

Adoption Quarterly

ISSN: 1092-6755 (Print) 1544-452X (Online) Journal homepage: www.tandfonline.com/journals/wado20

Sleep Disturbance, Emotion Lability/Negativity, and Behavioral Difficulties in a Sample of Internationally Adopted Children

Kristin M. Aho, Morgan Daugherty, Angela D. Staples, Elisa Esposito & Jamie M. Lawler

To cite this article: Kristin M. Aho, Morgan Daugherty, Angela D. Staples, Elisa Esposito & Jamie M. Lawler (2024) Sleep Disturbance, Emotion Lability/Negativity, and Behavioral Difficulties in a Sample of Internationally Adopted Children, Adoption Quarterly, 27:4, 409-426, DOI: 10.1080/10926755.2023.2217815

To link to this article: https://doi.org/10.1080/10926755.2023.2217815

Published online: 01 Jun 2023.

Submit your article to this journal

Article views: 247

View related articles

View Crossmark data

Full Terms & Conditions of access and use can be found at
https://www.tandfonline.com/action/journalInformation?journalCode=wado20

ADOPTION QUARTERLY
2024, VOL. 27, NO. 4, 409–426
https://doi.org/10.1080/10926755.2023.2217815

Routledge
Taylor & Francis Group

Check for updates

Sleep Disturbance, Emotion Lability/Negativity, and Behavioral Difficulties in a Sample of Internationally Adopted Children

Kristin M. Aho[a], Morgan Daugherty[a], Angela D. Staples[a], Elisa Esposito[b] and Jamie M. Lawler[a]

[a]Department of Psychology, Eastern Michigan University, Ypsilanti, Michigan, USA; [b]Department of Psychology, Widener University, Chester, Pennsylvania, USA

ABSTRACT

Although internationally adopted children experience elevated sleep problems and psychosocial difficulties, little research has evaluated predictors and correlates of sleep issues in this population. The current study aims to address gaps in current research by examining associations between pre-adoptive risk, sleep disturbance, emotion lability/negativity, and internalizing and externalizing behavior in a sample of internationally adopted children. Parents completed questionnaires about the children's ($N = 109$; M age = 7.9, $SD = 1.5$; 39.6% male, 60.4% female) history, behavior, and functioning. Results reveal that sleep difficulties and emotion lability/negativity later in childhood mediated the relation between pre-adoptive conditions and internalizing and externalizing behavior in a sample of internationally adopted children. Future studies of internationally adopted children are needed to continue exploring trajectories of sleep problems and other self-regulatory difficulties in this population.

ARTICLE HISTORY
Received 2 November 2022
Revised 31 March 2023
Accepted 4 May 2023

KEYWORDS
International adoption; sleep; emotion regulation

Introduction

Sleep is implicated in many processes that allow better quality of life throughout the lifespan. When adequate sleep is not achieved, difficulties with emotionality often emerge, including increased risk of psychopathology and problems with emotion regulation (Palmer & Alfano, 2017). Children who are adopted internationally have difficulties with self-regulation (Batki, 2018; Loman et al., 2013), and adoptive parents report sleep problems in this population (Rettig & McCarthy-Rettig, 2006; Schenkels et al., 2018). Yet, few studies have examined predictors and correlates of sleep issues in this population. The current study examines associations between pre-adoptive adversity, sleep, emotional lability/negativity, and

CONTACT Kristin M. Aho kaho2@emich.edu Department of Psychology, Eastern Michigan University, Ypsilanti, MI, USA.
© 2023 Taylor & Francis Group, LLC

behavior problems in a group of school-aged internationally adopted children.

Sleep

Child sleep problems are a common presenting concern affecting at least 25% of children, with rates as high as 75% for children with comorbid conditions (Maski & Owens, 2016). This high rate of sleep problems is notable, given the increased risk of psychopathology, emotion dysregulation, and problem behavior (Alfano et al., 2009; Aronen et al., 2000; Beebe, 2011; Fallone et al., 2002; Owens, 2008). Poor sleep is associated with higher levels of emotional reactivity, which can further impair sleep (Altena et al., 2016) and increase the risk of internalizing (anxiety and depression; Alvaro et al., 2013; Quach et al., 2018) and externalizing conditions (conduct problems, inattention, and hyperactivity; Quach et al., 2018). The current study explores general disturbances in sleep, which is a broad term that can include diagnosable or subclinical sleep difficulties across a number of domains including bedtime resistance, sleep duration, parasomnia, sleep-disordered breathing, night waking, daytime sleepiness, sleep anxiety, and sleep onset delay (Grandner, 2014; Owens et al., 2000b). Alternatively, sleep problems that fall in the clinically significant range indicate that a child may have a diagnosable sleep condition that warrants further evaluation (Owens et al., 2000b).

International adoption

Thousands of children are adopted internationally each year, and the United States (US) continues to be the leading recipient of internationally adopted children (Selman, 2022; US Department of Health and Human Services, 2020). The US international adoption rate apexed in 2004 with 22,989 adoptees but has since declined dramatically with 1,622 children adopted in 2020 (Selman, 2022; US Department of State, 2004, 2020). The decline is attributable to more stringent oversight of international adoption policy, changing laws and cultural attitudes in countries of origin, notable cases of fraudulent adoption and human trafficking for profit, and, more recently, the Covid-19 pandemic (Neville & Rotabi, 2020; Wilkerson, 2021). International adoption is a dynamic and complex process influenced by geographic, economic, and sociopolitical dynamics as well as host country child welfare policy (Miller, 2005; US Department of State, 2019). Moreover, countries of origin vary widely in regard to financial resources, healthcare, and attitudes about abandoned children, factors which influence pre-adoptive care and child health and development (Miller, 2005).

