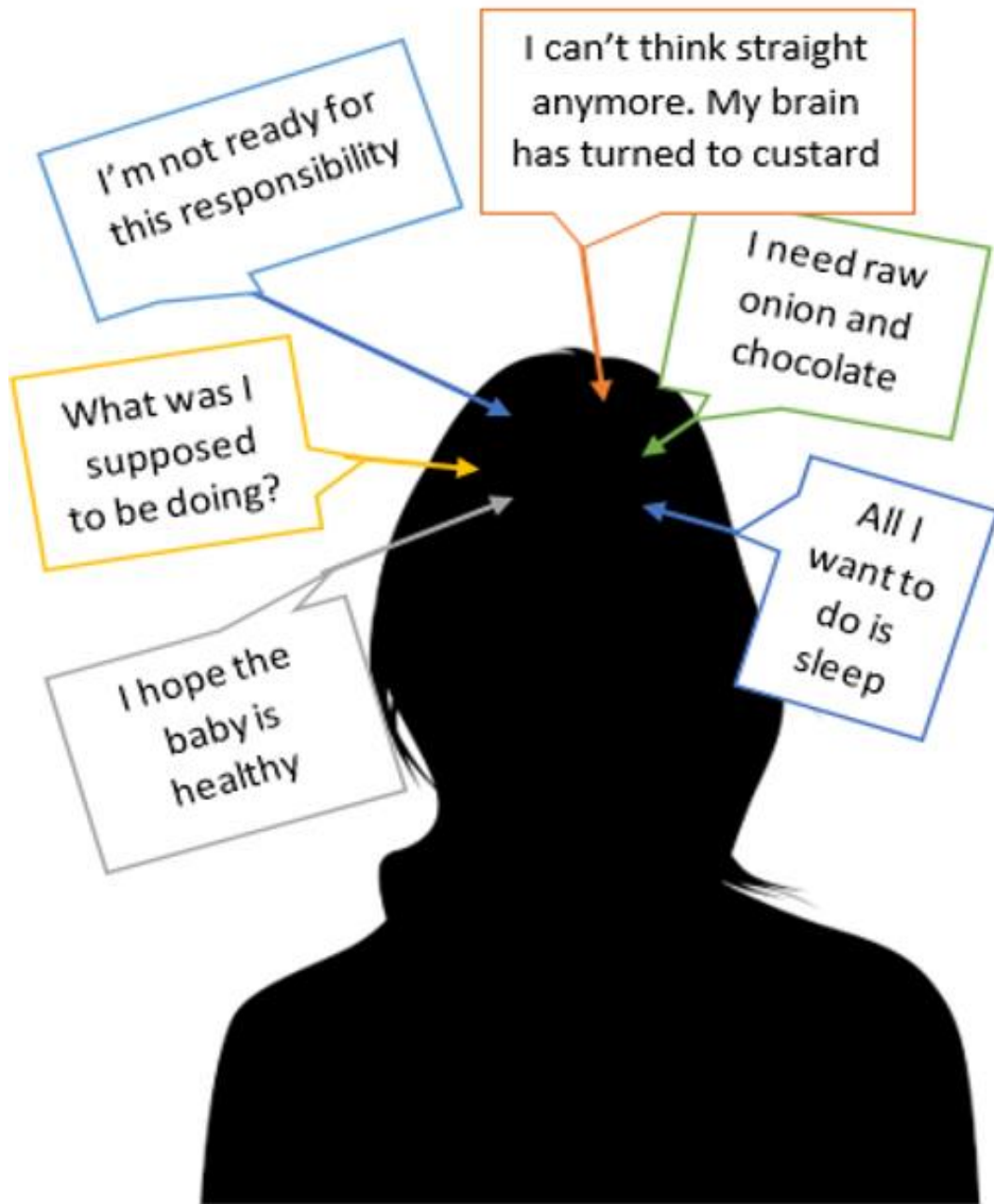
.....

Tanya Turner

Karakia

**Tukua te wairua kia rere ki ngā taumata
Hai ārahi i ā tātou mahi
Me tā tātou whai i ngā tikanga a rātou mā
Kia mau kia ita
Kia kore ai e ngaro
Kia pupuri
Kia whakamaui
Kia tina! TINA! Hui e! TĀIKI E!**

*Allow one's spirit to exercise its potential
To guide us in our work as well as in our pursuit of our ancestral traditions
Take hold and preserve it
Ensure it is never lost
Hold fast.
Secure it.
Draw together! Affirm!*



Pregnancy Brain [Preg-nan-cy Brain]

A side affect of pregnancy where the brain ceases to function properly; therefore, resulting in amnesia like symptoms. Otherwise known as *Momnesia!*

Abstract

Recent research has found that grey brain matter reduces during pregnancy. This loss is thought to result in a phenomena popularly known as 'baby/pregnancy brain' (BB). Research in this area has focused mainly on structural brain changes and quantifying deficits in cognitive function during pregnancy with relatively little attention given to the individual and subjective perceptions of cognitive change. Therefore, this thesis will review current findings regarding BB; and present the results of an online survey regarding BB from the perspective of mothers, midwives and friends/family of mothers. This study utilised a mixed qualitative and quantitative approach. The primary objective was to establish whether experiences of cognitive deficits are universal across New Zealand Māori and European cultures; and secondly, to present particular problems associated with BB and successful coping methods employed to accommodate/avoid BB.

Due to the low response to the surveys, particularly by Māori, midwives and friends/family, the view on the influence of culture on BB experiences was severely compromised. As a result the focus of the research was changed to an analysis of the responses to the 'mother' survey, rather than focusing on group belief systems. This provided insight into how BB is perceived and experienced by mothers, their key coping methods and the possible elements which may have contributed to their accounts of BB.

The mothers surveyed were generally able to cope successfully with the symptoms of BB. However, awareness of the benefits to wellbeing of social support, adequate rest and a healthy lifestyle should be encouraged more strongly in informal social and formal medical care contexts to combat social isolation, cognitive function deficits, anxiety and low moods. Importantly, there is a need to define BB more comprehensively, so that it may be better characterised in research and in discussions amongst/between medical staff and pregnant women.

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List of Abbreviations

BB: Baby/pregnancy brain

GM: Grey matter

GMI: Gestational memory impairment

HRQoL: Health-related quality of life

SPSS: Formerly ‘Statistical Package for the Social Sciences’. A Statistics software package used for interactive, or batched, statistical analysis

SWB: Subjective wellbeing

List of Terms

Atua: God, spiritual deities

Baby Brain: Pregnancy induced changes in cognition, most notably deficits in memory and information processing

Culture: A psychological construct and a collective, dynamic and learned determinant of how we behave

Hapū: To be pregnant, conceived in the womb

Hauora: Wellbeing or the breath which sustains life

Kuia: Respected women providing spiritual and cultural support to women and whanau.

Mana: Prestige, authority, influence

Mate Māori: Sickness, psychosomatic illnesses attributed to transgressions of tapu

Mātauranga Māori: Education, knowledge, wisdom, understanding, skill pertaining to Māori

Medical gaze: A state requiring surveillance, diagnoses, testing and management

Pākehā: New Zealand Europeans

Tangata Whenua: Māori, people of the land

Tapu: Under spiritual and physical restriction

Te whare tangata: “The house of humanity”, the womb or uterus

Tohungas: Traditional spiritual healer

Wairua: Spiritual wellbeing/health

Whakapapa: Ancestry, past influences and future potential

Whānau: Extended family, to be born, to give birth

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Hutia te rito

(The Pregnancy and Parenting Information and Education Curriculum, n.d., p. 2)

*Hutia te rito o te harakeke
 Kei hea te kōmako e kō?
 Kī mai ki ahau
 He aha te mea nui o te ao?
 Māku e kī atu
 He tangata! He tangata! He tangata, hī!
 If the shoot of the flax bush is pulled out
 Where will the bellbird sing?
 If you say to me
 What is the greatest thing in the world?
 I will say
 It is people! It is people! It is people!
 Ki te whei ao (To the glimmer of dawn)
 Ki te ao mārama (To the bright light of day)
 Tiheiwa mauri ora! (There is life!)*

This speaks of the hope and potential of the dawn as it forms into a new day. As parents or whānau of a new baby, the glimmer of light is a metaphor for learning new knowledge. From this knowledge comes understanding, an acknowledgment of us moving from a place of unknowing or a glimmer of light, into the full light of day. Knowledge and understanding shapes the values and ideals we embrace as we move into the world of parenting, breathing life into the new journey we embark on as parents to a new pēpi.

Te Whei Ao can also be likened to a growing child as she or he makes their way into the world from the safety and protection of the mother's womb. A child is born into Te Ao Mārama, the physical world where they take their first breath of life - tiheiwa mauri ora!

Chapter 1

Overview

In western cultures the concept of pregnancy or baby brain (BB) is part of a widespread and negative stereotype (Bates & MacRae, 2015). Our collective knowledge endorses notions that expectant women are cognitively diminished, displaying signs of forgetfulness and an inability to focus on or process information as quickly as women who are not pregnant. Women's periodicals often reflect this, with permanent stretch marks and mental confusion emphasised over the wonders of producing a child. Consequently, mothers-to-be are inclined to expect and are assumed to be slightly dim-witted; and due to confirmation bias, every incident of distraction or 'brain-fog' is falsely perceived to confirm this belief (Davies, 2003). Even the celebrity Reece Witherspoon was quoted as saying "Ever since I had a baby, I can't remember anything. Seriously, this child has stolen my brain" (Ravitz, 2013). Unfortunately, popular bias and negative stereotyping are taken as empirical proof by multiple news outlets worldwide, perpetuating the phenomenon of BB (Hurt, 2011).

What we currently know about baby brain is still in the infancy stage; and cognitive impairment experienced during pregnancy is now attributed to changes in the grey matter of the mothers' brains. Originally, I became interested in the BB phenomena after a discussion with my supervisor and other psychology students with an interest in neuropsychology, who were examining the positive and negative impact of BB on cognition.

It was the lack of consensus about the effects and mechanisms behind these brain changes and what they mean for women, that drew my attention. Review of the BB literature revealed a predominance of research on the cognitive deficits and the possible reasons for them, by means of a vast range of tests measuring everything from memory to information processing speed and physiological tests of, for example, hormone levels. However, findings were inconsistent or were contradicted by other researchers.

Under these circumstances and despite conceding that this area of research is under-researched, academics including Henry and Rendell (2007) deduced that during the postpartum period women's cognition is negatively impacted. Informed then by such research, it is no wonder that pregnant western women conceive that they have a lower quality of life and are out-performed cognitively by women who are not pregnant. And this regardless of other psychological testing conducted by researchers such as Bates and MacRae (2015), which determined that the cognitive performance of pregnant women is not markedly different to that of controls. Therefore, there is no substantive basis for such stereotyping.

Two main topics around baby brain are notable in recent research. Firstly, pregnancy related physiological changes alter cognition to prepare women for mother-to-child attachment (Anderson & Rutherford, 2012; Barha & Galea, 2017; Brunton & Russell, 2008; Hoekzema et

al., 2017). An increasing amount of research has demonstrated less perceivable and more positive adaptations to women's bodies, associated with pregnancy. These neurobiological changes for the mother-to-be, herald behavioural and cognitive flexibility to support the survival of her child (Pawluski, Lambert & Kinsley, 2016). More than that, they suggested that any cognitive changes may actually allow for more efficient communication between parts of the brain; and do not necessarily equate to deficits in function.

Secondly, other studies (Casey, 2000; Christensen, Leach & Mackinnon, 2010; Crawley et al., 2008; Logan, Hill, Jones, Holt-Lunstad & Larson, 2014) propose that cultural beliefs and stereotyping may generate a social context in which women are customarily expected to suffer from cognitive decline during pregnancy, and these expectations then lead them to believe that they are experiencing baby brain, rather than a measurable degree of cognitive deficit.

It was clear that while there is a growing amount of research outlining objective clinical and laboratory studies, there is less report of subjective individual accounts of differences in experience. Moreover, it is not the actual functional capacities of participants that interested me. The articles which questioned the impact of social influences, such as stereotyping of pregnant women, on experiences, drew my attention. As an immigrant to New Zealand, I questioned whether what I knew of BB is the same as what New Zealanders understand it to be. The potential richness of the various social and lived aspects of our understanding of brain changes, was more intriguing (and had attracted less attention) than, in my belief, testing which did not reflect the variety of individual experiences.

After further discussion with my supervisor, my focus narrowed to the specific impact of culture on the perceptions of BB and I removed parts of the survey that I was developing to exclude testing of information processing speed. Instead, we wondered whether social and cultural expectations of cognitive deficit would make women prone to more negative experiences of BB? Alternatively, would some groups of women dismiss any negative symptoms as passing or unimportant?

Further reading prompted me to find out too whether women attributed any cognitive issues to specific causes such as fatigue; and whether they are able to cope with BB. If so how and if not, is there any particular way in which they feel they could be helped to cope better? Then too, do midwives and friends/family observe the same symptoms as the pregnant person is reporting? From this point three surveys were constructed to include the views of midwives and family/friends. And so, the focus changed to the social and cultural aspects of experiences of BB.

From a local perspective, the New Zealand identity has also transformed in contemporary times. This has been due to considerably more engagement by European New Zealanders (Pākehā) with Te Ao Māori (Forsyth, 2018). Forsyth claimed that this has transpired because of the government accepting responsibility in honouring the Treaty of Waitangi and addressing Māori

grievances. Furthermore, Forsyth subscribed to the belief that both identities are shaped, to a degree, through their interaction and engagement with one another. This consequently deepened their understanding of their own cultural 'self' and the other's roles and experiences within the New Zealand socio-cultural contextual framework. He also found that this engagement marked a point at which a third and collective national identity has been created through acculturation and ethnically blended families.

Although there has been contention about the definition of 'self', it is typically agreed that it is an experimental, cognitive phenomenon influenced by social intercommunication between an individual and their lived in world (Cooley, 1956; Mead, 1954). Furthermore, it is this self-awareness and its association with the person's participation in society, which has moulded a particular cultural identity (Forsyth, 2018). So through social interaction, New Zealanders then, are characterised as a nation of industrious problem solvers, with a keen affinity for DIY (Do It Yourself) (Clifton, 2010). In an article listing some of New Zealanders' characteristics, Clifton emphasized expressions like 'suck it up' and 'harden up' as being common manifestations of the New Zealand culture which promotes a stoical outlook. Similarly, she mentioned 'she'll be right' and a degree of conformity to social expectation. In the context of BB, this would suggest gentle self-mockery of any symptoms of cognitive decline as a temporary and perhaps foreseen hurdle which should be, if not ignored, not complained about.

This study therefore gave consideration to academic literature regarding structural changes within the brains of expectant mothers-to-be; negative stereotyping about deficits to the cognitive performance of pregnant women; personal experiences of BB; whether there is disparity between individual experiences; and whether any mothers found effective means to cope with BB or felt that they would have benefited from any particular sources of support. Equally, given that Māori and European New Zealand cultures have some differences in their views about and definitions of concepts like health and wellbeing, it is likely that there are group differences between their experiences, understanding of and coping with cognitive changes, particularly during pregnancy and therefore perceptions of BB.

Following this overview of the BB phenomenon as experienced in pregnancy, Chapter 2 will introduce two main bodies of research on the changes specific to the maternal brain during pregnancy. Chapter 3 examines cultural beliefs and frameworks about BB, pregnancy and cognition from a New Zealand perspective. How this research informed the original research idea with aims and specific hypotheses is explored in Chapter 4. The methodology is outlined in Chapter 5 and research results and a discussion are presented in Chapters 6 and 7 respectively. This thesis concludes in Chapter 8 with a summary including discussions of limitations of this study, areas which require further research and interpretations made as a result of the literature review and survey responses.

Chapter 2

Cognition in Pregnancy

“Deficit’...is neurology’s favourite word- its only word, indeed, for any disturbance of function...Traditional neurology, by its mechanicalness, its emphasis on deficits, conceals from us the actual life” (Sachs, 2011, p91).

1. Literature Review

Historically, neuropsychological assessment sensitive to changes in brain function originated in the 1940s in response to testing for the functional effects of head injuries (Shum, O’Gorman, Myers & Creed, 2013). Such assessment involves interviews and the application of tests to resolve questions around individual behavioural, cognitive and emotional capabilities, particularly as regards dysfunction and pathology (Gurd, Kischka & Marshall, 2010; Shum, O’Gorman & Creed, 2013). Over time and with advances in neurophysiological imaging technology, though, psychological assessment has shifted from a narrow focus on pathology (Lezak, Howieson & Loring, 2004; Shum et al., 2013) to one focused more on establishing residual weaknesses and strengths; and providing evidence for and guidance of neurological impairment and changes, which cannot necessarily be explained or measured with imaging techniques.

Wright and Hopwood (2016) proposed that utilising valid and reliable measures of cognition in pregnancy such as information processing speed (IPS) tests and comparing these to scores of females who are not pregnant, would provide better understanding of the mechanisms concerned with any dynamic behaviour and cognition changes, in this context, in pregnant women. Similarly, Casadevall and Fang (2009, p. 3517) offered that while descriptive science such as subjective recollections of cognition during pregnancy offer insight into the “who,” “what,” “where,” and “when,” of BB, the use of cognitive function tests provides the “how” and “why”. They concluded that understanding these mechanisms would enable more useful identification of cognitive deficits and promote better psychological wellbeing. Similarly, Brunton and Russell (2008) added that by understanding cognition, deficits and issues may be better managed.

To this end, recent articles were selected from the Massey University library database using the following keywords and phrases: baby brain, pregnancy brain, cognition and pregnancy, Māori culture and pregnancy, culture and pregnancy, cognition impairment/deficits during pregnancy and memory and pregnancy. Only peer-reviewed English articles were included. Article titles were considered first for suitability, then abstracts and finally complete article texts.

Thirteen recent academic articles studying cognition in pregnancy were chosen for review of their similarities and differences in the research findings (see Table 1). Of the reviewed articles,

neuropsychological function was tested by means of batteries of tests assessing individual function including memory, recall, IPS, anxiety and depression. Several studies report inconclusive findings (articles 1, 10 & 12) as regards decline of function during pregnancy. In fact researchers (articles 1, 4, 7, 11 & 13) who assert that there are cognitive changes in pregnancy which could result in problems with cognition, also argue that these changes are mild to inconsequential, only documented in some cortical areas and that more research is needed (articles 4, 7, 8, 10 & 13).

As to what causes the changes in maternal grey matter, two primary avenues of thought were noted. Firstly, endocrine related hormonal changes appear to prepare the mother for her maternal, caregiving experience (articles 1, 4, 8, 9 & 11). Hoekzema et al. (2017) determined that these pregnancy induced grey matter (GM) changes support an adaptive process which assists postpartum motherhood development, including mother-to-child attachment. However, Buckwalter et al. (1999, article 4) were adamant that, based on their research investigating the effect of hormonal changes on cognition, there are no discernible hormonal explanations for cognitive deficits during pregnancy, a stand corroborated in later years by Parsons et al. (2004).

Secondly, articles 5, 7 and 12 look to social contexts which generate and perpetuate observations of cognitive changes. Christensen et al. (2010, article 6), Crawley, Grant and Hinshaw (2008, article 7) and Logan et al. (2014, article 12) specifically question whether particular life situations, social expectations and cultural bias against pregnant women's cognitive abilities are not to blame for reports of pregnancy brain. In fact, after conducting longitudinal studies which considered data from both subjective self-reports and objective tests, Casey (2000, article 5) argued that any cognitive changes perceived during pregnancy are most likely due to the personality type and anxious preoccupation of some individuals, rather than objective self-analysis. Moreover, in articles 6, 7 and 12 it was theorised that society, specifically western groups, expect mothers-to-be to display cognitive deficits. As a result, women internalise such expectations and thus misinterpret or possibly imagine symptoms as deficits. This confirmation bias supporting cognitive decline is maintained by popular culture, regardless of whether other confounding issues such as sleep deprivation could be the reason behind any issues reported (Nickerson, 1998).

Indeed, it is the investigation of the effects of confounding factors such as social expectations (which could potentially function as antecedent phenomenon to baby brain symptoms), which is prominently absent from the articles reviewed. Equally, the majority of articles failed to include subjective experiences of participants. When the participant voices were included in larger studies including Casey (2000, article 5) and Crawley et al. (2008, article 7), it was highlighted that participant personality, subjective experiences and cultural expectations had a strong impact on reports of cognitive short-comings. Even Anderson and Crawley (2012, article 1) who included a large number of participants in their research (2041), but missed the opportunity to represent their individual realities of baby brain, acknowledged the need to better analyse the confounding effects of social interaction on the BB phenomenon. Similarly, Davies, Lum,

Skouteris, Byrne and Hayden's (2018) very recent meta-analysis urged that although impairments in cognition are noted in some pregnant women, research data must be interpreted prudently. They admonished that studies to date must investigate and explicate thoroughly the actual lived experiences of pregnancy, including baby brain.

Equally, from more recent social context-driven and evolutionary perspectives, Elyada and Mizrahi (2015, article 9) contend that the neural system of expectant mothers undergoes plasticity in its adaption to the role of childcare, rather than becoming flawed. This theory is supported by articles 1 and 3 which further questioned whether hormone induced neural plasticity actually advantages certain cognitive domains. In the same way, Barha and Galea (2017, article 2) and Elyada and Mizrahi (2015, article 9) offered that while there may be evidence of grey matter reduction during pregnancy, this does not imply deficits, but rather a means of establishing more efficient communication within the brain region.

Perhaps, the changes merely reflect an altered way of cognitive function Hoekzema et al. (2017, article 11). This then begs the question, what causes the perceptions of changes in cognition, from the perspectives of pregnant individuals and the rest of society? Does the aforementioned who, what, where, and when of pregnancy brain, gleaned through subjective recollections, offer deeper insight into individual lived experiences?

It is clear from the articles examined, that academic understanding and research around BB and cognitive changes to the brains of pregnant women are still in their early stages of development. While some studies report differences of brain functionality in some areas, for instance memory, they frequently have not considered the effects of confounding issues like sleep disruption or cultural stereotyping on individual capacity and test scores. Also, there appears to be no or little comments in the examined articles marking the positive increases in function during pregnancy like an improvement in facial recognition reported elsewhere by Pearson, Lightman and Evans (2009). Thirdly, from the articles considered, there is a marked absence of subjective narratives documented, or records of cultural perceptions of BB.

It would certainly be worth investigating whether some cultures such as Māori have a more positive and functional perspective and therefore experiences of cognitive adaptations during pregnancy. Relatedly, if western ideology is more focused on deficits, the medicalised view may be improved on by highlighting more functional coping methods and cultural perceptions of indigenous groups. This, with a view to increasing the wellbeing of all mothers-to-be and ensuring that positive cultural values and beliefs are supported throughout healthcare.

Table 1: Critical appraisal of and questions raised by articles relating to cognitive changes in pregnant women (adapted from JBI-QARI; Briggs, 2014).

