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Perception of Partner Sleep and Mood: Postpartum Couples' Relationship Satisfaction

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Abstract

Separate research areas indicate that sleep quality, mood, and relationship satisfaction decline among couples during the postpartum period. Furthermore, accurate partner perceptions are associated with positive relationship qualities. Twenty-one first-time postpartum mother-father dyads, contributed one week of continuous wrist actigraphy along with concurrent subjective Palm Pilot monitoring to provide both objective and subjective sleep measures. Parents also reported on their own as well as their perception of their partners' sleep, mood, and relationship satisfaction. Greater objectively measured total sleep time was associated with greater relationship satisfaction. Mothers underestimated fathers' self-reported frequency of nocturnal awakenings and relationship satisfaction, and overestimated fathers' self-reported sleep quality. Fathers underestimated mothers' self-reported duration of wake at night and sleep quality, and overestimated mothers' self-reported mood disturbance. Preventative measures that target sleep and improvement in perception of partner's experiences could be used to buffer against decreases in relationship satisfaction among new parents.

Keywords

Relationship satisfaction; postpartum; sleep; development

Introduction

Relationship Satisfaction Across the Transition to Parenthood

Relationship satisfaction is typically highest during early marriage and tends to decrease following the birth of the first child (for review, see Medina & Magnuson, 2009). The transition to parenthood has been identified as the potential cause of a general increase in marital conflict and a decrease in marital satisfaction (Lawrence, Rothman, Cobb, Rothman, & Bradbury, 2008; Shapiro, Gottman, & Carrére, 2000). The catalyst for this decreased relationship satisfaction appears to be the stress of entering parenthood rather than the time of being in the relationship (see review by Gottman & Notarius, 2002). For example, when compared to childless couples whose marital satisfaction increased slightly across time, there was a significant decline in marital satisfaction among new parents (Schulz, Pape-

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Cowan, & Cowan, 2006). Relationship satisfaction is particularly important to consider among postpartum parents because it influences positive mother and father coparenting behaviors towards young infants (Schoppe-Sullivan, Mangelsdorf, Brown, & Sokolowski, 2007) and generally promotes positive health outcomes within relationship dyads (Robles & Kiecolt-Glaser, 2003).

Sleep and the Postpartum Period

The birth of a child also has a significant impact on parental sleep (see review by Ross, Murray, & Steiner, 2005), and sleep disturbance negatively impacts physical, emotional, and mental well-being (Gregory, 2008). Moreover, among a large community sample of women, subjective sleep quality was positively associated with relationship satisfaction (Troxel, Buysse, Hall, & Matthews, 2009). A recent review indicated that postpartum sleep disturbance may impact postpartum relationship satisfaction (Medina & Magnuson, 2009). Such a relation is logical considering the near-universal high experience of postpartum sleep disturbance (Condone, Boyce, & Corkindale, 2004; Ross, et al., 2005), and the deleterious effects that sleep disturbance has on well-being. Yet, the influence of sleep disturbance on relationship satisfaction among couples during their transition to parenthood has been under-investigated.

Partner Perceptions

Another factor in relationship satisfaction is accurate perceptions of one's partner, which are positively associated with favorable relationship outcomes (Neff & Karney, 2005). Among postpartum couples, awareness of one's partner may require 'cognitive room' (Shapiro et al., 2000), which could be impeded by the effects of postpartum sleep disturbance. Generally, sleep disturbance has deleterious effects on decision making (Harrison & Horne, 2000) and neurocognitive performances (Banks & Dinges, 2007; Durmer & Dinges, 2005); therefore, sleep disturbance may have similar deleterious effects on awareness for one's partner.

Rationale for Current Study

These separate, but complimentary research areas indicate that sleep quality (Condone et al., 2004; Ross et al., 2005), mood (Soliday, McCluskey-Fawcett, & O'Brien, 1999), and relationship satisfaction (Gottman & Notarius, 2002; Medina & Magnuson, 2009) all decline during the postpartum period. Furthermore, subjective sleep (Troxel et al., 2009) and mental health (Whisman, 1999; Whisman, Sheldon, & Goering, 2000) are specifically associated with relationship satisfaction. Therefore, the first study goal was to evaluate the independent associations among objectively measured sleep, self-reported sleep, and mood disturbance with relationship satisfaction among postpartum couples during the early postpartum period to better understand which variable is most strongly associated with relationship satisfaction.