The neurobiological development of internationally adopted children can be negatively impacted by maternal stress, teratogen exposure, and nutritional deficiencies during the prenatal period (Julian, 2013). Prior to adoption, internationally adopted children experience relatively higher rates of prenatal insults and postnatal privation, abuse, and neglect in the pre-adoptive setting, often leading to an early experience characterized by global deprivation (Gunnar, 2001; Julian, 2013). During the postnatal period prior to adoption, international adoptees are at risk for poor medical care, nutritional deficiencies, infectious disease, and intestinal parasites (Miller, 2005; Rettig & McCarty-Rettig, 2006). In addition, for children adopted from institutions, overcrowded orphanage conditions limit the availability of enriching experiences and continuity of care with a primary caregiver, which are necessary for optimal development (Gunnar & Kertes, 2005). Recent data demonstrate that early privation, particularly of longer duration, produces long-lasting deficits in brain function and structure (Bick et al., 2022; Mackes et al., 2020).

International adoption, sleep difficulties, and problem behavior

Pre-adoptive adversity in internationally adopted children is associated with higher risk for child behavior problems (Gunnar & Van Dulmen, 2007; Miller, 2005; Nalavany et al., 2009; Simmel et al., 2001). Yet, some research demonstrates small effects in the relation between pre-adoptive adversity and later behavioral adjustment, indicating that other pre- and post-adoption variables related to child behavior problems should be explored (Finet et al., 2018). There is limited research examining sleep in samples of internationally adopted children despite the relation to problem behavior (Aronen et al., 2000), being a common complaint among families with internationally adopted children (Miller, 2005; Rettig & McCarthy-Rettig, 2006), and the increased likelihood of internationally adopted children experiencing pre-adoptive adversities and environments as well as post-adoptive factors that negatively impact sleep. From a neurobiological perspective, internationally adopted children are at risk for micronutrient deficiencies (Fuglestad et al., 2016), including iron deficiency (Fuglestad et al., 2008) which has been shown to have both acute and long-lasting detrimental effects on the development of sleep patterns in early childhood (Peirano et al., 2010). Internationally adopted children are also more likely to have a history of trauma (Miller, 2005), which is related to impaired sleep in children (Wamser-Nanney & Chesher, 2018).

Some environmental factors that may contribute to early sleep difficulties in this population include change in time zone between origin and adoptive countries, adapting to a new daily schedule, and transitioning from co-sleeping to sleeping alone (Miller, 2005). Additionally, popular adoption

manuals and websites often promote co-sleeping with the goal of improving parent-child attachment despite little supporting empirical evidence and a negative association with some aspects of psychological functioning (Gunnoe & Helder, 2023). Sleep difficulties attributable to early stress and environmental factors may be further compounded by stress, anxiety, depression, or decreased marital satisfaction or stability often experienced by parents following international adoption (Malcorps et al., 2022; Miller, 2005), which may negatively and reciprocally impact child sleep (Mannering et al., 2011; Meltzer & Montgomery-Downs, 2011). Further, factors affecting the emotional climate of the family, such as parenting style and family stressors, predict child sleep problems (Mannering et al., 2011; Meltzer & Montgomery-Downs, 2011). Lastly, insecure attachment has been shown to be associated with impaired sleep in young adoptees (Tan et al., 2009). Despite these risk factors, few studies have examined predictors of sleep problems in this population or how long sleep remains impaired, and no study has examined the relation of pre-adoptive adversity to child sleep. One study suggests that international adoptees continue to have shorter sleep duration and experience higher rates of insomnia during adolescence, with sleep problems being more severe in those who were adopted after 12 months of age (Askeland et al., 2020). Other pilot data suggest that internationally adopted children experience greater difficulties with sleep initiation and maintenance within the first 6 months of adoption when compared to matched controls (Schenkels et al., 2018).

In typically developing children, sleep difficulties (e.g., short sleep duration) are predictive of internalizing and externalizing behavior problems (Astill et al., 2012). Moreover, children who have been adopted internationally have a higher likelihood of developing internalizing and externalizing problem behavior (Gunnar & Van Dulmen, 2007). To our knowledge, this is the first study to examine the relation between pre-adoptive risk, sleep, and emotion and behavior problems in a sample of internationally adopted children.

Current study

While research with internationally adopted children has demonstrated risk and resilience for numerous outcomes, there is a paucity of research examining sleep in this population. Furthermore, no study has examined the unique contributions of pre-adoptive history and sleep disturbance on problem behavior in internationally adopted children. The current study aims to address gaps in current research by examining associations between pre-adoptive risk, sleep disturbance, emotion lability/negativity, and internalizing and externalizing behavior in a sample of internationally adopted children. Sleep disturbance and emotion lability/negativity are hypothesized

to mediate the effect of pre-adoptive risk on behavior problems. If confirmed, results could provide key information in promoting successful transition through international adoption and developing interventions for children at risk of developing sleep difficulties and downstream behavioral difficulties.

Materials and methods

The current investigation is part of a larger study examining the effects of self-regulation training in internationally adopted children. A detailed explanation of recruitment and experimental procedures can be found in Lawler et al., 2019. The initial study was approved by the University of Minnesota Institutional Review Board (IRB approval number 1201S09544), and data were collected from 2013 to 2015. The final two authors of the current manuscript were responsible for designing the study and collecting the data. Only baseline data were utilized in the current secondary data analysis. The first, third, and fifth authors analyzed and interpreted data, and the first two authors drafted the majority of this manuscript.

Participants

Participants (Table 1) were 106 internationally adopted children recruited from an existing database of families with internationally adopted children. Participants were 6-10 years old ($M = 7.9$, SD = 1.5; 39.6% male, 60.4% female). Average age at adoption was 1.3 years (SD = 1.0). Parents reported regions of origin as 38.5% Southeast Asian; 6.3% African; 25% Russian, Eastern European, or Indian; and 30.2% Latin American. Exclusionary criteria included parent report of fetal alcohol syndrome, autism spectrum disorder, or severe cognitive impairment. Children with substantial yoga or traditional martial arts participation were also excluded, as these activities include mindfulness techniques that may have confounded results of the mindfulness training component of the larger study.