Article	Key issues	Theory Frame work	Conclusion	Support baby brain?	Not included	? raised	Limitations?	Study design	Participant #	Participant voice	What was measured ?	What causes change?	Relevance to my study?
1 Anderson & Rutherford (2012).	View cognitive changes in social context Evolutionary psych-adaptive advantage. Past studies contradictory	Working hypothesis	Deficit on some memory tasks. Explore confounds	Yes, positive & adaptive function.	Subjective experiences.	Human results ≠ animals? Does neural plasticity advantage some cognitive domains?	New & need more research. Tasks abstract-lack validity + relevance.	Clinical study with Correlational research methods.	2041	No	Memory, Recall, General cognition, Info processing speed.	Motivation, distraction, hormones.	Highlights importance of social interaction & confounding factors.
2 Barba (2017).	Maternal brain plasticity prepares for care of child. Remain 2 years after birth.	Working hypothesis	Do not assume greater grey matter volume = ↑ function. More efficient brain communicate-on?	Yes, unknown long-term implication	Subjective experiences. Confounding factors	Does less grey matter = more efficient communication within brain regions?	New & need more research.	Review.	0	No	n/a	Hormonal brain plasticity, maternal experience.	Pregnancy = life-changing event from social and biological perspective.
3 Brunton & Russell (2008).	Brain change optimizes foetal growth. Mental health disturbances often post pregnancy Understanding cognition = management.	Explanatory frame work	Pregnancy hormones = optimal pregnancy outcome. Post-partum normalization of chemical = depression in some.	Yes, through changes in neuroendocrine systems.	Subjective experiences.	How do behaviour and social aspects affect chemicals ?	New & need more research.	Review.	0	No	n/a	Hormonal brain plasticity.	Chemical changes affect moods and experience.
4 Buckwalter et al. (1999).	Effects of pregnancy on cognition and mood.	Practical ideal type	Cognitive deficits ≠ mood issues. Hormone changes ≠ cognitive change.	Yes. Impairment in some areas.	Subjective experiences.	Mechanisms for cognitive changes?	Confounders? Some mood + cognitive changes normal in menstrual cycle.	A repeated measure Design.	19	No	Dysphoria, Anxiety, Hormone levels.	Hormones. Mechanism not determined.	Cognitive deficits are independent of mood, but hormones affect mood/experience.
5 Casey (2000).	Longitudinal studies = no cognitive	Practical ideal type	Personality + context affect memory-	No, perception difference-	Subjective experiences.	Organised participants less	Need naturalistic	Longitudinal study: self-report object	52	Yes	Anxiety, personality, memory.	Personality & particular life	Subjective experiences influence

	differences.		unclear how	s.		deficits?	qualitative	-ive test data			depressio- n	situations.	cognitive deficit
6 Christensen et al. (2010).	Does Pregnancy = cognitive deterioration?	Practical ideal type	No deficits. Emotional bias.	No.	Subjective experiences.	Volunteer participant may be anxious type?	Need qualitative data too.	Longitudinal.	+100	No	Cognitive speed, memory, recall.	Social expectation?	Highlights social bias
7 Crawley et al. (2008).	Pregnancy = mild cognitive deterioration.	Practical ideal type	Mostly cultural stereotype.	Maybe, but cultural stereotype	Other confounds e.g. depression	Compare to larger samples	Measures in different locations	Cross-sectional.	S1:75 S2:30 S3:96 = 201	Yes	Preg/not cognitive speed + beliefs	Mild preg. affect + Cultural stereotype.	Cultural expectations
8 de Groot et al. (2006).	Pregnancy = cognitive deterioration	Practical ideal type	Cognitive deficits real-evident till 32 weeks postpartum.	Yes, but in memory not info processing speed.	Pre-preg measures, confounds, select bias, subjective	Confounds like sleep problems	Selection bias + no subjective info.	Longitudinal Parallel test versions.	107	No	Memory, speed.	Biological, hormonal changes in pregnancy.	Pregnancy ≠ homogenous experiences.
9 Elvada & Mizrahi (2015).	Maternal plasticity in sensory systems.	Working hypothesis	Neural circuit modified in transition to motherhood.	Difference -s in brain protocols ≠ deficits.	Key brain connections in neuronal plasticity.	neural mechanisms involved	Only animal + auditory system.	Review.	0	No	Cortical processing in auditory system.	Hormones, plasticity adaption to motherhood.	Biological changes support motherhood.
10 Henry & Rendell (2007).	Pregnancy= memory issues, tests inconsistent.	Practical ideal type	Subtle, cognitive deficit like normal aging.	Yes, in some areas.	Effects impacting memory + behaviour measures.	Confounds + small sample sizes	Causes of deficits.	Meta-analysis of studies.	0	Some	Memory.	Not fully discussed.	Participants can self-assess objectively.
11 Hoekzema et al. (2017).	Long-lasting changes in maternal brain but not fathers.	Practical ideal type	Changes in GM volume = adaptive process.	No, function deficits, just changes	Factors contributing to observed GM changes.	Confounds, effect of environment + lifestyle	No participant experiences	Prospective ('pre'-post pregnancy) study - Longitudinal	45	No	Specialization of the neural network.	Hormones, biological process of pregnancy.	GM changes= social process serving transition into motherhood.
12 Logan et al. (2014).	Pregnancy issues tests inconsistent.	Practical ideal type	Subjective experiences affect wellbeing not function.	Subjective yes, objective no.	Real world context for testing	Difference subjective vs neuro test results?	Lack confounds e.g. depression.	Longitudinal controlled.	42	Yes	Neuropsychological domains.	Negative social stereotype	Self-report = deficits in wellbeing but not function.
13 Davies et al. (2018).	Cognitive impairment during pregnancy	Practical ideal type	Cognitive deficits. Need qualitative info	Yes	Subjective experiences-real world impact.	Effects on everyday function and wellbeing	Lack of subjective info +	Meta-analysis of studies	709: 20 studies	No	General cognitive, memory, & executive functioning	Reductions in brain grey matter	Lack of subjective info.

2. Factors Associated with ‘Baby Brain’

As reported by Hensch (2005, p.877), in order to present humans with the most adaptive neurological representation at any given stage of life, their brain circuitry is shaped and altered during what is referred to as ‘critical periods’. Pregnancy is one such period. Leuner and Sabihi (2016) attested that modifications to maternal brains occur in multiple areas including the amygdala, hypothalamus, olfactory bulb, hippocampus, nucleus accumbens; and parietal, auditory, somatosensory and prefrontal cortical regions.

Research by neuro-scientists and psychologists has presented mechanisms that motivate cognitive and behavioural changes involved in BB experiences. These range from the evolutionary benefits of maternal neural plasticity in brain areas which support the care of a child, to changes in neuroendocrine, neurochemical, morphological, functional and activational systems within an interdependent network (Barha, 2017; Brunton & Russell, 2008; de Groot et al., 2006; Hoekzema et al., 2017; Leuner & Sabihi, 2016). However, our understanding of the underlying mechanisms and importance of these cognitive changes is still developing, and more research to establish exactly how maternal cognition changes and if/how it persists, has been called for by many scientists (Hampson et al., 2015; Slattery & Hillerer, 2016).

2.1. Neurobiological Changes

2.1.1. Structural Grey Matter Changes

One of the most obvious changes to brains during pregnancy is the marked decrease in the volume of the maternal brain, specifically to GM (Oatridge et al., 2002). This is linked to peripartum related adaptations in structural and morphological characteristics of maternal neurons, generally referred to as the maternal circuitry according to Numan (2007). This circuitry connects with the medial prefrontal cortex (mPFC) and the limbic system; and is necessary so that the expectant mother can cope with growing stresses and caregiving tasks related to her new maternal environment and role (Slattery & Hillerer, 2016). Therefore behavioural and cognitive performance of expectant women is impacted in preparation for motherhood.

2.1.2. Hormones and Mood Changes

From a physiological view, pregnancy is characterised by hormonal changes in progesterone and estradiol, which increase by 70% and 30% respectively (Henry & Sherwin, 2012). Similarly, measures of oxytocin, a neuropeptide which functions as both a neuromodulator and as a hormone affecting social cognition and behaviour and is recognised as regulating maternal behaviour as regards caregiving and attachment relationships, also rise (Carter, 2014; MacKinnon et al., 2014; Strathearn, 2011). By suppressing hypothalamic pituitary adrenal (HPA) stress hormones, oxytocin reduces physiological and psychological anxiety reactions to stressors, serving as a protective feature for the expectant woman (Bartz, Zaki, Bolger & Ochsner, 2011; Heinrichs et al., 2006). Henry and Sherwin stated that BB may be attributed to these hormonal fluctuations, which may impact some cognitive functions. Buckwalter et al.

(1999) added that hormone surges also impacted women's moods and experiences of pregnancy.

Studies investigating the effect of mood on cognition though, have shown mixed results with some (e.g., Niemiec & Lachowicz-Tabaczek, 2015) supporting the notion that a positive mood decreases cognitive functionality, while others (e.g., Bohn-Gettler & Rapp, 2011; Buckwalter et al., 1999) reported no evidence of any correlations between memory deficits in pregnancy, increased steroid hormones or mood states. Rather, Ziegler (2014) claimed that ultimately, based on mood, one creates expectations in one's ability to process information. Wegener, Petty and Smith (1995) insisted that information processing is impaired if the nature of the information differs from the individual's mood. Therefore, if an expectant women is confronted with unpleasant information which is incongruent with her positive mood, she will process this data more effectively.

More recently, Niemiec and Lachowicz-Tabaczek (2015) recommended instead that a good mood may cause individuals to be less motivated to perform cognitive tasks, while Casey (2000) suggested too that subjective experiences influence perceptions of cognitive deficits. This provides a plausible explanation for some experiences of BB if the women afflicted tend to have a more positive temperament and are thus less motivated to perform cognitively and/or perceive the deficits to be context dependent.

2.2. Cognitive Dimension

2.2.1. Attention and Motivation

According to van Iddekinge, Aguinis, Mackey and DeOrtentiis (2018), many theorists believe that motivation and cognitive ability are the key determinants of performance and share an interactive relationship. Ability is related to knowledge, while motivation directs and maintains the intensity of effort and behaviour (Blau, 1993; Campbell, 1990; Diefendorff & Chandler, 2011; van Iddekinge et al., 2018). From this, one may surmise that an expectant woman who supports the concept of BB, could be less motivated to perform cognitively, thereby impacting her performance negatively. This was supported by Henry and Rendell (2007), who asserted that effortful cognition is more likely to be decreased during pregnancy.

Relatedly, pregnancy heralds a major life-change, particularly for a first time mother-to-be. Therefore, Brindle, Brown, Brown, Griffith and Turner (1991) proposed that cognitive shortcomings may result from an individual becoming less attentive to extraneous demands, rather than experiencing actual events of functional . This related to a study by Raz (2014) in which he utilised scalp recorded Event-Related-Potentials and concluded that pregnant women's brains change and consequently, so does the manner in which they draw on neurological resources when processing emotional stimuli. This reflected a change in what motivated their behaviour and altered how they allocated attention, resulting not in a slowness in mental function, but rather in a dynamic way of responding to situations (Christensen, Poyser, Pollitt & Cubis, 1999; Raz, 2014).

2.2.2. Information Processing Speed (IPS)

IPS is a measurement of one's cognitive and broad processing speed, with regards to how an individual accomplishes easy tasks and over-learned exercises like basic mathematic questions automatically, in a restricted timeframe (Cohen-Zion, Shabi, Levy, Glasner & Wiener, 2016; Danthiir, Wilhelm & Roberts, 2012; Doebler, 2015). More simply put, it is the ability to quickly, spontaneously and unconsciously make use of data, as it is presented. Kail (1994) added that because all human cognition involves degrees of information processing, IPS therefore impacts all cognitive processes and consequently what we think and how we behave. Additionally, incorrectly interpreted information has potentially adverse effects on decision making and behaviour too.

Under those circumstances, IPS, in this context as a symptom of BB, is of increasing interest to researchers as it is believed to facilitate insight into general mental abilities, particularly reasoning and fluid intelligence (Danthiir et al., 2012, Krumm et al., 2009, Sheppard & Vernon, 2008). Even so, debate continues about common measures as, according to Cepeda, Blackwell and Munakato (2013), these measures blur the lines between executive control and processing speed and therefore comprise decision making, data manipulation in working memory and goal maintenance. Moreover, individuals process data at varying speeds and these individual and fluctuating speeds can reflect age-related modifications in neural processing too, such as increases and decreases of axonal myelination over a lifespan as well as changes to the brain's GM during pregnancy (Cepeda et al., 2013; Charlton et al., 2006, 2008; Hoekzema et al., 2017).

2.2.3. Memory/Executive Function

Another common complaint by pregnant women is that the physiological changes associated with pregnancy have negatively affected their memory (Brindle, Brown, Brown, Griffith & Turner, 1991). This phenomenon was termed "gestational memory impairment" (GMI) by Brett and Baxendale (2001, p. 354) who noted that it is generally reported in the second and third trimesters; and suggested glucocorticoid and progesterone increases are probably responsible. However, researchers including Christensen et al. (2010), de Groot et al. (2006) and Henry and Rendell (2007) disagreed, highlighting that evidence to support GMI is either lacking, contradictory or the deficits are short-lived.

2.3. Other Factors

2.3.1 Normal Aging

Irrespective of education, race or mood, symptoms of cognitive decline (especially related to executive functions and IPS) become more frequent towards mid-life (Epperson et al., 2013; Epperson et al., 2015). Deficits are noted particularly in the areas of working memory, organization, attention and focus (Epperson et al. 2011). Rabinowitz and Lavner (2014) added that finger tapping rates slow and decrease in accuracy with age. It is therefore feasible that

BB experiences in older women may then be related at least in part to age related decline in such areas as IPS.

Relatedly, in other studies, Barha and Galea (2017) and Hoekzema et al. (2017) maintained that pregnancy induced changes in the brain are long-term, particularly in the hippocampus which relates to memory function. Most studies though, do not venture past two years postpartum. What is more, other research data (e.g., Cook & Marsiske, 2006) suggests that lasting mild cognitive impairment in older individuals could in itself could be of clinical importance. Older women may have a higher risk for developing Alzheimer's according to Cook and Marsiske and systems of deficit attributed to BB may instead be early markers for Alzheimer's.

Therefore, it is important to establish a norm at which BB symptoms should resolve, if indeed they do. If indications of changes to brain function past a certain point in time are still apparent past this norm, the individual should be examined to screen for other possible causes, including neurodegenerative disorders. It would therefore be prudent to focus more research on the long-term effects of pregnancy on the brain (past the two years postpartum mark), and how this relates to an aging brain. Additionally, is an older individual's brain affected by pregnancy at the same rate or to the same degree as a younger individual's?

2.3.2. Evolutionary Adaptions

From an evolutionary perspective, survival of a species relies on the ability of mothers to nurture and protect their vulnerable offspring (Pearson, Lightman & Evans, 2009). Numan and Woodside (2010) held that this caregiving function is created and reinforced by brain plasticity and behavioural adaptations. One of the most recorded changes to the expectant mother is her steadily increasing hormone levels throughout pregnancy, which in turn affects her systems of emotion processing, such as to fear (Pearson et al., 2009).

More recently, Peltola et al. (2014) conducted research to establish whether the impending, heightened need for mothers to monitor their nonverbal babies' emotional cues and states, stimulates maternal cognitive adaptations. Or do all women have this ability regardless of bearing children? The researchers measured the adapted frontal event-related brain potentials of mothers and nonmothers for comparison. This provided neural markers frequently associated with processing facial expressions, which convey emotional signals. They found that in keeping with other academic literature, mothers displayed superior abilities to nulliparous females in differentiating between positive (pleasure and comfort) and negative (distress and discomfort) facial expressions (Batty & Taylor, 2003; Leppänen, Kauppinen, Peltola & Hietanen, 2007; Rilling, 2013; Schupp et al., 2004).

The neurological mechanisms responsible for emotion processing involve the amygdala and prefrontal cortex. These detect threat related indicators like scared faces in various contexts and generate an assortment of behavioural, cognitive and physiological reactions, including

attentional vigilance (Davis & Whalen, 2001; LeDoux, 1996; Mogg, Garner & Bradley, 2007). Anxiety then, is delineated as cognitive bias, especially in selective attention and stimulus evaluation as found by Raz (2014), which focus on processing threat cues, particularly in pregnancy (Pearson et al., 2009). Such biases are considered to under-lie vulnerability to and individual differences in experiences of anxiety (Beck & Emery, 1985; Mogg, Garner & Bradley, 2007; Williams, Watts, MacLeod & Matthews, 1998).

Likewise, in a review of empirical research data, Kim (2016) concluded that the dynamic changes to a mother's brain during pregnancy are critical and directly related to whether or not the woman's cognitive processes will adapt to facilitate her bonding well with the child; and whether the child will, in turn, enjoy positive developmental outcomes. Pearson et al. (2009) cited the woman's increased vigilance to potential threats as an example of such a psychological adaption. Generalised worrying and refocusing on the child's wellbeing rather than on other everyday tasks (which the mother deems as being of secondary importance), could thus be offered as a symptom of BB, or as a cause of memory problems experienced in this period. Unfortunately, researchers note too that such brain plasticity paired with stress, could make an individual more responsive to emotional vulnerabilities such as depression and anxiety; and that research must be conducted to support interventions for such women (Kim, 2016; Pearson et al., 2013).

2.3.3. Social Support

There are naturally occurring foils to emotional vulnerabilities though. Starting with Durkheim's (1951) work, studies have consistently promoted social support, consisting of subjective and objective support and support utilization, as a protective asset for maintaining and improving health-related quality of life (HRQoL) (Fekete et al., 2014; Garrido-Hernansaiz, Heylen, Bharat, Ramakrishna & Ekstrand, 2016; Pichon, Rossi, Ogg, Krull & Griffin, 2015; Sarason, Sarason & Gurung, 2001; Xiaowen et al., 2018). According to Xiaowen et al. quality of life is, in turn, assessed across five domains comprising usual activities, mobility, self-care, depression and anxiety. Furthermore, after careful examination of the effects of these domains on wellbeing, Xiaowen et al. concluded that social support is only valid if and when symptoms of depression and anxiety have been successfully treated.

During pregnancy in particular, emotional and practical social support acts as a buffer to stress (Sarason et al., 2001). Cobb's (1976, as cited in Sarason et al., 2001) seminal paper described such support as involving relationships which allow an individual to (a) feel loved and looked after; (b) valued and esteemed; and (c) be part of a social collective in which they could rely and be relied on. If all these points are met, Cobb believed a person would feel that they have access to social capital. In turn, such capital, builds and reinforces interrelationships within a collective of people; and means that members of a group could correct and/or counterbalance an individual's inadequacies, in this context, symptoms of BB like forgetfulness (Smith & Polanyi, 2003).

2.3.4. Personality Type

However, it may be that an individual experiencing BB is actually always a 'bundle of nerves' by nature. The American Psychological Association (2017) has outlined a variety of patterns of behaviour, cognition and emotions which combine to indicate different personality types.

Although these patterns change over the course of a day, McCrae and Costa (2003) held that an overview of how an individual thinks, feels and reacts suggests a personality type. This type becomes stable in adulthood. The most prominent personality characteristics include neuroticism, agreeableness, extraversion, openness to experience and conscientiousness (Grant, Langan-Fox & Anglim, 2009). More recently, Isik and Cengiz (2018) suggested that humour should be considered as a trait too.

Diener, Suh, Lucas and Smith (1999) posited that, "it appears a substantial portion of stable subjective well-being (SWB) is due to personality" (p. 214). In fact, Lucas (2008) and Kim-Prieto, Diener, Tamir Scollon and Diener (2005) all reported that personality type is responsible for half of the differences in SWB, as it relates to individual's reactions to emotional stimuli, response intensity and duration of reactions. In particular, extraversion and neuroticism character traits are the dominant SWB predictors (Lucas, 2008; Lucas & Diener, 2008). Neuroticism is expressed as more negative responses to situations and health-related symptoms while conversely, extraverts tend to report more positive experiences (Larsen & Eid, 2008; Rusting & Larsen, 1997). Thus, when interpreting BB symptoms, more intense experiences of negative perceptions may be related, in part, to a neurotic personality type rather than actual deficits and even may fuel anxiety and/or depression.

2.3.5. Anxiety and Depression

Indeed, anxiety and depression are often comorbid and prevalence in pregnancy sits between 5% and 38% (Hernandez-Reif, Kendrick & Avery, 2018; Mukherjee et al., 2016). This not only negatively affects the wellbeing of the mother-to-be's (Hernandez-Reif et al., 2018), but ultimately presents several negative outcomes for her child (e.g. insecure attachment, childhood behavioural issues, cognitive delays and language delays) (Agnafors et al., 2016; Field, 2011; Murray, Fearon & Cooper, 2015; Netsi et al., 2015; Powell, Cooper, Hoffman & Marvin, 2014; Teti, Gelfand, Messinger & Isabella, 1995; Thomas, Letourneau, Campbell, Tomfohr-Madsen & Giesbrecht, 2017).

Relatedly, while a home can be therapeutic, domestic responsibilities can add to stress levels for time-strapped women who frequently assume most responsibility for home maintenance, particularly for those who work too. (Hertz, 1988). In fact, researchers have found that chronic stress is strongly associated with flatter diurnal cortisol slopes (measurements of a hormone produced by the hypothalamic pituitary-adrenal axis), which are related to heightened psychological distress (Abercrombie et al., 2004; Adam & Gunnar, 2001; Giese-Davis, Sephton, Abercrombie, Duran & Spiegel, 2004; Lauc, Zvonar, Vuksic-Mihaljevic & Flögel, 2004; Sjögren, Leanderson & Kristenson, 2006). This includes symptoms of stress and

anxiety, depression, complaints of a lack of social support, diminished coping skills and impaired interrelationship functioning (Abercrombie et al., 2004; Giese-Davis, 2004; Lauc et al., 2004; Sjögren et al., 2006).

Saxbe and Repetti (2010) offered, though, that high cortisol levels and negative effects on wellbeing can be attributed, at least partly, to issues such as problems managing daily tasks and a perceived inadequacy of self-efficacy due to disorganisation in home and/or work environments. In fact, McMains and Kastner (2011) found that being disorganised can overload the information processing centres of the brain. Selhub (2015) countered that research has shown that in order to improve perceptions of one's wellbeing and counteract some aspects of stress and anxiety, one should adopt more organised daily activities. Furthermore, by utilising time more efficiently, pregnant mothers could not only be more productive, but also have more time to pursue more enjoyable tasks which support a sense of wellbeing.

More recently, Hernandez-Reif, Kendrick and Avery (2018) affirmed that the symptoms displayed by pregnant women with anxiety and/or depression, provide a context for the social, emotional and cognitive problems their children may display too at a later stage. Such women tend to be withdrawn, hostile and/or demonstrate a flat affect (Cohn, Matias, Tronick, Connell & Lyons, 1986; Field et al., 1988; Field, 2011; Murray, Fearon & Cooper, 2015). Therefore, as the incidence of pregnant women with mood symptoms is substantial, early recognition of symptoms and interventions will benefit both the mother and her child (Zeanah, Larrieu, Heller & Valliere, 2000).

2.3.6. Sleep Deprivation and Micronutrient Deficiency

There are however other issues which impact on depression, anxiety, general cognition and BB symptoms. Chang, Pien, Duntley and Macones (2010) stated that 75-83% of pregnant women are affected by sleep loss, caused by hormonal, psychological and physical changes. Sleep deprivation results in many cognitive functioning impairments such as to executive function, attention and memory, the loss of which are frequently cited as evidence of BB (Frenda & Fenn, 2016).

As reported by scholars like Frenda and Fenn (2016), in order to attain optimal brain performance 7-9 hours of sleep is required per night. In fact, experimentation shows that to respond promptly to stimuli, curb impulsivity, sustain attention, make the minimum of errors, learn new information, acquire skills and adapt or change strategies according to failures, sleep is imperative (Alhola & Polo-Kantola, 2007; Dixon, 2014; Harrison & Horne, 1998; Lim & Dinges, 2010; Wimmer, Hoffman, Bonato & Moffitt, 1992). Kataja et al. (2017) suggested that due to insomnia, cognitive deficits during pregnancy may reflect the early stages of the mother-to-be's maladaptation to her new role. Consequently, more research is required around antenatal cognitive processes so that if Kataja et al. are correct, such women may be better supported.

Similarly, maternal micronutrient deficiencies are common, particularly in low-income groups who may not be able to afford multivitamin and mineral supplements. Consequently, some cultural practices which may favour certain types of food and therefore nutrient intake which fails to accommodate the increase of blood volume required to meet foetal and maternal physiological needs (Christensen, Leach & Mackinnon, 2010). Globally, Cogswell, Parvanta, Ickes, Yip and Brittenham (2003) indicated that about 42% of pregnant women are thought to be anaemic, with about half that number anaemic due to an iron deficiency.

In research by Lukowski et al. (2010), it was asserted that an iron deficiency impacts negatively on the dopamine system; executive functions like inhibitory control, planning and set-shifting; and memory tasks. Also, fetuses developing in such circumstances and then experiencing ongoing iron deficiency after birth, manifest problems in motor, affective and cognitive domains. In such contexts BB experiences of cognitive deficits may point to a nutritional shortcoming rather than a psychological or cultural manifestation. Therefore, Christensen et al. (2010) recommended that antenatal healthcare workers urgently screen for and promote micronutrient education and access to pregnant women, for the health of the mother and baby.

3. Summary

Changes to cognitive, behavioural and emotional function in one's everyday life, coupled with inadequate social support, can often negatively impact on vocational and social outcomes, independence and psychological well-being (Shum, 2015). Shum suggested that this could have lasting effects not only for the individual, but also their families. In fact, mental health disorders like maternal depression are well documented in academic literature as triggered by pregnancy and potentially negatively affecting the mother, her partner and their child/children (Fletcher, Matthey & Marley, 2006; Gawlik, et al, 2014; Gaynes, et al., 2005; Stowe, Hostetter & Newport, 2005).

Specifically, such affects tend to alter familial and wider social relationships due to the couple unintentionally marginalising one another as a source of disunity and disagreeableness rather than as supportive. However, researchers were quick to caution that what is perceived by pregnant women as cognitive deficits, does not always mirror empirical and objective neurocognitive test performances, particularly if the woman is suffering from depression or fatigue commonly associated with pregnancy (Brett & Baxendale, 2001; Cook & Marsiske, 2006; Grut et al., 1993; Henry & Rendell, 2007; Millikin, Rourke, Halman & Power, 2003; Vermeulen, Aldenkamp & Alpherts, 1993). Given such facts, it is important to accurately determine an individual's lived in experience of pregnancy, taking into account such factors as her SWB, her functional capacity and social support, for an holistic perspective of her BB perceptions.

In summary, the fundamental mechanisms causing cognitive performance deficits in pregnancy are unclear. Moreover, pregnancy is characterised by a range of etiologies such as hormonal changes, cultural stereotypes, sleep and micronutrient deprivation, a more negative perspective of symptoms by neurotic personality types and a lack of motivation. All these may impact on perceptions of BB as shown in Figure 1.

