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### Parent-Child Relations, Sleep, and Externalizing Problems in Clinical Youth

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LOMA LINDA UNIVERSITY  
School of Behavioral Health  
in conjunction with the  
Department of Psychology

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Parent-Child Relations, Sleep, and Externalizing Problems in Clinical Youth

by

Tiffany Thao Vo

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A Project submitted in partial satisfaction of  
the requirements for the degree  
Doctor of Psychology

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September 2022

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Each person whose signature appears below certifies that this project in his/her opinion is adequate, in scope and quality, as a project for the degree Doctor of Psychology.



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Tori R. Van Dyk, Assistant Professor of Psychology



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## ABBREVIATIONS

AMBIANCE	Atypical Maternal Behavior Instrument for Assessment and Classification
AOSD	Average Objective Sleep Duration
BASC-2	Behavior Assessment System for Children, Second Edition
CBCL	Child Behavior Checklist
CDC	Centers for Disease Control and Prevention
CSHQ	Children's Sleep Habits Questionnaire
CSP	Common Sense Parenting
IBM	International Business Machines
P-CDI	Parent-Child Dysfunctional Interaction
PCIT	Parent-Child Interaction Training
PDS	Pediatric Daytime Sleepiness
PDSS	Pediatric Daytime Sleepiness Scale
SPSS	Statistical Package for Social Sciences
TSD	Total Sleep Disturbance
YEPS	Youth Externalizing Problems Screener

## ABSTRACT OF THE DOCTORAL PROJECT

Parent-Child Relations, Sleep, and Externalizing Problems in Clinical Youth

by

Tiffany Thao Vo

Doctor of Psychology, Graduate Program in Psychology  
Loma Linda University, September 2022  
Dr. Tori R. Van Dyk, Chairperson

Sleep problems are a major prevailing concern in clinical youth populations. Research has shown that poor sleep is correlated with mental health problems, while parent-child relationships are associated with externalizing behaviors. The aim of this study was to (1) replicate these findings; (2) extend on previous research on the relationships between sleep, parent-child relationships, and externalizing problems; and (3) analyze moderating effects of parent-child relationships on the relationship between sleep and externalizing problems in youth ( $N = 25$ ) ages 6 to 11 presenting to mental health treatment. Bivariate analyses indicated average objective sleep duration is related to parent-child relations and parent-child relations is related to externalizing problems. Externalizing problems was regressed on each sleep variable (i.e., total sleep disturbance, daytime sleepiness, average objective sleep duration), parent-child relationships, and their interaction. There was a marginally significant relationship between parent-child relationships and externalizing problems in the context of subjective sleep disturbance ( $p = .061$ ). Furthermore average objective sleep duration was a marginally significant predictor of youth's externalizing problems ( $p = .06$ ). However, parent-child relationships were not found to moderate the effect of sleep and externalizing problems in any analyses. Overall findings imply that both sleep and

parent-child relationships are correlated with each other and are important influences on youth's externalizing behaviors. Replication in larger samples and using alternative analysis methods (e.g., mediation) is needed. Clinically, sleep problems and poor parent-child relationships should continue to be targeted to optimize mental health treatment for youth.

*Keywords:* clinical child population, daytime sleepiness, externalizing problems, parent-child relationships, sleep disruption, sleep duration

# **CHAPTER ONE**

## **INTRODUCTION**

Sleep plays an important role in many aspects of functioning for children, adolescents, and adults. Traditionally, sleep has often been identified as a symptom of mental health disorders in youth. However, more recently, sleep has been examined as a significant, independent risk factor with its own set of disorders. In fact, a significant body of research indicates that sleep precedes behaviors related to emotion regulation and other mental health disorders in youth (Alfano & Gamble, 2009). Sleep deprivation can cause many problems for individuals, such as behavioral concerns, diminished daytime functioning, and poor academic or work performance (Lo et al., 2016; Sadeh, Gruber, & Raviv, 2002; Steenari et al., 2003; Curcio, Ferrara, & De Gennaro, 2006; Dewald, Meijer, Oort, Kerkhof, & Bögels, 2010; Wheaton, Jones, Cooper, & Croft, 2018). Moreover, most children do not get a proper amount of sleep per night due to various influences, which may include later bedtimes, emotional or behavioral problems, or parent-child conflict (Gangwisch et al., 2010; Beebe, 2011; Gerard, Krishnakumar, & Buehler, 2006). The literature also suggests that there is a bidirectional relationship between sleep and externalizing behaviors in youth (Van Dyk et al., 2016). Since sleep deprivation or dysfunction is common and associated with extensive problems in development and functioning, it is important to address sleep problems in youth, especially in earlier childhood. Specifically, it is crucial to focus on treating sleep concerns with children who are presenting with above average behavioral and emotional problems to help improve physical and mental health symptoms related to insufficient sleep. Further, it is important to better understand factors that may significantly

influence the relationship between sleep and functioning in these children. Hence, our study presents a novel approach to examining sleep as a predictor of common factors that affect youth's clinical presentation in a mental health setting.

### **Importance of Sleep**

Poor sleep appears to be an escalating problem for youth. Inadequate sleep is prevalent in children and adolescents, especially for those at the age required to attend school. Parents of school-aged children report significant sleep disturbances and deprivation each week (Stein, Mendelsohn, Obermeyer, Amromin, & Benca, 2001). It is recommended that school age youth obtain 9 to 11 hours of sleep each night (Hirshkowitz et al., 2015); however, many fall below this, particularly on school nights (National Sleep Foundation 2006 Sleep in America Poll, 2015; Iglowstein, Jenni, Molinari, & Largo, 2003; Gruber, Somerville, Wells, Keskinel, & Santisteban Lopez, 2018). Although sleep problems are common across the general youth population, research suggests that sleep problems are even more prevalent and significant in children and adolescents who struggle with behavioral and emotional problems as well as developmental delays. Reigstad and colleagues (2010) found that children presenting with mental health concerns, such as behavioral and emotional problems, suffer from sleep problems up to six times more than children with no mental health issues. The high prevalence of sleep problems in youth presenting with clinical mental health problems is concerning, considering there are a host of problems associated with insufficient sleep that can significantly impact day-to-day functioning for children and adolescents with low psychological performance, behavioral difficulties, and emotional dysregulation

(Beebe, 2011; Wheaton, Jones, Cooper, & Croft, 2018; Sadeh, Gruber, & Raviv, 2002; Steenari et al., 2003; Paavonen et al., 2009; Paavonen, Porkka-Heiskanen, & Lahikainen, 2009).

According to a Centers for Disease Control and Prevention (CDC) report, there is an increased risk for poor academic performance, poor physical and mental health outcomes, injuries, and other chronic conditions resulting from insufficient sleep (Wheaton, Jones, Cooper, & Croft, 2018). Dewald and colleagues (2010) found that poor sleep quality, short sleep duration, and daytime sleepiness were associated with school performance, indicating that sleep deprivation can lead to low cognitive functioning and poor academic performance. Sleep dysfunction and deprivation can also affect the development of children's prefrontal cortex, potentially impacting the way they store important information, learn, and perform in school (Beebe, 2011). Several longitudinal studies have found that children's cognitive, behavioral, and functional development is also affected by poor sleep and that sleep deprivation can lead to behavioral problems related to inattentiveness, indicating that disrupted sleep is related to poor mental health in youth (Beebe, 2011). Many existing studies on sleep have also found links between children's sleep dysfunction and daytime functioning, which includes attention, behavioral regulation, and impulsive control (Sadeh, Gruber, & Raviv, 2002; Steenari et al., 2003; Paavonen et al., 2009; Paavonen, Porkka-Heiskanen, & Lahikainen, 2009).

Poor quality of sleep is prevalent in many children with psychiatric problems and leaving sleep problems untreated may exacerbate existing mental health symptoms (Huhdanpää, Klenberg, Westerinen, Fontell, & Aronen, 2018). Not only has sleep been found to be correlated with emotional and behavioral symptoms, but experimental

studies have demonstrated causal relationships. For example, Baum and colleagues (2014) found that shortening sleep across several nights resulted in drastic consequences to adolescents' emotional regulation. Findings indicated that adolescents experience worsened mood, increased irritability, and difficulties regulating their negative emotions, which can impact their overall daytime functioning, when obtaining short sleep (Baum et al., 2014).