Procedure

Participant children and their parents came into the lab for a 90-minute session. Written consent was obtained from parents and assent from children. Parents completed measures about the child's history, behavior, and functioning (see below), while children participated in tasks measuring executive functioning, brain activity, and prosocial behavior (reported elsewhere).

Table 1. Participant characteristics.

	M	SD
Age at Adoption (years)	1.3	1.0
Age at time of study (years)	7.9	1.5
Duration of institutionalization (months)	10.7	11.2
	Percent	
Sex		
Female	60.4	
Male	39.6	
Region of origin		
Asia	38.5	
Africa	6.3	
Russia/Eastern Europe/India	25.0	
Latin America	30.2	
Adoptive Family Income		
<$50,000	1.1	
$50,000–75,000	10.8	
$75,000–100,000	22.6	
$100,000–125,000	18.3	
$125,000–150,000	17.2	
>$150,000	30.1	
Adoptive parent level of education		
High school or GED	6.3	
Associates degree	10.4	
Bachelor's degree	28.1	
Master's degree	40.6	
Professional and/or doctoral degree	14.6	
Adoptive parent marital status		
Married	86.5	
Single	10.4	
Separated or divorced	3.1	

Note. Ages are reported in years. Duration of institutionalization is reported in months.

Measures

Pre-adoptive risk

Parents reported on the child's living arrangements (birth parents, relative care, foster care, hospital, baby home/orphanage, and unknown) before adoption and how long the child lived in each (Gunnar & Van Dulman, 2007). Pre-adoptive risk was captured with the question *Overall, please rate your general impression of the care your child received before coming into your full-time care*, rated on a 5-point scale from Good Care (1) to Extremely Neglectful (5).

Child Sleep Habits Questionnaire

Sleep-related difficulties were measured using an abbreviated form of the Children's Sleep Habits Questionnaire (CSHQ; Owens et al., 2000b) from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (CSHQ-A; 2017). The CSHQ-A includes 22 caregiver report items assessing sleep behavior during the past week. The measure is rated on a 5-point scale from "never" (0 times), "sometimes" (2-4 times/week), "usually" (5-6 times/week), and "always" (every night). A total sleep disturbance sum score is used to assess sleep

difficulties with a clinical cutoff of 30 (NICHD SECCYD-Wisconsin, 2017). Inter-item reliability of the CSHQ-A total sleep disturbance scale used in the current study is adequate (0.67). In the study sample, 4 participants (3.8%) had a total sleep disturbance sum score that passed the clinical cutoff of 30 (NICHD SECCYD-Wisconsin, 2017).

The original 45-item CSHQ was developed as a sleep screening survey for school-aged children and is a widely used and well validated (Owens et al., 2000a, 2000b) measure that assesses sleep habits and difficulties. Research has demonstrated adequate internal consistency using the measure with community (0.68) and clinical samples (0.78; Owens et al., 2000b). Test-retest reliability of the eight subscales using a community sample ranged from 0.62 to 0.79 (Owens et al., 2000b).

MacArthur Health Behavior Questionnaire, parent version

The MacArthur Health Behavior Questionnaire (HBQ; Essex et al., 2002) is a questionnaire with 18 subscales that can be given to parents and teachers to assess four domains of child health: emotional and behavioral symptoms, physical health, social adaptation, and school adaptation. The emotional and behavioral symptom domain measures subscales of Externalizing symptoms, Attention-Deficit/Hyperactivity Disorder (ADHD) symptoms, Internalizing symptoms, Functional Impairment, and Mental Health Care Utilization.

The MacArthur Health Behavior Questionnaire, Parent Version (HBQ-P 1.0) was given as part of the current study. The HBQ-P 1.0 is a 140-item questionnaire including questions requiring a dichotomous "yes" or "no" answer and 3- or 4-point Likert scales. Parents answered questions about their child's internalizing symptoms on three scales: Overanxious (e.g., *Worries about things in the future*), Depression (e.g., *Cries a lot),* and Separation Anxiety *(e.g., Worries about being separated from loved ones*). They also answered questions about their child's externalizing symptoms on four scales: Oppositional Defiant (e.g., *Gets back at people*), Conduct Problems (e.g., *Lies or cheats*), Overt Hostility (e.g., *Taunts and teases other children*), and Relational Aggression (e.g., *Tries to get others to dislike a peer*). Lastly, parents answered questions about Inattention (e.g., *Loses things*) and Impulsivity (e.g., *Talks excessively*). The HBQ-P 1.0 has been shown to be reliable for measuring mental health, physical health, and social and academic functioning. All but three of the subscales have demonstrated alpha above 0.70, and all have alpha above 0.55 (Ablow et al., 1999). In the current study, inter-item reliability ranged from adequate to very good with alphas ranging from 0.64 to 0.90. Test-retest reliability for the subscales in a community sample ranged from 0.59 to 0.83 and in clinical samples from 0.59 to 0.94 (Essex et al., 2002).

Emotion Regulation Checklist

The Emotion Regulation Checklist measures emotion regulation and dysregulation in school-aged children (Shields & Cicchetti, 1997). The 24-item questionnaire yields two subscales: Emotion Regulation (e.g., *Can recover quickly from episodes of upset or distress*) and Lability/Negativity (e.g., *Is easily frustrated*). The measure demonstrates high internal consistency for each subscale, .83 and .96 respectively (Shields & Cicchetti, 1997). Inter-item reliability in the current sample was adequate for Emotion Regulation (a = .62) and very good for Lability/Negativity (a = .87).

Data analysis plan

Inter-item correlations were calculated to explore the strength of the relation between all variables of interest. Given the bidirectional relation between emotional reactivity and sleep difficulties (Altena et al., 2016), a parallel mediation model using ordinary least squares path analysis (Hayes, 2018) was then created to assess the relation between pre-adoptive risk and problem behavior through sleep difficulties and emotion lability/negativity. Analyses were performed using the PROCESS macro V.3.5 in SPSS V.27. Past studies have demonstrated associations between socioeconomic status, child age, child gender, and child problem behavior (Martin et al., 2010; McIntosh et al., 2013; Smith et al., 2004). Based on previous research, it was predicted that lower socioeconomic status may be related to increased problem behavior due to increased family stressors (Martin et al., 2010). Additionally, younger child age and male gender was predicted to be associated with higher rates of problem behavior (Smith et al., 2004). Therefore, child sex, child age, parent education, and household income were included as covariates in the initial model for the current study. Child sex was the only significant and retained covariate in the final model.