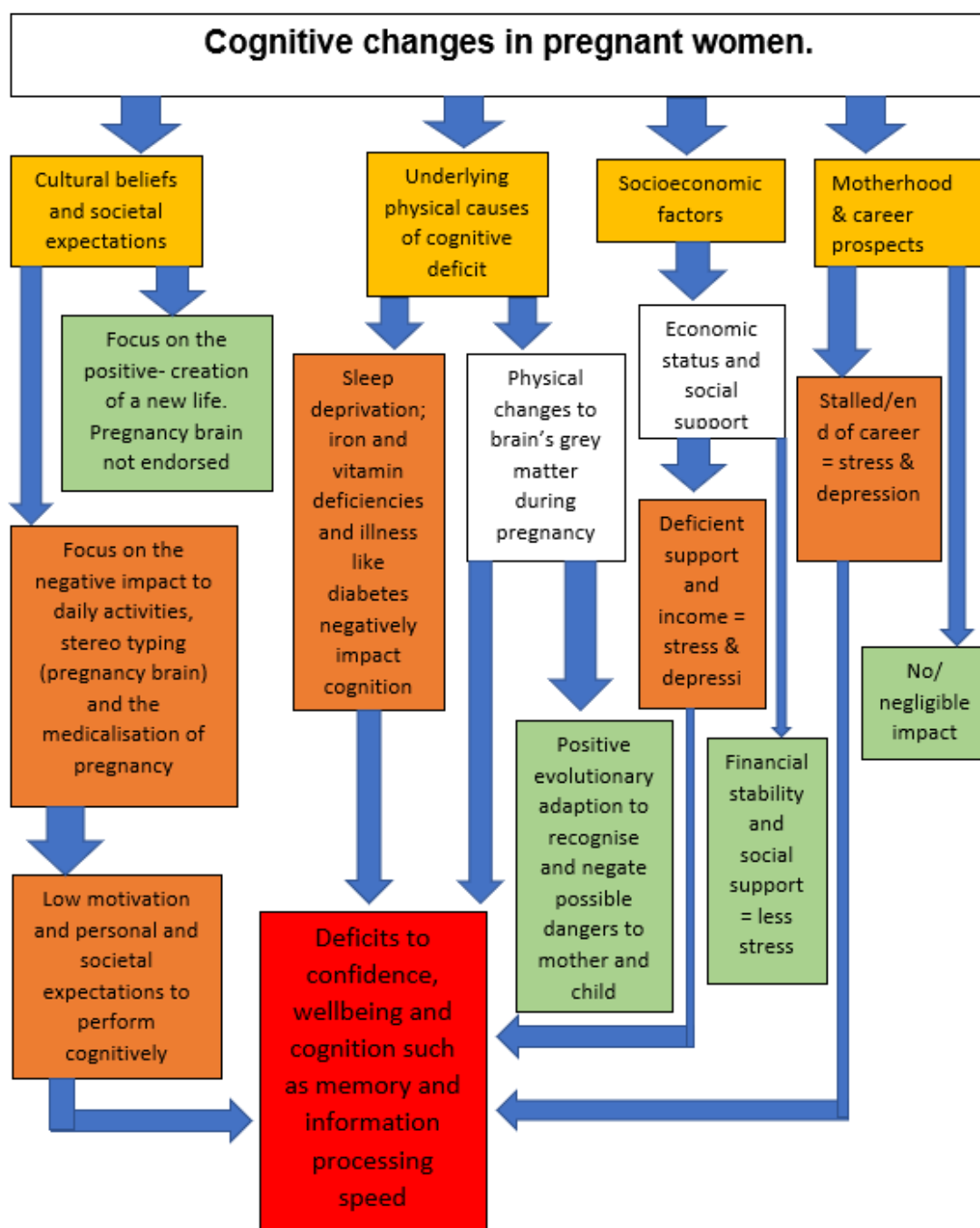


Figure 1: Factors which contribute to experiences of baby brain.

It is clear, after consideration of the literature, that further research is required to better understand the neuroscientific mechanisms possibly causing BB and the long-term effects of GM changes. As far as New Zealand is concerned, its basis in western biomedicine and cultural groups mirrors the increased global interest in measuring and documenting cognitive changes which occur in women during pregnancy. This tends to focus on dysfunction. The next chapter focuses on cultural beliefs and whether there are grounds for cultural differences in experiences of BB.

Chapter 3

Influence of Attitudes and Culture on Cognition in Pregnancy

*The [medical professional must be] concerned... with a single organism,
the human subject,
striving to preserve its identity in adverse
circumstances
(McKenzie, as cited in Sacks, 2011).*

1. Introduction and Overview of Culture and Group Cognition

Cultural psychology emerged as the effect of cultural values and beliefs on psychopathology (Tseng & Strelter, 1887). BB could therefore have varied historical bases for cultural groups, in particular Māori and Pākehā. It is not uncommon for healthcare professionals to encounter symptoms, or expressions of symptoms, which are not explained by western classification systems, thereby posing a challenge to patient assessment and treatment (Semmons, 2006).

Culture is a psychological construct and a collective dynamic and learned determinant of how we behave (Nakanishi & Rittner, 1992; Omohundro, 2008). It also refers to individuals collectively as regards gender, social class, ethnicity, religion or sexual orientation (Harley, Feist-Price & Alston, 1996). Consequently, a shared cultural identity, communal beliefs and a need for affiliation with a specific group provides historical expectations for behaviour and expression of emotion (McLennan, Ryan & Spoonley, 2004). In essence, cultural values and norms determine assumptions around health and functionality, how individuals interpret symptoms such as cognitive slowing in pregnancy, the appropriate behaviour to express symptoms like deficits in memory and coping styles. (Banja, 1996; Brown, Ballard & Gregg, 1994; Gallaher & Hough, 2001).

To this end, it has been determined that even though the experiences of individual women differ, pregnancy and childbirth are also influenced by their cultural, social and geographical contexts and the particular practices of the healthcare institutions which expectant mothers utilise (Happel-Parkins & Azim, 2017; McLennan et al., 2004).

Under these circumstances though, Roestoriff et al. (2010) proposed that within neuroscientific research, the notion of culture as an analytical framework through which to compare different groups, is problematic. Primarily, these researchers expounded that the practice of viewing a particular group as homogenous is now considered to be outdated, as it does not account for variation within a group. Instead, they suggested that broad concepts of culture as a determinant of general behaviour, beliefs and practices should be replaced with notions of specific, ordered, normative and patterned social interaction and brain function in particular contexts. Such patterns are created by both neural networks and shared cultural frames of reference (Roepstorff & Bubandt, 2003; Roestoriff et al., 2010). Additionally, particular groups

are predisposed to habitual expectations and responses to certain phenomena, for instance BB, as a result of their shared material-discursive environments and group cognition (Parsons & Shils, 2001; Theiner, Allen & Goldstone, 2010).

While researchers including Putnam (2001) postulate that people are becoming more independent and far less enmeshed in cultural groups, it cannot be denied that we continue to thrive as fundamentally social, interdependent and connected creatures. This notion is supported given facts including that hormones, for instance oxytocin, are involved in supporting social bonding processes (Domes, Heinrichs, Michel, Berger & Herpertz, 2007; Kosfeld, Heinrichs, Zak, Fischbacher & Fehr, 2005; Theiner et al., 2010). Also, from 1990-2003 internet and mobile phone usage increased over 100-fold, a clear manifestation of the human dependence on social collectives (Rehmeyer, 2007).

Elsewhere, from an evolutionary perspective, Theiner et al. (2010) maintained that rather than a disorderly collection of individual cognitions within a group, humans have learnt to form structured divisions of cognitive labour amongst themselves. They believe the purpose of such implicit division to be the enhancement of the group's ability to function effectively. One may deduce from this theory that while a pregnant individual's cognitive abilities and processes turn inward and focused on successfully producing a child, the group in turn will make allowances for the pregnant person, as illustrated by the BB stereotype.

Within New Zealand, the Treaty of Waitangi recognises two cultural groups, Māori and British subjects (now referred to as Pākehā, a collective name for groups other than Māori). Semmons (2006) advised that it is worth noting that studies have shown that as a result of decades of colonisation and acculturation, many Māori predominantly identify with Pākehā. More than that, there are some who locate themselves in a third cultural group in New Zealand, somewhere between Te Ao Pākehā and Te Ao Māori (Brown, 2011; Campbell, 2005; Forsyth, 2018; Mitcalfe, 2008). Berry (1980, 1997) therefore stressed the importance of assessing to what degree people identify with a particular custom. Accordingly, understanding Pākehā, Tangata Whenua and this third identity will offer a current means of understanding the experiences of pregnant women in the broader New Zealand socio-cultural context (Webber, 2008).

The term 'culture' is used within the current research to refer to customary behaviour and belief patterns within the context of the cognitive experiences of pregnant women from Māori and Pākehā ethnicity groups, who may have different expectations of wellbeing and cognitive changes during pregnancy. That is, would the BB phenomena be viewed as 'normal' in a shared and an individual context? In order then to interpret Māori and Pākehā beliefs around pregnancy and wellbeing, consideration was given to how their practices were conceived and are structured.

2. Māori Frameworks for Understanding Health and Pregnancy

In 1938, the New Zealand Labour party established a national healthcare system which reformed maternity care, amongst other things (Belgrave, 2011). Early archival records from that time (Journal of the House of representatives report: Parliamentary Papers, 1935), spoke of Māori women as opposed to the so-called 'skilled' interventions of European healthcare workers. On reflection and from this researcher's perspective, it could be that birthing was merely a very normal and commonplace concept with which Māori were confident in providing their own support by applying traditional skills.

Le Grice and Braun (2016) claimed that in colonised contexts such as in New Zealand, indigenous reproduction has long been a bone of contention due to cultural marginalisation and colonial dominion. Baxter (as cited in Romans, 1998) found that compared to Pākehā, statistical records show that Māori women are more prone to depression, tend to bare children at a younger age, solo parent, have lower rates of health education, less access to health services and suffer more from isolation and socio-economic hardship.

Scott, Sarfati, Tobias and Haslett (2000) provided evidence that younger Māori displayed similar health-related opinions to Pākehā groups, possibly suggesting some similarity in understanding of the role and symptoms experienced in pregnancy. Durie (2011) never-the-less validated the of legitimacy of perceiving Māori as a separate cultural collective. He advocated that by doing so, it could be highlighted how Māori cultural beliefs, including their unique psychological frameworks and perspectives on health and wellbeing, have in fact greatly influenced New Zealand's mental health services. Szasz (as cited in Ihimaera, Long, Ramsden & Williams, 1993, p.287) added that within their culture, Māori women were considered to have mana as the Te Whare Tapu Tangata- the scared house of mankind, who births the generations (see Figure 2). Therefore, pregnancy and related issues like BB, are traditionally revered and are viewed as a determinant of women's material and spiritual social authority (Palmer, 2002).

To this end, Durie (1994) proposed a model for psychological practice. This provides the most widely referenced framework facilitating measurement and understanding of Tangata whenua health perspectives which may be considered in the context of this study, to understand cultural perspectives about cognitive changes in pregnancy. This holistic model (see Figure 2), Te Whare Tapa Wha or house with four walls, is a metaphor which illustrates the four cornerstones of Māori wellbeing (Ministry of Health, n.d.). This includes Taha tinana, which relates to physical health and development. Secondly, Taha wairua or spiritual health which could contribute to physical illness. Taha whānau or family health depicts the link to ancestors, the present and future family and social connections, while Taha hinengaro, mental health, is about the individual's capacity to communicate their cognitive abilities and emotions.

Each of these four dimensions of hauora influences and supports the others.

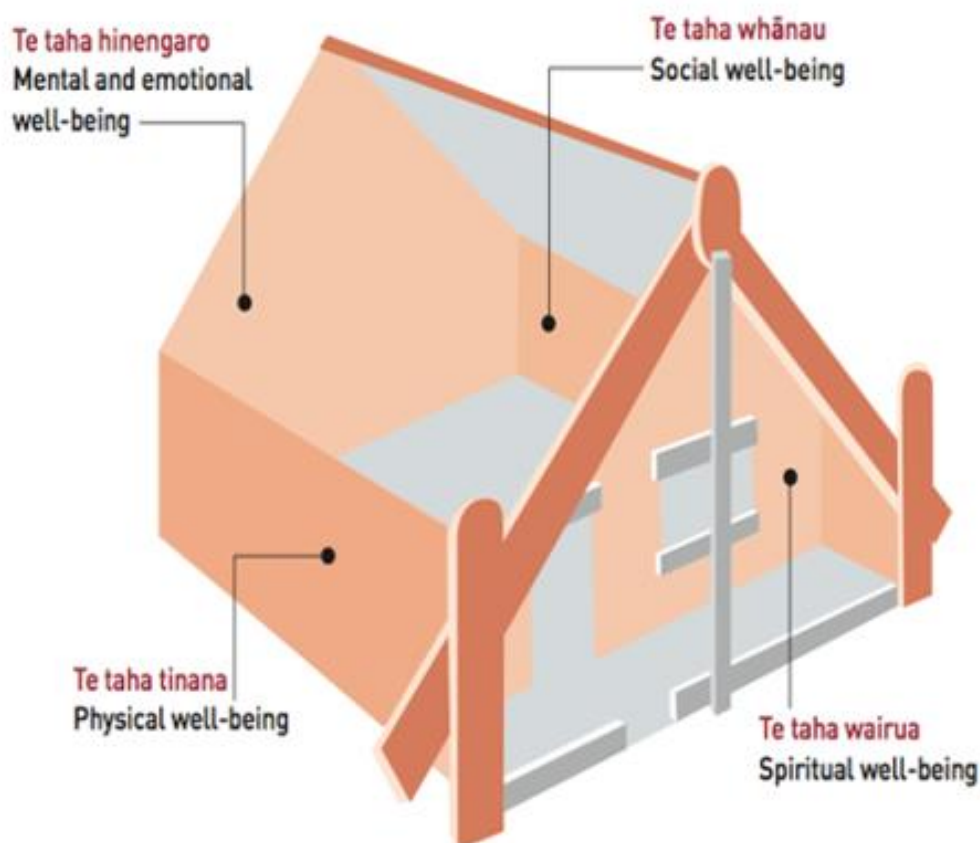


Figure 2: Te Whare Tapa Whā concept of Hauora (Durie, 1994).

Western ideology was transferred to Tangata whenua in various degrees through acculturation and dictates of the dominant western culture (Stern, as cited in Durie, 2002). However, despite their reticence, Māori women began to be routinely pressed to accept western birthing practices and forgo their pregnancy and birthing customs in favour of European medicalisation (Papps & Olssen 1997).

More recently, Elder (2013) reported in 2006 that Māori constituted about 18% of the New Zealand population. The 2009 New Zealand Attitudes and Values Study however, found more than 43% of people identified as at least partly Māori (see Table 2), a sizable portion of the population (Sibley & Houkamau, 2010).

Table 2: Data from the New Zealand Attitudes and Values Study detailing the proportion of people reporting Māori ancestry who identified with different ethnic categories (n=1322 people 'yes' to the question 'Do you identify as Māori and/or have any ancestors who are Māori?').

	%	N
Reported solely as Māori Proportion of total	30.9%	408
Reported ethnicity as Māori and also Proportion of total	43.9%	580
Reported as Māori ancestry, but did not report ethnicity as Māori Proportion of total	25.3%	334
Total people identifying as Māori and/or reporting Māori ancestry	100%	1322

However, Pākehā psychological practice and understanding of what constitutes 'wellbeing' and Tangata whenua ideology, remain somewhat disconnected (Bennett, 2009). Durie (1992) cautioned that due to their belief in Mate Māori (when illness is attributed to transgressions of tapu or things which are considered to be sacred/restricted), many Māori women could be uncomfortable discussing their BB in a clinical western context, because they fear western ridicule. This may be due to the fact that Māori women are characterised in academic literature as the 'exoticized other', biologically and culturally substandard, sexually promiscuous and inefficient in mothering and decision-making (Glover, Dudgeon & Huygens, 2004; McKinley, 2005; Silliman, Fried, Ross & Gutierrez, 2004). Lee (2009) described such ethnocentric practices as totalising the narratives of Māori women.

What is also evident in academic literature, is that Māori knowledge and beliefs about the human brain remain unexplored (Elder, 2013). This is particularly evident in the lack of literature regarding how Māori perceive the cognitive changes to pregnant women. Searches of academic databases using keywords in various combinations including Māori, pregnancy, women, cultural beliefs/knowledge, baby/pregnancy brain, cognition and changes to, captured no results.

It may be that Māori consider any cognitive changes as part of the natural physical process of pregnancy which do not constitute an unusual or serious concern (Le Grice & Braun, 2016). In fact, within Māori culture, Palmer (2002) spoke of pregnancy as a rite of passage and a source of prestige for women, rather than a time of deficit. Le Grice & Braun concurred, holding that in pregnancy, the focus is on the positive and that women are revered for their ability to reproduce and nurture. Additionally, Le Grice and Braun included the following extract (see below) in their study (p. 155), which provides an insight into mātauranga Māori and the

progression through pregnancy from 'nothingness' and expectations of physical, emotional, spiritual and social limitations to 'light', and the birthing process which produces a new life.

*The story of Ranginui, the sky father,
And Papatūānuku, the earth mother,
begins with their creation of the world as we know it.
Papatūānuku and Ranginui were
lovers, embracing, holding each other,
and producing many children who stayed
close to them.
They became separated by one of
their sons, Tāne,
who pushed Papatūānuku
downward to become the earth
and Ranginui
upward to become the sky.
.In separating his parents,
Tāne and his siblings
moved through stages of nothingness
to darkness,
finally emerging through to the
world of light
to become atua
specific to particular natural phenomena.
Māori understand various stages of
labour and birth
through this frame of reference.
(Le Grice & Braun, 2016).*

The role that is played by the person's lived-in environment, cultural expression, interrelationships and patterns of traditional practices in shaping their behaviour and determining their experiences during pregnancy, is gaining recognition according to Durie (2011), Smith (2006), Pihama, Cram and Walker (2002). Moreover, by reorienting studies to decolonize Māori femininities, including pregnancy, is particularly important for health services according to Simpson (2006). This, given the division between Māori and Pākehā knowledge and understanding of pregnant women and potentially of cognitive function and wellbeing. Therefore, knowledge about mātauranga Māori could be useful in informing research questions that explore Māori experiences and understanding of cognitive changes in pregnancy.

3. Pākehā and the Medicalisation of Pregnancy

Western cultures historically equate irrational behaviour and cognition with women (Semmons, 2006). At one point in time, according to Brookes (1998, as cited in Semmons, 2006), western doctors even theorised that in women, the nervous system joins the uterus and brain. It was thought that this made women prone to psychological disturbances, especially in times of biological and emotional change such as in pregnancy. Moreover, immigrant European women often lacked familial support having left their countries of origin. They were afforded low social status in the first half of the 20th century in New Zealand; and were culturally mandated to rely on hospitals and European male scientific 'experts' for pregnancy and birthing (Else, 2011; Romans, 1998).

Comparatively, current health care in New Zealand including antenatal, delivery and postnatal care, has changed considerably due to not only technological improvements, but also societal demand (Smythe, 1998). In fact the Ministry of Health notice on July 2002 specified the following as relates to pregnant women:

"Each woman and her whanau and family will have every opportunity to have a fulfilling outcome to her pregnancy and childbirth, through the provision of services that are safe and based on partnership, information and choice. Pregnancy and childbirth are normal life-stage for most women, with appropriate additional care available to those women who require it. A lead Maternity Carer chosen by the woman with responsibility for the assessment of her needs, planning her care with her and care of her baby being responsible for ensuring provision of Maternity services, is the cornerstone of maternity care in New Zealand Health"
(Ministry of Health, 2002, p. 11).

Nevertheless Semmons (2006) cautioned that traditional western dominated ideologies and practices tend to be venerated and imposed in a colonised setting such as New Zealand. Consequently, health care workers analyse and interpret cognitive issues such as BB while referencing historical knowledge bases. More than half a century has passed since Mead (1954) was quoted in reference to pregnancy and motherhood as saying:

*" Why should the worm of anxiety intrude so early on such pure pleasure?
Why does the new mother hear whispers of self-recrimination?
Why does she feel that nothing less than sacrificial devotion can
ever silence them--and maybe not then?
Because guilt has become a part of American motherhood,
which demands a mother's total self" (Mead, 1954).*

However such sentiments are still applicable today. As Mead (1954) suggested, anxiety over whether a mother is performing according to the expectations of society, was and still is a hallmark of western motherhood.

Tracy and Tracy (2003, p.717) termed contemporary, frequently unnecessary and invasive maternity medical practices including blood tests, scans and Caesarean sections, the 'cascades of intervention'. This medicalisation of reproduction is related to the marketing of maternity care as a product/service to be sold for revenue: a product which is expected to produce a profit of \$9 billion globally between 2017-2023 (Goodman, 2007; Organization for Economic Cooperation and Development, 2013; Research and Markets, 2017). Consequently, in western cultures, pregnancy has become highly medicalised- a state requiring surveillance, diagnoses, testing and management by licensed experts (Hallgrimsdottir & Benner, 2014; Scamell, Altaweli & McCourt, 2017).

Rothman (2014) defined our society as risk obsessed. Simply searching Google for 'risk and pregnancy' registers 149,000,000 results. These defects, according to the Centres for Disease Control and Prevention (n.d.) include risk to mothers like mental health and cognitive irregularities like BB. Consequently, we test for deficits, such as to IPS or memory retrieval, to arguably confirm what we are acculturated to believe and expect, that pregnancy makes women 'slow on the uptake' and impedes their performance at work and their participation in society.

Indeed, Christiaens, van de Velde and Bracke (2011) penned an article which discussed western women's fear of pregnancy and childbirth, due to the deficit focus and medicalisation of a natural process. This, to the point where postnatal women are commonly diagnosed with mental disorders including depression and post-traumatic stress disorder as a direct result of their pregnancy and parturition struggles (Beck, 2006, 2011; Chadwick, Cooper & Harries, 2014). McClean and Mitchell (2014) noted that women, for the most, try to retain some control of their changing bodies through efforts like constant monitoring. It is often only in retrospect and when comparing pregnancies with peers anecdotally, that we reframe pregnancy difficulties as 'normal' (World Health Organization, 1996). Rothman (2014, p.1) was not exaggerating when she stated that pregnancy is "a risky [and confounding] business indeed".

4. Summary

There are cultural differences in understanding of pregnancy and expectations of the mothers' functional roles including cognition. This is not reflected in the medicalised and deficit orientated healthcare system found in New Zealand, which does not consider the significance of traditional Māori holistic ideology pertaining to pregnancy and childbirth or individual experiences. In view of the weakening of many cultural and family groups ties with traditions because of urbanisation, acculturation and immigration, it is important to question how our biomedical and often male dominated system has taken control of a natural stage in the lives of women, causing much anxiety and surveillance of women's' cognition while pregnant.

More research needs to be done to better understand what is driving inequalities and the disconnectedness between Pākehā and Māori epistemological theories around healthcare, wellbeing and reproduction. This includes inclusion of a spiritual element and interconnectedness between the ancestral influences of the past and the future with wellbeing; creating a more positive and constructive view of the changes that women may experience during pregnancy; and how to cope better with BB symptoms, according to the needs expressed by women. Only then will healthcare professionals will be better equipped to provide culturally appropriate healthcare support to women, both Māori and Pākehā.

Chapter 4

The Present Study

1. The Purpose of this Study

Pregnancy is a singular experience and for various reasons, can bring about distress (Dipietro, Christensen & Costigan, 2008). Initially, the main objective of this study was to investigate how individuals and cultural groups define BB, to what they attribute the symptoms, whether women feel able to cope with the symptoms and whether there are particular coping methods which they have found to be beneficial.

This study differs from other academic literature about BB in that rather than evaluating cognitive function by means of psychological evaluations such as memory and IPS tests, participants would be asked to provide a reference of their lived experiences by means of on-line surveys. The survey results would be evaluated to establish whether there are patterns of symptoms and coping methods across all the survey data; and whether any beliefs, experiences and coping methods are particular to any cultural group.

However, owing to the low response rate to the surveys, especially from Māori, midwives and family/friends, the view on the influence of culture on BB experiences was severely compromised. Consideration is given to how the low response rate could have been prevented in Chapter 7: Discussion. Meanwhile, the focus of the research changed to an analysis of the 'mother' subjective survey responses, rather than group experiences influenced by cultural beliefs. This offered insight into individual accounts of BB, key coping methods and the participants views of the causes of their symptoms of deficit.

2. Aims and Objectives

Broadly speaking, this study presented information collated from recent academic literature and from subjective, qualitative and quantitative surveys. Consideration was given to varied participant input so as to present individual experiences. In turn, these could then be compared to examine specific phenomena of interest sorted into themes.

2.1. The Themes Analysed

2.1.1. The Social Influences

- Culture and perception of BB- Identifying whether there is a link between ethnicity and experiencing BB.
- Expectations of experiencing BB- Do women expect to experience BB?
- Social support- Investigating whether good social support of mothers relates to less BB reports/impact.

2.1.2. Individual Experiences

- Effect of age and education on experiences of BB.
- Sources of information- Establishing the extent to which mothers' sources of information about pregnancy are formal biomedical or informal socio-cultural in nature.
- Symptoms experienced.
- Context of symptoms- is BB more prevalent in specific contexts such as employment?
- Pregnancy stages affected by BB- Is BB experienced more in any particular trimester of pregnancy?
- Causes- Theories posed by participants about BB.
- Improvement in brain function.
- Concerns.
- Whether there are differences in perceptions of BB between the mother-to-be's and a friend/family or midwife.

2.1.3. Confounding Issues

- Hormone changes.
- Attention, IPS and motivation.
- Personality type and organisation.
- Depression and anxiety.
- Insomnia.
- Nutrient deficiency.
- Stress, financial and work pressures.

