Perceptions of Postpartum Cognitive Functioning

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Pacific University
Perceptions of Postpartum Cognitive Functioning

Abstract
The purpose of this paper is to explore the relationship between women's perceptions of mothers’ postpartum cognitive functioning as a product of depicted time postpartum as well as respondents’ reproductive history. Respondents included women with children and childless women. Respondents were randomly assigned to one of two conditions: to read a vignette either depicting a fictional mother 12 weeks postpartum or 24 weeks postpartum. The Profile of Mood States (POMS), in addition to author-written items, were used to assess differences in respondents’ perceptions of the fictional mother to which they were assigned. Statistically significant differences were found between vignette conditions on subscales measuring perceived depression and vigor as well as on an item measuring perceived ability to sustain attention. No significant differences were found on the majority of subscales and author-written items. Also, no significant differences were found between participants who had children and those who didn’t. The results are mostly consistent with past studies, tentatively fill in some gaps in the current literature, and suggest further directions for research.

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PERCEPTIONS OF POSTPARTUM COGNITIVE FUNCTIONING

A THESIS

SUBMITTED TO THE FACULTY

OF

SCHOOL OF PROFESSIONAL PSYCHOLOGY

PACIFIC UNIVERSITY

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REQUIREMENTS FOR THE DEGREE

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COMMITTEE MEMBERS:

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Abstract

The purpose of this paper is to explore the relationship between women’s perceptions of mothers’ postpartum cognitive functioning as a product of depicted time postpartum as well as respondents’ reproductive history. Respondents included women with children and childless women. Respondents were randomly assigned to one of two conditions: to read a vignette either depicting a fictional mother 12 weeks postpartum or 24 weeks postpartum. The Profile of Mood States (POMS), in addition to author-written items, were used to assess differences in respondents’ perceptions of the fictional mother to which they were assigned. Statistically significant differences were found between vignette conditions on subscales measuring perceived depression and vigor as well as on an item measuring perceived ability to sustain attention. No significant differences were found on the majority of subscales and author-written items. Also, no significant differences were found between participants who had children and those who didn’t. The results are mostly consistent with past studies, tentatively fill in some gaps in the current literature, and suggest further directions for research.

Keywords: postpartum, cognitive, functioning, motherhood, brain, memory
Perceptions of Postpartum Cognitive Functioning

Shortly after a woman gives birth, a host of changes occur within the mother (Katz, 2007); these changes are physiological, hormonal, psychological, and cognitive. During the six-week period following delivery, a woman’s recovering body typically undergoes a general reversal of the physiological changes that occurred during pregnancy (Katz, 2007). The major physiological and physical changes postpartum include shrinking of the uterus, cervix, and vagina; reduction in bladder volume, and physical healing from any birth-related vaginal or surgical trauma (Katz, 2007).

Commonly reported physical problems include exhaustion, backache, bowel problems, urination incontinence, and excessive or prolonged vaginal bleeding as well as vaginal tenderness and dryness (Thompson, Roberts, Currie, & Ellwood, 2002). Most women who reported these problems also reported that the problems resolved between eight and 24 weeks postpartum (Thompson et al., 2002). The Thompson study provided evidence that complications such as bowel problems and urinary incontinence resolve within six months postpartum.

Hormonal changes that occur during the postpartum period, also called the puerperium, include a sharp drop in estrogen and progesterone levels at delivery; whereas during pregnancy estrogen and progesterone levels increase consistently, those hormonal levels plummet once the placenta is removed (Hendrick, Altshuler, & Suri, 1998). In breast-feeding mothers, levels of prolactin remain high for several months after giving birth before gradually returning to pre-pregnancy levels, and prolactin levels dramatically decrease in the third week postpartum in non-lactating women (Hendrick et al., 1998). Oxytocin, which promotes the release of breast milk, rises significantly during
birth and breast-feeding. Animal studies have shown oxytocin to stimulate maternal behavior. Cortisol levels, which peak in late pregnancy due to placental production, also fall abruptly at delivery (Hendrick et al., 1998).

The postpartum period is considered a time of heightened vulnerability for developing major depression and postpartum depression (Gonidakis, 2007). According to one recent study, postpartum depression is known to affect approximately 15 percent of women (Brummelte & Galea, 2010). Mild postpartum depression, often dubbed the “baby blues”, is defined as a temporary, mildly depressive and labile mood marked by short periods of crying (Gonidakis, 2007). Mild postpartum depression has been estimated to occur in 80% of new mothers and usually subsides after the first 10 days postpartum (Gonidakis, 2007).

Major risk factors for developing depression include past depression, stressful life events, poor marital relationship, and poor social support (O’Hara, 2009). However, even with few or no risk factors, the disruption of endocrine hormones may contribute to postpartum depression (Brummelte et al., 2010). Studies have also shown physical pain to be a predictor of which women are at increased risk of developing postpartum depression. For instance, women with severe acute postpartum pain are three times more likely to develop postpartum depression compared to those who experience only mild postpartum pain (Eisenach et al., 2008).

In addition to hormonal changes and other risk factors, studies also suggest that sleep deprivation and maternal fatigue are strongly associated with depressive symptoms in the postpartum period (Dennis & Ross, 2005) as well as with cognitive impairment (Gay, Lee, & Lee, 2004).
According to experimental and correlational studies, sleep deprivation is linked to strong increases in negative mood (including increased irritability, hostility, and general negative mood) and decreases in positive mood (Medina, Lederhos, & Lillis, 2009). Further, these effects on mood appear to influence cognitive patterns. For instance, Kahn-Greene, Lipizzi, Conrad, Kamimori, and Killgore (2006), discovered that, relative to baseline, people deprived of sleep more frequently blamed and punished others when presented with stimuli depicting various frustrating situations. In addition, the researchers found sleep-deprived participants less frequently accepted blame to reduce conflict.

The different ways in which infants typically disrupt parental sleep have been grouped into the following categories: sleep interruption, sleep deprivation, sleep fragmentation (in which sleep is prevented from being consolidated), selective sleep stage deprivation (whereby sleep in specific stages is prevented), sleep restriction, and reduction of sleep duration (Banks & Dinges, 2007).

Newborn sleep and feeding patterns are the most common reasons for sleep disturbances (Hunter, Rychnovsky & Yount, 2009). Not surprisingly, new mothers experience greater sleep disturbance after the birth of a child compared to new fathers (Gay et al., 2004). Sleep deprivation and sleep restriction have also been blamed for impairment on tasks related to frontal lobe functioning (Durmer & Dinges, 2005). Such tasks include sustained attention (Van Dongen, Maislin, Mullington, & Dinges, 2003), working memory (Turner, Drummond, Salamat, & Brown, 2007), cognitive flexibility (Leonard, Fanning, Attwood, & Buckley, 1998), and verbal fluency (Salorio, White, Piccirillo, Duntley, & Uhles, 2002). These cognitive functions are critical for problem-solving as well as emotion regulation (Durmer & Dinges, 2005).
Outside of the scientific community, women have anecdotally reported similar findings. Stories of women’s brains turning to mush during pregnancy and/or after delivery are frequently encountered in the media and popular culture; in fact, so prevalent is the idea, that it has been popularly dubbed “mommy brain” (Ellison, 2005). Ellison’s book makes the case for motherhood equipping women with cognitive and emotional advantages, such as gains in empathy and increased alertness and efficiency over the long term. She takes the pejorative phrase and argues that the “mommy brain” is not simply a compromised brain, but in many ways an improved brain. The author stands in stark contrast to other prominent female writers who have tackled the subject of motherhood. Reflecting on her cognitive functioning after becoming a mother, Pulitzer-prize winning journalist and best-selling author Anna Quindlen (2004) wrote, “My brain no longer worked terribly well, especially when I added to that baby another less than two years later, and a third fairly soon after that” (p.1).

