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Short Report

The Effects of Social Support on the Relationship between
Infant Sleep and Postnatal Depression



The Effects of Social Support on the Relationship between Infant Sleep and Postnatal Depression

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Abstract

To date, research on social support as a factor affecting the relationship between infant sleep and postnatal depression (PND) has not been widely examined. This study aimed to determine the extent to which social support affects this relationship. The sample consisted of 108 caregivers of children between 6-18 months of age. Participants completed an online survey comprised of the Edinburgh Postnatal Depression Scale, The Social Provisions Scale and The Brief Infant Sleep Questionnaire. Results indicated that parents of children who were sleep disturbed had higher levels of PND and less social support. Correlations between PND and nocturnal sleep ($r = -0.231, p = 0.016$) and nocturnal wakefulness ($r = -0.228, p = 0.018$) were significant. Social support was also significantly correlated with nocturnal sleep ($r = 0.329, p = 0.001$) and nocturnal wakefulness ($r = 0.199, p = 0.039$). A significant negative relationship between social support and PND was found ($r = -0.539, p < 0.001$). No moderating effect of social support on the relationship between child sleep disturbance and PND was found for either nocturnal sleep duration ($b = -0.014, 95\% \text{ CI } [-0.099, 0.071], t = -0.33, p = 0.745$) or nocturnal wakefulness ($b = 0.065, 95\% \text{ CI } [-0.267, 0.396], t = 0.39, p = 0.700$). Overall, the results suggest that social support may have an impact on parental PND and child sleep disturbance. Although a significant moderating effect of social support was not found, the significant correlations support the need for further research in this area.

Keywords

Sleep; infants; social support; depression; Bioecological Model

1. Introduction

Sleep is vital to every human being as it fulfills important functions and is the foundation to good health (1). Through experimental and naturalistic experiments, research has shown that not getting enough sleep can affect both the brain and body, impacting on our overall health (2). These sleep disturbances can have impacts on the individual with negative personal, societal and economic consequences (3), with statistics showing that sleep disturbances and disorders cost Australia \$5.1 billion a year (3).

Infants (especially newborns) are among the most common populations to experience sleep disturbance. Sleep disturbance in infants and toddlers refers to increased activity and awakening during sleep, shorter average sleep duration and variable sleep schedules (1). Their sleep consolidation can be conceptualised in the context of a transactional model between infant sleep problems and intrinsic factors (development, temperament or medical conditions) and extrinsic factors (parental soothing behaviors, maternal depression, parenting stress and parental sleep-related cognitions) (4, 5). As a result of these intrinsic and extrinsic factors, it has been shown that overnight crying and sleep problems can affect up to 30% of infants (6).

Child sleep disturbance is important to consider because it may have aversive consequences for the child including developmental delay, behavioural problems and mood disorders (6), poor academic performance (7), and high levels of psychosocial, somatic and medical problems (8). Parents are also at risk of suffering negative outcomes as a result of a continued and consistent need to attend to their child overnight, as their sleep is also fragmented, and of poor quality and reduced quantity. As a result, their stress and fatigue levels increase, potentially causing poorer general health, irritability, or possibly even hostility towards their child (9). In addition, parents are at risk of having greater marital conflict and developing postnatal depression (1). Postnatal depression (PND) is common in mothers after the birth of a child, with the prevalence rate in Australia estimated at ranging between 10-15% of the general population, and an even larger proportion being less severe but still reporting reduced maternal well-being (10). It can occur as a result of having a predisposition to mood disorders, anxiety, stress, having a family history of depression (10), low socio economic status (11) and having

lack of health care and social support (12, 13). Furthermore, PND can also occur independently of a predisposition to mental health problems because parents, and in particular mothers, often have to cope with sleep fragmentation and sleep deprivation caused by infant night waking, on top of other life stressors and pressures (14).

Data have shown that up to 45% of mothers who seek formal help in relation to their infant's sleep problems score in the clinical range on the Edinburgh Postnatal Depression Scale (EPDS) (15). Such high scores on depression have been found to significantly correlate with elevated levels of stress that can persist in mothers for up to 3.5 years post-partum (16). Negative outcomes as a result of PND can include parents being less interactive and less responsive to the infant's needs.