### **Sleep and Externalizing Problems**

Externalizing problems are defined as problems relating to non-compliant, hyperactive, aggressive, and under-controlled behaviors (Achenbach & Rescorla, 2001). With the current health issues surrounding sleep disturbance and dysfunction, there is a significant body of literature that has examined the relationship specifically between sleep and externalizing problems among youth. Research suggests that sleep problems are consistently related to externalizing problems. For example, Roberts and colleagues (2008) found that sleep disturbance was prospectively associated with an increase in mental health problems for a community sample of young adolescents enrolled in managed care groups. Additionally, it was found that obtaining inadequate sleep exacerbates mental health symptoms over time in healthy young children, specifically impacting externalizing problems (Roberts et al., 2009). Sleep disturbances have also been shown to be linked to externalizing problems, such as increased aggression, related executive functioning impairments, such as attentional difficulties, and cognitive and learning outcomes, such as poor academic performance (Lo et al., 2016; Sadeh, Gruber, & Raviv, 2002; Steenari et al., 2003; Curcio, Ferrara, & De Gennaro, 2006). Research

has shown that sleep not only affects externalizing problems but also impacts executive functioning and cognitive impairments, which is subsequently associated with increased externalizing problems (Sadeh, Gruber, & Raviv, 2002; Wheaton, Jones, Cooper, & Croft, 2018). When experimentally sleep restricting healthy adolescents, Lo and colleagues (2016) found a decrease in positive mood and an increase in neurobehavioral impairments, which included processing speed, subjective alertness, and sustained attention. The impairments resulting from the sleep deprivation lasted up to one week despite two-nights of recovery of sleep. The findings from this study suggest that sleep restriction can cause long-term deficits in daily functioning that can eventually increase behavioral problems and decrease positive mood in healthy adolescents. In a correlational study, Sadeh and colleagues (2002) found that insufficient sleep is related to poor executive control and attentional deficits in school-aged children. Similar to experimental findings, results suggest that sleep deprivation may have a significant contribution to poorer mental health outcomes. Since youth with mental health concerns have a higher likelihood of disturbed sleep (Reigstad, Jorgensen, Sund, & Wichstrom, 2010), they may be at increased risk for aggravating externalizing problems. It is fundamental to emphasize integrating sleep screening and sleep interventions into clinical treatment for children presenting with physical and/or mental health problems.

In addition to research finding sleep problems may contribute to emotional and behavioral problems, findings indicate that children with mental health symptoms are at greater risk of developing sleep dysfunction, supporting the possibility of a bidirectional relationship. Many other research studies have found that symptoms associated with mental health problems can significantly impact patterns of sleep (Wang et al., 2018;



Fosse, Pallesen, Hysing, & Morten Stormark, 2011). Research has also shown that sleep problems, emotional dysregulation, attention deficits, and aggressive behaviors often co-occur and are comorbid from childhood to adolescence (Wang et al., 2018). For instance, Fosse and colleagues (2011) found that anxiety, irritability, hyperactivity, and many other mental health symptoms are associated with increased difficulties for children in obtaining adequate sleep. Essentially, these findings indicate that children who suffer from mental health problems may be more likely to experience sleep dysfunction.

Although most research has only evaluated one-directional relationships between sleep and mental health symptoms, it is likely that the relationship between sleep and mental health concerns is bidirectional. A longitudinal sleep study conducted by Van Dyk and colleagues (2016) found that there is a bidirectional relationship between sleep duration and mental health symptoms in children with mental health concerns, indicating that children who present with mental health problems typically receive an insufficient amount of sleep and that sleep deprivation can exacerbate these mental health symptoms. The findings in this study suggests that treating sleep disturbances and externalizing behavioral problems may be important for children's overall mental health. Based on the results of the study, there is a medium impact ( $f^2 = .36$ ) of poor sleep on child mental health problems (Van Dyk et al., 2016). Although a clinically relevant, the medium effect size may be a result of mental health problems being multifactorial, indicating a need to explore other contributing factors. It is possible that poor sleep may influence a child's physical and cognitive functioning, indicating that developments to effective and efficient treatment interventions for sleep dysfunction are important for optimal child development. Inadequate sleep among children with mental health problems can be

concerning because it has a significant impact on both physical and mental functioning as well as proper child development (El-Sheikh, Kelly, Buckhalt, & Hinnant, 2010). Hence, insufficient sleep and poor sleep quality are problems that need to be addressed to avoid a cycle of poorer sleep and worsening mental health.

Beyond correlational studies, experimental research is beginning to reveal causal associations between sleep and behavioral functioning. More specifically, literature has shown an increase in impulsive behaviors, hyperactivity, and other externalizing behavioral problems following sleep restriction in general youth populations (Beebe, 2011). Van Dyk and colleagues (2017) found improvements in adolescents' externalizing behaviors when their sleep was extended, while short sleep exacerbated their externalizing problems during the academic school year. Beebe and colleagues (2008) observed the presence of behavioral deficits and impairment in executive functioning when sleep restriction occurred in their experimental design. The results from these studies indicate that restricting sleep has detrimental effects to and a direct causal relationship with adolescents' health and well-being. Another experimental research study explored the effects of restricted sleep on healthy adolescents. In this study, partial sleep deprivation prolonged for a week was shown to have detrimental effects on daily functioning in healthy, short sleeping adolescents (Lo et al., 2016). Therefore, it is essential to consider the consequences of inadequate sleep in younger children, especially from the clinical youth population. Not only do these studies imply that decreased sleep has determinantal effects, but they also suggest that there is a direct causal relationship on mental health, physical health, and daily functioning in youth.

The relationship between youth's sleep and their mental health problems,

particularly externalizing problems, have been strongly established with extensive research support (Beebe, 2011; Wheaton, Jones, Cooper, & Croft, 2018; Sadeh, Gruber, & Raviv, 2002; Steenari et al., 2003; Paavonen et al., 2009; Paavonen, Porkka-Heiskanen, & Lahikainen, 2009). Furthermore, this relationship appears to be more salient in the context of existing mental health problems in youth (Roberts et al., 2009). Despite strong research support on this relationship, it is possible that there are other contributing dynamics that can significantly impact the relationship between sleep and externalizing problems in clinical samples of youth. Hence, it is likely that the association between sleep and externalizing problems is complex and may be influenced by other factors within a child's life.

### **Parent-Child Relationships and Externalizing Problems**

Externalizing problems in youth are multifactorial and, in addition to sleep, there are likely many contributing factors. Literature has shown that the parent-child relationship is one of many contributing dynamics to externalizing behaviors in youth (Mesman and Koot, 2001; Dujardin, Santens, Braet, Raedt, Vos, Maes, & Bosmans, 2016; Gerard, Krishnakumar, & Buehler, 2006). However, the vast majority of research speculating on the impact of parent-child relationships actually measures *parenting behaviors* that are predictive of *parent-child relationships* such as parental warmth, parental acceptance, behavioral autonomy, level of supervision, and children's self-perception of their relationship with their parents (Pinquart, 2013; Bi, Yang, Li, Wang, Zhang, & Deater-Deckard, 2018). A study that examined the relationship between parenting styles, specifically behavior autonomy and perceived parental authority, and

parent-adolescent relationships indicate that styles of parenting are often associated with conflict and cohesion between parents and their children (Bi, Yang, Li, Wang, Zhang, & Deater-Deckard, 2018). Results from this study show that the quality of the actual relationship between the child and the parent is not often directly measured. Although parenting behaviors only represent one aspect of parent-child relationship, they significantly influence the outcomes of parent-child relationships (Pinquart, 2013). It is well-established that parent-child relationships are associated with children's externalizing problems (Mesman and Koot, 2001). The current literature suggests that the role of the parent has a significant impact on the child's emotional regulation and stress response (Dujardin, Santens, Braet, Raedt, Vos, Maes, & Bosmans, 2016). According to attachment theory, the parent-child relationship plays an important role in the way children regulate their stress and emotions (Dujardin, Santens, Braet, Raedt, Vos, Maes, & Bosmans, 2016). Further, research has found that parent-child conflicts can increase the intensity of externalizing behaviors in children with behavioral and emotional problems (Gerard, Krishnakumar, & Buehler, 2006). Hence, the quality of the parent-child relationship is crucial in the way children develop strategies to cope with stress and react to aversive emotions.