An additional body of research indicates that accuracy of partner perception is associated with marital quality (Gagné & Lydon, 2004; Luo & Snider, 2009; Neff & Karney, 2005). Since the postpartum period is marked with poor sleep, and poor sleep is associated with a decrease in cognitive abilities, the second study goal was to describe the perceptions of partners' subjective sleep, relationship satisfaction, and mood disturbance among postpartum couples to better understand postpartum parents' ability to perceive their partner's state.

Method

The study was approved by the West Virginia University Office of Research Compliance (Institutional Review Board). Participants were administered informed consent and Health Insurance Portability and Accountability Act (HIPAA) authorization prior to participation.

Sample and Participants

First-time postpartum mother/father couples were recruited via a larger study of postpartum women, and through community advertisements. Couples were excluded on the basis of premature delivery, multiples, infant admission to the neonatal intensive care unit, either parent's treatment for a sleep disorder, either parent's history of or current treatment for major depressive disorder, or a score ≥16 on the Center for Epidemiologic Studies Depression Scale (Radloff, 1977).

Data from $N = 21$ couples who were between three and eight weeks postpartum ($M = 6.93$, $SD = 1.26$ weeks) were analyzed; 92.86% of parents were white. From this sample, one mother and one father (from different dyads) had missing actigraphy data due to equipment malfunction and non-adherence to the protocol, respectively; one mother/father couple did not have subjective wake after sleep onset data because the father did not report on this question according to the protocol. No participants withdrew from the study. Sample characteristics are show on Table 1.

Procedure

Throughout one week parents concurrently wore an actigraph to objectively record their sleep and wake, used a personal digital assistant (PDA) to report their own sleep and actigraph-off diaries, and self-administered subjective sleep questions each morning within two-hours of awakening. A two-hour latency from wake to subjective sleep question administration was established to facilitate parents' morning infant care responsibilities. At the end of the assessment week, the Comprehensive Marital/Relationship Satisfaction Scale (CMSS) and the Profile of Mood States (POMS) were independently self-administered by each parent to reflect their feelings from the previous week.

For each administration of the subjective sleep questions, and for the CMSS and POMS administration, parents were instructed to report for them self, and to also report how they thought their partner would have answered the questions. Parents were instructed to not discuss their ratings with each other during their participation in the study. Parents were assigned to one of two counterbalanced groups to disperse potential error from order effects; one group of parents reported their self-reports and then reported their perception of their partner's reports, the other group did the reverse.

Measures

Personal Digital Assistant: subjectively measured sleep—Each participant used a Palm Zire 72 PDA with customized software (Bruner Consulting, Inc.) that included subjective sleep questions, and sleep and actigrah diaries.

Subjective sleep: Three subjective sleep questions included: "How many times do you think you woke up last night?" (subjective frequency of nocturnal awakenings), "Please indicate how long you were awake last night (total)." (subjective wake after sleep onset), and (3) "Where 100 is feeling fully rested, please indicate your quality of sleep." using a 1 – 100 likert scale. (subjective sleep quality) (Lee, Hicks, & Nino-Murcia, 1991). Participants answered these questions each morning.

Sleep and actigraph diaries: Participants used the PDA diary to record in real-time when they went to sleep, when they awoke, when they removed their actigraphs, and when they put their actigraphs back on; these entries could also be recorded retrospectively. These diaries were used to identify sleep periods for analysis on the actigraph output.

Actigraphy: objectively measured sleep—Actigraps are small watch-like accelerometer devices used to measure movement and absence of movement. Wrist actigraphy is a valid system for non-intrusive measurement and analysis of sleep/wake periods among adults (Sadeh & Acebo, 2002). Specifically, actigraphy should be measured for at least six days to derive reliable (G = 0.80) measures of total sleep time and wake after sleep onset, and at least four days for sleep efficiency (M. Hall, personal communication, July 12, 2010). Continuous, nonintrusive activity monitoring was recorded with Mini Mitter's Actiwatch-64 actigraphs with 15-second recording epochs and a default wake threshold value setting = 40. Actiware Software Version 5.4 was used to manage, analyze, and archive actigraphy data.

