The Investigation of Sleep Patterns in Relation to Interpersonal Violence Victimization and Mental Health in Adolescent Girls

Rachel Langevin[1], Sebastian Kay[1], Teresa Pirro[1], Malka Hershon[1,2], Marie-Hélène Pennestri[1,2], Martine Hébert, PhD[3,4]

[1]Department of Educational and Counselling Psychology, McGill University, Quebec, Canada
[2]Hôpital en santé mentale Rivière-des-Prairies (CIUSSS-NIM), Quebec, Canada
[3]Département de sexologie, Université du Québec à Montréal, Quebec, Canada
[4]Tier 1 Canada Research Chair on Interpersonal Trauma and Resilience

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All correspondence for this article should be addressed to Martine Hébert, Département de sexologie, Université du Québec à Montréal, C.P. 8888, Succursale Centre-Ville, Montréal, Québec, Canada, H3C 3P8. Phone: 1-514-987-3000 #5697. Fax : 1-514-987-6787. Email: hebert.m@uqam.ca

Authors Contributions

Dr. Rachel Langevin: Study design, data analysis, interpretation of results, and preparation of the manuscript. Sebastian Kay: Data analysis, interpretation of results, and preparation of the manuscript. Teresa Pirro: Interpretation of results, and preparation of the manuscript. Malka Hershon: Interpretation of results, and preparation of the manuscript. Dr. Marie-Hélène Pennestri: Interpretation of results, and preparation of the manuscript. Dr. Martine Hébert: Study design, data collection, interpretation of results, and preparation of the manuscript. All authors have approved the final version of the article.

Abstract

Empirical studies reveal that interpersonal violence victimization is a highly prevalent phenomena in youth and is associated with a host of difficulties, including mental, physical, and behavioral issues. Sleep, a developmentally fundamental process, is implicated in these unfavourable effects. Despite this, little is known about the interplay between interpersonal violence victimization, sleep, and mental health in adolescent girls, who are at greater risk of victimization, sleep problems, and mental health difficulties than boys. **Objective:** The aim of the current study was to identify distinct patterns of sleep problems to understand how they are associated with interpersonal violence victimization and key mental health outcomes, namely dissociation and emotional dysregulation. **Method:** Latent class analyses were conducted on a sample of 706 adolescent girls aged 14-18 (88% of Canadian descent), who completed an online survey. **Results:** Three classes of sleep were identified: *Poor*, *Moderate*, and *High Quality Sleep*. Controlling for post-traumatic stress disorder, classes were found to differ regarding childhood sexual abuse, community violence, and emotional abuse. In addition, exposure to community violence was associated with dissociation only among girls in the *Poor Quality Sleep* class, indicating a moderation effect of sleep. **Conclusions:** The findings of this study, while awaiting replication with a more diverse sample, highlight the continued need to understand the interplay between interpersonal violence and sleep quality, which can help to inform trauma-focused clinical interventions.

Keywords. Interpersonal violence victimization; sleep; sleep difficulties; adolescent girls; latent classes analyses

Clinical impact statement

Interpersonal violence is highly prevalent and detrimental to adolescents' health. Our study confirms its negative impact on adolescent girls' sleep and mental health. In this context, universal prevention campaigns are warranted to reduce interpersonal violence and foster positive relationships within families, but also within communities. For girls suffering from sleep problems following a traumatic event, trauma-focused or sleep-focused interventions could be offered as studies show that both are helpful in treating sleep disturbances in this population. Furthermore, many adolescent girls in our study, victimized or not, reported suboptimal sleep. Thus, universal campaigns on positive sleep habits may be warranted.