Other studies have indicated that parenting practices, parent-child conflict, and perceived quality of the parent-child relationship, have direct effects on children's externalizing behavioral problems (Mesman & Koot, 2001; Burt, Krueger, McGue, & Lacono, 2003; Booker, Ollendick, Dunsmore, & Greene, 2016). Parenting behaviors, such as physical punishment and harsh discipline, have been found to be strong significant predictors of children's externalizing problems (Mesman & Koot, 2001).

Additionally, family dysfunction and parental psychological adjustment have been found to be associated with sleep concerns and externalizing problems in youth (Lavigne et al., 1998; O’Leary et al., 1999). The quality of the parent-child relationship is also at the foundation of effective treatments for children’s externalizing problems (McMahon & Forehand, 2003). For example, parent-child interaction training (PCIT), which is commonly used and has been found to be effective in managing externalizing problems in youth (Eyberg & Robinson, 1982), incorporates fundamental components that help build strong and positive parent-child relationships (e.g., applying strategies for special play to improve positive interactions). Relatedly, Eisenberg and colleagues (2005) have observed a significant impact of parental warmth and positive expressivity on children’s externalizing problems. They found that an increase in positive regard from parents predicts a decrease in externalizing problems for children approximately two years later (Eisenberg et al., 2005). The results from this study indicate that children who receive warmth or positive expressivity from their parents are less likely to be aggressive or dishonest when they grow into adolescence.

### **Sleep and Parent-Child Relationships**

The research examining parent-child relationships and externalizing problems is robust, however, there has been limited research on the associations between sleep and parent-child relationships. Currently, there are three studies that have examined the relationship between sleep and parent-child relations (Gangwisch et al., 2010; Kelly, Marks, & El-Sheikh, 2014; Liu, Sun, Uchiyama, Shibui, Kim, & Okawa, 2000). In one study, adolescents tended to perceive earlier set bedtimes as a caring behavior from the

parent (Gangwisch et al., 2010). Furthermore, later parental set bedtimes were significantly associated with shorter sleep durations for adolescents which in turn, placed adolescents at a higher risk for depression and suicidal ideation. Based on this finding, the quality of the parent-child relationship perceived by the child appears to be an important determinant to sleep behavior and subsequently mental health problems. The existing literature also indicates that parent-child conflict has significant influences on children's sleep patterns and level of adjustment (Kelly, Marks, & El-Sheikh, 2014). Kelly and colleagues (2014) found that conflict in the parent-child relationship was linked to insufficient sleep and increased sleep-wake episodes, which affects the child's sleep continuity and was associated with increased externalizing problems. Findings of this study suggest that poor parent-child relationships can significantly influence the quality of sleep that children are able to receive in the home as well as their mental health outcomes. The final study examining the relationship between parent-child relationships and sleep problems was in the context of a similar-authoritarian parenting style with Chinese children (Liu, Sun, Uchiyama, Shibui, Kim, & Okawa, 2000). Similar to the other findings, the results from this study suggest that children with poor sleep are reported to have poor relations with their parents, further suggesting that there may be an important association between the quality of sleep and parent-child relationships (Liu, Sun, Uchiyama, Shibui, Kim, & Okawa, 2000). Although there is limited research on the direct role of the parent-child relationship on children's sleep, the existing body of literature has shown that there may be interesting correlations between these constructs.

Additionally, there have been three studies that examined variables closely related to parent-child relationships and their association with poor sleep, including the

impact of parental discord and maternal distress on children's sleep behaviors. In these studies, maternal stress, parental discord, and adverse parenting practices were found to be related to children's sleep behaviors (Byars, Yeomans-Maldonado, & Noll, 2011; Rudd, Holtzworth-Munroe, D'Onofrio, & Waldron, 2018; Reid, Hong, & Wade, 2009). One study indicated that higher parenting stress was correlated with increased daytime sleepiness and bedtime resistance in children, leading to concerns for an increase in behavioral problems and the child's physical and mental well-being (Byars, Yeomans-Maldonado, & Noll, 2011). Rudd and colleagues (2018) have also shown that maternal relationship dissolution is associated with conflictual parent-child interactions and was linked to poor sleep quality and increased problematic sleep in children. The results of this study suggest that parental discord may significantly impact the quality of the parent-child relationship, and in turn, affect the child's sleep quality. Moreover, adverse parenting practices, as a result of maternal depressive symptomology and family dysfunction, have also been shown to be related to sleep problems in young children (Reid, Hong, & Wade, 2009). Hence, although limited, current research indicates that there are both direct and indirect influences of the parent-child relationship on children's sleep problems that, in turn, can impact their functioning. The findings of the indicated studies show that the parent-child relationship has an effect on healthy youth and more so on children with above average emotional and behavioral concerns.

### **Conclusion, Summary, and Significance**

Existing literature has shown that sleep is important for normal development, daily functioning, and regulation of mental health symptoms in youth (Beebe, 2011; El-

Sheikh, Kelly, Buckhalt, & Hinnant, 2010; Wheaton, Jones, Cooper, & Croft, 2018; Sadeh, Gruber, & Raviv, 2002; Steenari et al., 2003; Paavonen et al., 2009; Paavonen, Porkka-Heiskanen, & Lahikainen, 2009; Baum et al., 2014). We know that sleep is directly related to externalizing problems based on several experimental research studies (e.g., Lo et al., 2016). Additionally, consistent with the multifactorial nature of externalizing problems, a strong body of research supports the notion that parent-child relationships play an important role in children's emotional or stress regulating behaviors (e.g., Eyberg & Robinson, 1982; Eisenberg, Zhou, Spinrad, Valiente, Fabes, & Liew, 2005). Although the research on the direct impact of the parent-child relationship on children's sleep behaviors is scarce, preliminary studies have shown that child perceptions of parents' behavior impacts the parent-child relationship and sleep behavior and, in turn, influences development of poor sleep behaviors in youth (Gangwisch et al., 2010).

Overall, there has been limited research that has looked at the three constructs of sleep, parent-child relationships, and externalizing problems in children together. Supporting studies exist, for example, with Reid and colleagues (2009) examining the relationship between risk factors (e.g., family demographics, child characteristics), degree of parent and family functioning and parenting practices, sleep problems, and internalizing/externalizing behavior in toddlers who are at risk of developing emotional and behavioral problems. Additionally, research also suggests that there is a bidirectional relationship between sleep and externalizing behaviors (Van Dyk et al., 2016). However, the role that all three constructs play simultaneously as well as their importance in children who have already developed emotional and behavioral problems are unknown



and have yet to be examined. Nonetheless, the findings from these studies show that the parent-child relationship likely has an effect on sleep behavior and mental health for youth, especially for healthy children and adolescents. Despite research strongly suggesting that both sleep and parent-child relationships impact externalizing problems and preliminary research indicating that sleep and parent-child relationships are related, there are currently no studies examining the impact of parental relationships on the relationship between sleep and externalizing problems in a clinical child sample. Furthermore, sleep has often been identified as a symptom of mental health. Recent studies, however, are beginning to examine the role of sleep as a precipitant to psychiatric disorders and behaviors, especially in youth (Palmer & Alfano, 2017). Hence, our study presents a more novel approach in exploring sleep as a predictor of externalizing problems in youth with parent-child relationships as a moderator.

### **Present Study**

Despite the work of previous research, further analysis on the relationship between sleep, parent-child relations, and externalizing problems is necessary to better understand the impact of the parent-child relationship on the correlation between sleep and mental health. It is important for us to not only address the detrimental effects of sleep deprivation on children's mental well-being but also examine the impact of other modifiable factors, such as positive and negative parent-child relationships, on sleep and mental health. By conducting a cross-sectional study focusing on evaluating parent-child influences on children's sleep quality and mental health symptoms, there will be a push for advances in innovative evidence-based interventions that target treatment for sleep

deprivation and dysfunction while including parental involvement to fundamentally improve children's mental health symptoms. The findings from this study will help expand our knowledge on how the quality of parent-child relationships could influence sleep and mental health in the clinical child population.