Whereas the results of studies examining sleep deprivation and cognitive impairment are unequivocal, the presence, extent, and types of cognitive impairments in new and expecting mothers are disputed. Some studies, for example, have shown pregnancy and the postpartum period to be a time of significant forgetfulness and marked deficits in attention.

De Groot, Vuurman, Hornstra, and Jolles (2006) used a neurocognitive test battery to examine differences in cognitive performance between pregnant women and women in a control group. In addition, they investigated whether various stages of pregnancy and the postpartum period affected certain cognitive functions differently. The researchers employed a longitudinal case-control study involving 57 pregnant women and
a control group consisting of 50 non-pregnant, non-postpartum women matched for age and education. Both groups of women completed The Concept Shifting Test (CST), The Stroop Color-Word Interference Test, The Letter Digit Substitution Test (LDST), and the Visual Verbal Word Learning Task (WLT). The pregnant women completed the tests at weeks 14, 17, 29, and 36 of pregnancy, and 32 weeks postpartum. The control group completed the tests at comparable times.

No differences between the pregnant women and women in the control group were found on tests that measured general speed of information processing. However, postpartum women performed significantly worse than the non-pregnant women on the same tasks. Tests measuring speed of complex information processing such as planning and concept shifting ability showed no difference between the two groups at any time period. Memory tests yielded significantly worse performances for the pregnant women compared to the control group on tasks measuring encoding as well as on free recall tasks. New mothers performed worse on encoding tasks relative to the control group, and this difference persisted 32 weeks postpartum.

Women who are pregnant often report difficulty with memory. (Mickes, Wixted, Shapiro, & Scarff, 2009). A study by Mickes et al extended past research, which indicated that pregnancy is accompanied by worsening memory when memory is tested using free recall but not when memory is tested using item recognition. In this study, 37 women were administered a verbal learning test and it was found that participants’ free-recall memory was slightly worse during pregnancy than during the postpartum period, but that recognition memory appeared to be slightly enhanced. The finding that free recall
was worse during participants’ pregnancy was consistent with past research (Mickes et al., 2009).

Whereas most studies have focused on retrospective memory, a study by Rendell and Henry (2008) focused on prospective memory – remembering to perform an intended action, or remembering to remember. Pregnant women and women in a control group were asked to log the time of day at prescribed times over one week. Rendell and Henry asked the same women to perform the same task once again during the postpartum period. Both during pregnancy and postpartum, this group of women performed poorly on the task compared to the control group. The researchers suggest that pregnant women and new mothers are likely to suffer from impaired prospective memory in daily life.

The aforementioned studies suggest both that pregnancy and early motherhood affect cognitive functions and that specific cognitive domains are influenced differently contingent on the stage of pregnancy or postpartum period. Other studies, however, have suggested little or no cognitive impairment during pregnancy and the postpartum period.

Crawley, Dennison, and Carter (2003) examined self-assessment of cognitive function coupled with objective cognitive performance in women during pregnancy and the postpartum period. The cognitive functions researchers studied included verbal memory, focused attention, and divided attention. Focused attention was defined as the ability to concentrate on one things while something else was happening simultaneously (i.e., reading with radio on), and divided attention was defined as the ability to do two things at once.

Fifteen pregnant and 14 non-pregnant women participated in the study. Researchers used a Stroop task, a subtest of the Halstead Reitan Neuropsychological Test
Battery, and a text memory task. Participants completed the cognitive tasks and self-ratings during the second trimester, third trimester, 1 to 2 months postpartum, and 10 to 13 months postpartum. No significant differences were found on objective cognitive tests between the pregnant – and later, the postpartum women – and the non-pregnant women. Participants’ self-reports, however, revealed perceived mild cognitive impairments during pregnancy. Specifically, the pregnant women rated their memory lower in the third trimester exclusively for material that had been read.

Crawley et al. considered two possible conclusions. The first was that pregnant women did not experience more cognitive difficulties than their non-pregnant counterparts but considered themselves impaired due to either depressed mood or internalized cultural expectations of compromised cognitive function in pregnant women. The second possibility was that the pregnant women did experience mild impairment in memory and attention but compensated for these difficulties during the short testing sessions and that any mild impairments did not continue postpartum.

Three years later, a new study has offered an alternative conclusion. Vanston (2006) studied 45 women from early pregnancy through several months postpartum. She compared them with an age and education-matched control group of 45 non-pregnant women and found the pregnant women performed as well as the non-pregnant women on tests of cognitive functioning, which included memory tasks. Initially, it appeared that pregnancy had no effect on cognitive functioning, however, Vanston found significant differences between groups depending on whether the unborn child was male or female. Women pregnant with sons consistently outperformed the women pregnant with daughters on tests of working memory and this was unrelated to sleep, mood, or other
demographic variables. This effect continued into the postpartum period. The author entertained two possible explanations. The first was that the sex of the fetus affects maternal cognitive functioning during pregnancy and postpartum. The second was that qualities in the mother are correlated with both her cognitive profile and increased odds of giving birth to a boy.

A more recent study by Crawley, Grant, and Hinshaw (2008) elaborated on the earlier findings by Crawley et al. Twenty-five pregnant women in trimester 2, 25 in trimester 3, and 25 non-pregnant, childless women participated in a study that was designed to compare objective measures with perceptions of cognitive function, in addition to beliefs about pregnancy-related cognitive impairment. Once again, researchers used self-reports of functioning and objective tests of memory and attention. Consistent with the previous study, the pregnant women rated their cognitive abilities as having declined since becoming pregnant. The majority of the 15 objective cognitive measures showed no effect of pregnancy on cognitive functioning. In fact, evidence was found for mild cognitive decline on only two types of tasks: speed of language processing and speed of switching attention from one task to another. There was no evidence for between-group differences of memory ability. The authors concluded that there is too scant a basis from objective tests to support the idea of significant cognitive impairment during pregnancy and that negative cultural expectations contribute to pregnant women’s perception of cognitive impairment.

Although the evidence for cognitive impairment during pregnancy and the postpartum period is mixed, taken together the above cited studies suggest that – at worst – cognitive difficulties during pregnancy and early motherhood are mild and limited in
scope and that pregnant women and new mothers are aware of these cognitive changes and often believe their own cognitive impairment to be worse than objective tests indicate.

**Rats’ Maternal Advantage and Brain Plasticity**

Whereas most studies focus on real and perceived negative cognitive outcomes of pregnancy and the postpartum period, studies with rats have shown the postpartum period to be one of brain plasticity and enhanced learning. Pawluski, Vanderbyl, Ragan, and Galea (2006) found that primaparous (rats that have given birth and mothered once) and multiparous rats (rats that have given birth and mothered twice) had a significant advantage over nulliparous rats (rats that had not given birth). Both groups of rats that had given birth showed enhanced working and reference memory and made fewer mistakes on tasks compared to the nulliparous group. However, there were differences between the primarous and multiparous rats, with the former outperforming the latter. Researchers found that primaparous rats demonstrated superior spatial reference and working memory performance compared to nulliparous rats at the time of weaning, and multiparous rats had only better spatial memory performance relative to the nulliparous rats. And one month after weaning, primaparous rats made fewer errors than both of the other rat groups.