The Investigation of Sleep Patterns in Relation to Interpersonal Violence Victimization and Mental Health in Adolescent Girls

Interpersonal violence victimization is defined as "any violent act by a person or persons against another" (Brotto et al., 2017), and encompasses a wide range of experiences from child maltreatment to exposure to community violence or war. In a populational sample of youth, Cyr et al. (2014) found that 68% of children and adolescents were exposed to at least one form of interpersonal violence in their lifetime. Recently, Scardera et al. (2023) found that 66.8% of their representative cohort of Quebec youth were exposed to at least one form of probable child maltreatment assessed prospectively (sexual, physical, or psychological abuse, neglect, exposure to family violence). Experiences of interpersonal violence have been associated with several mental, physical, and behavioral health problems, such as post-traumatic stress symptoms, depression, dissociation, emotional dysregulation, and at-risk behaviors (Maloney et al., 2023; Parent et al., 2022). Furthermore, recent systematic reviews show a robust association between interpersonal violence victimization and sleep problems across the lifespan (Brown et al., 2022; Gallegos et al., 2021). These sleep problems may play a key role in exacerbating difficulties among survivors of interpersonal violence (Hertenstein et al., 2019; Palagini et al., 2019), but further studies are needed to expand our understanding of the interplay between interpersonal violence victimization, sleep, and mental health, especially among youth. The current study will examine patterns of sleep problems among adolescent girls, and how previous experiences of interpersonal violence are associated with these sleep patterns and with key mental health outcomes.

Sleep in Adolescence

Sleep-wake patterns evolve quite significantly across the lifespan, with specific challenges among different developmental stages (Illingworth, 2020). Adolescence is characterized by a delayed sleep-wake cycle that is mostly explained by a shift of circadian rhythm later at night (Illingworth, 2020). Therefore, adolescents naturally tend to go to sleep and fall asleep later at night, resulting in a

misalignment of their biological preference and external demands. Indeed, because of environmental factors, such as early school scheduling, adolescents often compensate by adopting different sleep patterns during weekdays and weekends, a phenomenon known as social jetlag. Combined with other psychosocial factors, such as electronic media use in the evening, these elements commonly result in sleep deprivation (Galland et al., 2018). Since women and adolescent girls typically report lower sleep quality and more sleep problems, adolescent girls are at increased risk of sleep deprivation compared to boys (Forest et al., 2022).

Yet studies have underscored important variability in youth as previous work using latent class analyses (LCA) have identified different sleep profiles. For example, Yue et al. (2022) found three latent classes of sleep problems (e.g., self-reported insomnia and daytime sleepiness) in their large sample of Chinese youth. Troxel et al. (2019) identified three to four classes in their longitudinal study of 1,850 Californian youth depending on the sleep dimension considered. Most LCA conducted in this study resulted in three classes with low, moderate, and high levels on a specific sleep dimension (e.g., duration, variability, quality). Troxel et al. (2022) identified four sleep classes based on self-reported quality, duration, and presence of social jetlag in their sample of about 3,000 Californian youth: 1) good sleepers (15%), 2) untroubled poor sleepers (34%), 3) troubled moderately good sleepers (35%), and 4) poor sleepers (15%). Girls were overrepresented in the two classes highlighting greater distress (classes 3 and 4). Thus, empirical evidence supports the presence of heterogenous sleep profiles in adolescents. Moreover, these sleep profiles were differentially associated with functional outcomes such as substance use (Troxel et al., 2022), risky sexual behaviors (Troxel et al., 2019), and internalizing and externalizing problems (Yue et al., 2022) (i.e., more mental health difficulties in more disturbed sleep classes).

Sleep and Mental Health

Sleep is critical to several aspects of development, including learning and memory, health, and academic success (Hayes & Bainton, 2020; Matricciani et al., 2021); it is also critical to mental health

(Chaput et al., 2016). Palagini and colleagues (2019) and Gruber and Cassof (2014) suggested models where sleep plays a key role in the pathogenesis of mood disorders due to its role as main regulator of several systems involved in emotion regulation; impaired monoamines activity and top-down regulation from the prefrontal cortex on the amygdala are proposed as mechanisms in the sleep-emotion regulation association. Emotion regulation is also widely acknowledged as a transdiagnostic factor in the development of internalizing and externalizing disorders (Aldao et al., 2016). Empirical findings concur in supporting the role of emotion regulation in the associations between sleep and mood disorders (Palmer et al., 2018).