Results

Preliminary analyses

Bivariate correlations and descriptive statistics are found in Table 2. Pre-adoptive care significantly predicted sleep difficulties, emotion lability/negativity, and internalizing and externalizing behavior symptoms. Total sleep disturbance significantly predicted emotion lability/negativity and internalizing and externalizing behavior symptoms. Four percent of the sample exceeded clinical cutoff for sleep disturbance, 21.0% exceeded clinical cutoff for internalizing symptoms (0.72; Lemery-Chalfant et al., 2007), and 10.7% exceeded clinical cutoff for externalizing symptoms (0.68; Lemery-Chalfant et al., 2007).

Table 2. Descriptive statistics and bivariate correlations between study variables.

	1	2	3	4	M(SD)	range
1. Child Sex					1.58(.50)	1-2
2. Pre-adoptive Care	.05				1.86(1.00)	1-5
3. Total Sleep Disturbance	−0.01	.26**			17.31(6.45)	5-42
4. Emotion Lability/ Negativity	−0.21*	.28**	.22*		1.95(.45)	1.07-2.93
5. Internalizing and externalizing Behavior Symptoms	−0.12	.31**	.44**	.74**	.50(.23)	.13-1.12

Note: $N = 99$,
*$p < .05$,
**$p <. 01$.

Mediation analysis

Parallel mediation using ordinary least squares path analysis was performed with child sex, preadoptive risk, sleep disturbance, emotion lability/negativity, and total internalizing and externalizing behavior problems. Results revealed that pre-adoptive risk indirectly influenced internalizing and externalizing behavior problems through effects on sleep disturbance and emotion lability/negativity. Children with higher pre-adoptive risk were more likely to experience sleep disturbance (a_1 = .28) and subsequent internalizing and externalizing behavior problems (b_1 = .28; Table 3 and Figure 1). Children with higher pre-adoptive risk displayed higher levels of emotion lability/negativity (a_2 = .28) and internalizing and externalizing behavior problems (b_2 = .69). A bootstrap confidence interval for the indirect effect of the first mediator, sleep disturbance, (a_1b_1 = .08) based on 5,000 bootstrap samples was entirely above zero (.01 to .15). Similarly,

Table 3. Regression coefficients, standard errors, and model summary information for the adoptive sleep disturbance and emotion lability/negativity parallel multiple mediator model depicted in Figure 1.

		Consequent							
		M_1 (Sleep Disturbance)			M_2 (Emotion Lability/Negativity)			Y (Total Bx Symptoms)	
Antecedent		β	SE		β	SE		β	SE
Child Sex		−0.01	.10		−0.24	.10		.04	.07
Pre-Adoptive Risk	a_1	.28**	.10	a_2	.28**	.09	c'	.04	.07
Sleep Disturbance		—	—		—	—	b_1	.28***	.07
Emotion Lability/ Negativity		—	—		—	—	b_2	.69****	.07
Constant	i_{M1}	−0.04	.10	i_{M2}	−0.01	.09	i_Y	.01	.06
		R^2 = .08			R^2 = .13			R^2 = .63	
		$F(2, 96)$ = 4.2*			$F(2, 96)$ = 7.4**			$F(4, 94)$ = 39.9****	

*$p < .05$.
**$p < .01$.
***$p < .001$.
****$p < .0001$.

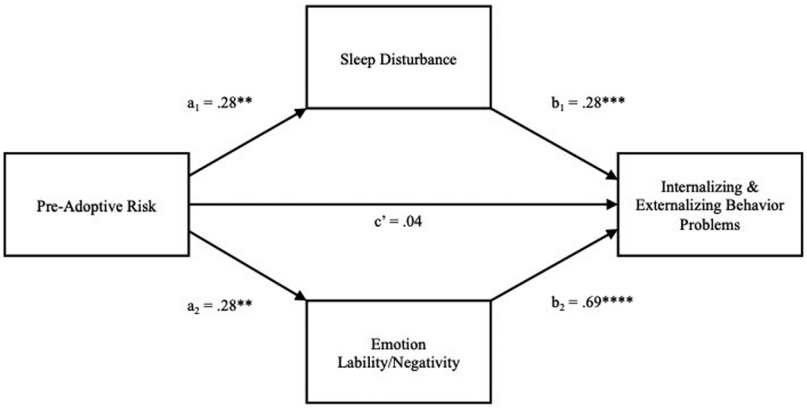


Figure 1. Standardized regression coefficients for the adoptive sleep disturbance and emotion lability/negativity parallel multiple mediator model.

a bootstrap confidence interval for the indirect effect of the second mediator, emotion lability/negativity, (a_2b_2 = 0.16) based on 5,000 bootstrap samples was entirely above zero (.02 to .30). There was no evidence that pre-adoptive risk influenced internalizing and externalizing behavior problems independent of its effect on sleep disturbance and emotion lability/negativity (c' = .04, p = .52).

Discussion

The present study aimed to expand the empirical literature related to sleep disturbance in internationally adopted children, a complaint frequently reported by adoptive families (Miller, 2005; Rettig & McCarthy-Rettig, 2006). Sleep literature regarding internationally adopted populations, including research on sleep disturbance and related constructs, is sparse. This study of internationally adopted children was used to explore the relation between pre-adoptive risk, sleep disturbance, emotion lability/negativity, and internalizing and externalizing behavior problems. In our sample, nearly a quarter of participants displayed clinically significant internalizing symptoms, and about 10% had clinically significant levels of externalizing symptoms. Bivariate correlations mirrored previous literature, with quality of pre-adoptive care significantly predicting difficulties with emotion regulation and behavioral problems. Expanding on previous literature, the present study demonstrated significant associations between pre-adoptive care and sleep disturbance. Total sleep disturbance was also found to be significantly associated with emotion regulation difficulties and symptoms of internalizing and externalizing behavior problems, similar to the relation between these variables demonstrated in typically developing children.