Infant sleep and parental levels of PND could be influenced and affected by parental characteristics such as rumination, temperament and mood (17), as well as the effects of socio-economic status (1), and parental beliefs such as the belief that infants should be picked up whenever they cry (18). Several health organisations have proposed that there needs to be more focus on the support provided to parents in the post-partum period (19-21), an area that has not been systematically assessed. Thus, further exploration is needed on the impact of social support on the relationship between PND and infant sleep disturbances.

Social support has been defined as "a well-intentioned action that is given willingly to a person with whom there is a personal relationship and that produces an immediate or delayed positive response in the recipient" (22). Social support for parents can include informal (paternal involvement, family, friends, colleagues or neighbours) and formal (support groups, nurses and medical practitioners, and parenting programs) social support services (23). Having strong social support networks for parents could lead to an improvement in mood, confidence and competence in their parenting (24), as well as overall better health and avoidance of disease (25). Conversely, inadequate support is commonly associated with outcomes such as depression (26). The World Health Organisation (19) proposes that social support interventions could lead to improved maternal depression, better child growth and development outcomes, and improved mother-infant interactions.

Despite the current support available for new parents in Australia, it is still unclear as to why PND is still so prevalent, in particular in mothers of infants whose sleep is disturbed.

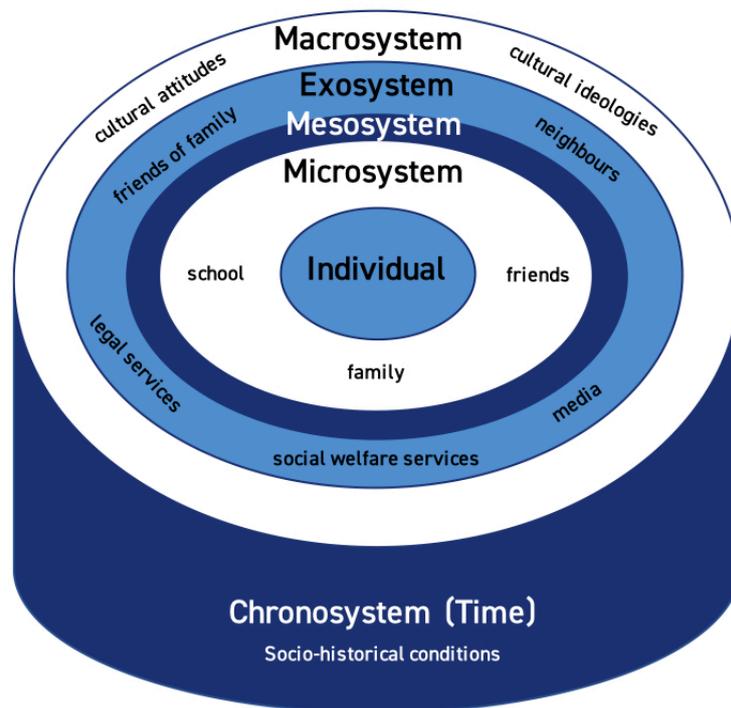


Figure 1. Bronfenbrenner: Ecological Theory of Child Development (adapted from (27)).

To better understand the relationship between these variables, viewing them through the theoretical framework of Urie Bronfenbrenner's Social Ecological Model (28) is useful. Bronfenbrenner suggests that social support is the integral and middle layer of the community system that surrounds an individual (Figure 1).

He proposes that this layer has a significant effect on the psychosocial development and wellbeing of an individual (29). By taking into account the biopsychological characteristics of the individual along with the Microsystem (e.g., the partner) and Exosystem (e.g., the community), the relationship between social support and PND can be more clearly understood.

The direct influence of the Microsystem is of great

importance on a parent's well-being. Having a partner who is available and actively supports, encourages and appreciates the person caring for the child can significantly improve parental mood and health (28). Stable social support from the Microsystem allows for a strong and supportive environment to be formed where both the main caregiver and the child would benefit (30). Therefore, this may result in a reduction of stress levels in the environment, and thus, a child's sleep problems may improve (31).

Parents without a partner can rely on the Exosystem as a supportive network depending on their level of closeness (e.g. to extended family and friends) and the availability of those subcategories (such as support groups) (32). If the Exosystem support is strong, similar benefits may be

achieved. However, if the availability and ease of access to formal social support services is problematic, this may lead to increased levels of PND and greater child sleep problems (33).