Another mental health variable of great interest, one that is also closely linked with emotion regulation, is dissociation (i.e., the "disruption of and/or discontinuity in the normal integration of consciousness, memory, identity, emotion, perception, body representation, motor control, and behavior"; APA, 2013). Dissociative symptoms are also transdiagnostic, as they are integral to dissociative disorders, but moreover part of post-traumatic stress disorder (PTSD), borderline personality disorder, and schizophrenia spectrum disorders (APA, 2022; Lynn et al., 2019). There is ample research to support that traumatic experiences may cause dissociative symptoms (Dalenberg et al., 2012). In this trauma model, dissociation is considered a regulatory response to extreme emotions such as fear (Dalenberg et al., 2012; Lynn et al., 2019). Despite its empirical support, this model is still the object of debate (Lynn et al., 2019). In turn, Lynn et al. (2019) propose an alternative model of dissociation centering the role of sleep and its negative impact on emotion regulation. According to this model, sleep disruptions – blurring the sleep-wake boundaries – are perceived as mechanistic in the association between highly aversive events (e.g., interpersonal violence), emotion regulation, and dissociative symptoms. Experimental and meta-analytic evidence supports this notion that sleep deprivation and disturbances are causally associated with dissociative symptoms (Barton et al., 2018).

Finally, the relationship between PTSD and sleep is complicated, and PTSD may confound the effects of interpersonal violence on sleep problems if uncontrolled for in empirical studies. Nightmares

are considered an intrusion symptom in PTSD diagnostic criteria and hypervigilance and difficulty sleeping are part of the alterations in arousal and reactivity symptoms cluster (APA, 2022). Adult and pediatric studies show that individuals with PTSD have greater sleep disturbances than those without PTSD (Kovachy et al., 2013). Furthermore, while pediatric studies have not yet explored this much, adult studies show robust evidence for the role of sleep problems as precursors or risk factors for PTSD onset (Kovachy et al., 2013). Therefore, the lack of control for PTSD in studies investigating sleep problems in survivors of interpersonal violence is a major limitation of the available literature (Langevin et al., 2022; Schønning et al., 2022).

Sleep and Interpersonal Violence Victimization

Many recent systematic reviews concur in identifying interpersonal violence as particularly deleterious to sleep throughout the lifespan. In their review of 73 studies, Brown et al. (2022) found a robust positive association between child maltreatment and sleep disturbances, including but not limited to longer sleep onset and reduced sleep duration, efficiency, and quality in childhood and adulthood. Our team also found strong evidence of increased sleep disturbances in child sexual abuse populations across 26 studies (Langevin et al., 2022). In adolescent samples specifically, child sexual abuse was associated with lower sleep efficiency, satisfaction, and duration as well as with delayed sleep onset and more nightmares (Langevin et al., 2022). Examining more broadly adverse childhood experiences (e.g., child maltreatment, family dysfunctions), Kajeepeta et al. (2015) identified associations with sleep apnea, narcolepsy, nightmares, sleep paralysis, and psychiatric sleep disorders (N = 30 studies). While most studies examined child maltreatment or dating violence victimization as predictors of sleep problems, Bobba et al. (2023) reviewed 10 longitudinal studies of exo- and macro-contextual factors (e.g., community violence, racial discrimination). Since adolescence is a period where extrafamilial exposure to violence increases (Finkelhor et al., 2009), this understudied area is worth exploring. Bobba et al. (2023) found significant associations between community violence exposure and reduced sleep duration and quality, as well as increased sleep disturbances.

While there is ample evidence for the association between interpersonal violence victimization and sleep problems, this literature is plagued with methodological shortcomings limiting studies' internal and external validity, including small and unrepresentative samples, a lack of consideration for important covariates (e.g., age, gender, PTSD, polyvictimization) that may confound the effects of violence on sleep, a lack of discrimination between sleep profiles, and the use of unvalidated measures of sleep or interpersonal violence (Brown et al., 2022; Langevin et al., 2022). Furthermore, studies are needed to ascertain the role of sleep in the associations between interpersonal violence victimization and youth mental health outcomes.