The results demonstrated that reproductive experience alters both working and reference memory past the time of weaning and that the first reproductive experience resulted in greatest change. The researchers suggested that differences in hormone actions of oxytocin and corticosterone between primaparous and multiparous rats mediate the lasting enhancement of memory.
Leuner and Gould (2010) conducted another study showing the postpartum period in rats to be one of increased brain plasticity. They found that mother rats exhibited dendritic growth in the medial prefrontal cortex, which coincided with improved attention and behavioral flexibility. The Leuner and Gould study adds to a growing suggestion that the postpartum period can be a time of enhanced cognitive performance.

Studies with rats have shown that expression of maternal behaviors is associated with structural changes in brain regions including the Medial Preoptic Area, the parietal lobe, and the prefrontal cortex (Fleming & Korsmit, 1996). In a prospective longitudinal study, Kim et al., (2010) found increased gray matter volumes in large portions of the prefrontal cortex, parietal lobe, and midbrain in human mothers during the first few months postpartum. In addition, mothers’ positive thoughts about their babies during the first month postpartum predicted gray matter volume increase from the first month to 3–4 months after giving birth. The researchers concluded that such structural changes in the brain may be crucial for learning and promoting maternal behavior.

**Perceptions of Pregnant Women and Mothers on the Job**

Despite the fact that pregnancy and postpartum-related impairment appears to be both mild and limited and that motherhood may even confer certain cognitive advantages, such as increased learning ability and spatial memory, negative perceptions of pregnant employees and working mothers persist.

One study in which undergraduate business students were asked to evaluate a pregnant job applicant compared with a non pregnant applicant found that both women (who had identical credentials) were perceived as equally well-suited for the job, however, the students stated that the pregnant applicant was more likely to miss work and
quit, and in turn, they rated the pregnant applicant lower on hiring recommendations (Cunningham & Macan, 2007).

A study by Masser, Grass, and Nesic (2007) examined stereotypes of pregnant women in the workplace and found that pregnant job candidates were recommended for lower starting salaries and were less likely to be recommended for hiring compared to non pregnant candidates. Unlike the Cunningham and Macan study, a concern about absenteeism appeared to be missing; to control for worries about the pregnant women taking maternity leave in the future, the position described in the study was temporary, short-term, and scheduled to end well before the candidates’ due dates.

Similar findings are echoed in other studies as well. Halpert, Wilson, and Hickman (1993) demonstrated negative bias against working pregnant woman by using videotapes that showed the same woman performing job tasks either while pregnant or while not pregnant. The results showed that when the woman appeared to be pregnant, college students rated her as less competent than the non-pregnant version of herself, and in turn, less qualified for promotion. A survey of attitudes within the same study revealed that the students perceive pregnant women as irrational, overly moody, physically limited, and less committed to their jobs than non-pregnant women. Male students endorsed these attitudes at a higher rate than female students.

Supporting the findings of Halpert et al., surveys completed by working men and women sampled by Pattison, Gross, and Cast (1997) showed gender, age, and workplace effects related to respondents’ attitudes about pregnant employees, with women demonstrating more positive attitudes than men, people within the ages of 26-45 endorsing a more positive attitude than younger and older ages, and university workers
endorsing a more positive attitude than workers in the manufacturing industry.

Working women who are already mothers are not exempt. Cuddy, Fiske, and Glick (2004) found that working women who become mothers encounter a trade-off upon returning to work: they are perceived as warmer but less competent than both their former selves and their childless colleagues. However, working fathers were given the benefit of increased warmth without having to sacrifice perceived competence. For the mothers, the trade-off posed barriers to advancement and they experienced discrimination related to job training and advancement.

What, beyond a concern for decreased commitment to the job, is the rationale for these biases? Is the predominant perception of working mothers as an occupational liability based on accurate, exaggerated or faulty beliefs about cognitive functioning?

To date, researchers have studied pregnant and postpartum women’s perceptions of their own cognitive functioning as well as other people’s perceptions of pregnant women and working mothers’ competence in the workplace. However, it is important to note that “competence” was not operationally defined within these studies, and presumably referred, then, to a vague sense of skills. In some of the studies, respondents seemed to confuse competence with commitment to the job. Although the prior research is invaluable, it has not addressed others’ perceptions of postpartum women’s specific cognitive abilities at specific intervals of time postpartum.

The purpose of the present study is to examine what women of mainstream society believe about postpartum cognitive functioning, and whether these perceptions vary as a function of depicted time postpartum and/or by respondents’ own reproductive history (either being a mother or a childless woman). It is expected that respondents will
perceive a mother depicted as being 12 weeks postpartum to suffer from greater cognitive
impairment compared to a mother depicted as being 24 weeks postpartum. It is also
expected that women with children will rate mothers as less severely impaired than will
childless respondents.
Method

Design

The author employed an experimental design in which time post-partum (in vignettes) was the independent variable and the POMS scores were the dependent variables. Qualitative questions were also used in order to provide a foundation for future studies.

Participants

A community sample of women was recruited via flyers distributed at numerous locations in the greater Portland, Oregon area (e.g., grocery stores, coffee shops, gyms, community centers, daycares, libraries, community bulletin boards, college and graduate school campuses) as well as through messages in e-mail and on community and social networking Web sites (including Craigslist, LinkedIn, and Facebook). In the recruitment flyer, participants were directed to an online survey. A total of 239 questionnaires were completed. Respondents included 159 mothers and 80 childless women varying in age from 20 to 74. Demographic information about highest level of education attained showed 10 participants completed high school, 33 completed some college, 119 completed college, and 77 completed post-graduate course work. The sample included women employed in a variety of professional fields as well as retired and unemployed women. The sample was mostly Caucasian (n = 215), followed by Native American (n = 5), Asian-American (n = 4), African-Americans (n = 4), and Hispanic/Latino (n = 4), and biracial (n = 3). Four respondents declined to identify their ethnicity.
Measures and Materials

Vignettes

Respondents read one of two possible randomly assigned vignettes depicting an employed postpartum woman. The vignettes differed only in time postpartum, and in the culturally generic name of the woman. Vignette A depicted a woman named Amanda who is 12 weeks postpartum whereas Vignette B portrayed a woman named Katie who is 24 weeks postpartum. The woman in the vignette was described as follows:

Amanda (Katie) is a 30-year-old married woman who has been working as a journalist for five years. Her work responsibilities include conducting interviews, generating story ideas, researching stories, and writing and editing stories for a news publication. Her hobbies include gardening and bicycling. She and her husband recently welcomed an addition to the family: Amanda gave birth to a healthy baby 12 (24) weeks ago.

Quantitative Measures

*The Profile of Mood States (POMS) short form*

The POMS short form is a self-report instrument designed to measure mood states (McNair, Lore, & Droppleman, 1971). The original POMS scale consists of 65 items using a 5-point Likert scale, with scores ranging from zero (not at all) to four (extremely). The POMS short form contains 30 questions and six subscales (vigor-activity, tension-anxiety, fatigue-inertia, depression-dejection, confusion-bewilderment, and anger-hostility).
Qualitative Measures

In addition to the POMS short form, a short questionnaire designed by the author asked about respondents’ experiences with new mothers as well as questions about their own postpartum mental functioning for those respondents with children. Part of the questionnaire also asked for basic demographic information (please see appendix for list of questions). This information was grouped into themes according to subject matter. Themes were chosen based on the frequency with which the topics appeared in the open-ended questions that constituted the short author-designed questionnaire. These themes included mental and emotional fatigue, postpartum depression, long-term versus short-term losses, gains in addition to losses, and interactions with new mothers.