The Bioecological Model was chosen as a theoretical rationale for this research as it is important to consider the whole system of factors that affect parents and their well-being. The Bioecological Model conceptualises individual well-being within an integrative community systems approach (34). This "systems thinking" approach establishes how factors interrelate as part of a whole system of environmental influences. The multi-layered complexity of the relationship between social support, child sleep problems and PND may benefit from being assessed from an integrative community systems approach. Previously research has focused solely on the single factors that affect this relationship. However, the combined effects of the Microsystem, Exosystem and the personal characteristics of an individual may need to be taken into account in order to establish their collective influence on a parent and their child. Surveying parents using a scale that investigates these domains is important.

Following these ideas and previous findings, the current research will consider the role of social support in the relationship between PND and child sleep based on the Bioecological Model. This will aid in assessing the social support systems of parents and whether more support is needed. Currently we do not know how big a factor social support is in the relationship between PND and child sleep disturbances. It may be possible that parents may need greater social support from their partner, peers and community groups, more systematic care or specifically targeted parent groups. In Australia there are many different support services offered to new parents, however, the prevalence of PND in parents with sleep disturbed children still remains high.

2. Methods

This study aims to investigate the social support that caregivers receive from their partner, peers and community groups and whether their level of social support can be a moderator for the relationship between child sleep problems and PND. It is envisaged that the study will make a theoretical contribution to the body of knowledge

about the interrelationship between PND and a child's sleep disturbances. Therefore, this study hypothesises the following:

1. Parents with high PND scores will report more infant sleep problems
2. Parents with high social support scores will report infants with fewer sleep problems
3. Parents with high social support scores will have lower PND scores
4. Social support will be a moderator for the relationship between PND scores and parental report of infant sleep problems

2.1. Participants

The sample consisted of 108 parents (105 females and 3 males), ranging from 16 to 44 years of age. All parents were caregivers of children between 6-18 months of age. This study was not restricted to biological mothers and included fathers, adoptive parents, grandparents, or anyone else who was the main carer for the child. Participants needed to have conversational English skills at the time of data collection. Participants who met this criterion voluntarily completed an online survey.

2.2. Recruitment

As this was an online pilot study, the sample collected was an online sample of convenience. This study was advertised via flyers placed in several venues across South Australia, including information boards at five mothers groups and six childcare centres. Flyers were also handed out at the Paediatric Sleep Clinic in Adelaide, a sleep seminar held in the country town of Berri and spread through word of mouth. As this was an easily accessible online link, there was no control of the location from where participants completed the survey. Therefore, participants were recruited from across all of Australia with one participant from the United Kingdom.

2.3. Procedures

Parents who chose to take part in the study were provided with a link to the online survey. Before beginning the survey, an information sheet describing the project aims, processes, risks and benefits, withdrawal, and how confidentiality and anonymity will be maintained was provided. It was necessary

to complete a consent form before beginning the survey. By agreeing to continue and submitting their responses, participants were giving consent for their data to be used in this research. Participants were provided with contact details of counseling services, a clinical psychologist, and other services they may contact if they felt distressed or unhappy as a result of the questionnaires or this study. Participants could withdraw at any time if they felt uncomfortable. Ethical clearance for this study was granted via Central Queensland University Human Research Ethics Committee.

3. Measures

3.1. Sociodemographic Factors

Participants completed demographic data providing their postcode, age, number of children, language spoken at home, their highest level of education, and their relationship status. Participants did not provide their names in order for their data to remain anonymous.

3.2. Postnatal Depression

Participants completed the EPDS (35), used to screen for the presence and severity of depressive symptoms in the antenatal and postnatal period. The EPDS is a 10-item self-report measure in the format of a 4-point scale. The scale ranges from 0 ("No, never") to 3 ("Yes, most of the time"), with higher numbers indicating increased severity of each symptom. A maximum score of 30 is possible. Scores of 12 or above indicate that the likelihood of depression is high (36).

This scale has shown satisfactory internal consistency ($\alpha = 0.87$) (35) and has been used extensively in similar cohorts (37).