The Current Study

The current study proposes to fill some gaps in the literature on interpersonal violence, sleep, and mental health in adolescence, a sensitive developmental period for all these variables of interest. Adolescent girls are the focus of the current investigation given their greater risk of interpersonal violence victimization, sleep problems, and of suffering from common mental health difficulties such as anxiety, depression, and PTSD compared to boys (Gaspar de Matos et al., 2019; Riecher-Rössler, 2017). Specifically, our first objective was to identify latent classes of sleep problems among adolescent girls. Based on past research we expected to identify 3 or 4 classes. Our second objective was to examine the key intrafamilial and extrafamilial interpersonal violence victimization experiences for adolescent girls (sexual abuse, emotional maltreatment, exposure to interparental violence and community violence) as potential predictors of sleep class membership while controlling for PTSD. Based on past studies, we expected that all forms of interpersonal victimization would be associated with more disturbed sleep. Our third objective, in line with the model proposed by Lynn and colleagues (2019), was to examine the moderating role of sleep classes on the association between interpersonal violence and emotional dysregulation and dissociation, which are key transdiagnostic mental health outcomes of interpersonal violence. We expected that adolescent girls with a history of interpersonal violence victimization would present more emotional dysregulation and dissociation symptoms, but

more so when they reported high levels of sleep problems.

Method

Participants and Procedures

Participants included 776 adolescent girls from the ages 14 to 18 located in Quebec, Canada. Participants were recruited online through social media to complete an anonymous Qualtrics survey, for which they were entered into a draw to win a $50 gift card. Consent was gathered electronically. Table 1 presents the sociodemographic characteristics of the sample and neighborhood material deprivation index determined using postal codes (Gamache et al., 2019). Thirteen participants were excluded due to not meeting the age bracket (14-18 years old), 54 because they did not self-identify as girls, and two because they had missing data for variables used for latent class classification, leaving a total final sample count of 706. The current study was approved by the Research Ethics Board of the Université du Québec à Montréal.

Measures

Subjective Sleep

The *Pittsburgh Sleep Quality Index* (PSQI), a validated questionnaire documenting self-reported sleep problems within the previous month, was used (Buysse et al., 1989). Seven sleep dimensions area covered: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency (time spent asleep/time spent in bed), sleep disturbances, use of sleeping medication and daytime dysfunction. Based on the PSQI scoring system, raw scores were recoded into a categorical 0-3 score for each dimension, with higher scores indicating greater levels of sleep problems. The PSQI was validated using a sample of community-based adolescents (Raniti et al., 2018) ($\alpha = .67$ in the current sample).

Interpersonal Violence Victimization

Interpersonal violence victimization was self-reported. Experiencing a sexual abuse was documented using an item adapted from previous studies: “Has anyone touched you sexually when you did not want it or has anyone coerced or manipulated you into having sex?” (Tourigny et al., 2008).

Other items were adapted from the *Resilience Portfolio Questionnaire Manual: Scales for youth* (Hamby, 2018): "Outside of your family, have you seen someone being attacked or intentionally hurt with an object that could hurt them?" (community violence) and "When you were a child, did you ever feel bad or scared because an adult member of your family insulted you, or said mean things to you?" (emotional abuse). Item adaptation involved combining items or slightly reformulating them. Victimization experiences were dummy coded as (1) having occurred and (0) not having occurred.

Exposure to interparental violence was assessed using the 4-item *Revised Conflict Tactics Scale* (CTS; Straus et al., 1999) on a 4-point Likert (0 = *never*, 3 = *11+ times in my life*). Items (e.g., "I saw my father do this to my mother…": "insult, swear, shout, or yell"; "push, shove, slap, twist her arm, or throw an object") load on to two subscales: 1) physical IPV and 2) psychological IPV. Total subscale scores were dichotomized as (0) no instances of exposure or (1) 1+ exposures. In our sample, each participant who reported exposure to physical IPV also reported exposure to psychological IPV. Given this, a dichotomous variable was created for participants who endorsed witnessing 1+ instances of psychological IPV but no physical IPV. This 'psychological IPV only' variable was used alongside the dichotomous physical IPV variable. The internal consistency for the CTS was high in our sample (α = .81).