Hence, the present study is using cross-sectional data from a larger study conducted by Van Dyk and colleagues (2016) to achieve the following:

1. Replicate prior research showing a relationship between
  - a. Sleep and externalizing problems
    - i. Hypothesis: Worse sleep problems will be associated with increased externalizing problems.
  - b. Parent-child relationships and externalizing problems
    - i. Hypothesis: Worse parent-child relationships, as measured by low parental warmth, will be associated with increased externalizing problems.
2. Extend upon the limited research examining relationships between parent-child relationships and sleep.
  - a. Hypothesis: Worse sleep will be correlated with worse parent-child relationships.
3. Examine the moderating effect of parent-child relationships on the relationship between sleep problems and externalizing problems in a unique, at-risk sample of children with above average emotional and behavioral problems.
  - a. Hypothesis: There will be a moderating effect of parent-child

relationships on the relationship between sleep disturbances and externalizing problems so that worse parent-child relations will strengthen the relationship between increased sleep disturbances and increased externalizing problems.

## **CHAPTER TWO**

### **METHODS**

#### **Participants**

Participants consisted of 25 school-age children (both male and female) who were presenting to mental health treatment with their caregivers at an outpatient behavioral health clinic in Omaha, Nebraska. Participating children were between the ages of 6 and 11 ( $M = 8.72$ ,  $SD = 1.65$ ). The sample consisted of children and accompanying caregivers with ethnically diverse backgrounds across different household income. To be eligible, participating children were required to be between the ages of 6 and 11, must have been accompanied by their parent or legal guardian, and both parent and child must have been able to speak and understand English. Children were excluded if they were diagnosed with a clinical sleep disorder based on parent-report; diagnosed with a cognitive impairment, developmental disability, or autism; and/or were not living with a parent or primary caregiver or who were a ward of the state. The exclusion criteria were included to eliminate confounding effects on the understanding of the relationship between sleep and parent-child relationships on externalizing behaviors in young children.

#### **Procedure**

Data were collected as part of a larger study that aimed to look at the relationship between sleep and psychopathology symptoms across time at the daily level for children who were presenting to mental health treatment (Van Dyk et al., 2016). Participants

were recruited from the Boys Town Center for Behavioral Health or Boys Town Common Sense Parenting (CSP) Program between January 2014 and February 2015 through referral from providers, fliers, or in-person recruitment from parenting groups. The Boys Town Center for Behavioral Health is an outpatient behavior health clinic that offered individual services to families and children who presented with emotional and behavioral difficulties. The CSP program is an outpatient group, behavioral parent training program involving parents whose children have above average emotional and behavioral problems.

There were two methods of participant recruitment. First, a research assistant invited parents to participate in the study at the beginning of the CSP session. Parents were asked to provide relevant contact information if they had expressed interest in our study. Second, the research assistant provided fliers with information about the study and the researcher's contact information was made available at CSP sessions. A clinician at the Boys Town Center for Behavioral Health also distributed fliers to families and children of the required age range. The fliers provided to families encouraged parents who were interested in the study to contact researchers for more details. Based on the methods of recruitment, 84% of participating families were recruited directly from CSP sessions, 8% were recruited from distributed fliers made available at CSP sessions, and 8% were recruited from distributed fliers at the Boys Town Center for Behavioral Health. Parents who were interested in our study were contacted by the primary investigator via phone to schedule an initial session.

At the initial session of the study, parents and children presented to the lab to meet with a research assistant. Both parents and children received more detailed

information about the study and consent from parents and assent from children were obtained. Children and their accompanying parent or legal guardian were then asked to complete provided baseline measures of sleep behaviors and mental health in a private room. Participants were compensated \$20 in cash for their time at the end of the initial lab visit.

## **Measures**

### ***Demographic Information***

Baseline measures provided at the initial session included a parent-report demographic questionnaire that assessed the child's age, gender, ethnicity, and family socioeconomic information (e.g., household income, parent education). The participating parent or legal guardian was asked to list any of the child's current diagnoses of psychological disorders, medical conditions, and/or prescribed medications.

### ***Subjective Youth Sleep***

#### **Pediatric Daytime Sleepiness Scale**

Baseline measures completed at the initial session also assessed the quality and patterns of the participating child's typical sleep using questionnaires that have been supported by research to be reliable and valid measures of child sleep and sleepiness. Participating children were asked to complete the Pediatric Daytime Sleepiness Scale (PDSS; Drake et al., 2003). The PDSS is an 8-item questionnaire that required responses

to questions on a Likert scale (i.e., 1 – *Always* to 5 – *Never*) assessing behavioral (e.g., “How often do you fall back to sleep after being awakened in the morning?”) and cognitive (e.g., “How often do you think you need more sleep?”) symptoms related to daytime sleepiness. Higher scores indicated greater levels of daytime sleepiness in youth. In prior studies with community samples, youth ages 11 to 15 were found to have an average daytime sleepiness score of 15.3 (Drake et al., 2003). According to the evidence-based assessment criteria, the PDSS is considered to be a well-established measure that has strong psychometric properties (Lewandowski et al., 2011). The present study used the PDSS total score which had acceptable internal consistency in our sample ( $\alpha = .71$ ).

### **Children’s Sleep Habits Questionnaire**

Participating parents were asked to complete the Children’s Sleep Habits Questionnaire (CSHQ; Owens, Spirito, & McGuinn, 2000). The CSHQ is a 45-item multidimensional measurement of youth sleep problems and patterns related to sleep duration, sleep onset delay, bedtime resistance, night wakings, sleep anxiety, sleep-disordered breathing, parasomnias, and daytime sleepiness. The total sleep disruption score was used for the purposes of our study which is a composite of the child’s sleep duration, sleep patterns, and sleep behaviors. The child’s typical sleep duration per day, which included daytime and nighttime sleep, was assessed through parent-report and used as a parent-estimate of how much sleep the child typically obtained each day. The CSHQ is considered to be a well-normed measure based on the evidence-based assessment criteria with excellent psychometric properties (Lewandowski et al., 2011).

The CSHQ total score demonstrated good internal consistency in our sample ( $\alpha = .82$ ). The clinical cutoff for the CSHQ's Total Sleep Disturbance scale is 41.

### ***Objective Youth Sleep***

Average objective sleep duration for youth was measured through an objective measurement using ActiGraph™ wristwatches (analyzed with accompanying ActiSleep software) worn for 14 days (Actigraph, Pensacola, FL). The ActiSleep software converted raw data into various sleep parameters, including objective sleep duration. For school-aged youth, it was recommended that children obtain 9 to 11 hours of sleep per night (National Sleep Foundation 2006 Sleep in America Poll, 2015). Therefore, sleep duration below 9 hours was indicative of deprived sleep in youth. Actigraphs have been validated against polysomnography and are considered the gold-standard for objective measurement of sleep outside of a lab setting (Dayyat et al., 2011).

### ***Parent-Child Relationships***

Participating children were asked to complete the Behavior Assessment System for Children, Second Edition (BASC-2; Reynolds & Kamphaus, 2006). The BASC-2 is a multidimensional questionnaire that measures children's emotional and behavioral functioning with multiple clinical (e.g., hyperactivity, depression, and anxiety) and adaptive (e.g., relations with parents) scales. Items on the BASC-2 are originally coded on a one-to-four Likert scale, ranging from one as "never" to four as "almost always". Parent-child relationships were assessed using the relations with parents adaptive subscale from the BASC-2 (e.g., "My parents listen to what I say," "My parents are



proud of me”) to evaluate the child’s perception of his or her parents’ trust and concern, importance in the family, and status of the parent-child relationship. This subscale is a measure of children’s perception of their parents’ behaviors, which represent only one aspect of parent-child relationships, that are predictive of positive parent-child relationships. Scores of 31 to 40 were considered at risk, while scores of 30 and below were considered clinically significant. The overall BASC-2 is considered to be a well-established measure with good psychometric properties (Reynolds & Kamphaus, 2006).

### ***Typical Youth Externalizing Problems***

Average mental health functioning in youth was assessed at the initial session using comprehensive and well-established measures of child emotional and behavioral symptoms. Participating parents were asked to complete the full version of the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001). The CBCL is a broadband questionnaire that measures maladaptive emotional and behavioral symptoms in youth with strong validity and reliability through supported research (Nakamura, Ebesutani, Bernstein, & Chorpita, 2009). The CBCL yields subscale scores related to DSM diagnoses (e.g., Affective, ADHD, Anxiety, Conduct Problems and Oppositional Defiant scores) in addition to yielding broad scales (e.g., Externalizing Problems, Internalizing Problems, and Total Problems). For the purposes of our present study, we will be examining children’s externalizing problems using the Externalizing Problems Composite scale. Scores of 60 to 64 were considered borderline, while scores of 65 and higher were considered clinically elevated.