3.3. Social Support

The Social Provisions Scale (38) was used as a measure of social support. The Social Provisions Scale is a 24-item self-report scale used to assess individuals' global perceptions of social support on a Likert scale of 1-4 where 1 represents "strongly disagree" and 4 represents "strongly agree". This scale assesses the extent of the individual's support from their family, friends and community members. The Social Provisions Scale assesses six relational provision scales with a total social support score computed afterwards. Higher

scores indicate the individual is reporting better social support. This scale has satisfactory construct validity and reliability ($\alpha = 0.91$) (38).

3.4. Infant Sleep

The Brief Infant Sleep Questionnaire (BISQ) (39), a parent-reported 13 item questionnaire on infant/toddler sleep over the past week was the final questionnaire that was completed as part of this study. The BISQ is a screening tool assessing a number of variables including infant nocturnal sleep duration, daytime sleep duration, number of night wakings and duration of nocturnal wakefulness. The BISQ has demonstrated good test-retest reliability ($r = 0.82$) in past research (39). Respondents also rated their infants sleep as "not a problem", a "small problem" or a "large problem".

As the questionnaires for this study were completed online, all the measures have been validated for online use. The EPDS has been used online in research on postpartum depression (40) and is commonly used on public websites such as Beyond Blue (41). Additionally, the Social Provisions Scale (42) and the BISQ (43) have also previously been administered online.

4. Statistical Analysis

In order to conduct the main analyses, the data were first tested for normality. Following assumption testing, descriptive statistics were analysed in order to illustrate the characteristics of the sample. For practical purposes of examining group differences in parents of sleep-disturbed infants versus parents of non sleep-disturbed infants using the BISQ, a cut-off score approach was implemented. The criteria used to define poor sleepers on the basis of the BISQ measures were as follows: 1) nocturnal sleep duration < 9 hours; 2) daytime sleep < 1 hour; 3) nocturnal wakefulness > 1 hour; 4) the child wakes > 3 times per night; and 5) the parents reported either "moderate sleep problem" or "severe sleep problem" on the final question of the BISQ (39). Following this, Independent Samples *t*-tests were run to determine *t*-statistics and significance levels for each variable by group membership. Pearson's product-moment correlations were then run to determine the strength and direction of the relationships between variables. Finally, moderation analyses assessed any moderating effects (interactions).

5. Results

The sample was overwhelmingly female and only 11 participants were without a partner. These demographics replicate that of previous studies (10, 44). Additionally, the majority of the sample (85 of 108 participants) was well educated (Diploma or higher), indicating a skew in the data for level of education. Demographic information for the sample is displayed in Table 1.

Using the previously-described BISQ cutoff-score approach, 44% of parents had children who they reported to be sleep-disturbed [consistent with literature that suggested that 30-40% of young children have sleep problems (10, 45)]. Results of the Independent Samples t-test showed significant differences between parents who reported their children to be sleep-disturbed and those that reported minimal disturbance, for PND scores ($p = 0.010$), social support ($p = 0.003$), nocturnal sleep duration ($p < 0.001$), and nocturnal wakefulness ($p < 0.001$) (Table 2). Parents who reported their infants to be sleep-disturbed had significantly higher levels of PND and lower levels of social support. Additionally, infants with reported sleep disturbance had significantly lower nocturnal sleep time, longer nocturnal wakefulness and more frequent night wakings.

Table 1. Demographics of the sample.

Variable	<i>n</i>
Gender	
Female	105
Male	3
Age (years)	
16-24	14
25-34	67
35-44	27
Highest Level of Education	
Year 10	10
Year 12	13
Diploma	19
Associate Degree	1
Bachelor's Degree	45
Master's Degree	15
Doctorate Degree	5
Relationship Status	
Single (Never Married)	7
Married	81
Separated	3
Divorced	1
De Facto	16
Number of Children	
1	55
2	38
3	11
4	4
Language Spoken at Home	
English	105
Other	3

Table 2. Means, SDs, and *t*-statistics of demographics and variables of interest by group membership (parents reporting infants who were sleep-disturbed compared to those reporting less sleep disturbance).