2.1.4. Coping and Interventions

- Do participants need help to better cope with BB?
- BB coping methods.

3. Hypotheses

With conceptual changes in neuroscience in mind, the hypotheses of this research are as follows:

- Symptoms of cognitive deficits are due to confounding factors such as insomnia and stress about issues like career prospects, rather than changes to brain matter.
- Different personality types influence perception of BB and coping with symptoms.
- Because of group cognition and stereotypical expectations, pregnant women, possibly due to a confirmation bias, believe that their cognition decreases greatly, regardless of scientific research.
- BB is primarily a Pākehā construct: Because of cultural differences in understanding the role of motherhood, the experience of pregnancy and wellbeing, Māori women, even those who have acculturated to some degree to western beliefs, may be less negatively affected by experiences of cognitive deficit than Pākehā women.

4. Summary

The main objective of this research was to establish what people's individual and subjective experiences of BB are, whether they are influenced by cultural beliefs and how they cope with BB symptoms. The hypotheses of this research included that BB is primarily a western construct; that despite research to the contrary, women expect to experience cognitive dysfunction during pregnancy; and that BB may be due to confounding physical and social issues like insomnia. Due to low response numbers the focus of the research evolved to interpret individual experiences of BB and coping methods. As such, this research focused particularly on qualitative findings. The themes to be analysed included the social influences on BB experiences; individual experiences; confounding issues; and coping.

Chapter 5

Methodology

1. Overview

This study examined understandings and experiences of BB by means of multimodal methods, incorporating evidence from academic literature about cognitive changes in women during pregnancy and surveys documenting participants' personal knowledge of BB. Data generated by the surveys would be analysed by utilising qualitative methods to plot patterns of beliefs and through a quantitative statistics programme (SPSS) to capture demographic trends such as whether certain ethnic groups are more inclined to believe in the notion of BB.

Finally, although this research was initially conducted as a means to assess whether cultural beliefs affect experiences of BB, low response rates to the surveys meant that the aim evolved. Analysis of the participant responses refocused from the impact of culture to gaining a broader sense of understanding of individual narrative by documenting and interpreting perceived BB symptoms, causes and coping methods.

2. Participants

Participants identifying as various New Zealand based ethnicities were recruited to obtain insight into both individual and group variations regarding BB. The self-reported data by participants of their experiences with pregnancy related cognitive changes, observations by midwives and those who have spent time with them during their pregnancies, provided a specific focus on BB and cultural beliefs from multiple subjective perspectives.

Māori participants were crucial to this research, given the hypothesis that Pākehā and Māori could experience BB differently, due to their cultural differences in understanding the significance of pregnancy and how they interpret and express any cognitive changes during pregnancy. However, to carry out culturally appropriate research, two models of research as proposed by Smith (1990) would underlie this study. Firstly, by means of a Power Sharing Model, the assistance of Māori midwives and mothers was sought in order for a meaningful research enterprise. Secondly, the Empowering Outcomes Model provided a framework by which information would highlight positive ways in which Māori perceive pregnancy. The purpose of these frameworks is to empower Māori, and also provided a more positive perspective of pregnancy for Pākehā, with less of a focus on expectations of cognitive deficits.

Participants in this study were recruited by means of snowballing to complete an online questionnaire. Printed flyers documenting the survey details were distributed at local Kindergartens. Printed introductory letters and survey flyers were delivered to staff at the maternity wings at Hutt hospital; advertisements for research participants were placed on social media and Midwifery societies of New Zealand were emailed with introductory letters and survey links. The aim was to represent and capture data about Māori and European

cultural ideologies regarding pregnancy and BB. Screening of individual participants was programmed into the surveys and required that participants should give consent to their responses being included in the research results.

2.1. Inclusion Criteria

- Persons with access to a device linked to the internet.
- Over 18 years.
- For the 'mothers' survey, persons who were pregnant at the time of conducting the survey or had given birth in the last 6 month. However, this was altered in social media appeals for participants after a week of the online surveys going 'live'. All New Zealand mothers were then included, not just the new, as initial participant response to the 'mother' survey had been very poor.
- Practicing midwives, who were to provide a valuable perspective on the issue of pregnancy brain and cognitive changes in pregnant/hapu women from a clinical and personal perspective.
- A friend/whanau member of the pregnant person/new mother who could offer observations of the pregnant person's experiences to establish whether they concurred with the pregnant person's self-reports of BB, life stressors and social support systems.
- Participants did not have to have experienced or be familiar with the concept of BB.
- An effort was made to represent a variety of personal and cultural beliefs which would be valuable in terms of understanding individual and cultural differences.

3. Mixed Methodology

As the cultural effects on experiences of BB and the voices of pregnant women are under researched and underrepresented at this point in time, it was determined that this research called for a mixed methods approach to capture the richness and variety of individual and group perceptions and in order to offer the most robust conclusions (Teddlie & Tashakkori, 2006). The basis for this decision was that Teddlie and Tashakkori suggested that qualitative procedures are concerned with generating theories, while quantitative methods verifies theories. Therefore, by combining the two techniques this study can both produce and validate theories.

This research was conducted through surveys. Responses were processed by means of a statistical qualitative procedure (SPSS), followed by the researcher's interpretation of the data. The aim was to uncover the nature of individual experiences of BB, though the lens of cultural beliefs and expectations. This method was utilised as the purely quantitative research methods used to date to investigate the BB phenomena, have provided mixed results and failed to account for the context in which they were conducted, cultural differences in understanding cognitive changes in pregnancy and other confounding effects on wellbeing including insufficient social support and inadequate diet (see Chapter 2: Cognition in

Pregnancy). The key to analysing the qualitative data then, according to Romans (1998), would lie in excluding researcher bias which affirms the researcher's preconceptions. Also, Romans advised that as women are often socialised to subordinate their needs and opinions to accommodate others, efforts would have to be made to recognise and negate courtesy bias.

In addition, Hensch (2005) cautioned though that qualitative information regarding changes to the neural circuitry is mainly anecdotal; and that the lived experiences of such changes would be inherently challenging to hypothesize and quantify across individuals. As this study required the collection of information which generalises across individuals, it became necessary to make certain assumptions. Likewise, ultra-cognitive neuropsychologists hold that cognition is modular (Coltheart, 2002) and McGeer (2007) stated that the brain is an information processing system, comprising multiple and distinct task substructures.

While quantitative methods collated demographic information and frequencies of experiences, open-ended survey questions offered participants opportunities to express beliefs, individual experiences and coping skills which were then compared and contrasted to determine group commonalities and to highlight the individual narratives. To this end, an inductive bottom-up approach was utilised in which theories were proposed and generated data was used to identify qualitative patterns of experiences and beliefs across different ethnic groups of pregnant women (Bernard, 2011; Goddard & Melville, 2004).

*Narrative synthesis is a form of storytelling...
bringing together evidence in a way
that tells a convincing story of why something needs to be done,
or needs to be stopped,
or why we have no idea whether a long established policy
or practice makes a positive difference
in one of the ways in which the gap between research, policy
and practice can start to be bridged"*
(Popay et al., 2006, p5).

Creswell and Plano Clark (2007) directed that when utilising mixed methods, a triangulation design is suitable. Both qualitative and quantitative information were to be collected by means of surveys; and then combined for interpretation. Creswell and Plano Clark expected that such a combination of methods would result in a broader view of the effect of culture on perceptions of the BB phenomenon.

3.1. Interpretive Methodology

This study also included an interpretive methodology. The aim was to focus on understanding individual and group experiences of BB (Briggs, 2014). The researcher focused on personal participant interpretations of BB and then, in turn, interpreted the collective information to

ascertain what participants understand to be the symptoms of BB, whether cultural differences in experiences of BB do exist and how they cope with symptoms.

Any inferences made as a result of investigating both academic articles and subjective survey responses then, have led to three assumptions based on guidelines set by other peer reviewed researchers (Caramazza, 1986, 2006; Harley, 2004; McGeer, 2007). Firstly, it has been expected that women's brains are universally homogenous in cognitive structure, function and changes occurring during pregnancy. Secondly, the literature described the assumption of 'fractionation' which referred to the ability of brain modules to function independently. This allowed for selective impairment due to pregnancy related changes, such as to memory. Thirdly, the assumption of 'transparency' meant that while some modules remained stable, others may have adapted structurally to pregnancy, creating a more current information processing framework.

3.2. Constructivist Epistemology

The researcher theorised that knowledge bases which various cultural groups refer to and express as their subjective 'truth' around cognitive changes during pregnancy, are actively constructed through their experiences and social interactions in particular environments (Denzin & Lincoln, 2011; Gray, 2014, p 20). Therefore, through a constructivist lens, it stands to reason that there may be multiple valid 'truths' in how different individuals and cultural groups make sense of and express reactions to BB (Denzin & Lincoln, 2011). This research then, aimed to capture group and within group variety by means of the survey data.

4. Measures

To date, there is no specific measure for BB. What researchers have developed is the Pregnancy Experience Scale (PES) (see Table 3), which measures anxiety and other psychological concerns related to maternal perspectives of their daily and ongoing problems during pregnancy. As shown in Table 3, the PES included 41 items ratings of negative and positive psychological instances, including spiritual feelings, spousal support and concerns with physical problems like pain (Dipietro, Christensen & Costigan, 2008). This test does not refer directly to BB, or how cultural factors may influence personal accounts of BB.

Therefore, PES was not used in this research. Instead, surveys were constructed which captured information directly related to BB. Survey (Likert type) questions would capture the influence of culture on expectations of experiencing BB; confounding factors which may produce BB symptoms such as insomnia; and mitigating factors like social support and a healthy lifestyle. The scales offer participants a range of responses to choose from, including very much so, moderately so, somewhat, not really and not at all. Also of importance, were open ended questions which captured descriptions of symptoms and coping methods which participants found effective in dealing with cognitive deficits during pregnancy.

Table 3: Pregnancy Experience Scale (PES) (Dipietro, Christensen & Costigan, 2008, p.267).

Below are 10 items that you may consider to be uplifting aspects of your pregnancy and 10 items that may be less appealing. Please circle the degree to which each item affects you now.

0 = Not at all 1 = Somewhat 2 = Quite a bit 3 = A great deal

How much have each of the following made you feel happy, positive, or uplifted?

- | | |
|---|---------|
| 1. How much the baby is moving | 0 1 2 3 |
| 2. Discussions with spouse about baby names | 0 1 2 3 |
| 3. Comments from others about your pregnancy/appearance | 0 1 2 3 |
| 4. Making or thinking about nursery arrangements | 0 1 2 3 |
| 5. Feelings about being pregnant at this time | 0 1 2 3 |
| 6. Visits to obstetrician/midwife | 0 1 2 3 |
| 7. Spiritual feelings about being pregnant | 0 1 2 3 |
| 8. Courtesy/assistance from others because you are pregnant | 0 1 2 3 |
| 9. Thinking about the baby's appearance | 0 1 2 3 |
| 10. Discussions with spouse about pregnancy/childbirth issues | 0 1 2 3 |

How much have each of the following made you feel unhappy, negative, or upset?

- | | |
|--|---------|
| 1. Getting enough sleep | 0 1 2 3 |
| 2. Physical intimacy | 0 1 2 3 |
| 3. Normal discomforts of pregnancy (heartburn, incontinence) | 0 1 2 3 |
| 4. Your weight | 0 1 2 3 |
| 5. Body changes due to pregnancy | 0 1 2 3 |
| 6. Thoughts about whether the baby is normal | 0 1 2 3 |
| 7. Thinking about your labour and delivery | 0 1 2 3 |
| 8. Ability to do physical tasks/chores | 0 1 2 3 |
| 9. Concerns about physical symptoms (pain, spotting, etc.) | 0 1 2 3 |
| 10. Clothes/shoes don't fit | 0 1 2 3 |
-

Although research leads to more effective psychotherapy and better understanding of the human brain and behaviour by psychologists, research and clinical practice are never-the-less disconnected to the point where psychotherapists seldom utilise standardised or empirical findings in clinical practice (Castonguay, Youn, Xiao, Muran & Barber, 2015). So too, Wright and Hopwood (2016) cautioned that while static tools used by psychologists to rate individual dispositions (e.g., 'yes/no' type answers) have proven valid, they tend to minimise how experiences and understanding of such constructs have manifested and in which contexts they occur, such as differing cultures. Therefore, to capture a holistic set of data about pregnancy brain, a combination of data collection methods were included. This combined both

formal static measures and less structured opportunities for participants to offer anecdotal narrations from various ethnic perspectives of their dynamic experiences; and the knowledge and clinical observation of healthcare workers directly in contact with pregnant women, specifically midwives.

However, Crawley, Grant and Hinshaw (2008) cautioned that pregnant women often report a decline in their cognitive abilities (BB), which is reinforced by popular culture such as parenting preparation literature. They added too that even contemporary midwifery textbooks may include references to baby brain (Tiran, 2004). Therefore it was important to establish whether participants in this study had preconceived expectations that pregnant women will suffer from BB. This predisposition may lead to confirmation bias when participants discern instances which substantiate BB, even without objective evidence (Crawley et al., 2008; Nickerson, 1998).

The bidirectional correlation between and protective function of wellbeing over physical and cognitive function is also well known according to Steptoe, Deaton and Stone (2015). Be that as it may, only a few studies have focused on the relationship between objective cognitive performance and subjective self-reports of dysfunction; and these have produced mixed results (Ahmed et al., 2008; van Oijen, de Jong, Hofman, Koudstaal & Breteler, 2007). Simon and Bjork (2001) cautioned that generally, subjective self-assessment of cognitive function is unreliable and that it tends to overestimate ability, although Janes, Casey, Huntsdale and Angus (1999) claimed that pregnant women, in particular, may underestimate their cognitive functionality.

Relatedly, Henry and Rendell (2007) cautioned that subjective self-assessment of certain aspects of brain processes like memory, are not always accurate as they are performed unconsciously, so individuals have no knowledge of them. Furthermore, depression and fatigue, which are common during pregnancy, may lead affected individuals to perceive an exaggerated view of their mental performance deficits (Grut et al., 1993; Millikin, Rourke, Halman & Power, 2003). Furthermore, such assessment is also affected by the context in which it is made, with emotional disposition and personality as easily to blame for inconsistencies between subjective deficits and objective performance (Minett, Da Silva, Ortiz & Bertolucci, 2008; Simon & Bjork, 2001).

All the same, as a result of their meta-analysis Henry and Rendell (2007) conceded that self-assessment has value. They reported that despite their initial concerns, women's perceptions of their brain performance were accurate. In fact after conducting their own research, Hohman, Lamar, Beason-Held and Resnick (2011) also recommended the validity of self-reports as reflecting alterations in brain activity such as memory functioning, or in the case of this research, perceptions of BB.

4.1. Internet Surveys

With its rapid expansion and average western population rates of access at around 75%, the Internet is fast becoming a preferred means to procure psychological information (Naglieri, Drasgow & Schmit, 2004). Naglieri et al. proposed several benefits of utilising internet testing and surveying including lower cost and time wasted on travel costs, faster speed of communication and turn-around of sending, completing, returning surveys and data collection and, of course, convenience. The survey material (see Appendices 2, 3, 4) was also presented consistently and participants were free to complete the questions posed as and when it suited them. Finally, the survey questions comprised closed response choices to allow for the collection of basic demographic data, but also open-ended choices which gave participants opportunities to express individual beliefs and experiences more thoroughly.

Due to the online nature of the surveys utilised in this study, the study population were required to have access to a device linked to the internet. Participants needed to be able to use the technology required to participate in the online surveys with no training, so the questions and the program formatting itself was kept simple to conduct and worded with lay-terms rather than academic jargon. Furthermore, participants required a basic level of literacy and their level of education was recorded to establish whether it could possibly be correlated with their experiences and expectations of cognitive function and BB.

Participants had to also be confident that their personal details and responses to the survey questions were securely and privately maintained and analysed. To this end the Internet Security Department at Massey University approved the Qualtrics survey utilised in this research. Furthermore, data resulting from this research will be securely stored at Massey University for 5 years, after which it will be destroyed. The researcher also promised at the onset of surveys to store any information obtained from participants in a secure and confidential fashion, and to only use it for the purposes of this research.

4.2. Distribution of Surveys

Working on the premise that Kindergartens would provide a point of contact between the researcher and potential participants in this study, the [New Zealand] Free Rimutaka Kindergarten Association's (n.d.) webpages were examined to identify Kindergartens that represent a variety of cultures. Four Upper Hutt Kindergartens were then approached for research support. These included Totara Park, Trentham, Irmgard Richie and Upper Hutt. Totara Park listed Māori children, Pākehā and 'other' ethnic groups while Trentham enrolled students classified as Māori, Pākehā, Indian, Fijian and 'other' ethnicities. Finally, Irmgard Richie and Upper Hutt kindergartens included Māori, Pākehā, Pacific and 'other' families. Permission was granted by the head teachers for the researcher to distribute a printed information page (see Appendix 6) to each student's family. 230 information pages were distributed across these Kindergartens.

Next, cover letters (see Appendix 5) detailing the researcher and the study's details and copies of the printed information page (see Appendix 6), were hand delivered to the Clinical Nurse Managers, the Special Care Baby Unit and the Leading Maternity Carer at Hutt Hospital in Lower Hutt, New Zealand. This was done by a nurse who is well known to the researcher, has been employed by that hospital for several years and is familiar with the senior staff. The hospital staff were asked to supply new mothers and midwives with the survey details. Similarly, Nga Maia Māori Midwives Aotearoa and the Midwifery Council of New Zealand were emailed directly by the researcher.

Email contact was established between the researcher and Jean Te Huia (the chief executive officer of Nga Maia Māori Midwives Aotearoa) towards the end of 2017. The nature of the research was discussed with her and she expressed interest, asking too whether the research could ultimately be presented to Māori midwives who were undertaking Masters and PhD study. The researcher agreed and Ms. Te Huia was asked to notify members of her organisation of the research and request their participation when the surveys were designed in 2018. Once the surveys were approved by the supervisor for this research Professor Leathem from Massey University, a further email was sent to Ms. Te Huia asking her to distribute the information page (see Appendix 6) to her organisation members.

Lastly, social media was utilised to contact potential participants. The researcher posted the information page (see Appendix 6) with links to the surveys on her personal Face Book page and also on a Cognition in Pregnancy Research Group established by other Massey Psychology students as a means to reach a wider audience of pregnant women. This information was also relayed to postgraduate Massey psychology students by the supervisor of this research, Professor Leathem.

The surveys comprised closed questions and some open-ended questions, which provided participants opportunities to express individual narratives too. The closed questions provided information which could be quantified and analysed by content analysis, for example how many people identified with particular cultures. While the open-ended questions did not demand expectations of long, detailed accounts of pregnancy, they did offer the opportunity for participants to record their individual accounts of certain aspects of their pregnancies in their own words, for a richer understanding of their experiences. Open-ended questions captured themes through deductive thematic means, such as loneliness.

5. Procedure

Participants chose between three surveys including 'mothers' (pregnant or recently pregnant women), 'midwife' or 'family/friend' (to ascertain how the mothers' perspectives of any BB symptoms compared with observations made by a friend or family member). After presenting an information sheet to potential participants, they were asked to provide consent for their survey responses to be included in this research project. From that point surveys took about

15 minutes to complete, although some participants did not complete the entire survey. Participants were also asked whether they would like the results of this research to be emailed to them on completion of the project and if so, provided an email address.

6. Ethical Considerations and Conflict of Interest

6.1. Informed Consent

Informed consent was requested at the end of the information page, before the main body of the survey. Participation was voluntary and there was no coercion of participants. Participants could skip survey questions (apart from the question related to age, as a minimum of 18 years was required as per the survey inclusion/exclusion criteria point 2) at any stage.

6.2. Confidentiality and Anonymity

Confidentiality was assured throughout this research. Some extracts of survey responses were detailed, however all identities of participants were removed from their statements.

6.3. Researcher's Perspective of Ethics

O'Leary (2004, p. 53) contended that fundamental tenet of ethical research is to "do no harm". As per his instruction, Participants in this study will be treated with respect and dignity and will give informed consent before their participation is commenced. This project has also been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher is therefore responsible for the ethical conduct of this research, under the direct supervision of an appropriate supervisor for the School of Psychology at Massey University. Furthermore, participants will remain anonymous and data resulting from this research will be used only for the purposes of this research. It will be securely stored at Massey University for 5 years, after which it will be destroyed.

A factor which was given consideration was the researcher's emic (specific) and etic (universal) evaluations performed in this research. As a European from a western cultural group, the researcher performed an etic analysis of the experiences of Māori participants, which differed from her culture. There was the possibility that values, beliefs or experiences of the Māori participants could have been misinterpreted by the researcher (Draguns, 1989). However, as an outsider to the Māori culture the researcher was also afforded an objective view and may more easily recognise differences in expression of BB symptoms and experiences to the Pākehā group according to Semmons (2006). Conversely, the researcher's emic assessment of Pākehā participants whose beliefs and values she shares, may have been advantaged by her insight into a familiar culture. Alternatively, the researcher's analysis of the Pākehā group with which she identified, could have been biased. It was therefore essential for the researcher to remain reflexive and thus aware of the likelihood of bias in either etic or emic assessments, to avoid ethnocentricity.

6.4. Māori Perspective of Ethics

Bishop (1992) and Smith (1994) held that historically, Māori women have been researched by Pākehā who have benefitted from their studies while negatively stereotyping and marginalizing their Māori participants. Pākehā researchers are often not closely involved with and accountable to indigenous whanau, hapu or iwi connections, but could nevertheless be endowed with the unfounded status of representing Māori as a result of their studies (Davidson & Tolich, 1999). To this end, Durie (1992) maintained that:

“Research... [needs] to be conducted with an in-depth understanding of Māori values, attitudes and mores necessary for a successful outcome, as is the probability of an understanding and willingness to abide by a Māori system of ethics and accountability (Durie, 1992, p.4)”.

In other respects, Barabash (2008) and Patterson (2004) contended that some mental healthcare professionals and academics do argue that there is too much emphasis on cultural difference at times, which could distract from individual participant needs. Moreover, in Barabash's experience, cultural awareness rather than cultural focus, ongoing supervision, sensitivity, professional knowledge of the psychological discipline, flexibility and respect, allow for successful working relationships when with people from other cultures.

On that account and as knowledge is considered tapu in Māori culture, it is crucial to accurately record it and to utilise it appropriately to ensure the mana of the group (Cram, n.d.; Smith, 1992). Moreover, Stokes (1985) and Te Awakotuku (1991) cautioned that undertaking research without a usable purpose, responsibility, social relevance or moral accountability for the benefit of Māori people, is pointless. On the other hand Semmons (2006) suggested that over time, the practices and rituals which supported Māori women during pregnancy have been mostly abandoned. Semmons concluded that this was due to colonists forcibly imposing western culture on to Māori and undermining their indigenous culture and identity. This research could therefore serve the purpose of aiding in identifying subconscious cultural practices and coping methods around pregnancy, and as a catalyst which allows Māori women to reconnect with traditions they may have discarded.

However, not all Māori have not been satisfied with a Pākehā foundation for wellbeing and health, focusing instead on contemporary treaty of Waitangi applications of the principles of Pākehā and Māori (Durie, 2001; Semmons, 2006). This comprises partnership, participation and protection to ensure Māori self-determination. Given this, Durie (2001) put forward the following when Māori health services and ideology are included in research or health practices:

“The components of culturally appropriate services include an assessment process that takes into account cultural values, Whanau (extended family) participation, use of Māori language and custom, outcome measures that are relevant to Māori understandings of health,

*and a Māori workforce with both professional and cultural competence
(Mental Health Commission, 1997, as cited in Durie, 2001, p.136)."*

With these principles in mind, elements of te reo Māori; the specific inclusion of Māori midwives; the narratives of Māori participants and their whanau; the inclusion of Māori terms and perceptions of baby brain and culturally specific strengths in understanding and coping with cognitive and emotional changes during pregnancy were highlighted; and supervision by a Māori Massey cultural advisor for the School of Psychology at Massey University was provided regarding the study and available for consultation if necessary during and after the data correlation and distribution stages.

7. Analysis

From the perspective of qualitative research, reliability is associated with the researcher's ability to be consistent when documenting and analysing data (Gibbs, 2007). To demonstrate reliability in the research according to Greene (2000), procedures followed in the analyses must be documented, as was done. This, then, ensures that further studies of the effects of culture on the BB phenomenon, participant's symptoms and coping methods, can be replicated in the future. However, as the qualitative analysis of data relied on the researcher's interpretation of participant comments, replication of the study by other researchers may vary due to interpretative differences.

The primary objective in this research was the comparison of ethnic groups' subscription to the BB phenomena (see Figure 3). Secondary objectives included establishing and documenting individual differences in experiences of BB and successful coping methods employed to minimise its impact. Thirty-six 'mother', two 'midwives' and six 'family/friend' participants participated in this study. The data was collected from participants by means of online surveys. As the 'midwives' and 'family/friend' participant numbers were low, the 'mother' group was given preference in the analysis of data.

