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Research Report

Patterns of women's mood after delivery: A growth curve analysis

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ABSTRACT

Background: The course and predictors of women's mood following childbirth have informed clinically significant phenomena, such as postpartum depression (PPD), with some contradictory findings due to methodological limitations. It is important to further investigate mood during this unique period of time to inform assessment and improve interventions.
Methods: Recently delivered mothers ($n=216$) recruited from the maternity unit at a University hospital completed sociodemographic questions and the Daily Experiences Questionnaire (DEQ), a measure of Negative Affect (NA) and Positive Affect (PA), for 10 consecutive days. The Structured Clinical Interview for DSM-IV was administered to assess postpartum depression diagnosis.
Results: Growth curve modeling (GCM) techniques revealed average trends in mood following delivery. NA changed in a curvilinear fashion with a peak at day 5. PA declined rapidly during the days immediately following delivery and then stabilized. Women diagnosed with PPD experienced higher overall levels of NA and lower levels of PA from delivery to 10 days postpartum. Patterns of mood varied as a function of neuroticism and several well-established sociodemographic variables.
Limitations: Small sample size and relatively few ethnic minority participants may affect generalizability of the findings.
Conclusions: NA changed in a pattern consistent with the "peaking phenomenon". Well-established risk factors of the blues had significant associations with mood from delivery to day 10. Increased understanding into the nature of NA and PA in the early postpartum, and its role in identifying women susceptible to experiencing PPD, can inform screening and therapeutic interventions for PPD.
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1. Introduction

It is well established that women show a characteristic pattern of mood (on average) during the first 10 days after childbirth. Negative mood increases from childbirth until about day 5 postpartum and then begins to decline, whereas, positive mood shows an opposite but somewhat muted pattern over the same time period (O'Hara, 1995). Relatedly, a phenomenon called the "postpartum blues" occurs during that same time period. The blues has been characterized variously as episodes of crying/tearfulness, mood instability, or being overemotional. The blues is understood to be relatively benign and self-limiting but has been found to be associated with later postpartum depression (PPD) (O'Hara et al., 1991). There are no established diagnostic criteria for the blues and it has been common to use cut scores on measures such as the Edinburgh Postnatal Depression Scale or to use investigator developed criteria applied retrospectively (through interview or self-report) to define the blues. Although there has been psychometric development of blues measures, particularly the Blues Questionnaire (Kennerley and Gath, 1989a), only recently has a blues measure been validated that takes advantage of earlier advances (Kennerley and Gath, 1989a) but with additional items reflecting the full range of Negative and Positive Affect (Buttner et al., 2012). The newly developed Daily Experiences Questionnaire (DEQ), validated with a postpartum sample, contains 31 items that reflect two factor analytically derived scales—labeled Negative Affect (NA) and Positive Affect (PA) (Buttner et al., 2012).

The finding that postpartum mood followed longitudinally could be characterized as reflecting the independent dimensions of Negative and Positive Affect parallels a large body of research on the structure of mood (Watson et al., 1988; Watson and Tellegen, 1985). These two dimensions are at the core of depressive disorders and are highly relevant to many of the anxiety disorders (Sellbom et al., 2008; Watson, 2005). Given the strong similarity of the structure of mood in the early postpartum period and the structure of mood found in other samples of adult women and men, we undertook a study of women in the early postpartum period to accomplish two

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goals: (a) elucidate patterns of mood across this important time period (via daily administration of the DEQ), and (b) identify clinically relevant patterns of mood.

1.1. Identifying risk factors for mood perturbations

There are multiple factors that may be related to mood perturbations during the days immediately following childbirth; however, the personality trait neuroticism is a particularly relevant factor to consider given that it represents a strong phenotypic expression of the polygenic diathesis for depression (Hettema et al., 2006). Also referred to as negative emotionality, neuroticism is defined as "individual differences in the extent to which a person perceives and experiences the world as threatening, problematic, and distressing" (Watson et al., 1994, p. 26). Individuals scoring high on trait neuroticism are prone to experiencing negative emotions, a wide range of problems, self-blame, and high levels of stress. Neuroticism is a stable trait in adulthood (Clark, 2005; Kendler et al., 1993; McCrae and Costa, 1997; Watson et al., 1994), and genetics researchers conclude that existing empirical evidence "establishes neuroticism as a reasonable target endophenotype…for a range of internalizing disorders" (Hettema et al., 2006, p. 862).

Women who are high in neuroticism appear to be at increased risk for experiencing mood perturbations following childbirth. Indeed, one study showed that higher scores on a measure of neuroticism were significantly associated with a "peak" in emotional lability and crying on postpartum day 3 and day 4 (Kendell et al., 1984). In another study, Kennerley and Gath (1989b) demonstrated that scores on the Eysenck Personality Inventory-Neuroticism scale were significantly associated with women's *peak* scores and their *mean* scores on a blues questionnaire across the first 10 days postpartum. Thus, there is some evidence suggesting that neuroticism is linked to the blues. Investigations that incorporate a measure based on theories linked to the structure of mood, such as the DEQ, may clarify the association between neuroticism and early postpartum mood.