Variable	Sleep-Disturbed	Not Sleep-Disturbed	<i>t</i> ₁₀₆	Total
<i>n</i>	48	60		108
Gender				
Female	47	58		105
Male	1	2		3
Age (years)				
16-24	8	6		14
25-34	25	42		67
35-44	15	12		27
Postnatal Depression	10.67 ± 5.22	8.22 ± 4.45	-2.63*	9.31 ± 4.94
Social Support	79.77 ± 10.04	85.72 ± 9.91	3.08*	83.07 ± 10.35
Nocturnal Sleep Time	9.47 ± 1.14	10.95 ± .763	7.72**	10.29 ± 1.20
Daytime Sleep	2.26 ± 1.04	2.55 ± .76	1.64	2.42 ± .90
Nocturnal Wakefulness	1.44 ± 1.23	0.57 ± 1.16	6.78**	0.96 ± 1.26
No. of Night Wakings	2.87 ± 1.63	1.25 ± 1.08	-5.65**	1.97 ± 1.57

Note: Values are mean ± SD; sleep time is in hours; **p* < 0.01, ***p* < 0.001; Postnatal Depression Scores: 10-12 = presence of depressive symptoms, 13+ = depression is high and further assessment and treatment may be needed (33).

Table 3. Correlation Coefficients for postnatal depression (PND), social support, and child sleep variables.

	PND	Social Support	Nocturnal Sleep Duration	Daytime Sleep	Nocturnal Wakefulness	No. of Night Awakenings
PND	1	-0.539**	-0.231*	-0.013	-0.228*	0.066
Social Support		1	0.329**	0.064	0.199*	-0.052
Nocturnal Sleep Duration			1	0.035	0.411**	-0.394**
Daytime Sleep				1	-0.096	0.115
Nocturnal Wakefulness					1	-0.469**
No. of Night Awakenings						1

Note: **p* < 0.05, ***p* < 0.01

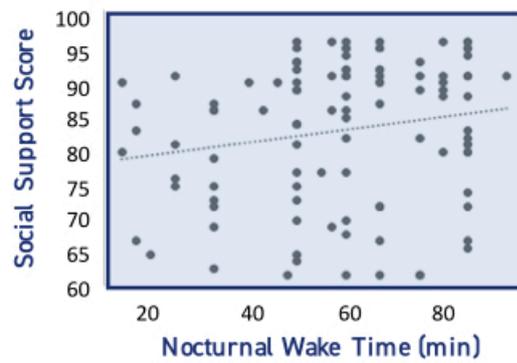
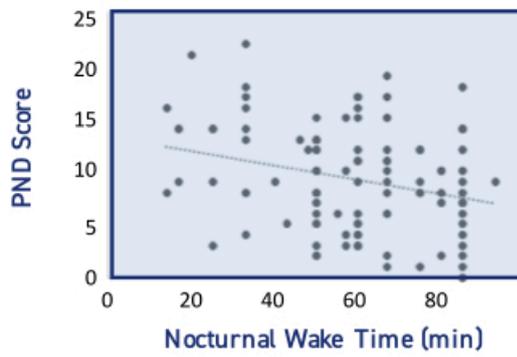
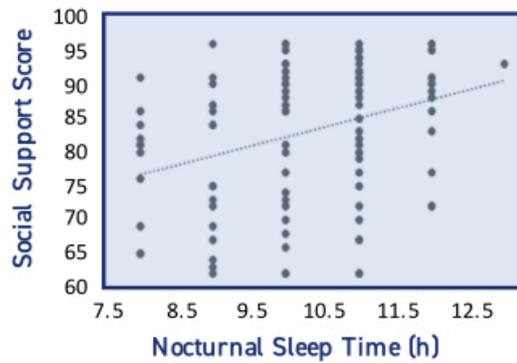
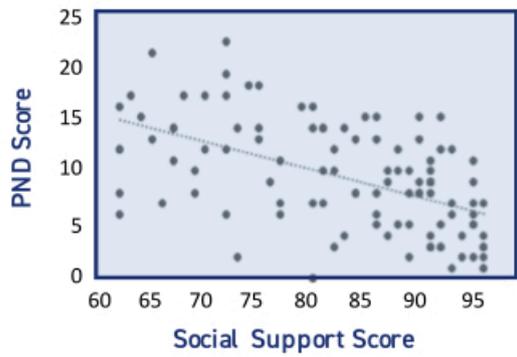
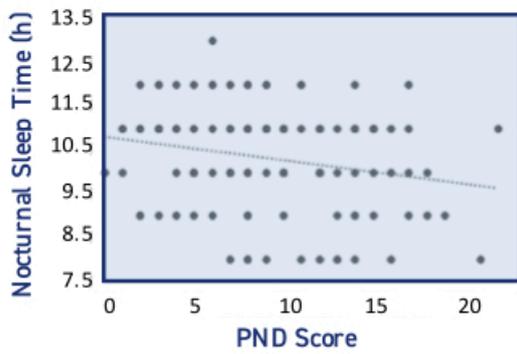


Figure 2. Scatterplots showing relationships between the variables of interest; infant nocturnal sleep and wake time, postnatal depression (PND), and social support scores.