Dissociation

The *Adolescent Dissociative Experiences Taxon* (ADES-T; Martínez-Taboas et al., 2004) was used to measure dissociative symptoms. The original ADES showed good reliability and validity in a sample of adolescent girls aged 12 to 18 years (Armstrong et al., 1997). The ADES-T (8 items) assesses four subscales of dissociative symptoms using a 10-point Likert scale (0 = never, 10 = always): amnesia, absorption, passive influence, and depersonalization. These subscales are comprised dichotomous items (e.g., "I hear voices in my head that are not my own"; "I find myself in a place and can't remember how I got there"). Items were then summed and averaged, yielding a total score ranging from 0-10 with higher scores indicating greater severity of dissociative symptoms (α = .83 in the

current study).

Emotion Dysregulation

The 18-item *Difficulties in Emotion Regulation Scale Short Form* (DERS-SF) was used to assess emotion dysregulation (Kaufman et al., 2016). Respondents indicate their answers (e.g., "When I'm upset, I don't think there's anything I can do to make it better") via a 5-point Likert scale (1 = *false* to 5 = *true*). Responses were tabulated to form a total continuous score (0-90), with higher scores indicating greater dysregulation (α = .86 in the current sample). The DERS-SF was originally validated with three adolescent samples (Kaufman et al., 2016).

PTSD

An abbreviated version (9 items) of the *UCLA Post-Traumatic Stress Disorder Reaction Index* (UCLA PTSD-RI) was used (Cohen et al., 2008) (e.g., "I get upset, scared or sad when something reminds me of what happened"). Respondents indicated their answers via a 5-point Likert scale (0 = *not at all* to 4 = *almost always*). Scores were then tabulated and dichotomized into a score indicating either (0) nonclinical (0-19) or (1) clinical (20 or higher) levels of PTSD symptomatology (Cohen et al., 2008). The internal consistency for the UCLA PTSD-RI was high in the current sample (α = .90).

Statistical Analyses

Preliminary analyses were conducted using SPSS 27. Data was visually examined for anomalies. Outliers exceeding three standard deviations from the mean (less than 1% of datapoints) were adjusted to reflect upper/lower bounds. Spearman's Rho correlations were computed. LCA were conducted using Mplus version 8.3. A best practice, bias-adjusted (manual) three-step LCA with predictor, control, and outcome variables simultaneously included was conducted based on Wang & Wang (2020). In Step 1, an unconditional LCA model was constructed using all sleep dimensions. The optimal number of classes was identified by running iterative LCA analyses with an increasing number of classes and referring to key statistical indices (Wang & Wang, 2020): Aikake's information criterion (AIC), Bayesian information criterion (BIC), sample-size adjusted Bayesian information criterion

(SABIC) along with the Lo-Mendell-Rubin likelihood ratio (LMR LR) test, the adjusted Lo-Mendell-Rubin likelihood ratio (ALMR LR) test and the bootstrap likelihood ratio (BLRT). Class size, entropy (closest to 1.0) and clinical value/utility were also considered in choosing the optimal number of classes. In Step 2, measurement error of the most likely class variable was estimated. In Step 3, measurement error was included in the full model with all variables of interest. The moderating effect of sleep classes was also estimated automatically as part of Step 3 through regressions. Covariates included in the model were sexual abuse, community violence, emotional abuse, exposure to physical and psychological IPV (conceptualized as predictors), and PTSD (conceptualized as a control variable). For more details about the three-step LCA using Mplus, please refer to Wang & Wang (2020).