In addition to neuroticism, there are several sociodemographic and obstetric factors that may be associated with early postpartum mood perturbations. Researchers have examined sociodemographic risk factors for the blues (between days 3 and 5 postpartum) such as marital status, age, and education; however, this research has produced contradictory findings (Henshaw, 2003). The literature on obstetric risk factors is similar in that some researchers have identified an association between parity, delivery by cesarean section, complications associated with the baby (e.g., low birth weight) and breastfeeding status (Hannah et al., 1992) as correlates of the blues, while others have not detected significant associations (Henshaw, 2003). The mixed findings associated with sociodemographic and obstetric risk factors may be due to the use of blues measures that are not psychometrically sound, thus making it difficult to draw substantive conclusions based on previous research. In addition, these risk factors have not been examined in association with varying mood trajectories during the early postpartum period.

1.2. The present study

The first aim of this study was to examine the normative course of women's mood during the 10 days after delivery using growth curve analytic techniques and scales from the DEQ to (a) examine average trajectories of mood over time, and (b) test for between-subject differences in mood trajectories. We predicted that, on average, women would experience a peaking phenomenon characteristic of the blues such that NA would demonstrate negative curvilinear change over time (NA increases through day 5 postpartum and then begins to decline), and that some women would experience more of a peaking phenomenon than others. In contrast to NA, little is known about the course of PA during the days following delivery; therefore, we did not have specific hypotheses regarding change in PA over time. Nonetheless, drawing from the mood literature on NA and PA (e.g., Watson and Tellegen, 1985), we expected PA to demonstrate an inverse pattern of change to that of NA, such that PA declines until day 5 and then beings to increase.

The second aim was to identify clinically relevant patterns of mood. That is, we aimed to examine trajectories of NA and PA that are associated with a diagnosis of PPD. We predicted that PPD would be associated with more negative curvilinear change (a more pronounced peaking phenomenon) and higher levels of NA on day 5 (the anticipated timing of the peak).

The third aim was to clarify who is at increased risk for mood perturbations in the early postpartum, with a particular emphasis on patterns of mood associated with PPD (based on the results of Aim 2). We predicted that mood perturbations would be associated with certain maternal characteristics and obstetric complications. We examined the personality trait neuroticism, sociodemographic variables (i.e., education, age), and obstetric variables (i.e., method of delivery, baby in NICU > 2 days) as risk factors of mood trajectories.

2. Methods

2.1. Participants and procedure

Eligible mothers spoke English and were between the ages of 18 and 45. Mothers were included in the study regardless of birth complications, number of days spent in the maternity unit, and method of delivery, to ensure a wide range of symptoms. Participants were, on average, 28 years old (SD = 5.57) and college educated (M = 15.06 years, SD = 2.94). Approximately 80% of the participants were Caucasian, 75% were breastfeeding at time of entry into the study, and approximately 70% were married. More than half of the participants were working (61.1%) and roughly half (49.9%) had an annual income equal to or greater than $40,000.

Upon receiving approval from the University of Iowa's Institutional Review Board, recently delivered mothers (n = 216) were recruited from the maternity unit at the University of Iowa Hospitals and Clinics. Study recruiters approached mothers meeting inclusion criteria (English speaking and 18 years of age or older) on postpartum days 0, 1, or 2 and asked for their participation in a research study that examined women's emotional experiences following childbirth. Postpartum day 1 was defined as beginning at 12:01 a.m. on the first day after childbirth. Recruiters explained the study protocol and reviewed the consent form with interested participants. Upon receiving informed consent, recruiters asked participants to complete the sociodemographic questionnaire and the Daily Experiences Questionnaire (DEQ; Buttner et al., 2012) in person. Participants were asked to complete the DEQ either online (60% of participants) or over the telephone with a researcher (40% of participants) between 5 p.m. and 8 p.m. for 10 consecutive days. If this was not possible, participants were asked to complete the DEQ before bedtime that evening or by noon the following day. If one day was missed, participants were instructed to complete two questionnaires (one for the previous day and one for the current day) in the evening on the following day. Online questionnaires were completed using a web-based survey application offered to researchers by the University of Iowa. Finally, a clinician-administered interview was conducted with participants over the telephone between postpartum days 11 and 14 comprising the Structured Clinical Interview for DSM-IV (SCID; First et al., 1995) and the neuroticism scale of the Big Five Inventory (BFI; John et al., 1991; John et al., 2008). Because neuroticism is a stable trait in adulthood (Clark, 2005; Kendler et al., 1993; McCrae and Costa, 1997; Watson et al., 1994), the assessment of neuroticism has high test–retest reliability (three month test–retest reliabilities for BFI scales range from 0.80 to 0.90 with a mean of 0.85, Rammstedt and