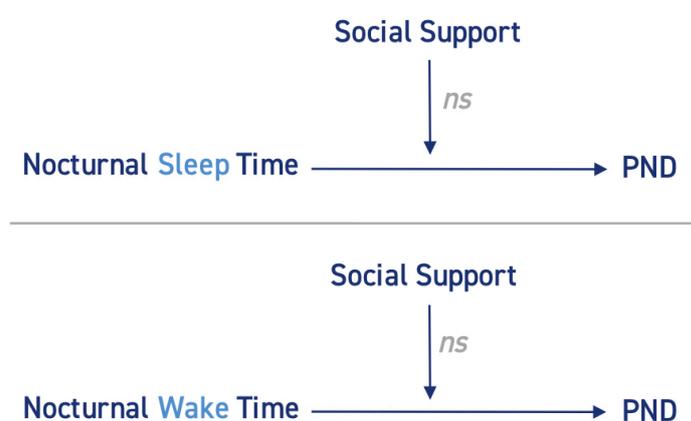


Figure 3. Proposed relationship between nocturnal sleep time (upper), nocturnal wake time (lower) and postnatal depression score (PND) with social support as a moderator.

Relationships between the variables of interest are summarised by correlation coefficients (Table 3) and scatterplots (Figure 2).

There were significant, negative, low to moderate, correlations between PND and two of the parent reported child sleep variables; nocturnal sleep duration and nocturnal wakefulness. Correlations between PND scores and night awakenings and daytime sleep were small ($r < 0.1$).

Social support was positively correlated with nocturnal sleep duration and wakefulness. Both correlation values were low to moderate and significant.

A significant, negative, moderate correlation was found between PND and social support.

To explore the fourth hypothesis as to whether social support had a moderating effect on the relationship between parental reports of child sleep and PND, the two sleep variables that had significant correlations with both social support and PND were used separately in two different moderations as the predictor variable (Figure 3). After checking assumptions, nocturnal sleep duration, nocturnal wakefulness and social support scores were centered prior to running the analysis.

The analysis revealed that social support was a significant predictor of PND ($t_{102} = 5.28, p < 0.001$). However, there was no significant moderating effect of social support on the relationship between child sleep disturbance and PND for either nocturnal sleep duration ($b = -0.014, 95\% \text{ CI } [-0.099, 0.071], t = -0.33, p = 0.745$) or nocturnal wakefulness ($b = 0.065, 95\% \text{ CI } [-0.267, 0.396], t = 0.39, p = 0.700$).

6. Discussion

For the first time in Australia, this study examined social support received by caregivers of infants between 6-18 months of age, and whether this social support can be a moderator for the relationship between PND and child sleep problems. Results suggest although there are some statistically significant relationships, the variance explained by some factors is quite small and therefore, interpretation of these findings must be made with caution. However, although social support did not show a significant moderating effect on the relationship between infant sleep and PND, the significant relationships between the three variables of interest highlight the need for more systematic analyses.

The first hypothesis was that parents with high PND scores would report their children to have more sleep problems. This hypothesis was partly supported as PND was significantly negatively correlated with total infant nocturnal sleep time. This indicated that as time spent asleep during the night was reduced, parental PND increased. However, PND and the second child sleep variable; nocturnal wakefulness (length of time spent awake at night) were also significantly negatively correlated, signifying an inconsistency. This correlation indicated that as PND decreased, nocturnal wake time increased.

The significant correlation found between PND and nocturnal sleep is consistent with previous findings, where PND was found to be a significant negative outcome for the parent as a result of their infant's sleep problem (9, 37). These current data are also consistent with past findings where mothers who reported infant sleep problems had poorer mental health than mothers of infants who slept well (18, 44). Research has shown (46) that parental PND can occur as a result of fatigue caused by lack of sleep. This is attributed to sleep fragmentation and sleep deprivation occurring as a result of the parent tending to their child who is sleeping poorly through the night (14). Furthermore, past research has found that up to 45% of mothers who seek help for their child's sleep problem score in the clinical range on the EPDS (15). The present study established that 50% of parents who were classed as sleep disturbed had a clinically significant score of 12 or above on the EPDS indicating the presence of depressive symptoms.