Actigraphs were worn continuously on the nondominant wrist except when it might have gotten wet. Participant diaries were used to identify periods of sleep on the actigraph signal, which was then analyzed for the following measures during each 24-hour recording period: total sleep time (minutes), nocturnal wake after sleep onset (minutes of wake during the nocturnal sleep period), and nocturnal sleep efficiency (minutes of sleep during the nocturnal sleep period divided by minutes in the nocturnal sleep period, multiplied by 100)

Comprehensive marital/relationship satisfaction scale—The CMSS was used to evaluate relationship satisfaction. The CMSS is a 35-item questionnaire that examines relationship satisfaction based on questions from three categories of homogamy, general satisfaction, and interpersonal interaction that are combined to describe a single relationship satisfaction factor (Blum & Mehrabian, 1999). The CMSS has high internal reliability (r = .94), satisfactory test-retest reliability (r = .83), and a normative score is $M = 80$, $SD = 42$; higher scores represent greater relationship satisfaction (Blum & Mehrabian, 1999).

The Profile of Mood States—The POMS was used to evaluate mood disturbance. The POMS measures six dimensions of mood: tension-anxiety, depression-dejection, anger-hostility, vigor-activity, fatigue-inertia, and confusion-bewilderment (McNair, Lorr, & Droppleman, 1971); the POMS yields a total mood disturbance score based on these dimensions and has an internal consistency of ≥ .90 (McNair et al., 1971). A normative POMS total mood disturbance score is $M = 20.3$, $SD = 33.1$; higher scores represent greater total mood disturbance (Nyenhuis, Yamamoto, Luchetta, Terrien, & Parmentier, 1999).

Statistical Analyses

Data were analyzed using SPSS version 16.0; a $p < 0.05$ was considered statistically significant. Objectively and subjectively measured sleep variables were each averaged within each week to create stable measures. Since separate research areas emphasize the importance of different variables that impact relationship satisfaction, stepwise linear regressions were calculated separately for mothers and fathers to determine which objective sleep, subjective sleep, or mood variables are most strongly associated with relationship satisfaction. Repeated measures ANOVAs and Cohen's *d* effect size values (for statistically significant differences) were calculated to determine differences between both self-reported and perception of partner's relationship satisfaction, mood disturbance, and subjective sleep.

Results

Consistent with the research protocol, subjective sleep questions were self-administered each morning within $M = 76$, $SD = 53$ minutes of awakening. Counterbalanced groups did not significantly differ on any measure.

Predictors of Relationship Satisfaction

For mothers and fathers separately, the following variables were examined as potential predictors of relationship satisfaction: subjective frequency of nocturnal awakening, subjective wake after sleep onset, subjective sleep quality, total sleep time, nocturnal wake after sleep onset, nocturnal sleep efficiency, and mood disturbance.

Among mothers, objectively measured total sleep time independently predicted relationship satisfaction, $R^2 = .46$, $F(1, 18) = 15.44$, $p < .001$, $\beta = .68$. Likewise among fathers, objectively measured total sleep time independently predicted relationship satisfaction, $R^2 = .30$, $F(1, 18) = 7.71$, $p < .05$, $\beta = .55$. Among both mothers and fathers, more total sleep time was associated with more positive relationship satisfaction.

Subjective Frequency of Nocturnal Awakenings

Mothers reported significantly more nocturnal awakenings ($M = 2.86$, $SE = .33$) than fathers ($M = 2.08$, $SE = .27$), $F[1, 20] = 4.93$, $p < .05$, $d = .57$. Mothers underestimated fathers' report of frequency of nocturnal awakenings ($M = 1.67$, $SE = .23$), $F(1, 20) = 4.50$, $p < .05$, $d = .36$; however, fathers' perception of mothers' frequency of nocturnal awakenings ($M = 3.32$, $SE = .34$) did not differ from mothers' report of frequency of nocturnal awakenings $F(1, 20) = 1.44$, $p = .24$ (Figure 1a).

Subjective Minutes of Wake After Sleep Onset

Mothers reported significantly more minutes of nocturnal wake after sleep onset ($M = 116.04$, $SE = 14.59$) than fathers ($M = 42.66$, $SE = 9.13$), $F(1, 19) = 22.58$, $p < .001$, $d = 1.32$. Mothers' perception of fathers' subjective wake after sleep onset ($M = 38.77$, $SE = 8.24$) and fathers' self-report did not significantly differ $F(1, 19) = 1.22$, $p = .28$; however, fathers significantly underestimated mothers subjective wake after sleep onset ($M = 92.25$, $SE = 11.80$), $F(1, 20) = 7.13$, $p < .05$, $d = .39$ (Figure 1b).