A parallel mediation model was used to account for the hypothesized bidirectional relation between sleep disturbance and emotional reactivity (Altena et al., 2016) and demonstrated that pre-adoptive risk was associated with increased internalizing and externalizing behavior through its association with increased sleep difficulties and emotion lability/negativity. Standardized coefficients revealed similar effects of pre-adoptive care on sleep disturbance (β = .28) and emotion lability/negativity (β = .28). Consistent with prior findings (Maire et al., 2017; Sobanski et al., 2010), emotion lability/negativity (β = .69) was a stronger predictor of problem behavior relative to sleep difficulties (β = .28). It is important to consider, however, that sleep disturbance may exacerbate emotion lability/negativity and that sleep disturbance was, on its own, a unique additional predictor, and represents a modifiable risk factor. The total variance explained by the full model was 63%. In sum, results of the current study indicate that sleep and emotion regulation difficulties mediate the relation between pre-adoptive care and problem behavior later in childhood. Sleep and emotion regulation difficulties may be worthy of exploring in future clinical research as modifiable risk factors in the development of internalizing and externalizing behavioral difficulties in internationally adopted children.

Although few participants surpassed clinical cutoff for total sleep disturbance, it is possible that specific sleep difficulties are not accounted for by the global sleep disturbance score. Owens et al. (2000b) note that the CSHQ is a screening tool that may identify children who could have a sleep disorder, but children with low total scores may also have a sleep problem in a specific, non-behavioral domain (e.g., parasomnias) that is not captured by the total score. Additionally, sleep disturbance is a global term often used to refer to diagnosed or undiagnosed sleep problems that can also be conceptualized as a domain of health behavior (Grandner, 2014). Whether or not sleep disturbance is diagnosable, it is important to study in this population because it is a concern mentioned frequently by adoptive parents (Tan et al., 2009), is associated with impaired neurobehavioral functioning (Beebe, 2011; Gruber et al., 2011), and is shown in our sample to be a unique predictor of problem behavior beyond pre-adoptive adversity and emotion lability/negativity. Our findings imply that even subclinical sleep problems are associated with problem behaviors and could be a potential target of intervention. At a minimum, clinicians working with children who have been internationally adopted should screen for sleep problems, given that this is recommended for all clinical assessments (Beebe, 2012), and should treat discovered sleep problems according to best practices (Meltzer & McLaughlin Crabtree, 2016).

Limitations

Although the current study has notable strengths, such as examining sleep and socioemotional functioning in an understudied population, there are also significant limitations. All data are derived from subjective parent-reported questionnaires; no objective historical data or information from other informants were available. On average, data were collected several years post adoption, although this also highlights the significance of ongoing sleep difficulties in internationally adopted children. Additionally, pre-adoptive risk was assessed using a single self-report item that asked parents to retroactively assess the quality of orphanage conditions. Although there are other indicators of pre-adoptive risk, such as age at adoption and country of origin, it is difficult to uniformly apply risk factors to a sample of children adopted from diverse regions with widely varying standards of pre-adoptive care. For example, it is possible that a relatively older child adopted from a country with generally higher-quality pre-adoptive care may exhibit more positive behavioral outcomes compared to a younger child adopted from a country known to have more severe institutional privation. Given the nuanced variation across risk factors, it was determined that the most reliable indicator of pre-adoptive care was the single descriptive item, despite the subjective nature of the rating and known validity issues with retroactive recall.

The cross-sectional, correlational research strategy employed by the current study is also a significant limitation. Although the nonexperimental approach to studying problem behavior in internationally adopted children sheds light on the relation between pre-adoptive care and problem behavior, directionality and causality between constructs cannot be assessed. However, given the known deleterious neurobiological and neuroendocrinological effects of institutionalized care on child development, particularly on the stress response system (Brodzinsky et al., 1998; Lawler & Gunnar, 2012), it is reasonable to hypothesize that poor pre-adoptive conditions put children at risk for later problems including sleep disturbance and emotional reactivity. Specifically, children who have experienced institutional privation are at higher risk for hypothalamic-pituitary-adrenal dysfunction, which is known to have downstream reciprocal effects on sleep disturbance and emotional reactivity (Altena et al., 2016). Additionally, it has been well established that sleep difficulties are associated with behavior problems in children, thereby supporting a hypothesized causal relationship between sleep disturbance and problem behavior in the current study. Nonetheless, the cross-sectional design of the current study precludes any causal assumptions due to threats to internal validity such as cohort effects (Gravetter & Forzano, 2018). Future longitudinal research designs with samples of internationally adopted children could shed light on how variables such

as early stress and privation, sleep disturbance, and emotional reactivity interact and change over time to predict behavior problems in this population. Further, a randomized intervention study could shed light on causal relations between these constructs.

Future directions

Longitudinal research is needed to continue exploring ongoing sleep and behavioral difficulties in order to make recommendations unique to internationally adopted children. Additionally, future research could explore transactional processes in family systems that contribute to or perpetuate sleep and self-regulatory difficulties in internationally adopted children. Further, the current study utilized a community sample, and results may extend further for clinical populations or for other populations experiencing early adversity such as maltreated children or children experiencing poverty-related risk factors. Future studies should examine sleep and emotion lability/negativity as possible mediators of effects in such populations. Future research should also explore sleep and self-regulatory interventions for internationally adopted children, as this may be an effective point of intervention for problem behavior following pre-adoptive adversity.