Markedly, the prevalence of PND in this sample is high. As a result, it is also possible that a parent experiencing PND may be more likely to perceive their child's sleep problem

as more serious. As shown by the correlation, this may be attributed to the parent either being woken by or attending to their child during the night. Therefore, these data support previous research that has been conducted on the bidirectional relationship between child sleep and parental PND, emphasising the significance of this relationship and the extent to which it affects parents. However, as shown in past research (14) it is also possible that a parent experiencing PND may have a more negative perception of their child's sleep problem. Thus, objective measures of infant sleep would be of benefit in future studies.

However, the association found between parental reports of nocturnal wakefulness and PND is inconsistent with previous work (47). Perhaps this may be as a result of the variable not being sensitive enough. That is, the BISQ (39) only reports one multidimensional measure of sleep appropriate for use with infants, and the use of the single variable "nocturnal wakefulness" as a predictor of PND may have been an inaccurate representation of overall sleep disturbance. Further studies should consider creating an overall sleep disturbance score that consists of all the responses made on the BISQ (39), making the measure more sensitive and comprehensive. Additionally, these findings are inconsistent with past research (14) where it was found that mothers suffering with depression may be more concerned by infant night waking than non-depressed mothers, and hence are more likely to report infant sleep problems. Although this sample is more depressed than the general community, parents experiencing PND did not report long overnight wakings. Thus, it may be the case that parental subjective reporting of their infants sleep, in particular length of time spent awake at night, could be usefully supplemented by objective measurements of child sleep patterns (48).

Nocturnal sleep, and also night wakings were also both positively correlated with social support, similarly only partially supporting the second hypothesis, that parents with high levels of social support will have infants with fewer sleep problems. Those with higher social support reported their infants to sleep longer throughout the night. It compares to previous studies (49, 50) where greater paternal social support contributed positively to the consolidation of infant sleep. Although this present study did not explicitly focus on paternal support, the significant correlation between social support and nocturnal sleep duration may suggest that the primary caregiver is feeling more supported by their partner. As 89% of the participants in the present study were

either married or in de facto relationships, there is a high chance that the social support parents were receiving was from their Microsystem, their partner. Consistent with past findings on social support (30); the significant result here could be attributed to partners sharing infant caregiving responsibilities, contributing positively to reducing maternal stress.

However, the positive correlation between social support and infant nocturnal wakefulness suggested that parents with high levels of social support reported their children to wake for long periods during the night. These data are inconsistent with past findings (49, 50). It is possible that nocturnal wakefulness as measured here again may be an inaccurate representation of infant nocturnal waking, or that self-reporting of the wakefulness is biased.

Alternatively, this outcome may have occurred as a result of several other factors. While it may be that the partner offers social support, they may be unable to help in resettling the child during the night. This may be due to the child having a stronger attachment to the main caregiver (51), or the partner having inadequate knowledge on how to help the main caregiver with their infants' sleep problem (52). This study did not assess perceived level and strength of partner support in relation to sleep problems, which would be helpful in future studies.

Additionally, it may be the case that the social support measure used in this study did not completely capture the aspects of social support we were seeking to assess. Although the scale may have indicated that parents were receiving strong global support, it did not specifically question about informal or formal social supports in relation to parenting and childrearing practices, or in relation to sleep and settling issues in particular. Therefore, it is difficult to conclude which source the social support came from, whether it was the Microsystem or Exosystem, or indeed how helpful they were.

The third hypothesis predicted parents with high social support scores will have lower levels of PND. This negative relationship was the strongest among all the variables of interest, suggesting that higher social support is associated with lower levels of PND. This is consistent with other findings (24, 26, 38), which indicated that having strong social support networks for parents could lead to an improvement in mood and overall better health. Previous studies have shown that the absence of social support contributes to

increases in PND, in particular a lack of support from a friend or confidant during pregnancy (13). Rahman *et al.* (13) proposed that there may be qualitative differences in the type of social support that predict worse depression. Thus, by providing different forms of social support for parents, this should create a calmer and more nurturing and supportive environment for the family unit as a whole (30).