Procedure

Before reading a vignette, respondents were asked to read and sign an informed consent document. The informed consent stated that the study was voluntary and that respondents were free to withdraw at any time. It also stated that their responses would remain confidential and anonymous. Upon agreeing to participate in the study, vignettes were then presented to all study participants (assigned to respondents randomly based on whether they chose an even or odd number near the start of the survey). Respondents then rated the mothers via the POMS questionnaire and answered qualitative questions.
Results

Quantitative Analysis

The purpose of this study was to determine whether perceptions of postpartum cognitive functioning differ as a result of respondents’ parental status (mother or childless) and the vignettes’ fictional mother’s portrayed time postpartum (12 versus 24 weeks). Both quantitative and qualitative data was gathered for this study, and both kinds of analyses were performed. Independent samples t-tests were conducted on the six subscales (anger-hostility, confusion-bewilderment, depression-dejection, fatigue-inertia, tension-anxiety, vigor-activity), the POMS total score, and four author-written items (able to manage stress, able to process new information, able to multi-task, and able to sustain attention for long) to determine whether there were significant differences in mean scores between the groups and evaluate research hypotheses. The independent variables were whether a respondent has children, and whether a respondent read Vignette A, depicting a mother at either 12 weeks postpartum, or Vignette B, depicting a mother 24 weeks postpartum. The dependent variables were mean scores on each of the six subscales, mean scores on the POMS total score, and mean scores on the four author-written items.

The results indicate there were significant differences between the means of Vignette A (12 wks PP) and Vignette B (24 wks PP) groups for three items: the POMS’ depression-dejection and vigor-activity scales, and the author-written item pertaining to ability to sustain attention for long (see Table 1).
Table 1

**Vignette Group Means, Standard Deviations and p Values**

<table>
<thead>
<tr>
<th>Item</th>
<th>Vignette</th>
<th>Mean</th>
<th>SD</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anger scale</td>
<td>A</td>
<td>11.98</td>
<td>2.37</td>
<td>.28</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>12.31</td>
<td>2.31</td>
<td>.28</td>
</tr>
<tr>
<td>Confusion scale</td>
<td>A</td>
<td>6.54</td>
<td>1.71</td>
<td>.77</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>6.60</td>
<td>1.73</td>
<td>.77</td>
</tr>
<tr>
<td>Depression scale</td>
<td>A</td>
<td>10.48</td>
<td>3.15</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>9.39</td>
<td>3.35</td>
<td>.01</td>
</tr>
<tr>
<td>Fatigue scale</td>
<td>A</td>
<td>12.31</td>
<td>2.81</td>
<td>.13</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>11.75</td>
<td>2.85</td>
<td>.13</td>
</tr>
<tr>
<td>Tension scale</td>
<td>A</td>
<td>12.85</td>
<td>2.60</td>
<td>.69</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>12.72</td>
<td>2.53</td>
<td>.69</td>
</tr>
<tr>
<td>Vigor scale</td>
<td>A</td>
<td>12.33</td>
<td>3.30</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>11.10</td>
<td>3.40</td>
<td>.00</td>
</tr>
<tr>
<td>POMS total score</td>
<td>A</td>
<td>41.83</td>
<td>7.77</td>
<td>.87</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>41.67</td>
<td>8.15</td>
<td>.87</td>
</tr>
<tr>
<td>Able to manage stress</td>
<td>A</td>
<td>2.92</td>
<td>.80</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>3.10</td>
<td>.82</td>
<td>.08</td>
</tr>
<tr>
<td>Able to process new info</td>
<td>A</td>
<td>2.98</td>
<td>.91</td>
<td>.14</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>3.16</td>
<td>.91</td>
<td>.14</td>
</tr>
<tr>
<td>Able to multi-task</td>
<td>A</td>
<td>3.45</td>
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<td>.15</td>
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<tr>
<td></td>
<td>B</td>
<td>3.64</td>
<td>.95</td>
<td>.15</td>
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<tr>
<td>Able to sustain attention</td>
<td>A</td>
<td>2.64</td>
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<td></td>
<td>B</td>
<td>3.05</td>
<td>.97</td>
<td>.00</td>
</tr>
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</table>

* = significant difference
Significant differences were found between vignette groups on the depression scale, $t(237) = 2.55$, $p = .01$, thus supporting the research hypothesis. Respondents who read Vignette A (12 wks PP) on average rated the depicted mother as more depressed ($M = 10.48$, $SD = 3.15$) than those who read Vignette B (24 wks PP) ($M = 9.39$, $SD = 3.35$). The 95% confidence interval for the difference in means ranged from .24 to 1.93 (see Figure 1).

**Figure 1**

*Ninety-five Percent Confidence Intervals for Depression Subscale Based on Vignette*
The eta square index indicated that 2% of the variance in the degree to which a participant rated the mother in the vignette as depressed was accounted for by whether the participant was assigned to the Vignette A (12 wks PP) or Vignette B (24 wks PP) condition.

The test for the vigor scale was also significant, $t(237) = 2.77, p = .00$, and the results also supported the research hypothesis. Respondents who read Vignette A (12 wks PP) on average rated the depicted mother as less vigorous ($M = 12.33, SD = 3.30$) than those who read Vignette B (24 wks PP) ($M = 11.10, SD = 3.40$). The 95% confidence interval for the difference in means ranged from .35 to 2.09 (see Figure 2).

**Figure 2**

*Ninety-five Percent Confidence Intervals for Vigor Subscale Item Based on Vignette*
The eta square index indicated that 3% of the variance in the degree to which a participant rated the mother in the vignette as vigorous was accounted for by whether the participant was assigned to the Vignette A (12 wks PP) or Vignette B (24 wks PP) condition.

Lastly, the test for the ability to sustain attention for long periods indicated significant differences between vignette groups, $t(237) = -3.52, p = .00$, and these results as well supported the research hypothesis. Respondents who read Vignette A (12 wks PP) on average rated the depicted mother as less able to sustain attention for long ($M = 2.64, SD = .80$) compared to those who read Vignette B (24 wks PP) ($M = 3.05, SD = .97$). The 95% confidence interval for the difference in means ranged from $-.637$ to $-.180$ (see Figure 3).

The eta square index indicated that 5% of the variance in the degree to which a participant rated the mother in the vignette as able to sustain attention for long periods was accounted for by whether the participant was assigned to the Vignette A (12 wks PP) or Vignette B (24 wks PP) condition.

To summarize, the research hypothesis that respondents assigned to the Vignette A condition (12 wks PP) would rate the mother portrayed in the vignette as cognitively impaired to a greater degree than would respondents assigned to the Vignette B condition (24 wks PP) was supported on three of the 11 items (depression, vigor, and able to sustain attention).

The second research hypothesis, that women with children would rate mothers as less severely impaired than will childless respondents, was not supported. Preliminary analyses revealed that there were no significant differences on any of the items between
groups. Therefore, further analyses were conducted without regard to whether the study participant had or did not have children, and independent samples t-tests were performed only on the groups that varied according to vignette.