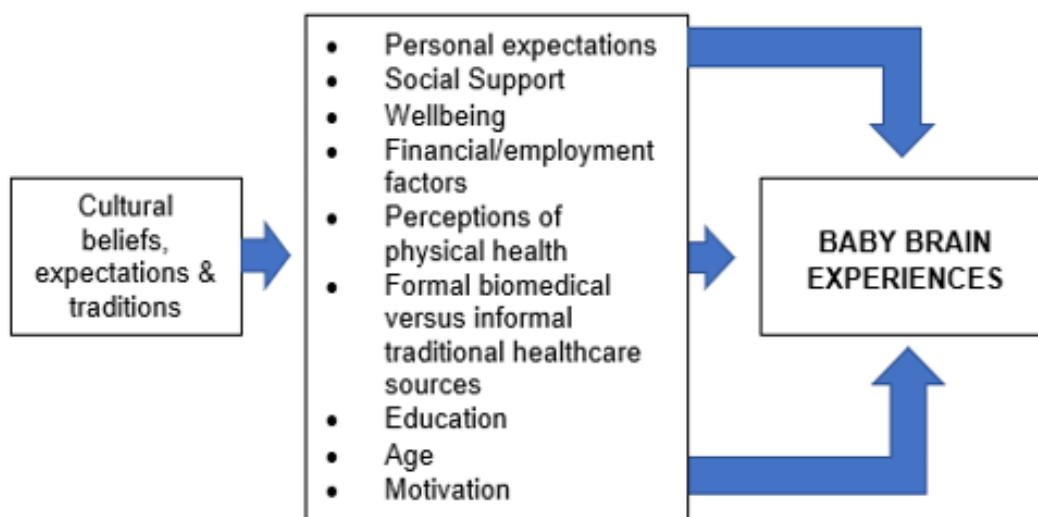


Figure 3: The primary question: How much of the variance in baby brain perceptions (dependant variable) can be explained by the impact of independent factors including age, health and culture?

Participant feedback from surveys was analysed by means of deductive and inductive methods. The deductive analysis comprised knowledge of factors which may impact on cognitive functioning, as discussed in Chapter 2. Inductive analysis was performed by listing specific patterns of words and themes such as 'fatigue' in individual feedback. The most frequently occurring responses were treated as the most relevant.

Survey data also provided successfully applied coping methods utilised by participants to avoid or minimise the impact of symptoms of BB; and identified whether a need for healthcare workers to treat baby brain exists. Some specific examples of participant responses were also included to illustrate particular patterns of contributors' understanding of and approaches to BB.

There were instances in which participants declined answering some survey questions. Therefore, when statistical analysis was performed, the option to exclude participants only in contexts in which they did not respond to a question linked to a particular variable (for instance education attained), was utilised- The 'exclude cases pairwise' option. In instances which these participants did respond to other questions related to another variable (such as 'have you experienced BB'), their information was included in analytical data.

As cultures within New Zealand are integrated through schooling, employment and social contexts, the researcher expected a small to moderate effect size. That is, some cultural variance would be found in BB experiences, but that it would not be strong and a large sample would be preferable to provide a more accurate representation of BB perception differences. Based on prior surveys of the general population collecting data through the same recruitment

methods conducted in the School of Psychology, it was expected that more than enough participants would be gathered to meet the appropriate sample size (80 in each group).

The IBM SPSS Statistics software program was employed to analyse the quantitative data generated by the surveys. Closed survey questions including those regarding demographics, utilised a Likert type scale for data analysis. This, when coded numerically (see Appendix 7), established a base-line for statistical quantitative comparisons to be drawn. This comprised such elements as establishing the amount of women who identified with certain ethnic groups, who also subscribed to BB; and how experiences of BB tallied with education levels achieved.

From the detailed participant experiences of pregnancy and BB, abstract generalisations were proposed based on patterns identified to give meaning to the data, as applying to particular groups (in this case cultures) of women (Gray, 2014; Lodico, Spaulding & Voegtle, 2010). with the intention of recognising and comparing themes in the data related to specific phenomena of interest, such as the correlation between culture and subscription to the BB phenomena.

7.1. Thematic/Content Analysis

According to Krippendorff (1980, as cited in Joffe & Yardley, 2004), a perceived state of cognitive deficit such as BB has a complex relationship with distress. He compared this to an observable and easily measured problem such as with heart function, suggesting that in this case, a phenomena like BB would not produce data which can be solely documented as frequencies of occurrence. Besides, Silverman (1993, as cited in Joffe & Yardley, 2004) judged such reliance on frequency outcomes as trite and removing the significance of BB from the context of the participants' comments.

As the study of the effect of culture on experiences of BB is a new area of research for which there are no predetermined models of assessment, patterns of responses were drawn through inductive coding from the raw information (Joffe & Yardley, 2004). Such coding required thematic and content analysis.

With content analysis there is the risk that a particular word such as 'forgetful' may occur frequently, but with analysis of the meaning within the overall patterns and contexts of the participants' comments, it could be that the problem is actually referred to a latent level, that is, fatigue, rather than to a memory deficit (Joffe & Yardley, 2004). In this research then, Krippendorff (1980 as cited in Joffe & Yardley, 2004) suggested analysis from different perspectives, as well as systematic and objective inferences about how participant beliefs, characteristics and descriptions impacted their accounts and their understanding of their experiences of BB.

Therefore, thematic analysis is a primary method of qualitative research analysis' "a method in its own right" comprising six phases (Braun & Clarke, 2006, p. 78) (see Table 4). It allows for

the description, recognition, inclusion, analysis, interpretation and understanding of BB in this research in a manner which is both methodologically and theoretically expedient (Braun & Clarke, 2006). The 'themes' captured through analysis represented patterns of participant comments and data which related to the research questions. Braun and Clarke proposed that researcher judgement is required to decide what to include as a theme, based on relevance to the BB phenomenon rather than the number of instances per say.

Table 4: Phases of thematic analysis (adapted from Braun & Clarke, 2006, p.87).

Phase	Description of the process
1. Familiarization with the survey data.	Reading through the survey comments and noting initial ideas.
2. Generating initial codes.	Coding prominent data systematically.
3. Searching for themes.	Collating codes into themes.
4. Reviewing the themes.	Generate a thematic map of the analysis.
5. Defining and naming themes.	Generate clear theme names.
6. Producing the results in written form.	Extract examples and final analysis relating to research questions and literature reviewed in chapter 2.

Once the themes are established, interpretation begins. Popay et al. (2006, p. 6) stated that 'the synthesis, at a minimum, is a summary of the current state of knowledge in relation to a particular review question'. Therefore, the following process would be applied to interpret participant responses (see Figure 4).

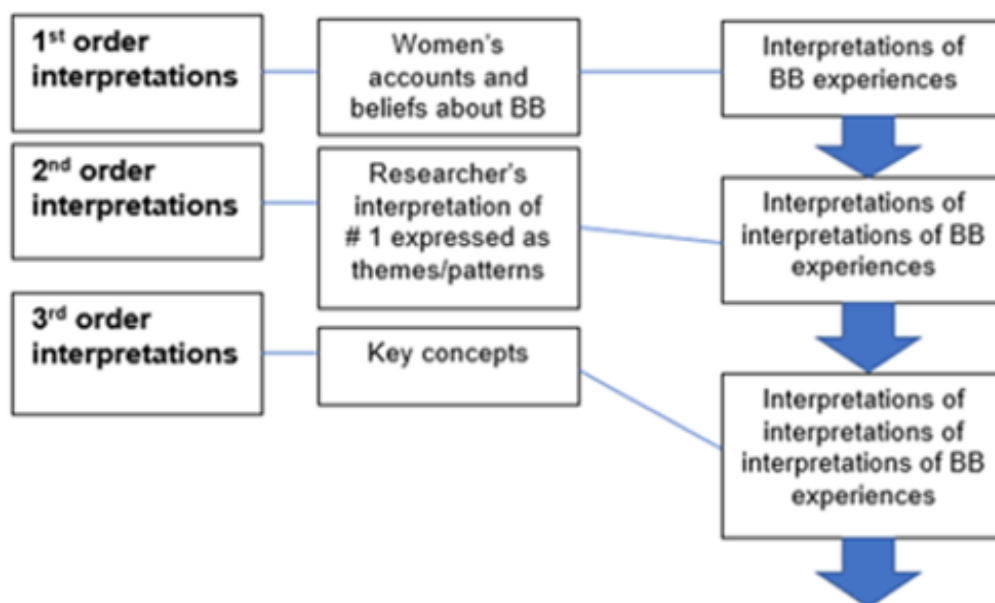


Figure 4: 1st, 2nd and 3rd order interpretations of open-ended survey questions (adapted from Malpass et al., 2009).

8. Summary

The aim of the research was to increase our understanding of the BB construct by exploring expectations and individual experiences of brain function during pregnancy. In order to achieve this the researcher relied on an interpretivist qualitative methodology, a constructivist epistemology and an interpretive perspective. Consequently, after reviewing current literature, three surveys were generated and distributed to participants. Findings were then subjectively determined by the researcher, based on a combination of data collated from academic literature, the SPSS statistical program and general themes noted in the anecdotal survey responses. Although the findings may not be generalizable, the participant responses were designed to capture a variety of subjective cultural and personal interpretations about how BB affects pregnant women and their wellbeing.

Chapter 6

Results

1. Overview

Thirty-six mothers/mothers-to-be aged between 18-39 years completed the 'mother' survey with 75% being in the 30-39 age group. Within this group, 73% ($N=24$) identified as Pākehā, 15% ($N=6$) as Pākehā/Māori and 12% as other ($N=5$) (European, Danish, Indian and American). One (2.8%) participant was aged between 18-19 years, three (8.3%) were between 20-29 years, 27 (75%) between 30-39 years and 5 (13.9%) between 40-49 years. Most of the participants had attained a tertiary level education (92%), 36% a bachelor's degree, 36% a postgraduate qualification 19% had attained a Polytechnic/trade certificate and 8% had not studied further after high school.

In the 'mother' group, one (2.8%) participant was aged between 18-19 years, three (8.3%) were between 20-29 years, 27 (75%) between 30-39 years and 5 (13.9%) between 40-49 years. 92% of the participants had attained a tertiary level education. 19% had attained a Polytechnic/trade certificate, 36% a Bachelor Degree and 36% a postgraduate qualification. Only 8% had not studied further after high school.

Six participants (two partners/spouses, one family member and one friend) completed the family/friend' survey and two completed the 'midwife' survey. None identified as Māori. As has been noted previously the low response to the surveys, particularly to the 'midwives' and "friend/family' surveys meant that the focus of the research was changed and emphasis was placed most on the responses to the 'mother' survey. Further because of low Māori response numbers (six Pākehā/Māori) results can only be suggestive of the impact of culture on BB.

Not all participants completed 100% of the survey tasks. However, all the data provided was included because it provided richness. Participants' comments, in particular, provided insight into how BB is perceived, experienced and coped with.

The results were derived from responses to the surveys and reported in sections covering the following aspects of BB: beliefs and attitudes to BB, experiences during pregnancy, confounding factors, support and coping and differences between mother-to-be's self-assessment and assessment by a friend/family or midwife. Tables 5, 6, 8, 9, 11 and 13 relate to these sections and provide an overview of responses to the 'mother' survey. Where applicable in the sections and sub-sections, qualitative results will follow quantitative results from the survey.

2. Beliefs and Attitudes to Baby Brain as a Concept

Table 5 provides an overview of responses to questions related to beliefs and attitudes, from the 'mother' survey.

Table 5: Beliefs and attitudes to BB

BB experiences, themes & questions:	Mean	Standard deviation	Mean descriptor:
Heard of BB	1.03	0.17	97% yes
Personally use BB as a term	1.26	0.44	74% yes
Comfortable discussing BB	1.52	0.87	Very much so
Your culture supports BB	2.03	1.12	Moderately so
Normal part of pregnancy	2.07	1.16	Moderately so
Temporary part of pregnancy	2.31	1.17	Moderately so
Identity and culture importance	2.35	1.02	Moderately so
Prepared for BB	2.90	1.17	Somewhat
BB requires medical intervention	4.52	0.57	Not really
Mother expected BB	2.96	0.96	Moderately so
Family/whānau & friends expected BB	3.50	1.06	Somewhat

From Table 5 it appears that the majority of the participants, their cultural groups and some of their family and friends are familiar with the BB construct. They expected to experience it, were moderately sure that BB is temporary and normal and were somewhat prepared for it.

2.1. Culture and Expectations of Experiencing Baby Brain

Figure 6 depicts that participants understood their particular cultures strongly expected BB to occur in pregnancy. From Figure 6, those who identified as Pākehā (73% in total) anticipated experiencing BB far more than those who identified at least partly with Māori (15%) and other cultures (12%). Figure 7 illustrates a correlation between ethnic identity and actual experiences of BB. 37% of Pākehā expected to experience BB 'very much so' but only 19% rated actual experiences as 'very much so'. This marks an 18% difference between expectations and experiences for Pākehā.

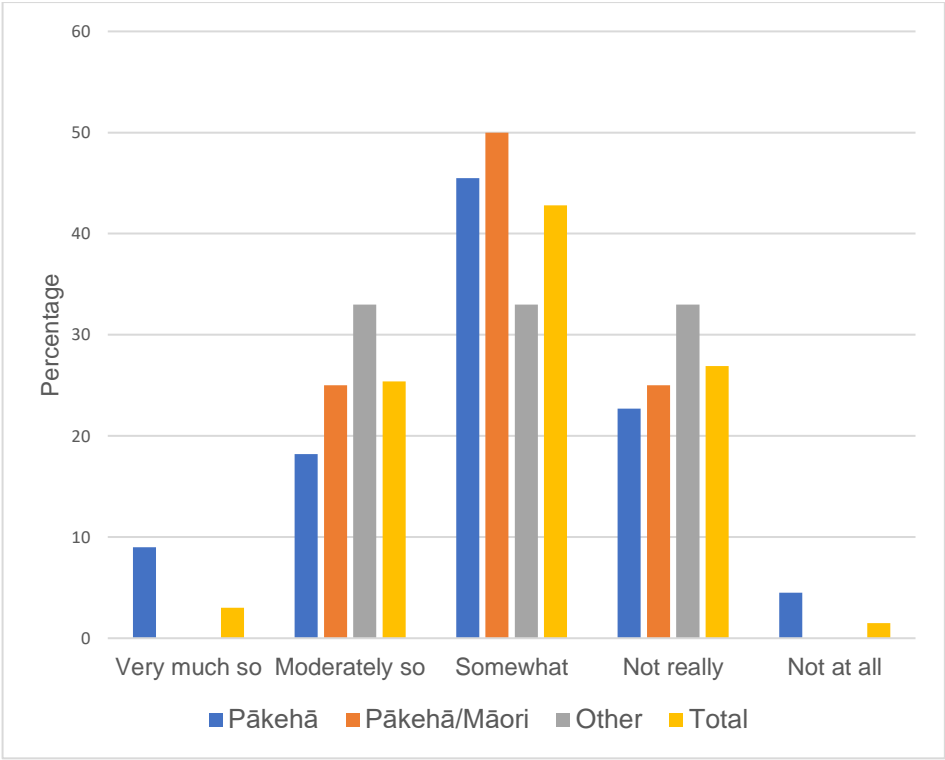


Figure 6: Culture and subscription to the baby brain construct.

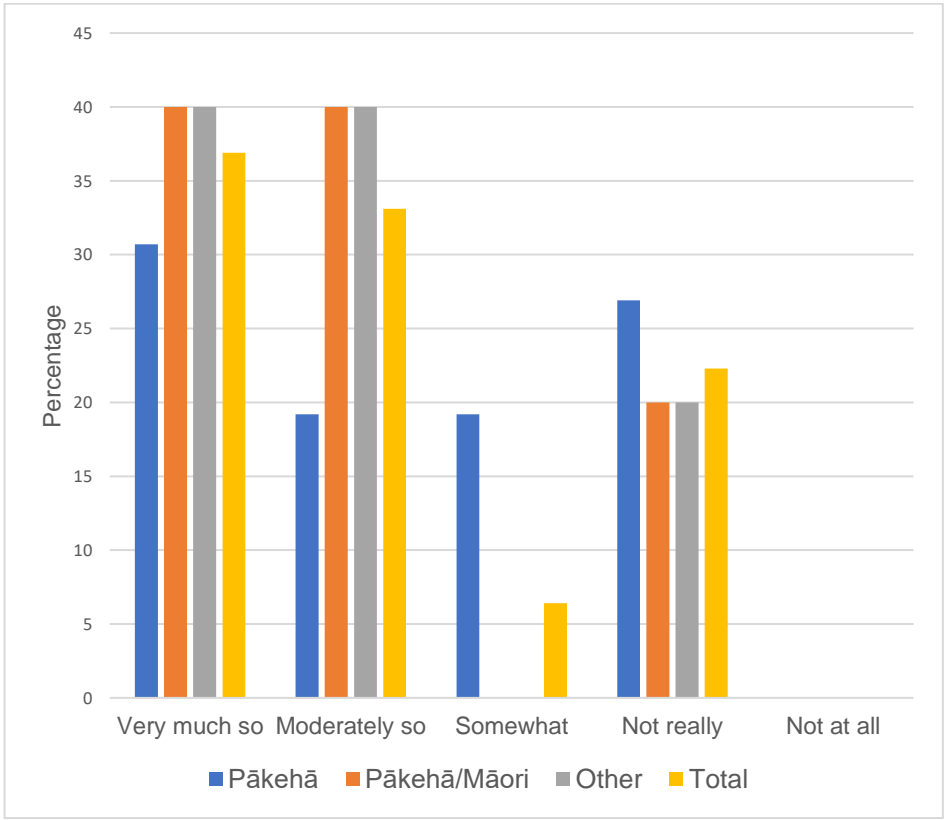


Figure 7: Culture and personal experiences of baby brain.

2.2. Sources of Information

As shown in Figure 8 responses suggest that previous experiences of pregnancy and medical professionals including midwives, proved the greatest resources for information about pregnancy. Sources of information about pregnancy were separated into two groups. Firstly, the informal group comprised 57% of the total; and consisted of the categories friends, family/whānau, the internet, previous experiences, cultural traditions and pregnant peers. The medical group amounted to 43% and included midwives, family doctors, medical specialists, birthing classes and other (which participants chose to indicate literature). When participant ratings were considered with a focus on the top three sources of data which people relied on, it became clear that informal beliefs and experiences were considered fractionally more enlightening.

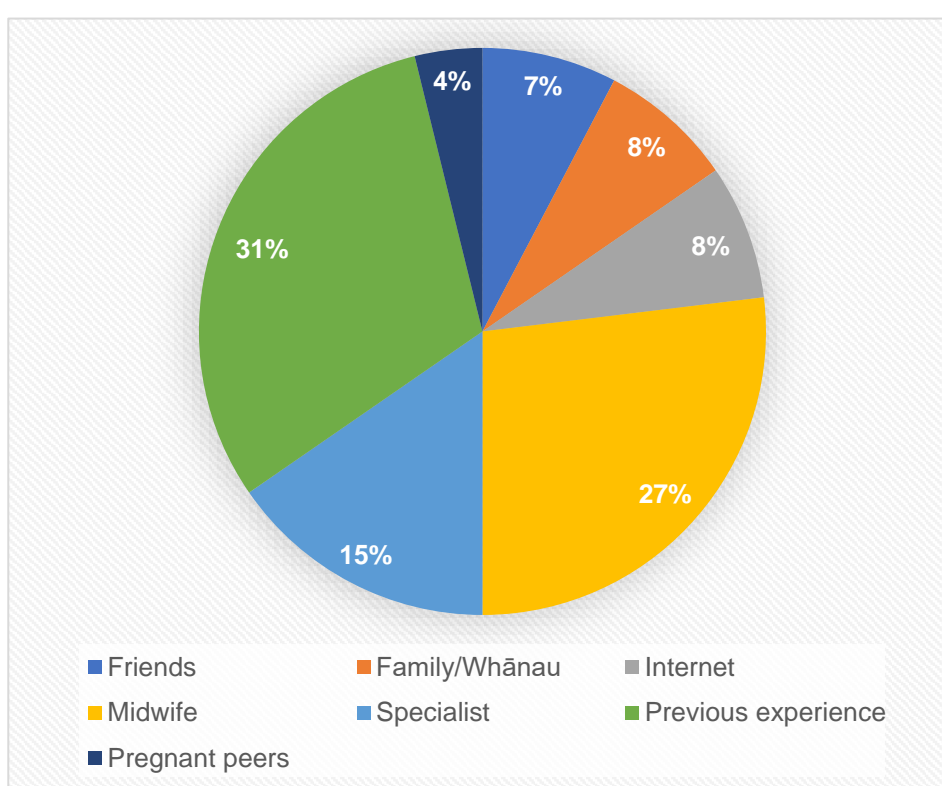


Figure 8: Sources of information about pregnancy for ‘mothers’ group.

Similarly, another survey question found that 70% of mothers relied primarily on their medical care provider (very much so, moderately so and somewhat) to guide them through pregnancy, based on up-to-date medical research. This, despite a midwife participant commenting:

“There is no formal education about ‘baby brain’” and “I don’t talk about it [BB]”.

Whether this is indicative of midwives in general will have to be ascertained through further research, however the comment she makes later that there is “General informal chit chat

amongst colleagues about 'baby brain', ...[with a] general acceptance of it in an informal setting” would suggest that medical staff do encounter BB and that there appears to be a lack of consensus about what BB involves, how to approach the issue in medical practice and if it should be treated in some way.

3. Experiences During Pregnancy

Table 6 provides an overview of responses to questions related to pregnancy experiences, from the 'mother' survey.

Table 6: Experiences during pregnancy

BB experiences, themes & questions:	Mean	Standard deviation	Mean descriptor:
Enjoyed daily activities	2.04	0.81	Moderately so
Enjoyed daily activities	2.04	0.81	Moderately so
Experienced BB	2.44	1.27	Moderately so
BB contextual differences	2.76	1.26	Moderately so
Teased about BB	2.92	1.32	Moderately so
Bothered by slowness	3.04	1.00	Somewhat
BB interference with daily activities	3.31	1.14	Somewhat
Quality of life improved	3.50	0.99	Moderately so
BB negatively affected wellbeing	3.66	1.14	Somewhat
Felt isolated	3.83	1.09	Somewhat

3.1. Context

When asked about whether they perceived BB symptoms to be situational, 57% answered yes. These responses varied between 'very much so', 'moderately so' and 'somewhat'. As regards the specific context in which BB was more apparent, 29% chose 'at home', 39% 'at work' and 18% 'studying/concentrating'. The remaining 14% were aware of symptoms while socialising,

3.2. Pregnancy Stages Affected

Equally large portions of the 'mother' sample reported BB as being particularly noticeable in the final stage of pregnancy (36%) and after the birth of the child (36%) (see Figure 9).

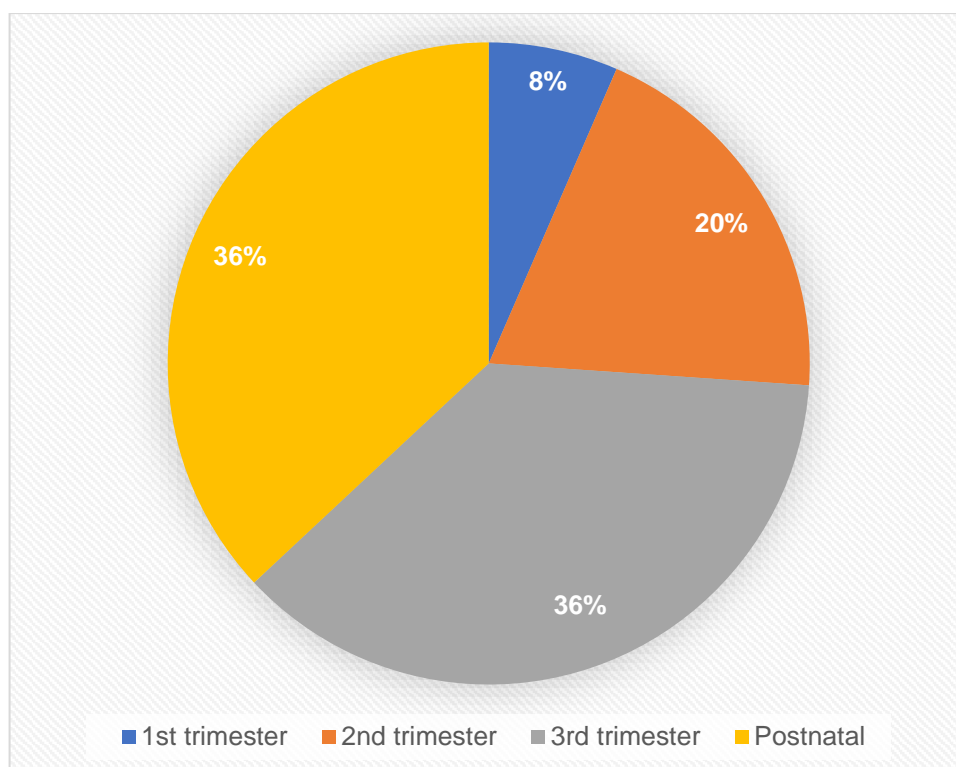


Figure 9: The distribution of baby brain experiences through pregnancy and postnatal stages.

3.3. Improvement in Brain Function

Not all the experiences documented were negative. Participants accounts noted the following favourable aspects of pregnancy:

"[I felt] switched on, confident, did really well at work and was generally very happy."