Whilst the emergence of sleep problems is likely independent of social support, it would be plausible to suggest that increased social support would assist in managing and possibly eliminating sleep problems. In relation to the Bioecological Model proposed earlier, it is evident that reciprocal interactions are present between the Microsystem and Exosystem significantly influencing a parent not only at a more micro level from their partner, but also at a broader level (53). This is consistent with the initial proposal of Bronfenbrenner and Morris's research (53) where they suggested that social support at an individual and community level can aid in eliminating the negative aspects of an individual's functioning and well-being, including, for example, lowering levels of depression, anxiety and stress.

Finally it was hypothesised that social support could reduce the prevalence of PND and child sleep problems in the Australian community if it acted as a moderator on this relationship. The current data showed that social support did not have a moderating effect. Findings are in contrast to a previous study (37) where social support was a significant moderator between self-efficacy and depression in mothers. However, direct comparisons are not possible as sleep was not a variable measured in their study. In the same study, Cutrona and Russell (38) proposed that if maternal stress levels exceed their threshold (maximum levels of stress a mother can endure before being unable to cope physically and emotionally), the received social support became ineffective as an aid. It is possible, that the current sample had high levels of stress due to higher than normal levels of depression, as depression and stress are often co-morbid (54). If so, this could explain the lack of a moderating effect. The absence of a moderating effect may be due to other factors including measurement limitations and sample biases (e.g. self-selective sample of mostly parents who had a partner). Larger more representative samples are needed.

Despite the lack of a moderating effect, this study demonstrated the significance of the relationships between parental report of child sleep problems, PND and social support. Providing adequate physical and emotional care for

an infant is of primary importance. However, this care may be compromised if the parent has interrupted sleep patterns as a result of their infant's sleep disturbances. It is important to prevent associated health problems persisting for several years post-partum (16, 31). Thus, as depression may increase infant sleep problems and vice versa, eliminating infant sleep problems and reducing parental PND is of primary importance. In order to do this, given that both are related to social support; adequate social support must be provided. Having strong social support networks can reduce emotional, psychological and physical problems in both the caregiver and the child.

As child sleep and PND together cost our society over \$5.1 billion a year to treat (3), factors such as social support should be explored further in order to reduce economic strain and prevent these problems from occurring.

Unfortunately, it was not clear from this study what form of social support parents were receiving. The measure used in this study encompassed a broad range of social support that were reported on a global scale and did not specify or filter the type of social support that was being received. Although this form of measurement is an accurate indication of the levels of social support felt by the participant and is consistent with past research (32, 53, 55), there was no indication of where exactly that social support came from. Therefore, when social support was put in a moderation analysis, the measure was not specific enough to determine its effects on the relationship between infant sleep and PND. However, the global focus of this study is consistent with the framework of the Bioecological Model as the scale used measured social support from the Ecological perspective.

Although it may be the case that more information was needed from an individual perspective; the approach used here highlights the importance of viewing an individual within an integrative community systems approach.

As there is no one single factor that is responsible for causing aversive outcomes, or ensuring positive development and well-being, it is likely to be a combination of factors (34) and according to the Bioecological model (including the Exosystem and Microsystem), through the integration of multiple systems. The present research was grounded in the Bioecological approach to child and parental wellbeing as previously, a whole system approach has not been utilised. This global integrative systems approach may inform future research of the depth and complexity of the system of

influences at each environmental level of an individual if specific risk and protective factors within this system are understood. By understanding that these multiple systems play a significant role in affecting parent and infant as a whole system, the complexity of an individual's social support system may be better recognised.

Whilst this is a pilot study, there are some limitations that must be taken into account. As previously mentioned, a significant limitation of this study was that it was unclear what type of social support parents were receiving due to a potential lack of sensitivity of the scale and the incomplete information regarding social support within the household. Future research could focus on either just the Microsystem (the partner) or Exosystem (family, friends, or other external supports) in order to understand the contributors to increased social support from these two separate systems and/or cumulatively. Further limitations include there being a strong potential for self-selection bias and group differences of those parents who participated. Furthermore a small sample size of mostly female participants who are married, well-educated and with only a single child, create difficulty in not only generalizing results but also drawing adequate inferences about the benefits of social support networks for parents from diverse sociodemographic backgrounds (56).

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