**Figure 3**

*Ninety-five Percent Confidence Intervals for Able to Sustain Attention for Long Item Based on Vignette*

![Graph showing 95% confidence intervals for able to sustain attention for long item based on weeks postpartum.]

In general, respondents’ answers indicated that both groups expected new mothers to experience a little to a moderate amount of emotional and cognitive distress and quite a bit of physical distress. Respondents in the Vignette A condition (12 wks PP) expected a higher amount of distress compared to their Vignette B (24 wks PP) counterparts, as expressed by a higher score the depression scale, lower score on the vigor scale, and lower score on the item regarding ability to sustain attention.
Qualitative Themes

Self-perceptions.

Mental fatigue.

Out of 156 respondents with children, 130 (83%) reported that their mental functioning changed after having a baby. Those who reported that their mental functioning changed indicated that, at least initially, their cognitive impairment was slight to severe. The main areas of concern were memory and concentration:

- “It changed during pregnancy, and again after. It was hard to do simple things like make dinner. I would decide what I wanted, then forget the first step in making it. Then remember and forget what I was making etc... After giving birth it got a bit better, but still not as good as before pregnancy. I still freak out that I've left the fork in every time I use the microwave, even though I'm still holding it.”

- “Much more "fuzzy" thinking. Less able to articulate what I'm thinking. Very fatigued, and sometimes forgetful. I notice it most in my speech. I often can't think of the words I want to say.”

- “Much more forgetful, struggle for words, foggy, exhausted. Many days I wish I could just go back to my former self so that I could get things done.”

- “…During pregnancy I had a severe case of what friends (and other pregnant ladies I met on online forums) referred to as ‘mama brain’ where it was harder for me to focus and I needed to depend on to do lists more than ever. I also referred to it as ‘swiss cheese brain’ because I felt like I had holes in my short term memory. Now that my child is 20 months old I definitely have more trouble focusing on tasks than I did before.”
pregnancy. It's not that I'm necessarily less efficient at my job than before pregnancy, but I have to work harder to focus...”

Mothers also reported feeling distracted, and as though they could not process information as quickly as they could before giving birth. Many respondents reported feeling mentally “foggy.” Twenty-eight percent of respondents (n = 37) explicitly attributed their cognitive changes to exhaustion, fatigue, and/or sleep-deprivation:

- “More divided attention due to need to meet more people's needs, increased awareness of physical and emotional states, sometimes muddled due to either lack of sleep or the difficulties of working with enormous quantities of new information (parenting) pouring in daily.”
- “Before having kids, I only had to think of one thing at a time. Now it's like I've got 4 balls constantly being juggled in my brain (3 kids plus me): who's doing what, where, how are they feeling, etc.. etc…”
- “Too tired to think most of the time.”

*Emotional fatigue.*

Many respondents reported experiencing more stress as a new mother. Respondents also reported feeling overwhelmed by the sudden demands of caring for an infant. Eleven percent (n = 14) stated they felt more stressed and/or overwhelmed by the new task of motherhood:

- “More stressed and less able to deal with the stress; often feeling overwhelmed by the responsibilities associated with growing a small person…”
- “Although overjoyed at the birth of my daughter, the immediate and complete lack of freedom was overwhelming. After a few months, however, as I got into the swing
of things, I learned to be a lot less selfish and self-centered, and learned to be more organized and flexible at the same time.”

“Foggy, stressed, anxious, a loneliness feeling (even with husband and company).”

Anxiety was also a common answer given to how women felt during the postpartum period. Six respondents (5%) explicitly reported feelings of anxiety that was greater than usual or new to them.

“I was overcome with anxiety and obsessive thoughts...”

“Fatigue, anxiety, worry impacted clarity immediately, but it did improve a bit as time went on.”

“Increase in anxiety, loss of focus, inability to complete tasks.”

“I am more anxious and forgetful; it also takes me a little longer to communicate as clearly as I did before becoming pregnant.”

“Very anxious and nervous and somewhat forgetful - but super happy, too!”

Postpartum depression.

Twelve respondents (9%) outright reported or alluded to having experienced postpartum depression. Responses ranged from mild to severe:

“...I felt a little blue, a little gloomy, sometimes a little lonely or guilty. I also felt joyful, of course. I suspect these feelings improved when I stopped nursing.”

“I suffered from extreme postpartum depression with suicidal thoughts.”

“I became depressed, loss of libido, lonely, and felt isolated from my friends and support network.”
Long-term versus short-term losses.

Responses to how long mothers perceived their cognitive functioning to be negatively affected varied widely, from several months to ongoing many years after giving birth. The average response time was several months (35%, n = 45), followed by one year (21%, n = 27), followed by several years (15%, n = 20) and permanently (15%, n = 19). The fifth most common response was several weeks (11%, n =15), followed by several hours (1%, n =2) and I don’t remember (1%, n =2). No one selected the response “several days” (n = 0).

- “My son is nearly 2, and I have felt incredibly ‘fuzzy’ and inarticulate since his birth. I feel like I’m a bit slow on the uptake now … It’s almost like I have tunnel vision, only seeing things narrowly … It’s slowly getting better.”
- “… since the birth of my daughter 3 years ago, I find it harder to finish the NY Times crossword puzzles. Whereas before she was born, I could finish even the hardest ones with no problems.”
- “I had to learn to multi-task and think about several things at once. I also felt very overwhelmed for the first few months when thinking about everything I had to do. After 4-5 months things went back to how they had been.”
- “Because I was up feeding my daughter every couple of hours, I was utterly exhausted for the first few months of motherhood. Once she started sleeping longer and I was only up once per night, it was much better -- it was just the lack of sleep that affected me.”
Gains in addition to losses.

Although the majority of respondents with children reported cognitive deficits in the postpartum periods, 12 respondents (9%) reported cognitive gains, such as an increased ability to multi-task and increased decision-making ability. Respondents also reported gains in emotional ability:

- “At first, the exhaustion and hormonal fluctuation took a pretty big toll on my mental functioning, but once my daughter was 6 months old or so, I felt very comfortable as a parent and began to be able to accomplish so much more than ever before. Now that my daughter is 15 months, I can really multi-task. My theory is that parenthood forces you to be extremely capable – and also looking at the world/life from the brand-new perspective of an infant (empathy). These two functions get the brain very active and possibly even rejuvenated. That's not scientific, but I know that it's possible for the brain to re-learn behaviors – maybe that's what's happening?”
- “More mental alertness-even when woken up in the night.”
- “Having a baby, and raising my daughter as she grows, has made me smarter and more creative. I was very tired when she was an infant, but became much faster mentally than ever before.”
- “...I would say having a baby gave me much greater capacity for empathy, hard work, problem solving, and numerous other positive traits.”

Two respondents (1%) stated that their mental functioning didn’t worsen, but rather changed to accommodate a new life role:
“It didn't get worse but it concentrated on other things, my mental functioning increased in areas of child development and education. However, decreased in less needed areas…”

“Not for worse, not for better - simply different!”

Respondents were also asked to rate their overall impression of new mothers’ mental functioning based on interactions they’ve had (if any) with postpartum women. A total of 232 women (97%) answered the question. The majority of respondents (56%, n=130) rated new mothers as “slightly worse” cognitively than they were prior to having a baby, followed by “same as before” (28%, n = 64), then “slightly better” (6%, n = 14), then “much worse” (5%, n = 12) followed by “I don’t remember” (3%, n = 8) and “much better” (2%, n = 4).