"More empathetic - I found I could be more patient and sympathetic with people."

"Moments of clarity would come and with it great enthusiasm and creativity and happiness."

"Emotional improvements."

"Great energy... I used them wholeheartedly and managed to accomplish a lot."

"Feelings of precision and getting organised."

"More in tune to my own body and emotions."

3.4. Concerns

All participants expressed degrees of negativity associated with their experiences through the use of words and phrases including: Scattered thoughts, frustrated, forgetting, weak and lacking. The wellbeing of two of the participants was of particular concern in that one mentioned how her negative symptoms were causing her to worrying about keeping her other baby alive. The other person spoke of having little control and memory of some of what she did. She showed concern about taking longer to make decisions and making bad choices. Some of the participants found it difficult to discuss their areas of concern for the following reasons:

*"A lot of people laugh it off either as a joke, or as something trivial.
I don't think they realise it can really affect someone's confidence in
themselves and can be incredibly frustrating."
"Doesn't seem 'real' more a joke."
"Everyone has their own experiences and some may laugh at what I went
through or may find it strange."*

3.5. Symptoms

Of the total, 72% of participants personally experienced BB. Most participants (45%) reported that BB did not really interfere with their daily activities and 48% that it did not negatively affect their sense of wellbeing. However, they described symptoms of BB, or 'porridge brain' as one participant referred to it, as including frequently being tired, clumsy, more forgetful and having less clarity (see Table 7 below). From Table 7, it is clear that short-term memory, concentration and IPS problems occurred frequently. Social isolation and general stress were also reported.

It was evident that the participants had given some thought to the causes and impact of their cognitive deficits. They felt fatigue, in particular, negatively affected their moods and in some cases resulted in less ability to control/adapt to emotions. They noted overreactions to things and contexts which may not normally have elicited a strong or negative response, like to television adverts.

Relatedly, one participant suggested that she felt overwhelmed by and over-sensitive to different forms of information, as her information processing capabilities were impacted by the aforementioned fatigue. Another related that her analytical thinking was harder to initiate and to maintain (for example doing computer programming), as was what someone else called her 'logical thinking ability'. One person lamented too that she felt unable to 'contribute' in her normal daily activities, which caused her some concern. This feeling seemed to underlie many of the frustrations expressed.

Several women mentioned specifically that they struggled to hold conversations. They noted forgetting what they had already said and what the conversation was about. This pointed to temporary problems processing memories and information in the short term. Consequently, many felt frustration with their own abilities and in turn, strong concerns about whether such issues were 'normal' in the context of pregnancy.

*"Could it be something else on top of baby brain,
or is this baby brain?
Trying to distinguish between the two was tricky
but always more so when exhausted."*

One participant theorised that BB is:

“simply tiredness and a change in hormones.

*Women use it as an excuse when they make mistakes
but I don't believe it to be the root cause of things all the time.”*

Table 7: Researcher's interpretations of 'mother' participants' baby brain experiences (adapted from Malpass et al., 2009).

.1st order interpretation: Participants' (mothers') experiences and beliefs		2nd order interpretation: Themes-patterned responses	3rd order interpretation: Key message
<i>E06 Describe the symptoms [of BB].</i>	<i>E08 What do you think causes BB?</i>		
1. ... very forgetful, bringing up things I only just spoke about.	1. Stress	1. Short term memory & stress.	1. Somewhat negative experience. Possibly needs more social support.
2. Forgetful as hell.	2. Lack of sleep.	2. Short-term memory & fatigue.	2. Somewhat negative experience.
3. Forgetting things like names, struggling to think of simple words in conversations or using the completely wrong word all together.	3. Tiredness, trying to juggle too many things at once i.e. cooking, cleaning, working, socialising etc.	3. Short-term memory & fatigue.	3. Somewhat negative experience. Possibly needs more social support.
4. Scattered thinking. Putting things in wrong places e.g. keys in fridge... ½ through a sentence and forgetting what we were talking about/ stopping mid-sentence thinking I finished. Not being able to think and say words you usually use. Starring off into space for long periods of time. Not recognising when someone is speaking to you. Not being able to keep up with conversations.	4. Prior/after pregnancy, things you do completely change (use it or lose it theory) e.g. working parents have adult conversations & utilise brains differently. Once baby comes they aren't thinking in such a specific way...often on their own & conversation is with someone who doesn't talk back [baby]. Main factors are lack of sleep, stress about keeping [baby] alive, constantly thinking of others & another child always talking to you & depending on you.	4. Short-term memory, concentration, IPS & social isolation..	4. Very negative experience! Stress about keeping [baby] alive- Definitely needs more social support.
5. Forget things- train of thought in discussions, especially later in the day!	5. Being extra tired.	5. Short-term memory, concentration & fatigue.	5. Somewhat negative experience. Possibly needs more social support.
6. Forgetting what I was doing & talking about mid conversation.	6. Lack of sleep & attention divided between tasks at hand & caring for older child.	6. Short-term memory, concentration & fatigue.	6. Somewhat negative experience. Possibly needs more social support.
7. Forgetfulness—especially forgetting words.	7. –	7. Short-term memory.	7. Somewhat negative experience.
8. Forgetfulness, vagueness, difficulty focusing & keeping up with conversations.	8. Hormones and thoughts/emotions relating to baby.	8. Short-term memory & concentration.	8. Somewhat negative experience. Possibly needs more social support.
9. Forgetful. Doing without remembering- autopilot. Taking longer to make decisions & more likely to make bad decisions.	9. Lack of sleep.	9. Short-term memory, concentration & fatigue.	9. Very negative experience! Concern for decision making - Definitely needs more social support.
10. Tiredness, forgetfulness, doing something silly, not being able to think clearly.	10. Tiredness, lack of energy from either growing a baby or with a new born.	10. Short-term memory, concentration & fatigue.	10. Somewhat negative experience. Possibly needs more social support.

11. Can't do anything complex after 2 pm as can't think, forget what I'm talking about, & don't comprehend	11. -	11. Short-term memory, concentration, fatigue & IPS.	11. Somewhat negative experience.
12. Forgetting things like times of appointments & words.	12. Low energy. Mind elsewhere.	12. Short-term memory & concentration.	12. Somewhat negative experience.
13. Forgetfulness.	13. Body using resources for the baby not for own benefits.	13. Short-term memory.	13. Somewhat negative experience.
14. –	14. Tiredness!!	14. Fatigue.	14. Somewhat negative experience.
15. Forgetting kids' names. Going to get something from the bedroom & forgetting what is was.	15. Tiredness & thinking about all the kids ... the schedule, needs etc.	15. Short-term memory, concentration & fatigue.	15. Somewhat negative experience. Possibly needs more social support.
16. Can't concentrate properly & get frustrated... eventually resigning to fact that it's a "stage" ... so just chill & enjoy pregnancy. Muzzy head, exhaustion, sleeplessness, starving, yawning, feeling weak.	16. Hormones.	16. Short-term memory, concentration & fatigue.	16. Somewhat negative experience. Possibly needs more social support. Tried to reframe BB as 'stage'-positive end goal.
17. Memory not as good as before/after pregnancy. Struggle working out things that are normally straight forward... put things in strange places, like keys in fridge & I found it hard to think at the level I am used to for my job as a Physics researcher.	17. Energy and nutrients being directed away from the brain to other parts of the body?	17. Short-term memory, concentration & IPS.	17. Somewhat negative experience. Possibly needs more social support.
18. –	18. Lack of sleep, juggling multiple priorities, stress.	18. Fatigue & stress.	18. Moderately negative experience. Stress - Definitely needs more social support.
19. Forgetfulness, clumsiness, absent minded, struggling to think.	19. Changes in mothers' brain and body function.	19. Short-term memory, concentration & IPS	19. Somewhat negative experience.
20. Forgetting appointments, not being able to string sentences together, forgetting what people tell me.	20. –	20. Short-term memory & concentration.	20. Somewhat negative experience.
21. Memory lacking, little slower to function.	21. Lack of sleep.	21. Short-term memory, concentration, IPS & fatigue.	21. Somewhat negative experience.
22. -	22. BB brain at work post maternity due to being confined to just baby duties at home, talking a different language at home (not English), pregnancy how way my brain operated after I returned to work.	22. Social isolation.	22. Moderately negative experience. Definitely needs more social support.
23. –	23. Lack of sleep and general fatigue.	23. Fatigue.	23. Somewhat negative experience.
24. Exhaustion= cognitive dysfunction regardless of pregnancy- from aching & growing body that creates BB. Like flu/broken leg/stress at work.	24. Exhaustion	24. Fatigue.	24. Somewhat negative experience.

3.5.1. Cognition

Table 8 provides an overview of responses to questions related to cognition, from the 'mother' survey. From the results it is clear that participants experienced moderate cognitive deficits while pregnant and that they approached tasks with the same level of effort as before they became pregnant.

Table 8: Cognition

BB themes & questions:	Mean	Standard deviation	Mean descriptor
Difficulty remembering multiple info	2.67	1.37	Moderately so
Difficulty remembering future	2.79	1.38	Moderately so
Re-read instructions	2.96	1.37	Moderately so
Concentration decreased	3.17	1.09	Somewhat
Difficulty remembering past	3.75	1.07	Somewhat
Made less effort with tasks	4.27	0.92	Not really

3.5.2. Confounding Factors

As regards possible causes or contributing factors to BB experiences, several questions were posed to capture information. Table 9 provides an overview of responses to questions related to confounding factors, from the 'mother' survey. From this information it would appear that the participants considered themselves to be moderately healthy during pregnancy and only low levels of insomnia, anxiety and low moods were noted.

Table 9: Confounding factors

BB themes & questions:	Mean	Standard deviation	Mean descriptor
<i>Physical & emotional health during pregnancy</i>			
Took Iron supplements	81% yes	19% no	
Chronic health conditions	20% yes	80% no	
Experienced good health	1.73	0.83	Very much so
Healthy diet	1.92	0.72	Moderately so
Tired	1.96	0.86	Moderately so
Exercising	2.58	1.30	Moderately so
Sleeping enough	3.08	1.02	Somewhat
Stress related insomnia	3.13	1.23	Somewhat
Anxious	3.29	1.16	Somewhat
Low mood	3.96	1.00	Somewhat

3.5.2.1. Hormone Changes

Although not scientifically measured within this research, hormone changes were referred to by participants as being the cause of BB, specifically mood changes, fatigue and cognitive deficits.

3.5.2.2. Attention, IPS and Motivation

92% of participants indicated that it was important to them that their brains worked to full capacity; and 85% related not making less effort with tasks requiring concentration just because they were pregnant. However, 42% were unprepared for the changes in cognition and mood that they experienced during pregnancy and 54% were bothered by experiences of forgetfulness and slowness. 50% wrote that their concentration decreased so that they had to keep refocusing on what it was that they were doing; 65% needed more time to process information; 62% needed to reread instructions more than before pregnancy; and 72% had difficulty remembering multiple pieces of information at a time (e.g., remembering to call someone while busy preparing dinner). 34% had problems with retrospective memory and 69% with prospective memory. They related cognitive deficits to fatigue, which they believed to have affected their moods and memory. Analytical and logical thinking were specifically reported as diminished.

3.5.2.3. Personality Type

As illustrated in Table 10 below, participants displayed an openness to new experiences, agreeable, extroverted-being sociable and easy-going/accepting of any cognitive changes in pregnancy, conscientious and finding humour in BB such as memory deficits. Although no questions were posed directly to determine personality type, participant comments were examined for indications of personality traits.

The statements show that on average, the group of participants were quite organised. Furthermore, in response to the question 'Did you make less effort with tasks requiring concentration, because you believed your information processing ability would be negatively affected by baby/pregnancy brain anyway?', the mean response was 'not really'. Both these results were in keeping with the overall conscientious nature of the 'mother' group, as illustrated in Table 10.

On the other hand, as also shown in Table 10, two participants noted isolation and irritability which could possibly have fuelled depression and could be deemed neurotic personality traits such as, and/or anxiety actual deficits. Their feedback suggested a correlation between social isolation and a more negative experience of pregnancy, including BB symptoms.

Table 10: Indications of positive and negative personality traits from the comments made by ‘mother’ participants (adapted from tables in Isik & Cengiz, 2018).

• Positive Personality Traits	Examples of trait behaviour as documented in Table 6: Participants’ coping methods
1. Openness & Agreeableness (benevolence, forgiveness, kindness, tolerance, respectfulness, flexibility)	1. I just carried on with my day to day activities. 2. Communication with those that saw/were impacted by [my] BB. 3. Don’t push yourself too hard. 4. Just time [BB is just a stage and will pass]. 5. Just accepted it. 6. Allowing myself to be human/fallible. 7. Complete mental tasks when ... at your best.
2. Extroversion (energetic, talkative, friendly, exciting, enthusiastic, social)	1. Trying to immerse myself ...with other adults. 2. Getting out & about. 3. Asking others for help. 4. Talking to people & being surrounded by supportive people.
3. Conscientiousness (planning ahead, reliable, organised)	1. Made an effort to get enough sleep. 2. Making notes/reminders. 3. Made sure not to be advising clients...in the afternoons 4. Being highly organised.
4. Humour	1. Laughed it off.
• Negative Personality Trait	Examples from table 5: Participants & researcher’s interpretations of reported BB
1. Neuroticism, social isolation, depression and/or anxiety (depression, irritability, sensitivity, anxiety, emotional instability, introversion).	1. A lack of adult conversations- social isolation. 2. Frustration & irritability with memory, IPS, fatigue & concentration problems. 3. Often on her own. 4. stress about keeping [baby] alive. 5. Making bad decisions.

3.5.2.4. Depression and Anxiety

Pre-existing or pregnancy related disorders such as depression and anxiety were considered. In response to “Have you ever, before or during pregnancy/hapūtanga, consulted a health care professional with concerns about your mental health?” 79% of ‘mother’ group indicated that they did not have previous mental health concerns.

Although 23% felt low in mood for extended periods and only 35% felt their quality of life improved during pregnancy, 96% of participants enjoyed their daily activities while pregnant, but

32% of participants felt their wellbeing was negatively affected by pregnancy. 19% had consulted a health care professional with concerns about their mental health before or during pregnancy. 54% felt anxious during pregnancy. 11% had a health condition during pregnancy which affected their psychological wellbeing. One participant was on sertraline for her postnatal depression from her last pregnancy.

Participants offered theories as regards the causes of any cognitive deficits they perceived during pregnancy. They believed that negative symptoms were related to stress rather than BB.

*“While pregnant this time around, we had moved cities, I was in a new job,
I was studying and we were trying and did buy our first home.
In general life was extremely busy, tiring and stressful.”*

*“The stress I experienced was due to a junior doctor
giving incomplete information over the phone
that my baby may have chromosomal abnormalities (didn’t)
and worrying whether we would terminate until the results came through.
We were very angry and upset.
Otherwise the stress was fine and unrelated to pregnancy.”*

3.5.2.5. Insomnia

39% of mothers did not feel that they slept enough during pregnancy with 96% very tired during pregnancy, although they reported that on average they slept ‘somewhat’ enough over this period. Several blamed fatigue for their BB symptoms like forgetfulness.

3.5.2.6. Nutrient Deficiency

Most participants (96%) believed they were eating a healthy diet during pregnancy and that their physical health was good too. Multi vitamins (Elevit), iron supplements (81% of participants used these) and folic acid were listed as medication taken in support of pregnancy.

3.5.2.7. Stress, Financial and Work Pressures.

Table 11 provides an overview of responses to questions related to employment and finances, from the ‘mother’ survey. From this it is evident that participants were mostly employed during pregnancy, had moderate financial and career concerns and did not feel able to/need to change their daily tasks because of pregnancy or BB.

Table 11: Employment and Finances

BB Themes & Questions	Percentage		
Paid employment at time of confirmed pregnancy	33% yes <30hrs/week 56% yes >30hrs/week	11% no	
Paid maternity leave	80% yes		
	Mean	SD	Descriptor
Financial concerns	2.29	1.33	Moderately so
Negative career impact	3.46	1.32	Somewhat
Needed to downscale/ change duties	3.48	1.41	Somewhat
Able to downscale/change duties at work without problems	3.90	1.29	Not really
Downscaled work duties because of BB	4.31	1.01	Not really

Eighty-nine percent of participants were in paid employment at time of pregnancy confirmation and 46% felt they needed to downscale or change their duties at work as a result of being pregnant. However, 88% needed this change for reasons other than BB. Of those who did need to change tasks because of BB, 70% felt unable to do so because of work policies, unaccommodating employers or their own concerns.

Of the working women 80% were entitled to paid maternity leave and of these, 80% were concerned about the financial implications. 58% also worried that having children would have a negative impact on their career.

Although 92% of participants considered themselves to have coped with stress during pregnancy and managed the demands made on them, 62% lost sleep due to stress. 92% were well organised at home and work and some felt this helped them to cope with stress. Furthermore, 20% had serious or chronic health conditions that were likely to have affected their baby, pregnancy, or long-term health. 11% had a health condition which was life-threatening or terminal.

4. Coping and Support

Table 12 presents an overview of responses to questions related to coping and support from the 'mother' survey. Mothers/mothers-to-be reported that they had, on average, 'moderate' success in coping with demands placed on them during pregnancy and reported feeling 'somewhat' afflicted by anxiety. Correspondingly, the participants did not feel low in mood for extended periods; and were able to enjoy their days to a 'moderate' degree.

Table 12: Support & coping

BB Themes & Questions	Mean	SD	Descriptors
Emotional support received	1.19	1.17	Very much so
Able to handle it [BB]	1.36	0.68	Very much so
Coped with stress	2.00	0.8	Moderately
Well-organised	2.00	0.83	Moderately
Adequate social support	2.19	0.94	Moderately
Managed demands	2.33	0.82	Moderately
Advice/practical support received	2.46	1.10	Moderately
Reliance on maternity care provider	2.48	1.63	Moderately

85% of participants received levels of emotional support varying between 'very much so', 'moderately so' and 'somewhat'. 15% felt they did 'not really' receive emotional support or 'not at all'.

Similarly, advice and practical support were forthcoming from the same social groups. 81% were 'very much so', 'moderately so' or 'somewhat' supported and 19% 'not really' or 'not at all'.

The sources of emotional support noted by the mothers included parents, sisters, wider family, friends, husbands, church groups doctors and midwives. Participants' comments highlighted the importance of social support during pregnancy and adjusting to a more manageable routine to compensate for symptoms.

"Managing during pregnancy depends on how many children you already have and how much support is available."

"I am very fortunate to have an understanding employer who has no issue with adjusting how I work to address all pregnancy symptoms."

Another mother contributed that her BB symptoms appear to be permanent and had therefore established a long-term coping method.

"I had two babies 17 and 20 years ago and still have baby brain almost like 'information overload'- so I am a lot more careful of what information I want to concentrate on as I don't want to waste my energy or time in trivia!"

4.1. Do Participants Need Help from Health Professionals or Social Groups to Better Cope with BB?

Thirty one participants responded. As regards coping, in response to whether they felt BB requires medical intervention 42% of the sample indicated 'not really' and 55% 'not at all'.

Most of the twenty eight respondents (75%) reported that they were *very much* able to handle BB by themselves, 14% *moderately so* and 11% felt only *somewhat able* to cope alone.

In Table 13, participants' BB coping methods such as social support were catalogued. Memory prompts like 'stick it' notes featured conspicuously. Having realistic expectations of one's abilities and being organised helped participants cope more effectively, as they claimed to feel more in control and less overwhelmed and frustrated. Also, organisation related to maintaining a healthy diet and as many opportunities for rest and recreation as possible in combating BB. This required planning for breaks and the help of family and/or colleagues to accommodate the expectant mothers with such things as babysitting of other children and moving meetings at work.

Another coping method presented as a comment that by accepting changing circumstances, some stress was eliminated. Relatedly, two ladies embraced the BB construct as a rite-of-passage. They used the stereotype and social expectations of diminished capacities and mood swings to explain and mitigate their perceived shortcomings, both to themselves and to others.

"I just carried on with my day to day activities.

People I work with and family members

used the term "baby brain" so were understanding."









"[I utilised] communication with those that saw or were impacted by BB

[like my] work colleagues, whanau & friends.

Identifying & addressing the behaviour

as/when it occurred helped me & others understand the impact."

Table 13: 'Mother' participants' coping methods (adapted from Malpass et al., 2009).

Participants' methods of coping with BB	Key methods:
1. I just carried on with my day to day activities. People I work with & family members used the term "BB" so were understanding.	<ul style="list-style-type: none"> Attributed negative symptoms to 'BB' Social support
2. Sleep, making notes/reminders	<ul style="list-style-type: none"> Memory prompts Rest & recreation
3. Communication with those that saw or were impacted by BB or work colleagues, whanau & friends. Identifying & addressing the behaviour as/when it occurred helped me & others understand the impact.	<ul style="list-style-type: none"> Attributed negative symptoms to 'BB' Social support
4. Trying to immerse myself as much as I can with other adults. Getting out & about. Resting as much as able. Trying to get some time away for myself.	<ul style="list-style-type: none"> Social support Rest & recreation
5. I tried to get more sleep... & small breaks for myself (away from my toddler) so I feel happier and calmer	<ul style="list-style-type: none"> Rest & recreation
6. Making lists although I was a list person before pregnancy maybe more so now	<ul style="list-style-type: none"> Memory prompts
7. Writing things down helped a lot in making sure I remembered tasks etc	<ul style="list-style-type: none"> Memory prompts
8. Allowing myself to be human/fallible. Lists. Asking others for help/reminders.	<ul style="list-style-type: none"> Realistic expectations Social support Memory prompts
9. Just accepted it, laughed it off	<ul style="list-style-type: none"> Acceptance and humour
10. Rest, eat well, don't push yourself too hard. Complete mental tasks when you feel at your best in the day	<ul style="list-style-type: none"> Rest & recreation Healthy diet Realistic expectations Changed routine to accommodate BB
11. Made sure not to be advising clients on anything complex in the afternoons when it was worst	<ul style="list-style-type: none"> Changed routine to accommodate BB
12. Sleeping as much as possible. Writing things down	<ul style="list-style-type: none"> Memory prompts Rest & recreation
13. Being sure to write down important things to refer to later	<ul style="list-style-type: none"> Memory prompts
14. Just laugh it off	<ul style="list-style-type: none"> Acceptance and humour
15. Being highly organised ... more time to rest & with rest you are better able to enjoy your pregnancy and family. Chose the things most time consuming...do once a week... Rest was my only cure! Just the time to find it was the difficult part! Eating huge amounts of salads & making sure I was eating helped!	<ul style="list-style-type: none"> Organisation Rest & recreation Healthy diet
16. Lists! & slowing down my pace of life so that I didn't feel overwhelmed by all the things I couldn't remember.	<ul style="list-style-type: none"> Memory prompts
17. Just time!!	<ul style="list-style-type: none"> Acceptance
18. Phone reminders	<ul style="list-style-type: none"> Memory prompts
19. Wrote down my appointments with reminders	<ul style="list-style-type: none"> Memory prompts
20. Post it's, write everything down don't rely on memory like I used to	<ul style="list-style-type: none"> Memory prompts
21. Meditation. Going for a walk at least for few mins every day. Talking to people & being surrounded by supportive people.	<ul style="list-style-type: none"> Social support Rest & recreation Exercise
Key coping methods:  Social support,  Memory prompts,  Rest & recreation,  Realistic expectations,  Acceptance & humour,  Changed routine,  Organisation,  Diet/exercise	

Finally, humour- laughing at oneself in situations which were potentially stressful, such as failing to remember words or hold a thought and rationalising that the BB symptoms are temporary, appeared to help some participants significantly.

Those participants who were only moderately or somewhat able to cope with BB, expressed the following help would have been beneficial:

“Just to be able to sleep - arrange help to watch over your child and prepare dinner, in your home as you take a three hour rest or so.

Possibly hire help to keep house in order before and after a weekend – a luxury but it gives you more time to sleep and be more alert on the weekends when it’s family time!

To have your shopping delivered – just practical things that are an ongoing normal home task but taking time away from sleep and quality time with your child.”

“I got more help with colleagues for the technical thinking involved in my job.

And my father-in-law worked out time zone things for me!

Support network basically.”

“Supportive friends, family and colleagues.”

“Just laughing about it.”

“More sleep! Strategies to help stop forgetting things/ being more organized.”

“Making a conscious effort not to confine myself to baby duties and staying locked in at home during maternity leave. Keep in touch with friends who talk English so it's not forgotten or goes back of mind More support from mid wives that's OK not to breastfeed More support from mid wives at hospital for new mums, especially those who had a c-section and/ or have had challenges during their pregnancy.”

5. Differences between Mother-to-be's Self-Assessment and Assessment by a Friend/Family or Midwife

The five 'friend/family' participants described symptoms which mirrored those reported by the 'mother' group. These comprised forgetfulness, such as repeating actions with no memory of having already completed a task, being unable to remember a term used daily and misplacing items; and having information processing problems, for example not being able to do basic calculation.

A participant in the 'midwife' survey believes BB to be a moderately normal and temporary part of pregnancy, moderately a myth and due to the following:

*"As long as someone is sleep deprived,
and exacerbated by having
little to do outside of looking after the baby."*

The midwife also did not really expect to see signs of BB in her clients, so did not raise the subject with them. She did add that the clients who sometimes noted symptoms of BB did so in the 3rd trimester of pregnancy (which correlated with 36% of 'mother' participants' experiences); were somewhat distressed by the symptoms, particularly forgetfulness; but that she did not provide clients with advice or referrals to medical services.