Subjective Sleep Quality

Mothers ($M = 62.66$, $SE = 2.65$) and fathers ($M = 57.09$, $SE = 3.38$) did not significantly differ on their self-reports of sleep quality, $F(1, 20) = 1.60$, $p = .22$. Mothers significantly overestimated fathers' sleep quality ($M = 68.70$, $SE = 2.75$), $F(1, 20) = 13.89$, $p < .001$, $d = .82$; conversely, fathers significantly underestimated mothers' sleep quality ($M = 55.92$, $SE = 3.27$), $F(1, 20) = 4.84$, $p < .05$, $d = .50$ (Figure 1c).

Relationship Satisfaction

Mothers ($M = 84.67$, $SE = 7.58$) and fathers ($M = 92.33$, $SE = 8.30$) did not significantly differ on their self-report of relationship satisfaction, $F(1, 20) = 1.29$, $p = .27$. Mothers significantly underestimated fathers' relationship satisfaction ($M = 77.19$, $SE = 7.95$), $F(1, 20) = 5.89$, $p < .05$, $d = .41$; however, fathers perception of mothers' relationship satisfaction ($M = 80.43$, $SE = 8.94$) and mothers' self-report did not significantly differ, $F(1, 20) = .48$, $p = .50$ (Figure 1d).

Mood Disturbance

Mothers ($M = 12.29$, $SE = 4.38$) and fathers ($M = 13.33$, $SE = 1.66$) did not significantly differ on their self-report of mood disturbance, $F(1, 20) = .004$, $p = .95$. Mothers' perception of fathers' mood disturbance ($M = 11.38$, $SE = 5.42$) and fathers' self-report did not significantly differ $F(1, 20) = .06$, $p = .82$; however, fathers significantly overestimated mothers' mood disturbance ($M = 28.00$, $SE = 6.42$), $F(1, 20) = 6.48$, $p < .05$, $d = .62$ (Figure 1e).

Discussion

Greater objectively measured sleep time was independently associated with more positive relationship satisfaction. Overall, mothers and fathers appeared to be poor reporters of their partners' subjective sleep, relationship satisfaction, and mood disturbance. In addition to the multidisciplinary nature of the current study, these findings are especially important because they generalize to postpartum parents—who are responsible for providing care and context for their developing infants. Notably, this work also extends the scant literature among postpartum fathers to provide a better understanding of their functioning during the early postpartum period.

Correlates with Relationship Satisfaction

Relationship satisfaction is generally known to decrease during the postpartum period (Medina & Magnuson, 2009); however, during seventh postpartum week relationship satisfaction was approximately normative among the current sample. This normative profile could be considered expected since previous work identified the earliest significant decrease in relationship satisfaction at one year postpartum (Shapiro et al., 2000). Although relationship satisfaction appeared normative we were able to identify total sleep time as its strongest correlate. The improvement of sleep time among postpartum parents may therefore be used to help them buffer against future declines in relationship satisfaction.

Recent reviews indicate that sleep disturbance may threaten the stability of relationship satisfaction among non-postpartum (Troxel, Robles, Hall, & Buysse, 2007), as well as postpartum (Medina & Magnuson, 2009) couples. The current study extends these reviews by demonstrating that objectively measured sleep does in fact share significant variance with postpartum relationship satisfaction. Specifically, among the six objective and subjective sleep variables entered into the regression, sleep time was associated with relationship satisfaction above and beyond all other variables. This finding is novel, and contrary, in light of recent work that identified perception of sleep as more strongly associated with postpartum mood disturbances than objectively measured sleep (Bei, Milgrom, Ericksen, & Trinder, 2010). Actual and perceived sleep may therefore be differentially associated with qualitativey different outcomes. Furthermore, the current finding is consistent among both mothers and fathers, thus demonstrating that relationship satisfaction may be influenced by similar properties among both postpartum sexes.