Other Women’s Perceptions of New Mothers.

When asked to describe their impression of new mothers’ mental functioning based on interactions they’ve had with postpartum women, 130 respondents (54%) rated new mothers as functioning “slightly worse” than before having a baby. Sixty-three respondents (26%) described new mothers as “the same”, 14 respondents (6%) rated new mothers as “slightly better”, 10 respondents described newly postpartum women as functioning “much worse”, nine respondents (4%) answered that they did not remember how other women’s postpartum cognitive mental functioning compared to prenatal functioning. Five respondents (2%) rated new mothers as functioning “much better” mentally than they had prior to having a baby. Out of 239 respondents, 43 (18%) elaborated by describing their impressions of new mothers. The responses were grouped into the following themes:
**Slightly to Moderately Worse Functioning.**

- They are just a bit distracted.
- Most moms do get a little bit more scatter-brained after having a child.
- Exhausted!
- Remembering what they are doing becomes difficult.

**Temporarily Worse Functioning.**

- “Brand-new mothers are muddled, but less so than when pregnant. After a few months, they are much more mentally active/capable than ever before.
- New mothers seem exhausted and overwhelmed most of the time, however, once the babies got to be a little older, the mother was much better at multi-tasking the day’s activities.
- Worse at first, but better long-term.
- In the beginning function decreases, then returns to normal with more sleep.
- All of the new mothers I've known--even the most supported ones with the least challenging babies--experience a period where they have a hard time functioning at their expected mental level for some period of time.

**Equal but Different Functioning.**

- It's not the mental functioning per se that is worse, it's the circumstances allowing good mental functions that diminish.
- I think it is the same as before baby, but the focus of their attention and their priorities have changed...
- It isn't that their functioning is worse, it is just divided and has more demands.
I've always felt the worsening of mental functioning was due more to distraction than a genuine loss of ability.

Functioning I assume is the same, but the focus is different.

Depends on type of thought/activity -- some better, some worse.

Slightly worse with the knowledge they had prior to baby, but since have learned so many more skills and knowledge set after having a baby that their mental functioning is higher. Mothers have acquired new information and skills to deal with the ever changing environment of raising children.

This is hard to respond to because some things get better as in connecting to others and some get worse as in spatial relations.
Discussion

Research of maternal cognitive changes during pregnancy and postpartum paints a mixed picture: the literature contains an almost equal number of confirmatory and negative results. There is little consensus other than the fact that further research is needed. Taken together, the findings to this date suggest that cognitive difficulties during pregnancy and the postpartum period are relatively mild and limited to certain domains, chiefly certain types of memory, speed of information processing, and speed of switching attention from one task to another.

The findings of this study mostly support and extend past research and indicate that women perceive new mothers to be cognitively and emotionally impaired in select spheres of functioning, with the degree of perceived impairment inversely related to time postpartum. There were significant differences in mean scores between participants assigned to Vignette A (12 wks PP) and Vignette B (24 wks PP) groups, but only for three items out of 11. Respondents in the Vignette A condition rated a mother depicted at 12 weeks postpartum as more impaired on scales of depression-dejection and vigor-activity as well as on an item describing ability to sustain attention than did respondents rating a mother depicted at 24 weeks postpartum. However, for the majority of items there were no significant differences in mean ratings. Respondents did not perceive the two depicted mothers to vary significantly on items pertaining to anger, confusion, fatigue, tension, the ability to manage stress, the ability to process new information, the ability to multi-task, or on the POMS total score.

Therefore, Hypothesis 1 (respondents will perceive a mother depicted as being 12 weeks postpartum to suffer from greater cognitive impairment compared to a mother
depicted as being 24 weeks postpartum) was not supported. The question as to why it was not fully supported suggests several possible answers, but first it’s important to consider why support was found for three items (depression and vigor subscales and ability to sustain attention).

Postpartum depression has been estimated to affect approximately 15 percent of women (Brummelte et al., 2010) and has been openly and widely discussed within mainstream media and the blogosphere in the last decade. U.S. Representative Richard Davis introduced The Barbara Smith Postpartum Depression Research and Care Act in 2001 in the wake of a young mother’s suicide, which was attributed to postpartum psychosis (Mudahar et al., 2010). The media’s coverage of Barbara Smith’s suicide, and coverage of several other high profile cases, attracted national attention to the problem of postpartum depression (Mudahar et al., 2010). Several years later, ex-Mormon mommy blogger Heather Armstrong, of the wildly popular blog Dooce.com, wrote extensively online about her severe struggle with postpartum depression and subsequent hospitalization. According to leading global information and measurement company Nielsen, Dooce.com has as many as six million visitors per month, and Armstrong ranks No. 26 on Forbes’ list of the Most Influential Women in Media (as cited in Belkin, 2011). Likely through a combination of the disorder’s prevalence and increased media attention, “postpartum depression” became part of the public’s vocabulary.

Respondents who read about the mother depicted at 12 weeks postpartum rated her as more depressed than respondents who read a vignette wherein the mother was depicted at 24 weeks postpartum. Determining whether this is consistent with the scientific literature is not possible in that no published studies have yet examined
women’s perceptions of other women’s postpartum cognitive and emotional functioning. Comparing the obtained results with what studies have found to be true of postpartum depression’s onset is problematic because mothers are more likely to experience postpartum depression between 3 and 6 months after childbirth (Thombs, Roseman & Arthurs, 2010), which is the time period exactly between the two time intervals portrayed in this study’s vignettes. Interpreted using the time period cut-offs strictly, participant responses are in agreement with previous research (Gonidakis, 2007), since 12 weeks coincides with when depression typically begins in women who experience postpartum depression and the beginning of the 24th week/6 month mark when it typically ends.

Significant differences were also found in scores for an item describing the ability to sustain attention. Respondents rated the mother depicted at 12 weeks postpartum as being more impaired (or less able to sustain attention) than did respondents rating the mother depicted as 24 weeks postpartum. This result is consistent with a study by Crawley, Grant, and Hinshaw (2008) showing impaired attention in postpartum women. They found a mild decline in speed of switching attention from one task to another, but it’s unclear from the study whether the deficit is tied to attention, speed or both. The ability to sustain attention has not been explicitly studied in postpartum women, however, research has linked sleep loss with reduced cognitive functioning in general, and reduced alertness and ability to pay and sustain attention, specifically. A study published this year found sleep deprivation to lower task-related visual processing capacity and increase distractibility, but only when the unattended stimuli were highly intrusive (Kong, Soon, & Chee, 2011). Another recent study showed that sleep deprivation reduces the ability to pay attention and leads to an overall decline in cognitive functioning (Ratcliff & Van
Dongen, 2009). Generally, the older an infant is, the longer he or she is likely to sleep and the less sleep-deprived the mother is going to be (Beardslee, 1976). The results of the attention ratings, then, appear consistent with information provided from past studies.

The third item in the current study for which there was a significant difference in average scores between groups was the vigor-activity subscale. Respondents who read Vignette A (12 weeks PP) rated that mother as less vigorous and active than respondents who read Vignette B (24 weeks postpartum). This is consistent with past studies.