## **Analysis Plan**

First, we ran descriptive statistics for demographics, sleep (e.g., sleep duration, daytime sleepiness, overall sleep disruption), parent-child relationships, and externalizing problems. Next, bivariate analyses were conducted with the primary variables of interest (i.e., sleep, parent-child relationships, externalizing problems) to determine associations between these constructs. We explored demographic differences across primary variables, specifically looking at differences in sleep, parent-child relationships, and externalizing problems for age, gender, ethnicity, and family income. A series of hierarchical multiple linear regression analyses were used to examine sleep (entered on the first step) and parent-child relationships (entered on the second step) as individual predictors of externalizing problems. The sleep x parent-child relationship interaction was entered on the third step of the model in order to examine the moderating effect of parent-child relationships on the association between sleep and externalizing problems. A separate regression was used for each sleep construct including daytime sleepiness, average objective sleep duration, and overall sleep disruption. The continuous predictors of child's current sleep problems (i.e., daytime sleepiness, sleep duration, total sleep disruption) and parent-child relationships were centered at the mean to improve interpretation of the linear regression analyses (Jaccard, Wan, & Turrisi, 1990). We ran tests for assumptions of our hierarchical multiple linear regression analyses; however, these tests were not representative of assumptions of normality for the present study due to a small sample. Hence, we were unable to evaluate covariates and correct for observed abnormalities in our analyses. As a result, we ran both parametric and nonparametric correlations and found that they were identical. Therefore,

results from parametric correlations were presented. Analyses were conducted using the Statistical Package for the Social Sciences (SPSS) Version 25.0 (IBM, 2017).

Effect sizes were examined to determine meaningful relationships within each linear regression analysis. An a priori power analysis was conducted using G\*Power (Faul, Erdfelder, Buchner, & Lang, 2009) with an alpha equal to .05 (p-value) for 80% power and three predictors. According to the a priori power analysis, our study's sample would have needed to consist of 77 participants in order to have 80% power to detect a significant medium effect size ( $f^2 = .15$ ) at an alpha of .05 with three predictors (i.e., child's sleep, parent-child relationship, and the interaction between the two predictors). Since our current sample size consisted of 25 participants, our analyses were underpowered. A priori analyses indicated that we would need a large effect size of approximately 0.5 to detect significance due to our small sample size. Hence, we calculated effect sizes for our analyses in addition to evaluating p-values. For the purposes of our study, we considered a medium effect size ( $f^2 = .15$ ) to be meaningful.

## CHAPTER THREE

### RESULTS

#### **Descriptive Statistics and Preliminary Analyses**

Participating children were between the ages of 6 and 11 ( $M = 8.72$ ,  $SD = 1.65$ ), with 64 % of the children identified as male and 36% as female. The sample consisted of children and accompanying caregivers with ethnically diverse backgrounds, including 11 individuals reported as European American (44%), 6 multiracial (24%), 5 African American (20%), 2 Hispanic (8%), and 1 American Indian (4%). Parent-report of yearly household income showed that 48% of the sample fell below the median household income in the area of \$50,000. Descriptive statistics also indicated that 84% of participating children had clinically significant sleep disturbances, 100% received less than the recommended nine hours of sleep per night, 12% had borderline or clinical levels of poor parent-child relationships, and 64% had borderline or clinically significant externalizing problems. Clinical cutoffs have not been established for the pediatric daytime sleepiness measure; however, on average, these youth had high levels of daytime sleepiness than found in community samples (Drake et al., 2003). Refer to Table 1 for a complete summary of participating child and parent demographics and Table 2 for descriptives on primary independent and dependent variables.

**Table 1.** Demographics of Participating Families (*N* = 25)

Demographics	<i>N</i> (%)
Child's Age	8.72 (1.65)
Child's Sex	
Male	16 (64%)
Female	9 (36%)
Ethnicity	
White	11 (44%)
Black	5 (20%)
Hispanic	2 (8%)
American Indian	1 (4%)
Multiracial	6 (24%)
Household's Income	
Under 10,000	3 (12%)
10,000-19,999	1 (4%)
20,000-29,999	2 (8%)
30,000-39,999	4 (16%)
40,000-49,999	2 (8%)
50,000-74,999	2 (8%)
75,000-99,999	5 (20%)
100,000-150,000	5 (20%)
Over 150,000	1 (4%)

**Table 2.** Descriptives for Primary Variables (Total Sleep Disturbance, Daytime Sleepiness, Average Objective Sleep Duration, Relations with Parents, and Externalizing Problems)

	<i>M</i>	<i>SD</i>	min	max
<b>Total Sleep Disturbance</b>	49.46	9.09	37.00	70.00
Clinically Elevated ( $T > 41$ )	21 (84%)			
<b>Daytime Sleepiness*</b>	15.96	6.01	6.00	28.00
<b>Average Objective Sleep Duration</b>	7.62	.60	6.33	8.84
Under 9 hours	25 (100%)			
<b>Relations with Parents</b>	46.95	13.48	12.00	62.00
Borderline Elevated ( $T = 31-40$ )	3 (12%)			
Clinically Elevated ( $T > 31$ )	2 (8%)			
<b>Externalizing Problems</b>	61.92	8.03	44.00	73.00
Borderline Elevated ( $T = 60-64$ )	16 (64%)			
Clinically Elevated ( $T > 64$ )	11 (44%)			

*Note.* \*Clinical cutoffs not yet established. Mean score from previous study with a community sample of 6<sup>th</sup> graders is 13.6 ( $SD = 6.4$ ) (Drake et al., 2003).

Demographic differences were examined for all primary variables. In one-way ANOVA analyses, total sleep disturbance, daytime sleepiness, average objective sleep duration, and relations with parents did not differ by ethnicity. Age and average objective sleep duration were significantly correlated as developmentally expected ( $p < .01$ ), where sleep duration tended to decrease as age increased. ANOVA analyses indicated that there were significant gender differences for daytime sleepiness, average objective sleep duration, and relations with parents (all  $p < .05$ ). Female children generally reported more daytime sleepiness yet received more average sleep, and also reported better relationships with their parents compared to male children. Further, a

one-way ANOVA analysis revealed that total sleep disturbance significantly differed ( $p < .05$ ) by income. Children from families earning under the median income of \$50,000 experienced more total sleep disturbance than children from families earning over the median income of \$50,000. Refer to Tables 3.1 to 3.5 for demographic differences between age, gender, ethnicity, and income for all primary variables.

**Table 3.1.** Demographic Differences for Total Sleep Disturbance

Demographic	Mean (SD)	F-value	P-value	<i>r</i>	<i>d</i>
<b>Age</b>	-	-	.548	-.126*	-
<b>Gender</b>	-	.287	.597	-	.238*
Male	48.72 (10.43)	-	-		
Female	50.78 (6.36)	-	-		
<b>Ethnicity</b>	-	1.710	.204	-	.537**
White	46.82 (7.39)	-	-		
Non-white	51.54 (9.99)	-	-		
<b>Income</b>	-	4.622	.042	-	.851***
Under median income in 2014	53.25 (10.52)	-	-		
Over median income in 2014	45.96 (6.01)	-	-		

*Note.* \*small effect; \*\*medium effect; \*\*\*large effect.

**Table 3.2.** Demographic Differences for Daytime Sleepiness

Demographic	Mean (SD)	F-value	P-value	<i>r</i>	<i>d</i>
<b>Age</b>	-	-	.916	-.022*	-
<b>Gender</b>	-	4.416	.047	-	.881***
Male	14.19 (5.72)	-	-		
Female	19.11 (5.44)	-	-		
<b>Ethnicity</b>	-	.951	.340	-	.393*
White	14.64 (5.94)	-	-		
Non-white	17.00 (6.08)	-	-		
<b>Income</b>	-	.927	.346	-	.385*
Under median income in 2014	17.17 (6.07)	-	-		
Over median income in 2014	14.85 (5.97)	-	-		

*Note.* \*small effect; \*\*medium effect; \*\*\*large effect.