Conclusions

Pre-adoptive adversities increase the likelihood that internationally adopted children will experience difficulties with sleep and the regulation of emotion and behavior. Despite sleep difficulties frequently voiced by families of internationally adopted children, few studies have examined the relation between sleep difficulties and related constructs. Consistent with the study hypotheses, results suggest that sleep difficulties and emotion lability/negativity later in childhood in internationally adopted children account for the relation between pre-adoptive adversity and behavioral difficulties. While emotion lability/negativity appeared to have a stronger association with problem behavior, sleep difficulties also significantly mediated the relation between pre-adoptive adversity and problem behavior, and each are deserving of future study as a potential intervention target for internationally adopted children.

Acknowledgements

The authors thank the children and families who participated, Megan Gunnar, Bonny Donzella, Kristin Frenn, Shanna Mliner, Bao Moua, Maria Kroupina, the International Adoption Project, and the Center for Neurobehavioral Development.

Disclosure statement

The authors report there are no competing interests to declare.

Funding

This work was supported by the Eva O. Miller Fellowship to Jamie M. Lawler and seed grants by the Center for Neurobehavioral Development and the Institute of Child Development at the University of Minnesota.

References

Ablow, J. C., Measelle, J. R., Kraemer, H. C., Harrington, R., Luby, J., Smider, N., Dierker, L., Clark, V., Dubicka, B., Heffelfinger, A., Essex, M. J., & Kupfer, D. J. (1999). The MacArthur Three-City Outcome Study: Evaluating multi-informant measures of young children's symptomatology. *Journal of the American Academy of Child and Adolescent Psychiatry*, *38*(12), 1580–1590. https://doi.org/10.1097/00004583-199912000-00020

Alfano, C. A., Zakem, A. H., Costa, N. M., Taylor, L. K., & Weems, C. F. (2009). Sleep problems and their relation to cognitive factors, anxiety, and depressive symptoms in children and adolescents. *Depression and Anxiety*, *26*(6), 503–512. https://doi.org/10.1002/da.20443

Altena, E., Micoulaud-Franchi, J.-A., Geoffroy, P.-A., Sanz-Arigita, E., Bioulac, S., & Philip, P. (2016). The bidirectional relation between emotional reactivity and sleep: From disruption to recovery. *Behavioral Neuroscience*, *130*(3), 336–350. https://doi.org/10.1037/bne0000128

Alvaro, P. K., Roberts, R. M., & Harris, J. K. (2013). A systematic review assessing bidirectionality between sleep disturbances, anxiety, and depression. *Sleep*, *36*(7), 1059–1068. https://doi.org/10.5665/sleep.2810

Aronen, E. T., Paavonen, E. J., Fjällberg, M., Soininen, M., & Törrönen, J. (2000). Sleep and psychiatric symptoms in school-age children. *Journal of the American Academy of Child & Adolescent Psychiatry*, *39*(4), 502–508. https://doi.org/10.1046/j.1467-0658.2000.00093-19.x

Askeland, K. G., Sivertsen, B., & Hysing, M. (2020). Sleep patterns and insomnia among internationally adopted adolescents. *Sleep Health*, *6*(5), 594–600. https://doi.org/10.1016/j.sleh.2020.02.011

Astill, R. G., Van der Heijden, K. B., Van IJzendoorn, M. H., & Van Someren, E. J. W. (2012). Sleep, cognition, and behavioral problems in school-age children: A century of research meta-analyzed. *Psychological Bulletin*, *138*(6), 1109–1138. https://doi.org/10.1037/a0028204

Batki, A. (2018). The impact of early institutional care on emotion regulation: Studying the play narratives of post-institutionalized and early adopted children. *Early Child Development and Care*, *188*(12), 1801–1815. https://doi.org/10.1080/03004430.2017.1289190

Beebe, D. W. (2011). Cognitive, behavioral, and functional consequences of inadequate sleep in children and adolescents. *Pediatric Clinics of North America*, *58*(3), 649–665. https://doi.org/10.1016/j.pcl.2011.03.002

Beebe, D. W. (2012). A brief primer on sleep for pediatric and child clinical neuropsychologists. *Child Neuropsychology: A Journal on Normal and Abnormal Development in Childhood and Adolescence*, *18*(4), 313–338. https://doi.org/10.1080/09297049.2011.602014

Bick, J., Lipschutz, R., Tabachnick, A., Biekman, B., Katz, D., Simons, R., & Dozier, M. (2022). Timing of adoption is associated with electrophysiological brain activity and

externalizing problems among children adopted internationally. *Developmental Psychobiology*, *64*(4), e22249–n/a. https://doi.org/10.1002/dev.22249

Brodzinsky, A. B. (1998). Children's adjustment to adoption: developmental and clinical issues. Sage Publications

Essex, M. J., Boyce, W. T., Goldstein, L. H., Armstrong, J. M., Kraemer, H. C., & Kupfer, D. J. (2002). The confluence of mental, physical, social, and academic difficulties in middle childhood. II: Developing the MacArthur Health and Behavior Questionnaire. *Journal of the American Academy of Child and Adolescent Psychiatry*, *41*(5), 588–603. https://doi.org/10.1097/00004583-200205000-00017

Fallone, G., Owens, J. A., & Deane, J. (2002). Sleepiness in children and adolescents: Clinical implications. *Sleep Medicine Reviews*, *6*(4), 287–306. https://doi.org/10.1053/smrv.2001.0192

Finet, C., Vermeer, H. J., Juffer, F., & Bosmans, G. (2018). Behavioral adjustment of Chinese adoptees: The role of pre-adoption experiences. *Children and Youth Services Review*, *86*, 226–235. https://doi.org/10.1016/j.childyouth.2018.01.029

Fuglestad, A. J., Kroupina, M. G., Johnson, D. E., & Georgieff, M. K. (2016). Micronutrient status and neurodevelopment in internationally adopted children. *Acta Paediatrica (Oslo, Norway: 1992)*, *105*(2), e67–e76. https://doi.org/10.1111/apa.13234

Fuglestad, A. J., Lehmann, A. E., Kroupina, M. G., Petryk, A., Miller, B. S., Iverson, S. L., Johnson, D. E., & Georgieff, M. K. (2008). Iron deficiency in international adoptees from Eastern Europe. *The Journal of Pediatrics*, *153*(2), 272–277. https://doi.org/10.1016/j.jpeds.2008.02.048

Grandner, M. A. (2014). Addressing sleep disturbances: An opportunity to prevent cardiometabolic disease? *International Review of Psychiatry (Abingdon, England)*, *26*(2), 155–176. https://doi.org/10.3109/09540261.2014.911148

Gravetter, F. J., & Forzano, L. B. (2018). *Research methods for the behavioral sciences* (6th ed.). Cengage Learning.