Research has shown that it takes time for a woman to increase her activity level after childbirth, with more activity following more time since delivery (Evenson, 2011). Widespread knowledge that new parents, and mothers in particular, suffer from sleep deprivation and frequently feel extremely tired may explain the significant difference in mean scores for the vigor-activity subscale. After all, if new mothers in general are tired, then it stands to reason that along the new mother continuum, newer mothers are even more tired than somewhat new or less new mothers. Yet, while there were significant differences on the vigor-activity subscale, there was no significant mean difference between vignette groups for items in the fatigue-inertia scale. The former scale contains ratings for the reverse-scored following adjectives: “lively”, “active”, “energetic”, “full of pep”, and “vigorous”. The fatigue-inertia subscale includes the items “worn-out”, “fatigued”, “exhausted”, “sluggish”, and “weary”. It seems that “energetic” may be considered a near-opposite of “sluggish”. All the items in the vigor-activity scale appear to mean roughly the opposite of all the items in the fatigue-inertia scale, thus one would expect that respondents in the Vignette A group (12 weeks PP) would choose both significantly lower ratings on items from the vigor-activity scale and significantly higher
ratings on items from the fatigue-inertia scale compared to respondents assigned to Vignette B (24 weeks PP).

The results showed this was not the case. Also, the results go against past studies showing the first 12 weeks postpartum to be more physically fatiguing than the first 24 weeks (Rychnovsky & Hunter, 2009). So, why did respondents rate the mother depicted at 12 weeks postpartum as less vigorous and less active than the mother at 24 weeks postpartum but not as more fatigued?

Speculation offers the explanation that maybe respondents did not consider the adjectives from the two subscales to be near-opposites at all, and instead interpreted items from the vigor-activity scale as reflecting attitude rather than a physical state. It’s true that “full of pep” really just means “peppy”, and “pep” is defined by Merriam Webster Dictionary as “brisk energy and initiative or high spirits” (“Pep,” n.d.) Seen in the context of spirits, this is consistent with the difference in mean scores between groups for the depression-dejection subscale. In that score, respondents also collectively indicated that the mother depicted as 24 weeks postpartum would feel more positive than the mother depicted at 12 weeks postpartum. It’s also worth taking into consideration the fact that in the U.S., the average working mother returns to the workplace 12 weeks after giving birth (Columbia University, 2002). Respondents may have assumed that the woman depicted in their vignette returned to work at the 12 week mark. If this was the case, it’s plausible that respondents who read Vignette A (12 weeks PP) envisioned a mother making the transition from maternity leave back to the workforce with new, conflicted emotions. Respondents who read Vignette B (12 weeks PP) may have assumed that after being back
at work for 3 months, the mother would be getting used to balancing work with a baby and more likely to feel positive emotions.

The fact that there was no significant difference between mean scores on the fatigue-inertia subscale based on which vignette respondents read might indicate that respondents in both groups view fatigue, exhaustion and the other states in that subscale as equally severe during the first 6 months of new motherhood. Respondents may have been trying to convey that they believe emotional or attitudinal outlook improves between 12 and 24 weeks postpartum, but they don’t believe the amount of rest new mothers get changes significantly from 12 to 24 weeks postpartum. Studies suggest most infants sleep through the night by the third month, so fatigue based on lack of sleep should lessen after the first three months (Beardslee, 1976). Feeding schedules may become less demanding after the first two or three months, changing from as many as 12 feedings a day spaced two or three hours apart to as few as 6 feedings a day (Mayo Clinic, 2010). Because of this, the mother depicted in Vignette A (12 weeks PP) may be considered to be standing on the border of better rest. It was expected that respondents rating the mother 12 weeks postpartum would consider her more impaired than respondents rating the mother in Vignette B (24 weeks PP), who presumably has been sleeping better for the last two or three months. However, the feeding schedule can remain unpredictable beyond the first few months (Mayo Clinic, 2010) and numerous other new tasks and stressors that do not abate between 12 and 24 weeks (such as cleaning up after an infant) can contribute to fatigue (Pollock, Amankwaa & Amankwaa, 2005).
It appears that respondents collectively believe fatigue-inertia, tension-anxiety, confusion-bewilderment and anger-hostility remain roughly equivalent in the postpartum period, regardless of whether 12 weeks or 24 weeks have passed since childbirth. Scores on the fatigue-inertia, tension-anxiety, and anger-hostility subscales had among the highest means (see Table 1), suggesting that women in both groups believe at least the first six months postpartum to be a time of high fatigue, tension, anxiety, irritation and anger. There is support for this within the scientific literature, especially if one considers that even though the “average” baby begins to sleep through the night at approximately 24 weeks, there is considerable variation between infants. Though no studies clearly examine anger and hostility in the postpartum period, many studies have highlighted sleep deprivation during the postpartum period, and studies have also linked anger to sleep loss (Medina, Lederhos, & Lillis, 2009; Paterson et al., 2011).

It’s difficult to determine whether there is scientific support for the idea that new mothers experience high levels of anxiety through at least the first 24 weeks postpartum. The prevalence of postpartum depression is well established, but much less is known about prevalence levels for postpartum anxiety (Yelland, Sutherland, & Brown, 2010). In fact, there are very few studies that have measured postpartum anxiety, and these few were published outside the U.S. In 2010, findings from a community survey of Australian women showed that at 24 weeks postpartum 12.7% scored above the normal range for anxiety on the Depression Anxiety Stress Scales (DASS-21) and 17.4% scored above the normal range for depression (Yelland, Sutherland, & Brown, 2010). A study using data from a German community sample using data gathered over the first 12 weeks postpartum drew very different conclusions, with higher rates of anxiety than of
depression. The German study estimated rates of postpartum anxiety disorders at 11.1% and postpartum depressive disorders at only 6.1% (Reck et al., 2008).

It’s not clear why no significant difference in means was found between the two groups of respondents for the confusion-bewilderment subscale, which yielded the lowest mean score of all the POMS subscales. The confusion-bewilderment subscale contains these items: “confused”, “muddled”, “bewildered”, “efficient” (which was reverse-scored), and “forgetful”. From the context of sleep, one could expect that forgetfulness is likely to be worse for a new mother during the first 12 weeks postpartum versus the first 24 weeks, though perhaps only marginally. Or perhaps, despite scientific findings, it’s not widely known or believed that most infants sleep through the night by 12 weeks. It could be that words such as “bewildered” and “confused” seemed too severe, but this is merely speculation. Because this is a confusion-bewilderment subscale, and not a forgetfulness subscale, this result appears consistent with the literature. Past studies have not assessed confusion or bewilderment per se, but the body of research on postpartum cognitive functioning has provided evidence suggesting no confusion (of the “where am I?” sort) in healthy postpartum populations. Confusion of first-time mothers learning a new life role (what it means to be a mother, etc.) does not appear to have been the subject of published studies.

Of the four author-written items (able to manage stress, able to process new information, able to multi-task, and able to sustain attention for long periods of time), a significant difference in mean scores between vignette groups was found only for the latter – able to sustain attention for long. To date, no study has examined multi-tasking ability in the postpartum period or new mothers’ ability to manage stress. Studies of
postpartum cognitive functioning have found no evidence of any decrease in ability to process new information, only in speed of processing (De Groot, Vuurman, Hornstra, & Jolles, 2006). Hence, these results support past research.

Unlike for Hypothesis 1, findings within the current study failed to provide support for Hypothesis 2 (women with children will rate mothers as less severely impaired than will childless respondents). Respondents did not differ in their assessment of the depicted mothers based on whether a respondent herself is a mother. No past research has examined whether childbirth experience influences perception of postpartum cognitive functioning in other women.