**Table 3.3.** Demographic Differences for Average Objective Sleep Duration

Demographic	Mean (SD)	F-value	P-value	<i>r</i>	<i>d</i>
<b>Age</b>	-	-	.004	-.556***	-
<b>Gender</b>	-	6.775	.016	-	1.059***
Male	444.72 (30.34)	-	-		
Female	479.63 (35.39)	-	-		
<b>Ethnicity</b>	-	2.637	.118	-	.644**
White	470.00 (39.12)	-	-		
Non-white	447.30 (30.85)	-	-		
<b>Income</b>	-	3.770	.065	-	.775**
Under median income in 2014	443.57 (35.71)	-	-		
Over median income in 2014	469.95 (32.24)	-	-		

*Note.* \*small effect; \*\*medium effect; \*\*\*large effect.

**Table 3.4.** Demographic Differences for Relations with Parents

Demographic	Mean (SD)	F-value	P-value	<i>r</i>	<i>d</i>
<b>Age</b>	-	-	.224	.293**	-
<b>Gender</b>	-	6.317	.022	-	1.413***
Male	42.31 (13.65)	-	-		
Female	57.00 (5.48)	-	-		
<b>Ethnicity</b>	-	.049	.828	-	.100*
White	46.13 (15.76)	-	-		
Non-white	47.55 (12.34)	-	-		
<b>Income</b>	-	.024	.880	-	.071*
Under median income in 2014	46.38 (14.13)	-	-		
Over median income in 2014	47.36 (13.67)	-	-		

*Note.* \*small effect; \*\*medium effect; \*\*\*large effect.

**Table 3.5.** Demographic Differences for Externalizing Problems

Demographic	Mean (SD)	F-value	P-value	<i>r</i>	<i>d</i>
<b>Age</b>	-	-	.747	-.068*	-
<b>Gender</b>	-	.705	.410	-	.360*
Male	62.94 (8.57)	-	-		
Female	60.11 (7.08)	-	-		
<b>Ethnicity</b>	-	.302	.588	-	.219*
White	60.91 (8.61)	-	-		
Non-white	62.71 (7.78)	-	-		
<b>Income</b>	-	1.209	.283	-	.441*
Under median income in 2014	63.75 (7.76)	-	-		
Over median income in 2014	60.23 (8.21)	-	-		

*Note.* \*small effect; \*\*medium effect; \*\*\*large effect.

### **Correlations of Sleep, Externalizing Problems, and Parent-Child Relationship**

Refer to Table 4 for parametric correlations of parent-reported children's total sleep disturbance, child-reported daytime sleepiness, average objective sleep duration, child-reported relations with parents, and parent-reported externalizing problems. Table 4 includes information on relationships demonstrating statistical significance ( $p < .05$ ) in addition to effect sizes ( $r \geq .10$ , small effect;  $r = .30$  to  $.49$ , medium effect;  $r \geq .50$ , large effect). In sum, based on relationships demonstrating a medium to large size effect, total sleep disturbance was correlated with daytime sleepiness, and externalizing problems; average objective sleep duration was correlated with relations with parents; and relations with parents was correlated with externalizing problems.

**Table 4.** Parametric Correlations between Primary Variables

Primary Variables	Pediatric Daytime Sleepiness	Average Objective Sleep Duration	Relations with Parents	Externalizing Problems
Total Sleep Disturbance	.436*	-.109	.061	.162
Pediatric Daytime Sleepiness	-	-.003	-.055	-.072
Average Objective Sleep Duration		-	.447	-.197
Relations with Parents			-	-.466*

Note. \*\* $p < .01$ ; \* $p < .05$ .

### **Parent-Child Relationships as a Moderator of Sleep and Externalizing Problems**

Regression analyses were used to analyze the effects of total sleep disturbance, daytime sleepiness, average objective sleep duration, relations with parents, and the interaction between each sleep variable and relations with parents on children's externalizing problems. A separate regression analysis was conducted for each sleep variable (i.e., total sleep disturbance, daytime sleepiness, average objective sleep duration). In each separate analysis, the sleep variable was entered on the first step, while the second step consisted of relations with parents, and the third step consisted of the interaction between the sleep variable and relations with parents.

#### ***Total Sleep Disturbance***

Results from the regression analysis with externalizing problems as the dependent variable revealed that parent-reported total sleep disturbance, which was

entered on the first step, did not account for a significant amount of variance in children's externalizing problems ( $R^2 = .056$ ,  $F(1, 17) = 1.012$ ,  $p > .05$ ). There was a small effect of sleep disturbance on children's externalizing problems ( $f^2 = .059$ ). Relations with parents was entered on the second step and accounted for a marginally significant amount of change in variance in predicting externalizing problems,  $R^2\Delta = .191$ ,  $F(1, 16) = 2.627$ ,  $p = .061$ . When taking sleep disturbance into consideration, relations with parents had a medium effect size ( $f^2 = .236$ ) on externalizing problems, such that more positive relationships with parents was associated with decreased externalizing problems. The total sleep disturbance and relations with parents interaction was entered on the third step and did not account for a significant amount of change in variance in externalizing problems ( $R^2\Delta = .006$ ,  $F(1, 15) = 1.697$ ,  $p > .05$ ) and yielded a small effect size ( $f^2 = .006$ ). Refer to Table 5 for results of the multiple linear regression model.

**Table 5.** Results of a Multiple Regression Analysis Predicting Externalizing Problems from Total Sleep Disturbance, Relations with Parents, and Their Interaction

	<i>b</i>	$\beta$	95% CI	<i>p</i>	<i>t</i>	$\Delta R^2$	$f^2$
<b>Step 1</b>						.056	
TSD	.229	.237	[-.251, .708]	.329	1.006		.059*
<b>Step 2</b>						.191	
TSD	.189	.196	[-.256, .635]	.382	.900		-
RWP	-.282	-.439	[-.578, .015]	.061	-2.015		.236**
<b>Step 3</b>						.006	
TSD	.242	.251	[-.319, .803]	.372	.920		-
RWP	-.285	-.443	[-.592, .023]	.067	-1.975		-
TSD x RWP	.005	.096	[-.023, .032]	.730	.352		.006*

*Note.* Total Sleep Disturbance represents children’s T-score for total sleep problems and behaviors that cause disturbances in sleep. Total Sleep Disturbance is denoted as TSD and Relations with Parents is denoted as RWP. TSD x RWP is the interaction between children’s Total Sleep Disturbance and their Relations with Parents. \*small effect; \*\*medium effect; \*\*\*large effect.

### *Pediatric Daytime Sleepiness*

A regression analysis with externalizing problems as a dependent variable indicated that daytime sleepiness, which was entered on the first step, did not account for a significant amount of variance in externalizing problems for children ( $R^2 = .005$ ,  $F(1, 17) = .088$ ,  $p > .05$ ) and yielded a small effect size ( $f^2 = .005$ ). Relations with parents, entered on the second step, accounted for a marginally significant amount of change in variance in children’s externalizing problems,  $R^2\Delta = .207$ ,  $F(1, 16) = 2.157$ ,  $p = .057$ , with a medium effect size ( $f^2 = .261$ ). More positive relationships with parents was associated with fewer externalizing problems. The interaction between daytime sleepiness and relations with parents was entered on the third step and was not a

significant predictor of externalizing problems for children ( $R^2\Delta = .001$ ,  $F(1, 15) = 1.356$ ,  $p > .05$ ). This relationship accounted for a small effect size ( $f^2 = .001$ ). Refer to Table 6 for results of the multiple linear regression model.

**Table 6.** Results of a Multiple Regression Analysis Predicting Externalizing Problems from Pediatric Daytime Sleepiness, Relations with Parents, and Their Interaction

	<i>b</i>	$\beta$	95% CI	<i>p</i>	<i>t</i>	$\Delta R^2$	$f^2$
<b>Step 1</b>						.005	
PDS	.098	.072	[-.596, .791]	.770	.297		.005*
<b>Step 2</b>						.207	
PDS	.077	.057	[-.562, .717]	.801	.257		-
RWP	-.292	-.455	[-.595, .010]	.057	-2.052		.261**
<b>Step 3</b>						.001	
PDS	.091	.067	[-.606, .788]	.372	.278		-
RWP	-.290	-.452	[-.606, .026]	.069	-1.957		-
PDS x RWP	.002	.033	[-.034, .039]	.894	.136		.001*

*Note.* Pediatric Daytime Sleepiness is denoted as PDS and Relations with Parents is denoted as RWP. PDS x RWP is the interaction between children’s Pediatric Daytime Sleepiness and their Relations with Parents. \*small effect; \*\*medium effect; \*\*\*large effect.