She did offer the following thoughts regarding BB:

*"I tend not to think about 'baby brain' too much,
nor put much store into it.
I think it might be due to sleep deprivation,
but not really sure.
I worry that labelling women as having 'baby brain' is a way to dismiss
pregnant or postnatal women as being less capable.
Whereas if it is simply due to sleep deprivation,
it is more understandable,
has an obvious solution,
and then we could equally talk about daddy brain.
I'd be open to reading more research about women's experience of baby brain,
and especially open to reading of physiological difference
that is not explained by sleep deprivation
-then I might change my mind.
I'm sympathetic of people who talk about 'baby brain',
and not dismissive of it,
because I think it is people expressing their lived experience.
Get more sleep, get more time to yourself, share the parenting responsibilities more,
and I think we'd see less 'baby brain'."*

A formulated interpretation of a midwife's comments (adapted from Malpass et al., 2009) provided the following: BB is not important and as reported by some of the mother-to-be participants, is due to fatigue. From her perspective, she elaborated that fatigue as a cause for cognitive deficit is ideal because it can be treated and generalized to men. She added that BB is due to a lack of social support and no time for rest and recreation, which again mirrors comments made by the 'mother' group. The midwife cited her concerns about stereotyping of pregnant women as deficient in some way due to BB; and expressed a need for scientific evidence regarding BB. She concluded that she would be open to open to BB research and documented cognitive changes not related to fatigue, but that it should allow and take into consideration individual and subjective experiences.

Chapter 7

Discussion

1. Overview

Pregnancy is a critical period for women. Not only do they have the overt physical changes to their bodies to contend with, but also the psychological effects of imminent changes to their lives. This study examined academic literature to establish the causes and impact of structural changes to the brains of expectant mothers-to-be. Surveys captured patterns of issues which may explain cognitive deficits and factors which may improve pregnancy experiences.

2. Academic Literature

From the literature, understanding of and research around BB and cognitive changes to the GM of pregnant women, is still in its early stages; and the underlying mechanisms causing BB deficits are unclear. Some reports discuss deficits to brain functionality in areas like memory and IPS. Essentially though, BB is characterised as the resulting symptoms of hormonal changes, possible cultural stereotypes, maybe some sleep and micronutrient deprivation, neurotic personality types and a lack of motivation. However, most have failed to account for the impact of issues like fatigue and cultural understanding and beliefs. Furthermore, there is scant mention of any positive increases in function, documentation of subjective narratives or cultural perceptions of BB interventions to help women cope with symptoms such as anxiety and fatigue.

From a New Zealand perspective with its basis in western biomedicine, we focus primarily on dysfunction. Therefore, this thesis focused on understanding the 'baby/pregnancy brain' construct by exploring expectations and individual experiences of BB during pregnancy.

3. Hypotheses- Findings Based on this Research

3.1. Symptoms of Cognitive Deficits are Due to Confounding Factors

The hypotheses of this research included that BB symptoms may be due to confounding factors such as insomnia and stress, rather than changes to brain matter. According to the participants' survey responses, this was confirmed. An example would be that large portions of the 'mother' participants experienced BB in the final stages of pregnancy and after the birth. This may be partially explained by the common complaint of fatigue noted by the group (see Table 6 and Chapter 2), especially towards the end of pregnancy and with a new-born.

Their beliefs included that BB relates to fatigue and stress, such as the impact of having children on financial and career stability, and not to pregnancy per se; that the effects of BB are long-term; and that mothers' coping depends on previous experience of pregnancy and social support. While participant experiences were individual and subjective, the fact that 92% have attained tertiary education levels, 89% were employed during pregnancy and regard their cognitive function as

important, could have made them oversensitive to possible cognitive deficits and social bias around BB as regards their ability to maintain functionality in a work environment.

3.2. Different Personality Types Influence Perception of BB and Coping with Symptoms.

Most of the 'mother' participants felt able to cope with BB. They also displayed an openness to new experiences, agreeableness, extroversion and acceptance of any cognitive changes in pregnancy and conscientiousness; and found humour in BB. The two individuals who displayed neurotic personality traits including isolation and irritability, had a very negative pregnancy experience. Based on this group of women then, those who displayed positive personality traits did indeed have less negative perceptions of BB and better coping mechanisms, although the direction of the causal effects remains undetermined.

3.3. Beliefs about BB.

Most women, especially those who identified as Pākehā, strongly expected to suffer from BB. By comparison though, their actual experiences of BB related symptoms were less marked and while 44% of mothers expected to experience BB, only 32% actually did.

Also, 14% of respondents perceived BB symptoms while socialising, within group situations. This could suggest a relation between BB and group cognition- a confirmation bias experienced by mothers to conform to stereotypical expectations of BB.

A midwife raised the following concern:

"I worry that labelling women as having 'baby brain' is a way to dismiss pregnant or postnatal women as being less capable. Whereas if it is simply due to sleep deprivation."

3.4. BB is Primarily a Pākehā Construct

After consideration of all the survey responses it appears that Pākehā, rather than those with some Māori identity, have stronger expectations that BB will occur during pregnancy. However, the participant numbers of those identifying even partially as Māori was very low, but from the data gained from these individuals it seems that they anticipated BB to a lesser degree than those who identified as only Pākehā. Therefore, it would appear that there is some possibility that this hypothesis has merit.

3.5. General

In the article by Davies et al. (2018) reviewed in Chapter 2, it was concluded that BB effects are more apparent in the third semester of pregnancy. This was in keeping with this research where 36% of the participants reported that their symptoms were more noticeable towards the end of pregnancy. Similarly, 36% also reported these symptoms extend into the postnatal stage. It may be argued that fatigue would be a confounding cause of cognitive deficit during this time, as mothers and new born babies establish a new routine for feeding and sleeping.

In light of the academic research which was examined for this study, sleep problems may be attributed to hormonal changes, the discomfort of finding a comfortable position to sleep in with an extended abdomen, stress associated with the imminent change in one's life-role and other concerns such as financial implications of bearing a child. Also, it may be surmised that increased BB symptoms at home may be due to the increased opportunity to focus on symptoms, rather than concentrating on work tasks and scrutiny by employers.

Participants in this research attributed their main impairments to function to fatigue. Moreover, BB symptoms may be improved/avoided by the following: A healthy diet, exercise, recreation, realistic expectations, memory prompts, being organised, acceptance of physical and mental changes during pregnancy and humour.

Furthermore, medical staff such as midwives are rated highly as sources of information during pregnancy. Participant comments highlight the need for healthcare workers such as general practitioners and midwives, who have point-of-call contact in these situations, to discuss any psychological concerns that pregnant women may have. But given that these healthcare workers have reported encountering BB but not addressing it directly, there is a clear opportunity for mothers-to-be to be educated as well as reassured by such workers. It appears that women need to be provided with a generalised overview of the types of cognitive and emotional issues that they may encounter, so that they may have a better understanding of what is 'normal/abnormal', that their experiences are valid and not just a 'joke', what may be the root-causes of some of their symptoms and how they may alleviate symptoms such as by getting more rest.

Equally, there is also a lack of consensus about what BB involves in both informal and formal medical contexts, how to approach the issue in medical practice and if it should even be treated in some way within the medical field. Midwives, in particular, are open to scientific research about BB. Consequently, more research is required to improve understanding, definitions and categorizations of BB as well as de-stereotyping pregnancy as a cause of intellectual and functional deficit for women. From such information it may then be determined how the medical field and communities could better support women affected by BB, or help them cope with any other negative affects due to factors including fatigue or social isolation which may be the actual cause of instances cognitive deficiencies, rather than changes to brain matter and pathways.

4. Interventions

Hoekzema et al. (2017) provided evidence that the effects of pregnancy on a woman's brain, such as GM reductions, endures through pregnancy up to a minimum of two years postpartum. Rutherford and Mayes (2016) proposed that although neural plasticity is in many ways an advantageous period for primiparous women, such as shaping their brains for motherhood, there are negative experiences reported too. Considering the potential length of the period in which BB may cause distress, some form of intervention is required.

Searches through the Massey University library database, using keywords including combinations of the words/phrases baby brain, pregnancy brain, mothers, interventions, psychological, cognitive deficits/complaints and so forth, yielded no academic literature regarding how to overcome or cope with BB. Instead, it is however possible to research and source therapies, interventions and support for particular symptoms of BB like anxiety, fatigue and social isolation. Examples of such research includes a study analysing the relationship between anxiety, depression symptoms and dysfunctional motherhood-related beliefs, what the mechanisms are and assessment of individuals for interventions (Fonseca, Monteiro & Canavarro, 2018).

In such instances and particularly if the individual is not able to cope with the cognitive changes on her own or has inadequate support from family and friends, structured community and/or professional intervention may be called for. As insufficient social support poses a serious risk for anxiety and depression both during and after pregnancy, support, particularly peer support, is crucial (McLeish & Redshaw, 2017). In fact, Mead and MacNeil (2006) declared the following:

“People who have like experiences can better relate and consequently offer more authentic empathy and validation”.

What is required according to healthcare professionals is affirmational (emotional), empathetic, informational, motivational and instrumental (practical) encouragement and help (Brown, 1986; Dennis, 2003; Leger & Letourneau, 2015). McLeish and Redshaw (2017) counselled that from this, mothers will be enabled to problem solve and make better informed decisions regarding their pregnancy issues.

While the ‘mother’ participants in this research already had some support from midwives, friends and family, they still documented various sources of stress and frustration encountered during pregnancy and two participants were clearly in need of emotional and practical support. With the lack of formal information available about BB, it may be that formal roles for pregnancy related peer supporters, who will add to the midwives roles, should be created. These supporters would then contact the available local resources on the behalf of mothers-to-be/mothers. As lamented by a mother (MO11) in McLeish and Redshaw’s (2017) study:

*“Lots of people [are] there to help but if you don’t know,
you can’t get any help...
When you have [a peer supporter]
they have contact with everywhere”.*

McLeish and Redshaw (2017) concluded that funding should be made available for such peer support projects, as from their research, they determined that face-to-face help from organised and trained peer supporters has a definite positive impact on the wellbeing of women. They did caution too that there are cultural differences in perceptions of support, so further research will be required to meet the particular challenges and requirements of various groups.

To that end, Māori communities and medical facilities have services designed specifically to accommodate the needs of Māori (Romans, 1998). Kuia, provide support to women and their families. According to Romans they foster an interdependence between people as a means to gain strength and health. Moreover, they take a broad approach to wellbeing as recommended by Durie (1995) by taking into account the physical, emotional, spiritual, social and family needs of individuals, which may collectively contribute to their particular experiences of distress. From this, the western biomedical model can certainly learn to value social support and the individual voice as a valuable contributor to planning any provision of services required in overcoming or avoiding negative pregnancy symptoms.

As for mainstream medical professionals working with those who identify as Māori, Durie (1995) suggests they will need to challenge their cultural assumptions. One would assume that this refers to the dominant presupposition that Māori should adapt to western biomedical ideology. He advocates instead that not only must Māori health services be provided as a choice to women for understanding such issues as those caused by BB, but reminds too that Māori women have always assumed a crucial part in provision and development of services for Māori, and should therefore be deferred too as specialists in the area of indigenous healthcare.

5. Limitations

This research had several limitations. Firstly, a range of socioeconomic and cultural participants could not be ensured. Most of the participants had attained a tertiary level education, so a clear link between experiences of BB and education level could not be investigated. Similarly, most participants identified as Pākehā, or partly Pākehā, so future studies would need to include more Māori women to determine the full effect of culture on individual and group perceptions of BB.

The smaller number of participants could also be due to a lack of free time to complete surveys. Postgraduate students were busy completing assignments when the survey information was distributed and may not have had time to complete surveys. This also holds for new mothers who are sleep and time deprived. In hindsight a face-to-face interview could possibly have ensured that more surveys were actually completed and completed 100%.

Similarly, from the limited response to the surveys by midwives, it would seem that whilst they are aware of BB, they do not discuss it directly with pregnant women or other medical professionals. A focus on a study with midwives with more participants is required to establish whether this is indeed a generalised issue. Also, it needs to be established how to best educate midwives regarding the causes, effects and coping methods around cognitive deficits in pregnancy.

Socioeconomic factors could potentially have confounded the data. Some participants with more financial security could have access to healthier diets and healthcare, limiting some of the symptoms like nutrient deficiency induced fatigue, which may be attributed to BB. Other

possible limitations included that the differences in experiences of BB across various age groups may be explained by generational differences in understanding and reacting to symptoms and distress, rather than cultural variance. Also, the coding used in the surveys to ascertain the strength of responses was subjective. For example, one participant may view and report memory deficits more negatively than another, although their levels of functionality/deficit are similar.

However, as the five participants who identified as Māori also identified as Pākehā, the results of this research were not definitive. It is impossible to guarantee that the data generated by this research is generalisable to all individuals or cultural groups within New Zealand. It is hoped though that cultural differences aside, the diversity of participant survey responses recorded may still contribute to our understanding of how factors such as personality and social support impact on women's experiences of BB; and how healthcare workers can help in improving these experiences if needs be.

If future research of this nature is conducted, Māori community leaders should be approached through an introduction by a Massey cultural advisor. Perhaps, if the aim of the research is explained to them and their input is ensured in the planning and execution of research, their blessing and involvement may ensure larger numbers of Māori participation.

6. Recommendations for Future Research

Longitudinal studies are required to establish whether BB has real and lasting effects on women, or if temporary, for how long. In fact, a few of this study's participants noted that their BB symptoms were evident postnatal. So too, more studies need to focus on the mechanisms behind BB. For this to be achieved, researchers will have to find a reliable means to define, characterise and measure the symptoms more accurately.

The influence of cultural beliefs on expectations of BB has not been discussed adequately in published literature. Researchers must establish what the particular beliefs around pregnancy involve for different cultures, socioeconomic and age groups and whether findings from research is generalisable. This will require working closely with representatives from those groups, and being led by the women who have experienced BB for lived-in, subjective and individual accounts reflecting the differences between groups and individuals. Similarly, the third combined Māori and Pākehā cultural group provides another topic for further research, to discover how the combination of values and beliefs impact and shape one another.

7. Conclusions

The research into the area of BB is still in its infancy; and the effect of culture on perceptions of BB is still at the level of theorising. Consequently, the studies reviewed and utilised to construct and support this research showed inconsistencies in the ways BB is defined, experienced and understood as either a functional adaption or cognitive deficit. This research, in particular, has a

limited participant rate and therefore the hypothesis that culture affects how BB is experienced remains unproven.

In conclusion, women's experiences of pregnancy differ greatly due to confounding factors including cultural beliefs, physical and mental health, socio-economic factors and individual personality traits. Therefore, it is not feasible to attribute BB symptoms purely to changes to the brain structure of pregnant women. Moreover, there is a lack of consensus about how to even define BB and how to present information about it. From survey comments it would seem that discussions about symptoms and coping methods are purely informal: amongst midwifery colleagues, friends or family. Measurable characteristics of BB need to be formalised and defined in order for to be studied and then presented as a source of information to the public and healthcare workers.

However, because pregnancy experiences are far from homogenous and because of group cognition and stereotyping, those who have not experienced BB (and perhaps some who have) may be dismissive of it. A midwife who participated in this study even cautioned that there is the chance that women admitting to experiencing BB will be labelled in a negative light. In such circumstances, all care should be taken to avoid further negative stereotyping of pregnant women as temporarily cognitively deficient. The focus should instead be on how their brain functions are adapting in a positive way, to the role of carer. In the words of Miocevic (Barabash, 2006, p. 98):

*"It is not so much what we do or not do,
but who and how we are with the people we work with
in that existential moment that does make the difference."*

Perhaps too, this may be accomplished by framing support groups as just that, prenatal and postnatal support according to the cultural needs of women requiring such services, rather than as a means to specifically overcome emotional and functional issues. More research will have to be done to establish what the individual and cultural needs and understandings are exactly. However this is accomplished, it is clear that women participating in this study have generally managed to cope very well with what they understood to be BB by employing methods they conceived themselves. Therefore, women should be instrumental in how, what and when help should be presented, while scientists provide further research data on the mechanisms behind BB to support their quest for more positive experiences, adaption to the role of caregiver and social support during pregnancy.

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Appendices

Appendix 1:

Ethics review notification

humanethics@massey.ac.nz

M.E.Thomas@massey.ac.nz

HoU Review Group

Ethics Notification Number: 4000018921

Title: A study of baby/pregnancy brain and how such factors as individual experiences and cultural beliefs impact the personal experiences of pregnant/hapu women.

Thank you for your notification which you have assessed as Low Risk.

Your project has been recorded in our system which is reported in the Annual Report of the Massey University Human Ethics Committee.

The low risk notification for this project is valid for a maximum of three years.

If situations subsequently occur which cause you to reconsider your ethical analysis, please log on to <http://rims.massey.ac.nz> and register the changes in order that they be assessed as safe to proceed.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:

"This project has been evaluated by peer review and judged to be low risk. Consequently it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director (Research Ethics), email humanethics@massey.ac.nz. "

Please note that if a sponsoring organisation, funding authority or a journal in which you wish to publish require evidence of committee approval (with an approval number), you will have to complete the application form again answering yes to the publication question to provide more information to go before one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

You are reminded that staff researchers and supervisors are fully responsible for ensuring that the information in the low risk notification has met the requirements and guidelines for submission of a low risk notification.

If you wish to print an official copy of this letter, please login to the RIMS system, and under the Reporting section, View Reports you will find a link to run the LR Report.

Yours sincerely

Dr Brian Finch

Chair, Human Ethics Chairs' Committee and Director (Research Ethics)

Appendix 2:
Information sheet and survey for pregnant/recently pregnant women
Individual and cultural differences in experiences of baby/pregnancy brain
Information sheet for pregnant participants

Who is doing the research?

Kia ora, my name is Tanya Turner and I am conducting this research as a partial requirement for completing a Masters of Arts degree in Psychology at Massey University, New Zealand.

What is the research about?

Problems with thinking and memory during pregnancy/hapūtanga, sometimes referred to as 'baby/pregnancy brain', are reported in many cultures. This research aims to increase our understanding of 'baby/pregnancy brain' by exploring expectations and individual experiences of brain function during pregnancy.

Who can take part in the research?

You are invited to participate if you are over the age of 18 and have given birth in the last 6 months. You do not have to have experienced baby/pregnancy brain to take part. Your participation in this research will be valuable in terms of understanding individual and cultural differences.

What will I be asked to do?

You will be asked to complete a survey relating to your personal experiences during pregnancy/hapūtanga. The survey should take approximately 15 minutes to complete.

What are my rights as a participant?

You are under no obligation to accept this invitation. If you decide to take part in the survey, submission of the survey implies consent. You have the right to decline to answer any particular question. You can ask any questions about the research, and withdraw from the study at any time.

Data resulting from this research will be used only for the purposes of this research. It will be securely stored at Massey University for 5 years, after which it will be destroyed.

What do I do now?

If you would like to participate in this research, please click on the >>Next button below, to take you to an online consent form, and then on to the online version of the research survey.

Who can I contact about the research?

If you have any further queries or would like to know more about the study, please contact me or my supervisor (contact details below):

<u>Researcher:</u> Tanya Turner Email: [REDACTED]	<u>Supervisor:</u> Professor Janet Leathem School of Psychology Massey University PO Box 756 Wellington 6140 Telephone: +64 (04) 801 5799 ext. 63610 Email: J.M.Leathem@massey.ac.nz
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This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director (Research Ethics), email humanethics@massey.ac.nz.

Respondent Consent

Thank you for participating in this survey.

Your participation implies consent.

You have the right to decline to answer any particular question.

I have read and understood the information sheet for this study and consent to collection of my responses. (Please click on the 'Yes' choice if you wish to proceed.)

Yes

No

I would like to receive a summary of the research results once it is completed

Yes

No

If you answered 'yes' to the above question, to whom and where would you like the results emailed to?

Instructions

Please choose the relevant answer (choose more than 1 if necessary) or add a comment in the box provided.

If a question is not relevant to you, please skip to the next one.

Part 1
Demographic information

D1 What is your current age?

- Less than 18
- 18 to 19
- 20 to 29
- 30 to 39
- 40 to 49
- 50+

D2 Which ethnicity/ethnicities do you identify with?

Choose as many as applicable.

- Pākehā
- Māori
- New Zealand European and Māori
- Pasifika
- Other (state)

D3 What is the highest level of education you have completed?

- Less than High School
- High School
- Polytechnic or trade certificate
- Bachelor Degree
- Postgraduate qualification

D4 Family size?

- You have one child/te tamaiti
- You have more than one child/te tamaiti

Part 2
Your experiences during pregnancy/hapūtanga of baby/pregnancy brain

EO1 Had you heard of baby/pregnancy brain before receiving this information sheet and survey?

- Yes
- No

EO2 Is baby/pregnancy brain a term you use personally?

- Yes
- No

EO3 If you know it by an ethnically different name or term, what is it?

EO4 Does your culture support the idea of baby/pregnancy brain?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO5 Have you personally experienced baby/pregnancy brain?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO6 If yes, please describe the symptoms

EO7 If yes, at what stage or stages of their pregnancy/hapūtanga is/was it most noticeable?

Choose as many as applicable.

- 1st trimester
- 2nd trimester
- 3rd trimester
- After the birth of your child/te tamaiti

EO8 What do you think causes baby/pregnancy brain?

EO9 Do you think it is a normal part of pregnancy?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO10 Do you think it is a temporary part of pregnancy?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO11 Were you prepared for the fact that during pregnancy/hapūtanga your brain structure, and therefore cognitive abilities and emotions, could change?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO12 How much did baby/pregnancy brain interfere with your daily activities?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO13 Did baby/pregnancy brain negatively affect your sense of wellbeing?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO14 Have you ever, before or during pregnancy/hapūtanga, consulted a health care professional with concerns about your mental health?

- Yes
- No

EO15 Do you think baby/pregnancy brain requires medical intervention such as prescription medication?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO16 If you did experience baby/pregnancy brain, did you feel that you were able to handle it by yourself?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO17 If not, what sort of help do you think would have benefitted you in better coping with baby/pregnancy brain?

EO18 If yes, are there any particular methods of accommodating or overcoming baby/pregnancy brain which have worked for you?

EO19 How comfortable are you about discussing any concerns you have had about experiences of baby/pregnancy brain with others?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO20 If not, what makes it difficult to discuss?

EO21 If you experienced any improvements during pregnancy/hapūtanga with how you feel your brain was functioning, please list them.

EO22 If you have experienced any problems with how you feel your brain was functioning in pregnancy/hapūtanga, please list them.

EO23 If yes, did the symptoms which presented during pregnancy such as forgetfulness and slow thinking appear to increase in different situations?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO24 If your baby/pregnancy brain symptoms did vary across different situations, in which situations did you experience them more strongly?

Tick as many options as applied.

- At home
- At work
- Studying/concentrating
- Other _____

Part 3

General questions about pregnancy/hapūtanga

Gen1 Did you rely primarily on your maternity care provider to guide you through pregnancy/hapūtanga based on up-to-date medical research?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen2 Which of the following have been your main sources of information about pregnancy/hapūtanga and its effects?

Please rank your sources in order of preference by entering numbers, starting with the most helpful as number 1.

Choose as many as applicable.

- _____ Friends
- _____ Family/whānau
- _____ The Internet
- _____ Midwife

- _____ Family doctor
- _____ A Medical specialist (*e.g., obstetrician*)
- _____ Your previous experiences of pregnancy
- _____ Cultural traditions
- _____ Birthing classes
- _____ Pregnant/hapūtanga peers
- _____ Other

Gen3 Were you in paid employment during pregnancy/hapūtanga?

- Yes - less than 30 hours a week
- Yes - more than 30 hours a week
- No

Gen4 If yes, did you feel that you needed to downscale or change your duties at work as a result of being pregnant/hapū?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen5 If yes, did you feel that you needed to downscale as a result of baby/pregnancy brain in particular?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen6 If yes, were you able to downscale or change your duties at work without any problems such as work policies prohibiting changes in your duties, unaccommodating employers or your own concerns about the effects of such changes?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen7 Were you entitled to paid maternity leave?

- Yes
- No

Gen8 Were you concerned about the financial implications of having a baby (*e.g., scaling down from two to one salaries or the cost of childcare when you return/returned to work*)?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen9 Were you concerned that having children will negatively impact your career?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen10 Did you have any serious or chronic health conditions during pregnancy/hapūtanga that were likely to affect your baby/pēpi, your pregnancy/hapūtanga, or your long-term health?

- Yes
- No

Gen11 If yes, how did the health condition affect you?

Tick as many options as applied.

- Affected daily ability to function
- Was life-threatening or terminal
- Affected psychological wellbeing
- Took prescription medications

Gen12 If you were using prescription medication, please list them and what they were for.

Gen13 Were you taking iron supplements during pregnancy/hapūtanga?

- Yes
- No

Gen14 Do you think that you were exercising enough during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen15 Do you think that you were eating a healthy diet during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen16 Do you think that you were coping with stress during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen17 Do you think that you were sleeping enough during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen18 When you became pregnant/hapū, did you receive emotional support like someone listening to your concerns?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen19 If yes, from whom?