Previous research identified strong associations between mental health and marital quality among large population based samples (Whisman, 1999; Whisman et al., 2000). However, the current study indicated that objectively measured sleep time independently accounted for more variance in relationship satisfaction than mood disturbance. Previous work indicates that the accumulation of experimentally induced sleep deprivation and wake after sleep onset have deleterious effects on mood (Dinges et al., 1997, Bonnet, 1985). Therefore, when our current findings are synthesized with previous works, we speculate that mood may mediate the relation between sleep and relationship satisfaction.

Perception of Partner

Accuracy of perception of partners' state is associated with a more positive relationship satisfaction for both the perceiver (Kobak & Hazan, 1991) and the perceived (Swann, De La Ronde, & Hixon, 1994). Specifically, increased awareness that postpartum mothers had of their partners was a protective factor against a decline in their marital satisfaction (Shaprio et al., 2000).

The current results indicate that postpartum parents' perceptions of their partners' sleep, mood, and relationship satisfaction are significantly different than their partners' perceived

experiences. The lack of a parents' awareness about their partner's behaviors/states may transpire from the deleterious cognitive effects that result from sleep disturbance. Lack of partner awareness may also be explained by the new parental experience that is described as "living in a new and overwhelming world" (Nystrom & Ohrling, 2003; p. 319); thus, new parents may focus more of their attention towards adjusting to parenthood rather than toward each other. Accurate perception of partner's state may be interpreted by that partner as a subtle form of support, which is known to be the most effective kind of support (Bolger & Amarel, 2007), and may therefore positively influence the relationship and assist the dyad in their adjustment to parenthood.

Methodological Considerations

Due to the design of our study we were unable to infer causation or change regarding sleep and relationship satisfaction. In the context of current literature, we suspect that the relations are likely transactional where both sleep and relationship satisfaction reciprocally influence each other (Troxel et al., 2007). Future longitudinal work designed to examine changes in relationship satisfaction across the postpartum period, along with its interactions with variables described in the current work, would permit specific directional conclusions. Furthermore, we were unable to discuss partner perceptions as 'accurate' or 'inaccurate' because although both parents may agree on something, they both may be wrong (Gagné & Lydon, 2004). The study design permits analyses of mediation, as well as which objective sleep, subjective sleep, mood, and relationship satisfaction variable(s) are associated with accurate perceptions of partner's reports; however, due to the small sample size and thus power restrictions, we were unable to explore all of these relations. The current work provides a foundation for future studies to mechanistically examine the variables that lead to inaccurate perceptions of partner's state among postpartum parents.

Conclusions

Clinicians as well as couples should pay special attention to sleep, especially during the early postpartum period, because sleep may be a sentinel marker of relationship satisfaction among postpartum parents. Future research could investigate ways to improve postpartum parents' perceptions of partners' behaviors/states and examine how improved perceptions could potentially be used to increase relationship satisfaction and help parents negotiate nocturnal caregiving responsibilities. An informed and negotiated approach to nocturnal caregiving could provide families with the ability to improve their mood, maximize their sleep, and ultimately buffer against decreases in relationship satisfaction.

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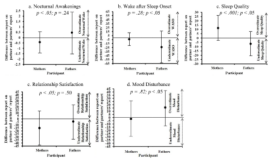

Figure 1.
Difference between report on partner and partners' report of study variable (error bars report standard deviation)
Note. *p* values correspond to 'Participant' difference between perception of partner and partners' report on the specified study variable. 0 on Y-axis represents no difference between perception of partner and partners' report on specified study variable.

Table 1

Sample Characteristics for Total Sample, Mothers, and Fathers

	Total	**(*N* = 42)**	**Mothers**	**(*N* = 21)**	**Fathers**	**(*N* = 21)**
Demographic Variable	***M***	***SD***	***M***	***SD***	***M***	***SD***
Age	27.94	5.03	26.81	4.80	29.08	5.11
Yrs. Education	15.5	3.58	15.29	3.47	15.71	3.76
Income	$56,091	$34,320	-	-	-	-
Infant Gestational Age (weeks)	39.61	1.09	-	-	-	-
Infant Age during study (weeks)	6.93	1.26	-	-	-	-
Relationship Variable*	*M*	*SD*	*N*	%	-	-
Time knowing each other	6.67	4.85	-	-	-	-
Time dating	5.40	4.27	-	-	-	-
Time cohabitating	4.17	3.17	21	100	-	-
Time married	3.33	1.66	15	71.43	-	-

Note:

*Relationship Variable values are calculated based on 21 couples.