### *Average Objective Sleep Duration*

Regression analysis involving externalizing problems as the dependent variable showed that average objective sleep duration entered on the first step accounted for a marginally significant amount of variance in children’s externalizing problems,  $R^2 = .193$ ,  $F(1, 17) = 4.059$ ,  $p = .060$ . A medium effect size was found ( $f^2 = .239$ ), such that less overall sleep was associated with more externalizing problems. When taking

average objective sleep duration into consideration, relations with parents entered on the second step did not account for a significant amount of variance in children’s externalizing problems ( $R^2\Delta = .067$ ,  $F(1, 16) = 2.807$ ,  $p > .05$ ) and yielded a small effect size ( $f^2 = .072$ ). Further, average objective sleep duration was no longer a significant predictor of externalizing problems when taking relations with parents into effect. Finally, the interaction between average objective sleep duration and relations with parents, which was entered on the third step, did not account for a significant amount of variance in children’s externalizing problems ( $R^2\Delta = .013$ ,  $F(1, 15) = 1.873$ ,  $p > .05$ ). Adding this interaction term to the model yielded a small effect size ( $f^2 = .013$ ). Refer to Table 7 for the results of the multiple linear regression model.

**Table 7.** Results of a Multiple Regression Analysis Predicting Externalizing Problems from Average Objective Sleep Duration, Relations with Parents, and Their Interaction

	<i>b</i>	$\beta$	95% CI	<i>p</i>	<i>t</i>	$\Delta R^2$	$f^2$
<b>Step 1</b>						.193	
AOSD	-.126	-.439	[-.258, .006]	.060	-2.015		.239**
<b>Step 2</b>						.067	
AOSD	-.077	-.269	[-.233, .079]	.311	-1.046		-
RWP	-.199	-.310	[-.549, .151]	.246	-1.203		.072*
<b>Step 3</b>						.013	
AOSD	-.077	-.267	[-.238, .084]	.327	-1.014		-
RWP	-.243	-.379	[-.649, .162]	.220	-1.280		-
AOSD x RWP	-.002	-.132	[-.010, .006]	.615	-.514		.013*

*Note.* Average Objective Sleep Duration represents children’s average duration of sleep based on actigraphy from daily study. Average Objective Sleep Duration is denoted as AOSD and Relations with Parents is denoted as RWP. AOSD x RWP is the interaction between children’s Average Objective Sleep Duration and their Relations with Parents. \*small effect; \*\*medium effect; \*\*\*large effect.



## **CHAPTER FOUR**

### **DISCUSSION**

#### **Overall Findings**

The results of the study indicate that a positive relationship with parents can be a protective factor against externalizing problems, even for youth who, on average, report experiencing poor sleep. Findings indicate that children who have positive relationships with their parents tend to experience fewer externalizing problems than those who have poor relationships with their parents. These findings support existing research on perceived parent-child relationships as predictors for youth externalizing problems (Mesman & Koot, 2001). Research has shown that there are detrimental effects of negative parent-child relationships on management of child externalizing problems, suggesting that parent-child conflict can exacerbate children's externalizing problems (Gerard, Krishnakumar, & Buehler, 2006). Based on the present findings, it is likely that the quality of the parent-child relationship, and specifically components of the child's perceived importance in the family, status of parent-child relationships, and child's perceived degree of trust and concern from parents are related to externalizing problems. Additionally, the present study extends previous research on parent-child relationships and externalizing problems by examining the relationship between the two variables together within the context of sleep problems among school-aged children presenting to mental health treatment.

Findings from the study indicate that parent-child relationships are also important for youth with parent- and child-perceived poor sleep, suggesting that evidence-based

treatment interventions that work toward improving or strengthening parent-child relationships may be beneficial for these individuals. Interestingly, when average objective sleep duration was taken into account, parent-child relationships were not predictive of externalizing problems. This may be because average objective sleep duration and parent-child relations appear to be strongly correlated themselves, leaving less variance to be accounted for in regard to externalizing problems. The finding that average objective sleep is related to parent-child relations and, when examined independently, parent-child relations is related to externalizing problems suggests the possibility of alternative relationships than those examined in this present study. Specifically, future research should examine these variables in longitudinal and/or mediational analyses to determine the possibility that short sleep worsens parent-child relations which in turn exacerbates externalizing problems or, conversely, that poor parent-child relations leads to worse sleep which then contributes to these problems. Nonetheless, both average objective sleep duration and parent-child relationships appear to matter in children presenting to mental health treatment. Thus, clinical recommendations suggesting the need to target both parent-child relations and sleep in order to see improvements in youth's externalizing behaviors remain.

Interestingly, results from the study did not indicate significant relationships between child- and parent-reported sleep problems and externalizing problems, although average objective sleep duration was found to be a marginally significant predictor in the regression analysis before parent-child relations was taken into consideration. The finding of non-significant relationships between externalizing behaviors and child- and parent-reported sleep problems but significant findings with average objective sleep

duration may be related to differing perceptions in sleep. All children in the study were sleep-deprived on average when objectively measured. However, all did not report clinically significant or problematic sleep. In other words, it is possible that some youth are more resilient in that, despite obtaining inadequate sleep, they and their parents do not perceive this to be problematic. These results indicate that reports of subjective experiences of sleep are important in identifying different perceptions among parents and youth on the impact that poor sleep has on mental health. Furthermore, subjective sleep reports are more commonly used in clinical settings to determine additional screening and treatment is warranted, which makes examining subjective reports important in a research context. Either way, the findings from this study are not consistent with prior research on the significant impact of sleep problems (both subjectively and objectively reported) on externalizing problems among youth (Roberts et al., 2009; Lo et al., 2016; Sadeh, Gruber, & Raviv, 2002; Steenari et al., 2003; Curcio, Ferrara, & De Gennaro, 2006; Van Dyk et al., 2016; Wheaton, Jones, Cooper, & Croft, 2018). However, this sample differs from those examined in the past in that all youth were presenting with existing, above-average emotional and behavioral problems and this study simultaneously examined parent-report, child-report, and objective measures of sleep.

Although results suggest that average objective sleep duration has significant effects on children's externalizing problems, parent-child relationships do not appear to moderate this effect. As previously mentioned, correlational analyses indicated that average objective sleep duration and parent-child relationships were highly correlated, suggesting that the significant amount of shared variance between average objective

sleep duration and parent-child relationships resulted in a weaker associations between average objective sleep duration and externalizing behaviors. As a result, sleep duration was no longer predictive of worse externalizing problems when taking into consideration parent-child relationships. Since most youth in the sample were generally sleep deprived (i.e., receiving on average less than 9 hours of sleep), it is possible that average objective sleep duration may have mattered less than parent-child relationships in predicting greater levels of externalizing problems. This finding may imply that once youth reach a certain level of sleep deprivation, further deprivation of sleep would not exacerbate their externalizing problems.

It is also possible that objective measures of sleep are more indicative of changes in brain functioning, and subsequently behavior, than subjective measures. For example, the present study sample was generally sleep deprived and, thus, when sleep varied amongst individuals it varied all within a clinical range. It is possible that at a certain point, parents and children perceive sleep to be poor but are less discriminating about the magnitude of “poor”. This may be particularly true if sleep problems are seen as a secondary problem, which may be the case for families presenting to mental health treatment to address emotional and behavioral concerns. However, it is possible that there are functional differences in brain functioning that occur at these varying levels of objective short sleep. In this case, objective sleep may be more indicative of an individual’s brain responses, such as processes in the amygdala and/or frontal lobe, and more reflective of the individual’s level of emotional regulation and/or impulsivity. It is important to examine both subjective and objective measures of sleep in order to understand the biological and perceptual impacts of sleep on externalizing behaviors.

Hence, this study partially supports previous research on the significant effects of objectively decreased sleep and further explores perceived negative relations with parents among youth with mental health problems.