Gen20 When you became pregnant/hapū, did you receive advice/practical support in helping you get things done?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen21 If yes, from whom?

Gen22 If you have been pregnant/hapū more than once, have your cognitive experiences differed in any way?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Gen23 If your cognitive experiences differed across pregnancies/hapūtanga, please list some examples (e.g., did you find you could process information better in one pregnancy than the others?).

Gen24 If there were differences in your cognition between your pregnancies/hapū, to what do you attribute these differences (e.g., you may have had a medical complication for one pregnancy which was debilitating)?

Part 4

How would you rate your experience of the following during pregnancy/hapūtanga?

Exp1 Your physical health was good

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp2 In your day-to-day activities, was it very important to you that your brain worked to full capacity?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp3 Did you feel like a little forgetfulness or slowness bothered you?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp4 Did you lose sleep over stress?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp5 Did you feel isolated and alone?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp6 Did you feel very anxious?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp7 Did you feel very tired?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp8 Are your identity and culture very important to you?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp9 Did you expect to suffer from baby/pregnancy brain during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp10 Did you make less effort with tasks requiring concentration, because you believed your information processing ability would be negatively affected by baby/pregnancy brain anyway?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp11 Did your family/whānau and friends warn you that you would suffer from baby/pregnancy brain during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp12 Did your family/whānau and friends tease you about having baby/pregnancy brain?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp13 Did you feel that your quality of life improved during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp14 Did you get adequate social support?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp15 Did you enjoy your daily activities?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp16 Were you feeling low in mood for extended periods during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp17 Were you well-organised at home and work?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp18 Did your ability to concentrate decrease so that you had to keep refocusing on what it was that you were doing?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp19 Did you feel that you needed more time than before pregnancy/hapūtanga to process information?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp20 Did you have to re-read instructions such as for recipes more than you did before pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp21 Did you have difficulty remembering multiple pieces of information at a time (e.g., remembering to call someone, while busy preparing dinner)?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp22 Did you feel that you had difficulty remembering things that happened in the past?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp23 Did you feel like you had difficulty remembering things which would happen in the future (e.g. appointments)?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp24 Did you feel that you could manage the many demands on you?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

Exp25 Any other comments?

Thank you for your input. Your contribution is greatly appreciated.

Appendix 3: Information sheet and survey for friend/family

Individual and cultural differences in experiences of baby/pregnancy brain Information sheet for friend/family research participants

Who is doing the research?

Kia ora. my name is Tanya Turner and I am conducting this research as a partial requirement for completing a Masters of Arts degree in Psychology at Massey University, New Zealand.

What is the research about?

Problems with thinking and memory during pregnancy/hapūtanga, sometimes referred to as "baby/pregnancy brain", are reported in many cultures. This research aims to increase our understanding of 'baby/pregnancy brain' by exploring expectations and individual experiences of brain function during pregnancy.

Who can take part in the research?

You are invited to participate if you are over the age of 18. You need to be someone with regular contact (preferably daily) with a pregnant or recently pregnant individual. Your participation in this research will be valuable in terms of understanding individual and cultural differences.

What will I be asked to do?

You will be required to complete a survey. The survey should take approximately 15 minutes to complete.

What are my rights as a participant?

You are under no obligation to accept this invitation. If you decide to take part in the survey, submission of the survey implies consent. You have the right to decline to answer any particular question. You can ask any questions about the research, and withdraw from the study at any time. Data resulting from this research will be securely stored at Massey University for 5 years, after which it will be destroyed. I promise to store any information obtained from you in a secure and confidential fashion, and only use it for the purposes of this research.

What do I do now?

If you would like to participate in this research, please click on the >>Next button below, to take you to an online consent form, and then on to the online version of the research survey.

Who can I contact about the research?

If you have any further queries or would like to know more about the study, please contact me or my supervisor on the following details:

<p><u>Researcher:</u> Tanya Turner Email: [REDACTED]</p>	<p><u>Supervisor:</u> Prof Janet Leathem School of Psychology Massey University PO Box 756 Wellington 6140 Telephone: +64 (04) 801 5799 ext. 63610 Email: J.M.Leathem@massey.ac.nz</p>
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This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director (Research Ethics), email humanethics@massey.ac.nz.

Respondent Consent

Thank you for participating in this survey.

Your participation implies consent.

You have the right to decline to answer any particular question.

I have read and understood the information sheet for this study and consent to collection of my responses. (Please click on the 'Yes' choice if you wish to proceed.)

Yes

No

I would like to receive a summary of the research results once it is completed

Yes

No

If you answered 'yes' to the above question, to whom and where would you like the results emailed to?

Instructions

Please choose the relevant answer (choose more than 1 if necessary) or add a comment in the box provided.

If a question is not relevant to you, please skip to the next one.

Part 1
Demographic information

D1 What is your current age?

- Less than 18
- 18 to 19
- 20 to 29
- 30 to 39
- 40 to 49
- 50+

D2 What gender are you?

- Male
- Female

D3 Which ethnicity/ethnicities do you identify with?

Choose as many as applicable.

- Pākehā
- Māori
- New Zealand European and Māori
- Pasifika
- Other

D4 What is the highest level of education you have completed?

- Less than High School
- High School
- Polytechnic or trade certificate
- Bachelor Degree
- Postgraduate qualification

D5 What is your relationship with the pregnant/hapu or recently pregnant individual?

- Partner/spouse
- Family/Whānau member
- Friend
- Colleague
- Other

Part 2
Your experiences and observations of baby/pregnancy brain

EO1 Had you heard of baby/pregnancy brain before receiving this information sheet and survey?

- Yes
- No

EO2 Is baby/pregnancy brain a term you use?

- Yes
- No

EO3 If you know it by an ethnically different name or term, what is it?

EO4 Is baby/pregnancy brain something that is expected within your culture?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO5 Do you think that baby/pregnancy brain is a myth?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO6 Do you think it is a normal part of pregnancy?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO7 Do you think it is a temporary part of pregnancy?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO8 If you have given birth, have you experienced baby/pregnancy brain during your own pregnancy/pregnancies?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all
- Not applicable

EO8b If so, what symptoms of baby/pregnancy brain did you experience?

EO9 What do you think causes baby/pregnancy brain?

EO10 Do you think baby/pregnancy brain requires medical intervention such as prescription medication?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO11 Are you comfortable discussing any concerns the pregnant/hapu woman you are reporting about may have/have had about experiences of baby/pregnancy brain e.g. slowed thinking?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO12 If not, what makes it difficult to discuss?

EO13 Was the person you are reporting about forgetful or slow in processing information before becoming pregnant/hapu?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all
- Don't know

EO15 If yes, at what stage or stages of their pregnancy/hapūtanga is/was it most noticeable?

Tick as many as applicable.

- 1st trimester
- 2nd trimester
- 3rd trimester

EO16 Were/Are there particular situations e.g., when concentration is required, say at work, when such deficits are/were more noticeable?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO17 If so, when?

EO18 Please describe the symptoms of baby/pregnancy brain they display/displayed?

EO19 Does/did the person you are reporting about display any improvements in their brain functioning while pregnant/hapū?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO20 If so, what?

EO21 In your opinion, how much does/did baby/pregnancy brain interfere with their daily activities?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO22 From their experience, how much does/did baby/pregnancy brain interfere with their daily activities?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO23 In your opinion, are/were the person's cognitive abilities such as concentration or processing information compromised during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO24 If the individual feels that her mental abilities such as concentration are/were compromised during pregnancy/hapūtanga, why do you think this is?

EO25 If so, what do/did you say to her, if anything, about how she should cope given that she believes that her brain is not functioning as quickly or adequately?

EO26 Do you believe that the person has/had too many demands on her while she is/was pregnant/hapū?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO27 Since the person you are reporting about became pregnant/hapū, do you think she has received emotional support like someone listening to her concerns?

- Very much so
- Moderately so
- Somewhat
- Not really

- Not at all

EO28 If yes, from whom?

EO29 When the person you are reporting about became pregnant/hapū, do you think she received advice/practical support in helping her get things done?

- Yes
- No
- Do not know

EO30 If yes, from whom?

EO31 Do/did you tease the person about having baby/pregnancy brain?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO32 Have you observed symptoms of baby/pregnancy brain before, either in the same person during another pregnancy or in someone else?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO33 If you answered yes to the above question, have the symptoms differed between individuals or between pregnancies/hapūtanga in one person?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO34 If you answered yes to the above question, please list how symptoms differed.

EO35 Do you think that the pregnant/hapū individual you are reporting about is/was exercising enough during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO36 Do you think that the pregnant/hapū individual you are reporting about is/was eating a healthy diet during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO37 Do you think that the pregnant/hapū individual you are reporting about is/was coping with stress during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO38 Do you think that the pregnant/hapū individual you are reporting about is/was sleeping enough during pregnancy/hapūtanga?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO39 Did you know much about the cognitive changes which occur in pregnancy/hapūtanga,

when the person you are reporting about became pregnant/hapū?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO40 Which of the following have been your main sources of information about pregnancy/hapūtanga and its effects?

Please rank your sources in order of preference by entering numbers, starting with the most helpful as number 1.

Choose as many as applicable.

- _____ Friends
- _____ Family/whānau
- _____ The Internet
- _____ Midwife
- _____ Family doctor
- _____ A Medical specialist (*e.g., obstetrician*)
- _____ Your previous experiences of pregnancy
- _____ Cultural traditions
- _____ Birthing classes
- _____ Pregnant/hapūtanga peers
- _____ Other

EO41 Any other comments?

Thank you for your input. Your contribution is greatly appreciated.

Appendix 4:

Information sheet and survey for midwives

Individual and cultural differences in experiences of baby/pregnancy brain Information sheet for midwifery participants

Who is doing the research?

Kia ora. my name is Tanya Turner and I am conducting this research as a partial requirement for completing a Masters of Arts degree in Psychology at Massey University, New Zealand.

What is the research about?

Problems with thinking and memory during pregnancy/hapūtanga, sometimes referred to as "baby/pregnancy brain", are reported in many cultures. This research aims to increase our understanding of 'baby/pregnancy brain' by exploring expectations and individual experiences of brain function during pregnancy.

Who can take part in the research?

You are invited to participate if you are practicing as a midwife. As a midwife, you will have a valuable perspective on the issue of pregnancy brain and cognitive changes in pregnant/hapu women, regardless of whether you have personally experienced pregnancy brain. Your participation in this research will be valuable in terms of understanding individual and cultural differences.

What will I be asked to do?

You will be asked to complete a survey. The survey should take approximately 15 minutes to complete.

What are my rights as a participant?

You are under no obligation to accept this invitation. If you decide to take part in the survey, submission of the survey implies consent. You have the right to decline to answer any particular question. You can ask any questions about the research and withdraw from the study at any time. Data resulting from this research will be securely stored at Massey University for 5 years, after which it will be destroyed. I promise to store any information obtained from you in a secure and confidential fashion, and only use it for the purposes of this research.

What do I do now?

If you would like to participate in this research, please click on the >>Next button below, to take you to an online consent form, and then on to the online version of the research survey.

Who can I contact about the research?

If you have any further queries or would like to know more about the study, please contact me or my supervisor on the following details:

<u>Researcher:</u> Tanya Turner Email: [REDACTED]	<u>Supervisor:</u> Prof Janet Leathem School of Psychology Massey University PO Box 756 Wellington 6140 Telephone: +64 (04) 801 5799 ext. 63610 Email: J.M.Leathem@massey.ac.nz
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This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named in this document are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you want to raise with someone other than the researcher(s), please contact Dr Brian Finch, Director (Research Ethics), email humanethics@massey.ac.nz.

Respondent Consent

Thank you for participating in this survey.

Your participation implies consent.

You have the right to decline to answer any particular question.

I have read and understood the information sheet for this study and consent to collection of my responses. (Please tick the 'Yes' choice if you wish to proceed)

Yes

No

I would like to receive a summary of the research results once it is completed

Yes

No

If you answered 'yes' to the above question, to whom and where would you like the results emailed to?

Instructions

Please choose the relevant answer (choose more than 1 if necessary) or add a comment in the box provided.

If a question is not relevant to you, please skip to the next one.

Part 1
Demographic information

D1 What is your current age?

- Less than 18
- 18 to 19
- 20 to 29
- 30 to 39
- 40 to 49
- 50+

D2 What gender are you?

- Male
- Female

D3 Which ethnicity/ethnicities do you identify with most?

Choose as many as applicable.

- Pākehā
- Māori
- New Zealand European and Māori
- Pasifika
- Other

D4 What is the highest level of education you have completed?

- Less than High School
- High School
- Polytechnic or trade certificate
- Bachelor Degree
- Postgraduate qualification

D5 Does the midwifery society you work for support the idea of baby/pregnancy brain?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

D5b If so, how?

D6 Do the hospitals you work in support the idea of baby/pregnancy brain?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

D6b If so, how?

Part 2
Your experiences and observations of baby/pregnancy brain

EO1 Had you heard of baby/pregnancy brain before receiving this information sheet and survey?

- Yes
- No

EO2 Is baby/pregnancy brain a term you use?

- Yes
- No

EO3 If you know it by an ethnically different name or term, what is it?

EO4 Is baby/pregnancy brain something that is expected within your culture?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO5 Do you think that baby/pregnancy brain is a myth?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO6 Do you think it is a normal part of pregnancy?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO7 Do you think it is a temporary part of pregnancy?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO8 How long do you think symptoms of baby/pregnancy brain last?

EO9 What do you think the causes of baby/pregnancy brain are?

EO10 If you have given birth, have you experienced baby/pregnancy brain during your own pregnancy/pregnancies?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO11 Do you expect to see signs of baby/pregnancy brain in your clients?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO12 Do you raise the subject of baby/pregnancy brain with clients?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO13 Have you observed symptoms of baby/pregnancy brain in your clients?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO14 What cognitive symptoms related to baby/pregnancy brain do you tend to observe in clients?

EO15 Are the clients who report symptoms of baby/pregnancy brain distressed by these symptoms?

- Very much so
- Moderately so

- Somewhat
- Not really
- Not at all

EO16 Do the symptoms differ between individuals?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO17 If yes, please list how symptoms differ.

EO18 Do the symptoms differ between pregnancies/hapūtanga in one person?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO19 If yes, please list how symptoms differ.

EO20 Which ethnicity group/s do you associate baby/pregnancy brain symptoms and complaints with?

Choose as many as applicable.

- Pākehā
- Māori
- Pākehā and Māori
- Pasifika
- Other

EO21 In which trimester does baby/pregnancy brain tend to be experienced?

Tick as many as applicable.

- 1st trimester
- 2nd trimester
- 3rd trimester

EO22 Do clients raise the subject of baby/pregnancy brain with you?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO23 What cognitive symptoms related to baby/pregnancy brain, do clients raise?

EO24 Are there particular situations when such deficits are more noticeable to your client?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO25 If so, where?

Choose as many as applicable.

- At home
- At work
- Studying/concentrating
- Other

EO26 Do you offer advice about baby/pregnancy brain?

- Yes
- No

EO27 If so, what is it?

EO28 Do you believe that clients should be referred to other medical services for symptoms related to baby/pregnancy brain, like inability to concentrate?

- Very much so
- Moderately so
- Somewhat

- Not really
- Not at all

EO29 If you refer clients for baby/pregnancy brain related symptoms, to whom do you refer them?

EO30 Do you think clients reporting cognitive deficits such as forgetfulness should be referred for psychological counselling?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO31 Do you think baby/pregnancy brain requires medical intervention such as prescription medication?

- Very much so
- Moderately so
- Somewhat
- Not really
- Not at all

EO32 Any other comments regarding baby/pregnancy brain?

Thank you for your input. Your experience and guidance are appreciated.

Appendix 5: Cover letter

Tanya Turner
 [REDACTED]
 [REDACTED]
 [REDACTED]
 [REDACTED]
 e-mail: [REDACTED]

30th July 2018

Leading Maternity Carer
 Hutt Hospital
 High Street
 Lower Hutt
 5010

To whom it may concern

Kia ora koutou. I am Tanya Turner, a psychology student at Massey University. I am currently working on my Masters thesis titled 'Individual and cultural differences in experiences of baby/pregnancy brain'. To this end, I have designed three surveys to explore expectations and individual experiences of brain function during pregnancy. These include a survey for pregnant or recently pregnant women, a survey for a friend/family member who has spent time with the mother during her pregnancy and a survey for midwives.

After reviewing academic literature about the changes to grey brain matter in pregnant women, I found that many academics believe that stereotyping and cultural beliefs around baby brain may impact individual experiences. However, there is not much research looking specifically at the influence of culture on perceptions of baby brain. This research aims to increase our understanding.

Although this research project has been evaluated by peer review and judged to be low risk, this study has been approved by Massey University. Also, supervision for the research has been provided by Prof Janet Leathem, School of Psychology, Massey University, Wellington, +64 4 801-5799 ext 63610.

May I ask please, that you distribute my accompanying information page to midwives and maternity patients who may be interested in participating? The surveys will only take about 15 minutes to complete online and participant responses will be treated as confidential. If you or participants are interested in my thesis, a copy can be emailed to you once it is completed in November.

If you have any further queries or would like to know more about the study, please contact me or my supervisor.

Thank you in advance for your help.

Yours sincerely
 Tanya Turner

Appendix 6: Information page

Baby brain

Reece Witherspoon said “Ever since I had a baby, I can’t remember anything. Seriously, this child has stolen my brain”.



But is baby brain a real thing? Scientists can't agree.

Kia ora. I am Tanya Turner, a psychology student at Massey University

Ladies, have you experienced baby brain, or do you think it's nonsense?

Either way, if you are pregnant or have given birth in the last 6 months, I would love to hear about your experiences, those of a friend/family member who spent time with you during your pregnancy and even your midwife.

If you have 15 minutes, please complete my online survey at the link below.

Your participation is valuable in terms of understanding individual and cultural differences in experiences.

Mother survey

https://qasiasingleuser.asia.qualtrics.com/jfe/form/SV_2t45ZRHUVFIwz9b

Friend/family survey

https://qasiasingleuser.asia.qualtrics.com/jfe/form/SV_cJeSP3dcjUP5QW1

Midwife survey: https://qasiasingleuser.asia.qualtrics.com/jfe/form/SV_2fvny2SkQAO8fcx

Thanks in advance.

Tanya Turner

Primary Research Supervisor: Professor Janet M. Leathem, School of Psychology, Massey University.

Appendix 7:

Surveys Response Table for Data Analysis

Mothers	Family/friends	Midwives
Participant numbers:	Participant numbers:	Participant numbers:
D1: Age 1. Less than 18 2. 18 to 19 3. 20 to 29 4. 30 to 39 5. 40 to 49 6. 50+	D1: Age 1. Less than 18 2. 18 to 19 3. 20 to 29 4. 30 to 39 5. 40 to 49 6. 50+	D1: Age 1. Less than 18 2. 18 to 19 3. 20 to 29 4. 30 to 39 5. 40 to 49 6. 50+
D2: Ethnicity Pakeha Māori Pasifika Other	D2 Gender • Male • Female	D2 Gender 1. Male 2. Female
D3: Education 1. Less than High School 2. High School 3. Polytec or Trade 94. Bachelor's Degree 123. Postgraduate	D3: Ethnicity Pakeha Māori Pasifika Other	D3: Ethnicity Pakeha Māori Pasifika Other
D4: Family size 1. 1 child 2. more	D4: Education 1. Less than High School 2. High School 3. Polytec or Trade 94. Bachelor's Degree 123. Postgraduate	D4: Education 2. Less than High School 2. High School 3. Polytec or Trade 94. Bachelor's Degree 123. Postgraduate
	D5 Relationship to 'mother' 1. Partner/spouse 2. Family/Whānau 3. Friend 4. Colleague 5. Other (specify)	D5: Midwifery society BB support 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all b. How
		D6: Hospitals BB support 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all b. How
E01: Heard of BB 3. Yes 4. No	E01: Heard of BB 1. Yes 2. No	E01: Heard of BB 1. Yes 2. No
E02: You use BB term 1. Yes 2. No	E02: You use BB term 1. Yes 2. No	E02: You use BB term 1. Yes 2. No
E03: Different ethnic name	E03: Different ethnic name	E03: Different ethnic name
E04: Your culture support BB • Very much so • Moderately so • Somewhat • Not really • Not at all	E04: Your culture support BB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E04: Your culture support BB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
E05: You experienced BB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E05: BB a myth? 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E05: BB a myth? 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
E06: Symptoms	E06: BB normal 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E06: BB normal 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
E07: What preg stage o 1st trimester o 2nd trimester o 3rd trimester	E07: BB temporary 1. Very much so 2. Moderately so 3. Somewhat	E07: BB temporary 1. Very much so 2. Moderately so 3. Somewhat

o After the birth	4. Not really 5. Not at all	4. Not really 5. Not at all
E08: What causes BB	E08: You experienced BB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all B: Symptoms	E08: BB lasts
E09: BB normal 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E09: What causes BB	E0: What causes BB
E010: BB temporary 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E010: BB med intervention 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E010: You experienced BB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
E011: You prepared for BB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E011: Happy to discuss BB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E011: BB in clients 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
E012: BB daily activities 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E012: What makes BB discussion difficult	E012: Raise subject 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
E013: BB neg affect WB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E013: BB before pregnancy? 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E013: Observed BB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
E014: Mental health history 1. Yes 2. No	E014: BB during pregnancy? 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E014: BB observed symptoms
E015: BB med intervention 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E015: Stage o 1st trimester o 2nd trimester o 3rd trimester	E015: Client distress 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
E016: Could you handle BB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E016: Situations 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E016: BB differ across clients 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
E017: What would've helped	E017: When	E017: How
E018: successful coping methods	E018: Symptoms	E018: Differ between pregnancies 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
E019: Happy to discuss BB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E019: 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E019: How
E020: What makes BB discussion difficult	E020: What	E020: BB ethnicities Pakeha Māori Pasifika Other (state)

E021: BB improvements	E021: 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E021: Pregnancy stage o 1st trimester o 2nd trimester o 3rd trimester
E022: BB problems	E022: BB daily activities 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E022: Clients raise BB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
E023: BB situational 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E023: Cognitive effects 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E023: Symptoms
E024: BB situations 1. At home 2. At work 3. Study/concentrating 4. Other	E024: Why BB	E024: BB situations 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
Gen 1: Biomed reliant 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E025: Advice	E025: Where 1. At home 2. At work 3. Study/concentrating 4. Other
Gen 2: Sources of info -----Friends _____ Family/whānau _____ The Internet _____ Midwife _____ Family doctor _____ Med specialist _____ Your previous BB _____ Cultural traditions _____ Birthing classes _____ Peers _____ Other	E026: Too many demands 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E026: Advice o Yes o No
Gen 3: Employed 1. Yes, -30hrs/week 2. Yes - +30hrs/week 3. No	E027: Emotional support 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E027: What
Gen 4: Downscale duties 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E028: Whom	E028: Medical referral 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
Gen 5: BB cause of downscale 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E029: Practical support 1. Yes 2. No 3. Do not know	E029: Where
Gen 6: Problems downscaling 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E030: Whom	E030: Psych counselling 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
Gen 7: Maternity leave 1. Yes 2. No	E031: Teasing 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E031: Medical intervention 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all
Gen 8: Financial concerns 1. Very much so 2. Moderately so	E032: Other BB 1. Very much so 2. Moderately so	E032: Comments

3. Somewhat 4. Not really 5. Not at all	3. Somewhat 4. Not really 5. Not at all	
Gen 9: Neg career impact 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E033: BB differed across individuals/pregnancies 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	
Gen 10: Health problems 1. Yes 2. No	E034: Symptoms differ	
Gen 11: How 1. Affected function 2. life-threatening 3. Affected WB 4. Prescription meds	E035: Exercise 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	
Gen 12: Meds	E036: Diet 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	
Gen 13: Iron 1. Yes 2. No	E037: Stress 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	
Gen 14: Exercise 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E038: Sleep 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	
Gen 15: Diet 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E039: Did you know about BB 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	
Gen 16: Stress 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E040: Sources of info -----Friends ____Family/whānau ____The Internet ____Midwife ____Family doctor ____Med specialist ____Your previous BB ____Cultural traditions ____Birthing classes ____Peers ____Other	
Gen 17: Sleep 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all	E041: Comments	
Gen 18: Support 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Gen 19: Who		
Gen 20: Advice/support 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Gen 21: Who		

Gen 22: Multiple BB differences 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Gen 23: Examples		
Gen 24: Reasons		
Exp 1: Health 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 2: Cognitive importance 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 3: BB concerns 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 4: Stress + sleep 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 5: Isolated 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 6: Anxiety 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 7: Tired 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 8: Identity + culture 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 9: BB expectation 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 10: Motivation 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 11: BB expectation 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		

Exp 12: BB teasing 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 13: Quality of life 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 14: Social support 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 16: Low mood 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 17: Organisation 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 18: Concentration 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 19: Information speed 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 20: Concentration 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 21: Short-term memory 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 22: Retro memory 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 23: Memory future 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		

Exp 24: Manage demands 1. Very much so 2. Moderately so 3. Somewhat 4. Not really 5. Not at all		
Exp 25: Comments		

He aha te mea nui o te ao?
He tangata! He tangata! He tangata!

Ki ngā whakaeke haumi.

What is the most important thing in the world?

It's people! It's people! It's people!