Gruber, R., Wiebe, S., Montecalvo, L., Brunetti, B., Amsel, R., & Carrier, J. (2011). Impact of sleep restriction on neurobehavioral functioning of children with attention deficit hyperactivity disorder. *Sleep*, *34*(3), 315–323. https://doi.org/10.1093/sleep/34.3.315 21358848

Gunnar, M. R. (2001). Effects of early deprivation: Findings from orphanage-reared infants and children. In C. A. Nelson & M. Luciana (Eds.), *Handbook of developmental cognitive neuroscience.* (pp. 617–629). MIT Press.

Gunnar, M. R., & Kertes, D. A. (2005). Prenatal and postnatal risks to neurobiological development in IA children. In Sigel (Sigel (Series Ed.) & D. M. Brodzinsky & J. Palacios (Vol. Eds.), *Advances in applied developmental psychology: No 24. psychological issues in adoption: Research and practice* (pp. 47–65). Praeger.

Gunnar, M. R., & Van Dulmen, M. H. (2007). Behavior problems in postinstitutionalized IA children. *Development and Psychopathology*, *19*(1), 129–148. https://doi.org/10.1017/S0954579407070071

Gunnoe, M. L., & Helder, E. J. (2023). Co-sleeping, regressive parenting, and onset of punishment as predictors of child adjustment 5 years after international adoption: An empirical evaluation of controversial practices in popular adoption manuals. *Adoption Quarterly*, *26*(2), 186–220. https://doi.org/10.1080/10926755.2022.2156013

Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.) The Guilford Press.

Julian, M. M. (2013). Age at adoption from institutional care as a window into the lasting effects of early experiences. *Clinical Child and Family Psychology Review*, *16*(2), 101–145. https://doi.org/10.1007/s10567-013-0130-6

Lawler, J., & Gunnar, M. (2012). Implications of research on postinstitutionalized children for practice and policy in early education. In R. Pianta's (Ed.), *Handbook of early*

childhood education (pp. 457–479). Guilford Press.Lemery-Chalfant, K., Schreiber, J. E., Schmidt, N. L., Van Hulle, C. A., Essex, M. J., & Goldsmith, H. H. (2007). Assessing internalizing, externalizing, and attention problems in young children: Validation of the macarthur HBQ. *Journal of the American Academy of Child and Adolescent Psychiatry*, *46*(10), 1315–1323. https://doi.org/10.1097/chi.0b013e3180f616c6

Loman, M. M., Johnson, A. E., Westerlund, A., Pollak, S. D., Nelson, C. A., & Gunnar, M. R. (2013). The effect of early deprivation on executive attention in middle childhood. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *54*(1), 37–45. https://doi.org/10.1111/j.1469-7610.2012.02602.x

Mackes, N. K., Golm, D., Sarkar, S., Kumsta, R., Rutter, M., Fairchild, G., Mehta, M. A., & Sonuga-Barke, E. J. S. (2020). Early childhood deprivation is associated with alterations in adult brain structure despite subsequent environmental enrichment. *Proceedings of the National Academy of Sciences of the United States of America*, *117*(1), 641–649. https://doi.org/10.1073/pnas.1911264116

Maire, J., Galéra, C., Meyer, E., Salla, J., & Michel, G. (2017). Is emotional lability a marker for attention deficit hyperactivity disorder, anxiety and aggression symptoms in preschoolers? *Child and Adolescent Mental Health*, *22*(2), 77–83. https://doi.org/10.1111/camh.12168

Malcorps, S., Vliegen, N., Fonagy, P., & Luyten, P. (2022). A four-year multi-wave prospective study on the role of parental reflective functioning and parenting stress in the development of socio-emotional problems in internationally adopted children. *Development and Psychopathology*, 1–14. https://doi.org/10.1017/S0954579422001171

Mannering, A. M., Harold, G. T., Leve, L. D., Shelton, K. H., Shaw, D. S., Conger, R. D., Neiderhiser, J. M., Scaramella, L. V., & Reiss, D. (2011). Longitudinal associations between marital instability and child sleep problems across infancy and toddlerhood in adoptive families. *Child Development*, *82*(4), 1252–1266. https://doi.org/10.1111/j.1467-8624.2011.01594.x

Martin, M. J., Conger, R. D., Schofield, T. J., Dogan, S. J., Widaman, K. F., Donnellan, M. B., & Neppl, T. K. (2010). Evaluation of the interactionist model of socioeconomic status and problem behavior: a developmental cascade across generations. *Development and Psychopathology*, *22*(3), 695–713. https://doi.org/10.1017/S0954579410000374 20576188

Maski, K., & Owens, J. A. (2016). Insomnia, parasomnias, and narcolepsy in children: Clinical features, diagnosis, and management. *The Lancet. Neurology*, *15*(11), 1170–1181. https://doi.org/10.1016/S1474-4422(16)30204-6

McIntosh, K., Reinke, W. M., Kelm, J. L., & Sadler, C. A. (2013). Gender differences in reading skill and problem behavior in elementary school. *Journal of Positive Behavior Interventions*, *15*(1), 51–60. https://doi.org/10.1177/1098300712459080

Meltzer, L. J., & McLaughlin Crabtree, V. (2016). *Pediatric sleep problems: A clinician's guide to behavioral interventions*. SAGE Publications. https://doi.org/10.1177/0973134220160205

Meltzer, L. J., & Montgomery-Downs, H. E. (2011). Sleep in the family. *Pediatric Clinics of North America*, *58*(3), 765–774. https://doi.org/10.1016/j.pcl.2011.03.010

Miller, L. C. (2005). *The handbook of international adoption medicine: A guide for physicians, parents, and providers*. Oxford University Press.