### **Clinical Implications**

Findings from the present study have important implications for future research and clinical practice. Based on findings from the current study, mental health professionals should assess the impact of sleep, quality of the parent-child relationship, and externalizing problems on overall functioning for children presenting to mental health treatment through brief screeners, such as the BEARS Sleep Screening Tool (e.g., measures child's sleep; Owens & Dalzell, 2005), the Parent-Child Dysfunctional Interaction (P-CDI; Barroso, Hungerford, Garcia, Graziano, & Bagner, 2016) subscale of the Parenting Stress Index, Short Form (e.g., measures parent-child relationships), and the Youth Externalizing Problems Screener (YEPS; Renshaw & Cook, 2018) (e.g., measures child's externalizing problems). Assessment is important when children present to mental health treatment because these factors (i.e., sleep, parent-child relationship, and externalizing problems) appear to contribute to mental health functioning in varying ways. Objective assessment of sleep appears to be important in youth, however, may be more difficult within clinical settings due to costs of actigraphs, failure of insurance companies to reimburse for this time, and burden on patients and families. However, results from the present study inferred that sleep duration, through objective measurement, had some significant impact on children's externalizing problems, while subjective measurements of sleep did not have a significant impact on

youth's externalizing behaviors. Therefore, it is important for mental health professionals to consider and encourage an objective measurement of sleep in order to gain a more comprehensive understanding of any differences that may occur between the child's brain responses and perceptual responses to their average duration of sleep. New research on the validity of consumer wearable devices in tracking sleep in youth may make these recommendations even more feasible (Lee et al., 2019).

Research has indicated that children presenting to sleep clinics with a primary presenting problem of sleep have high rates of comorbid externalizing problems (Van Dyk, Becker, & Byars, 2019). The current study found the converse – that children presenting to mental health treatment have high rates of sleep problems and that average objective sleep duration is predictive of worse externalizing problems. However, when parent-child relations are taken into consideration, the relationship between objective sleep and externalizing problems is much weaker. Consequently, sleep did not appear to matter above and beyond the effect of parent-child relationships because of its significant impact on externalizing problems. As a result, working to strengthen parent-child relationships may be a more beneficial first-line treatment than increasing sleep duration for youth presenting to mental health treatment. However, throughout the course of treatment, providers should target sleep as this was also predictive of externalizing problems and parent-child relationships. This treatment would include addressing bedtime problems, decreasing sleep onset latency, reducing night awakenings, and increasing sleep duration. Hence, findings from the current study imply that both child psychologists and behavioral sleep medicine providers should aim to assess for externalizing problems and consider including strategies that would improve

the parent-child relationship into treatment so that youth's externalizing problems are subsequently improved.

Previous research has also shown that sleep has significant effects on youth's cognitive and executive functioning, and neurobehavioral impairments (e.g., processing speed, subjective alertness, and sustained attention) in addition to their externalizing problems (Sadeh, Gruber, & Raviv, 2002; Wheaton, Jones, Cooper, & Croft, 2018). Although outcomes from the current study were only consistent with this research in regard to average objective sleep duration, the study found that youth who actually received a poor amount of sleep had worse externalizing problems. Hence, improving sleep in the context of mental health treatment can potentially improve youth's brain functioning (i.e., cognitive and/or executive functioning), reduce externalizing behaviors caused by certain brain responses (e.g., amygdala, frontal lobe), and improve neurobehavioral processes (e.g., subjective alertness, sustained attention). Misperceptions of poor sleep from parents and children can be corrected through psychoeducation, objective measurement of sleep duration, and/or improvement of sleep behaviors to address significant differences between perceived poor sleep and objective measurements of poor sleep. Therefore, treatment plans should aim to treat any sleep-related problems for children presenting to mental health treatment to improve children's baseline functioning and possibly correct misperceptions to ensure that treatment through the use of evidence-based interventions is more effective.

### **Limitations and Future Directions**

The most significant limitation to the current study was the small sample size.

Because the study was underpowered, it is difficult to determine if nonsignificant findings were truly indicative of no relationship or if this was a result of the small sample size. Effect sizes were examined to supplement p-values. Additionally, although underpowered, significant relationships were still found in the present study due to medium to large effect sizes, which further emphasized the importance of these specific relationships. Further, the small sample size limits our ability to widely generalize findings and more research is needed to confirm the effects found. The small sample size also limited our ability to detect violations to assumptions of normality, as the non-linearity and potential outliers observed in the analyses may not be best representations and may not be generalizable across the youth population presenting to mental health treatment. However, effect sizes were clearly large enough to detect some significant relationships in our sample despite the small sample size. Overall, replication of the present findings is needed using larger samples.

Correlational conclusions from this study were also limited to data collected at baseline and causal relationships cannot be determined due to the cross-sectional design. Furthermore, we were unable to evaluate covariates in the full model due to being underpowered. Limitations also exist around subjective data collection through responses from participants, suggesting potential response biases. Our study examined reports of subjective sleep, rather than just objective reports, due to the importance of exploring differences between subjective experiences and perceptions as they affect different aspects of mental health (Van Dyk, 2016). Additionally, subjective reports of sleep tend to be more clinically relevant as it aimed to measure different perceptions in severity and impact of sleep problems on mental health outcomes and is more relied on in clinical



settings for screening and treatment purposes as the utilization of objective sleep measurements is rare. Nonetheless, the measurement of parent-child relationships relied on children's perspectives on their relationships with their parents. This type of measurement does not take into consideration parent perspective, which may be problematic as parents are often primary reporters in health care and mental health settings. There are more objective measures of parent-child relationships such as observation tasks (e.g., Atypical Maternal Behavior Instrument for Assessment and Classification (AMBIANCE; (Goldberg, Benoit, Blokland, & Madigan, 2003) that should be considered in future investigations. A strength of the study was the objective measurement of sleep that was supplemented by both parent- and child-report measures. This allowed for an examination of not only true sleep duration but perceptions of poor sleep which clearly differed.

Future research is needed to continue the investigation into these relationships among youth experiencing mental health problems. It is likely that parent-child relationships have effects on other aspects of youth sleep and mental health, including, but not limited to, internalizing problems and/or the combination of externalizing and internalizing problems. It is also possible that other similar variables may be related to the relationship between sleep and mental health, which can include other parenting practices, parenting stress, and/or stress related to separation between parents. Therefore, it is recommended that prospective research also focus on examining the relationship between sleep problems, perceived and objective observations of parent-child relationships, and other mental health variables. Furthermore, future research should also consider including longitudinal examinations or experimental studies to establish

temporal relationships and causality between sleep variables, relations with parents, and youth externalizing problems. Moreover, prospective studies should further explore a mediation between objective sleep duration and parent-child relationships with externalizing problems. It would also be interested to determine whether variations of sleep duration above normal sleep (i.e., in a sample of youth who are not sleep deprived) and/or perceived sleep problems would indicate stronger and more significant relationships with externalizing problems among a clinical youth sample. Future research with larger samples should also look into controlling for age, gender, ethnicity, and family income as we were unable to evaluate covariates in the full model of the present study. Clinical interventions would also be useful in determining effects of strengthening parent-child relationships on children's externalizing behavior and sleep, such as examining if improving parent-child relationships would also improve externalizing problems in youth with sleep or mental health problems.

### **Conclusion**

Greater average objective sleep duration is related to better parent-child relationships and perceiving more positive relationships with parents is related to fewer externalizing problem in children. Further, objectively shorter sleep duration is related to worse externalizing problems unless parent-child relationships are taken into consideration. However, parent-child relationships do not appear to influence the relationship between poor sleep and externalizing problems. Nonetheless, positive parent-child relationships were found to have some significant influence on youths' level of externalizing behaviors. This study helps expand the understanding of significant

effects that self-perceived sleep, parent-perceived sleep, and average objective sleep duration have on children's externalizing problems. Findings from the study have clinical implications for children presenting with externalizing problems. Specifically, providers should aim to improve mental health treatment by enhancing parent-child relationships and reducing sleep problems as first priority. Additionally, behavioral sleep medicine and other mental health providers should subjectively and objectively assess and target improvement of sleep problems and parent-child relationships in addition to correcting misperceptions of sleep quality in order to better manage sleep-related behavioral problems, reduce externalizing problems, and improve overall mental health treatment. Future research on these relationships, particularly in larger samples, is necessary to further understand the potential significant effects surrounding perceptions of the parent-child relationship, sleep, and externalizing problems.

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