Whereas Hypothesis 1 was grounded in science and media portrayals, Hypothesis 2 was based on anecdotal reports by childless women. These reports, encountered by the author, cast normal pregnancy processes, such as weight gain, in negative light (i.e., “I’d feel so fat and unattractive”) and to exaggerate cognitive changes as permanent pathways to feeble-mindedness. This paper’s author suspected that, on average, mothers’ first-hand postpartum experiences would lead them to endorese a more moderate view. Perhaps this logic was faulty or based on too flimsy anecdotal evidence. It’s also possible that the childless respondents in this study, many of whom are students of psychology, do not reflect the views of a typical childless woman.

No studies have examined women’s perceptions of new mothers, therefore the results of the current study must be considered in the context of scientifically observed cognitive changes. Overall, the quantitative results from this study are mixed, with many perceptions supporting past findings and some in contradiction to what research suggests is true. This holds a mirror up to the scientific community and indicates that even among
respondents consisting of mothers and highly-educated women, the postpartum period is not always well understood, with some facets of the experience much better understood than others.

Qualitative data from respondents who shared perceptions of new mothers based on interactions with them revealed an interesting finding: slightly more than half demonstrated a belief that postpartum cognitive deficits are real, relatively mild and usually temporary. Slightly fewer than half of the respondents indicated they believed cognitive functioning changed following pregnancy and childbirth, but not necessarily for the worse. Because the results are so mixed, they closely mimic past studies, which are equally equivocal, with some showing no declines in cognitive functioning and some showing marked deficits that are usually mild and restricted to certain types of memory, attention and speed of processing problems.

Qualitative data from respondents who are biological mothers provided different information, despite the fact that there may have been considerable overlap between these two groups. Respondents who are mothers indicated a greater range of cognitive impairment as well as enhancement. Seventy-four percent reported that they suffered deficits, and these ranged from slight to severe in the areas of memory, concentration and speed of information processing. They reported a range in duration, too, from several months to ongoing many years after giving birth. The average response time given for a decline in cognitive functioning was several months. Nine percent of the respondents who are mothers indicated that childbirth conferred cognitive advantages, including improved multi-tasking skills, better decision-making ability, greater empathy and greater overall emotional connectivity to others. These combined results are consistent with past
studies in some ways, such as affected cognitive domains (memory, concentration/attention, and speed of processing). The indication of cognitive plasticity and gains reported by a minority of respondents are in line with animal studies, though the areas of cognitive enhancement found in maternal rats differed. For instance, studies with rats found improvement in memory, attention and behavioral flexibility (Leuner & Gould, 2010). It can be speculated, however, that gains in human behavioral flexibility may lead to improved social and emotional skills. Past research provides insufficient data regarding range of duration for postpartum cognitive impairment.

Limitations

The current study contains at least one major limitation. Study results should be interpreted with some caution due to the sample’s homogeneous racial, educational, and socioeconomic makeup and restricted age and occupational range (most respondents indicated they are in their 20s, 30s or 40s and work in a professional field or are studying psychology). Because of this, the ability to generalize these results to the female population at large is restricted. In fact, the very nature of collecting data via an online survey preselects respondents who both have access to the internet and are familiar with computers. Although respondents of any socioeconomic status may access the internet through the public library system, it is likely that women with internet access at home or through work would be more inclined to complete the online questionnaire, and that educated women under a certain age are more likely to be familiar with computers (National Center for Education Statistics, 2004). Recruiting for the study was conducted both offline in the greater Portland, Oregon area and online. Portland is a mostly Caucasian city (City-Data.com, 2010), and anticipating a racially homogeneous sample,
the author made efforts to recruit women of color by posting flyers advertising the study in community centers, libraries and shops in traditionally African-American, Asian, and Hispanic neighborhoods. Despite these efforts, the sample was overwhelmingly Caucasian.

It’s also possible that the times depicted in the two postpartum vignettes (12 weeks PP versus 24 weeks PP) hid what would otherwise have been additional significant differences in mean scores between the two groups. For instance, if Vignette A had presented a mother eight weeks postpartum instead of or in addition to 12 and Vignette B had presented a mother 30 weeks postpartum instead of or in addition to 24, the results might be very different. It was beyond the scope of this study to include more than two time periods. The two times that were chosen serve as a reminder that the current study examined two very narrow points in time and that perceptions of postpartum cognitive functioning based on time postpartum may contain wider discrepancies than seen in this study if based on wider depicted time intervals.

Conclusion and Suggestions for Further Research

Most studies in the postpartum literature have focused on aspects of cognitive functioning related to memory, attention, and speed of information processing, or postpartum women’s perceptions of their own cognitive functioning. This study was the first to examine women’s perceptions of other women’s postpartum cognitive functioning and whether these perceptions vary as a function of depicted time postpartum. It was also the first study that analyzed whether reproductive experience affects perceptions of postpartum cognitive functioning by comparing the perceptions of mothers with those of childless women, and the first to collect data regarding perceived duration of postpartum
cognitive impairment. Very few studies have examined duration, and those that have measured it utilize cognitive testing.

Thus, this study fills in some of the gaps in the research, providing tentative answers to some questions while inviting additional inquiry. Questions to consider include, would means scores and themes of the qualitative data differ significantly if comparing childless respondents versus mothers in a sample with lower educational attainment? Would a significant gender effect be part of the results if each vignette group was subdivided according to sex rather than reproductive experience? What additional information would be gained by adding both men and additional times postpartum to the study? How would adding race and socioeconomic status (with all their cultural implications) as additional independent variables influence results?

Finally, this study demonstrated that a minority of mothers (9%) acknowledged cognitive benefits believed to be related to motherhood. This finding suggests further research in the areas of maternal empathic response, maternal efficiency at multi-tasking, and maternal decision-making processes. Further research is also needed to build a more robust understanding of how long postpartum cognitive impairment typically lasts and whether the maternal brain eventually resumes pre-pregnancy functioning or is forever altered for better, for worse, or for both.
Appendix

List of supplemental questions

1. How old are you?

2. What is your race/ethnicity? (Caucasian, African American, Asian American, Hispanic/Latino, Native American, Pacific Islander, Biracial/Multiracial, Decline to answer, Other)

3. What is your current occupation or field of study?

4. What is the highest level of schooling you have completed? (elementary school, high school, some college, college, post-graduate)

5. If you have had interactions with new mothers, please choose the best description of your overall impression of their mental functioning. (much worse than before they had a baby, slightly worse than before they had a baby, same as before they had a baby, slightly better than before they had a baby, much better than before they had a baby, I don’t remember)

6. Do you have biological children for whom you are or have been a primary caregiver?

If respondent indicated she is a mother, she was also asked:

7. Did you own mental functioning change after you gave birth?

8. In what way did you mental functioning change?

9. How long would you estimate your mental functioning was affected after giving birth? If your mental functioning is still affected, please choose how long it has been affected so far. (Several hours, several days, several weeks, several months, one year, several years, permanently, I don’t remember)
References


Pawluski, J. L., Vanderbyl, B. L., Ragan, K., & Galea, L. A. M. (2006). First reproductive experience persistently affects spatial reference and working memory in the mother and these effects are not due to pregnancy or mothering alone. *Behavioral Brain Research, 175*, 157-165. doi: 10.1016/j.bbr.2006.08.017