Nalavany, B. A., Ryan, S. D., & Hinterlong, J. (2009). Externalizing behavior among adopted boys with preadoptive histories of child sexual abuse. *Journal of Child Sexual Abuse*, *18*(5), 553–573. https://doi.org/10.1080/10538710903183337

Neville, S. E., & Rotabi, K. S. (2020). Developments in U.S. intercountry adoption policy since its peak in 2004. *Adoption Quarterly*, *23*(1), 63–83. https://doi.org/10.1080/10926755.2020.1719254

NICHD SECCYD-Wisconsin (2017). Children's Sleep Habit Questionnaire (Abbreviated). Retrieved July 1, 2022, from http://njaap.org/wp-content/uploads/2016/04/Childrens-Sleep-Habits-Questionnaire.pdf

Owens, J. (2008). Classification and epidemiology of childhood sleep disorders. *Primary Care*, *35*(3), 533–546, vii. https://doi.org/10.1016/j.pop.2008.06.003

Owens, J. A., Maxim, R., Nobile, C., McGuinn, M., & Msall, M. (2000a). Parent and self-report of sleep in children with attention-deficit/hyperactivity disorder. *Archives of Pediatrics & Adolescent Medicine*, *154*(6), 549–555. https://doi.org/10.1001/archpedi.154.6.549

Owens, J. A., Spirito, A., & McGuinn, M. (2000b). The Children's Sleep Habits Questionnaire (CSHQ): Psychometric properties of a survey instrument for school-aged children. *Sleep*, *23*(8), 1–9. https://doi.org/10.1093/sleep/23.8.1d

Palmer, C. A., & Alfano, C. A. (2017). Sleep and emotion regulation: An organizing, integrative review. *Sleep Medicine Reviews*, *31*, 6–16. https://doi.org/10.1016/j.smrv.2015.12.006

Peirano, P. D., Algarín, C. R., Chamorro, R. A., Reyes, S. C., Durán, S. A., Garrido, M. I., & Lozoff, B. (2010). Sleep alterations and iron deficiency anemia in infancy. *Sleep Medicine*, *11*(7), 637–642. https://doi.org/10.1016/j.sleep.2010.03.014

Quach, J. L., Nguyen, C. D., Williams, K. E., & Sciberras, E. (2018). Bidirectional associations between child sleep problems and internalizing and externalizing difficulties from preschool to early adolescence. *JAMA Pediatrics*, *172*(2), e174363-e174363. https://doi.org/10.1001/jamapediatrics.2017.4363

Rettig, M. A., & McCarthy-Rettig, K. (2006). A survey of the health, sleep, and development of children adopted from China. *Health & Social Work*, *31*(3), 201–207. https://doi.org/10.1093/hsw/31.3.201

Schenkels, E., Steinfort, N., Wojciechowski, M., & Verhulst, S. (2018). Sleep problems in internationally adopted children: A pilot study. *Nature and Science of Sleep*, *10*, 335–336. https://doi.org/10.2147/NSS.S180769

Selman, P. (2022). *Global statistics for intercountry adoption: Receiving states and states of origin 2004-2020*. https://assets.hcch.net/docs/a8fe9f19-23e6-40c2-855e-388e112bf1f5.pdf

Shields, A., & Cicchetti, D. (1997). Emotion regulation among school-age children: The development and validation of a new criterion Q-sort scale. *Developmental Psychology*, *33*(6), 906–916. https://doi.org/10.1037/0012-1649.33.6.906

Simmel, C., Brooks, D., Barth, R. P., & Hinshaw, S. P. (2001). Externalizing symptomatology among adoptive youth: Prevalence and preadoption risk factors. *Journal of Abnormal Child Psychology*, *29*(1), 57–69. https://doi.org/10.1023/A:1005251513130

Smith, C. L., Calkins, S. D., Keane, S. P., Anastopoulos, A. D., & Shelton, T. L. (2004). Predicting stability and change in toddler behavior problems: contributions of maternal behavior and child gender. *Developmental Psychology*, *40*(1), 29–42. https://doi.org/10.1037/0012-1649.40.1.29 14700462

Sobanski, E., Banaschewski, T., Asherson, P., Buitelaar, J., Chen, W., Franke, B., Holtmann, M., Krumm, B., Sergeant, J., Sonuga-Barke, E., Stringaris, A., Taylor, E., Anney, R., Ebstein, R. P., Gill, M., Miranda, A., Mulas, F., Oades, R. D., Roeyers, H., … Faraone, S. V. (2010). Emotional lability in children and adolescents with attention deficit hyperactivity disorder (ADHD): Clinical correlates and familial prevalence. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *51*(8), 915–923. https://doi.org/10.1111/j.1469-7610.2010.02217.x

Tan, T. X., Marfo, K., & Dedrick, R. F. (2009). Preschool-age adopted Chinese children's sleep problems and family sleep arrangements. *Infant and Child Development*, *18*(5), 422–440. https://doi.org/10.1002/icd.630

United States Department of Health and Human Services, Administration for Children and Families, Administration on Children, Youth, and Families, Children's Bureau.

(2020). *The AFCARS report*. https://www.acf.hhs.gov/sites/default/files/documents/cb/afcarsreport27.pdf

United States Department of State. (2004-2020). *Annual report of intercountry adoption*. https://travel.state.gov/content/travel/en/Intercountry-Adoption/adopt_ref/AnnualReports.html

Wamser-Nanney, R., & Chesher, R. E. (2018). Trauma characteristics and sleep impairment among trauma-exposed children. *Child Abuse & Neglect*, *76*, 469–479. https://doi.org/10.1016/j.chiabu.2017.11.020

Wilkerson, A. (2021). The fate of intercountry adoptions following COVID-19. *The International Lawyer*, *54*(3), 457–482.