Results

Preliminary Analyses

Descriptive statistics for the full sample are displayed in Table 2 with means and standard deviations for each PSQI dimension. Correlations between variables are provided as Supplementary Material. All PSQI dimensions were highly correlated with one another. Physical IPV, PTSD, community violence, sexual abuse and emotional abuse were all significantly correlated with each PSQI dimension excluding sleep efficiency, which in turn was only significantly correlated with PTSD and sexual abuse. Psychological IPV was not correlated with PSQI dimensions. Outcome variables were correlated with each PSQI dimension, excluding the correlation between dissociation scores and habitual sleep efficiency. Finally, outcome variables showed high correlations with all other covariates and outcomes, excluding psychological IPV, which only yielded a significant correlation with emotion dysregulation.

Objective 1: Latent Class Analyses

An increasing number of classes, up to five, were modeled (Table 3). The number of participants per class with the three- and four-class models was satisfactory, but not the five-class model. The three-class model demonstrated the lowest ABIC value, a lower AIC value than the two-

class model, and a lower BIC value than either the four or five-class models. The three-class model also achieved significant LMR LR, ALMR LR and BLRT test values and demonstrated acceptable entropy. Additionally, it offered higher conceptual and clinical value than the two-class model. Thus, the three-class model was retained.

Class 1 (22% of the sample) is comprised of participants who, relative to other classes, reported higher rates of sleep problems. Indeed, 26.8% of participants in this class reported that their subjective sleep quality was 'very bad', while only 7.5% reported the same in the complete sample. Most adolescents in this class were in the worse possible category for sleep latency (57.2%). Additionally, 34.7% (versus 14.5%) of participants reported using sleeping medication three or more times a week; 45% of them reported very high levels of daytime dysfunctions. This trend of reporting high sleep difficulties was consistent across all indicators. This group was labelled *Poor Quality Sleep* (Table 4).

Class 2 (59% of the sample) is considered the normative class as it includes the highest proportion of girls. It is comprised of participants who, when compared to other classes, endorsed items indicating an average/slightly better than average quality of sleep. Illustrating this, 59.3% of this group reported that their subjective sleep quality was 'mostly good', versus 46.6% in the overall sample and 3.9% in the *Poor Quality Sleep* class. Moreover, 79.2% participants of this class indicated an average sleep duration of 7+ hours, while 70.2% reported the same in the overall sample and only 27.0% in the *Poor Quality Sleep* class. When reporting on several dimensions, this class showed similar response rates to the overall sample. Thus, this class was labelled *Moderate Quality Sleep*.

Class 3 (18% of the sample) is comprised of participants who reported low rates of sleep problems. Indeed, 32.2% of this class reported that their sleep quality was 'very good', versus 6.2% in the overall sample and 0.6% in the *Poor Quality Sleep* class. Strikingly, 99.1% of girls in this group reported sleeping 7+ hours a night, versus only 70.4% in the total sample. Almost all participants in this group (93.4%) had a high habitual sleep efficiency versus only 40.2% and 71.2% in the *Poor Quality Sleep* and *Moderate Quality Sleep* classes respectively. Given this consistent pattern, this class was

labelled *High Quality Sleep*.

Objective 2: Interpersonal Violence and Latent Sleep Classes

At the last step of the LCA, the entropy decreased slightly to .672. Compared to adolescents with *High Sleep Quality*, those with *Poor Sleep Quality* were 3.18 times more likely to have experienced child sexual abuse ($p = .012$) and 5.41 times more likely to have been exposed to community violence ($p = .035$). They were 23.14 times more likely to report clinical levels of PTSD symptoms ($p < .001$). Compared to adolescent girls with *Moderate Sleep Quality*, girls assigned to the *Poor Sleep Quality* class were 1.94 times more likely to have been exposed to community violence ($p = .040$) and 1.99 times more likely to have experienced emotional abuse ($p = .040$). They were 4.61 times more likely to suffer from clinical levels of PTSD ($p < .001$). Adolescents with *High Sleep Quality* only differed from those with *Moderate Sleep Quality* in terms of their odds of presenting clinical levels of PTSD ($p = .021$); *Moderate Sleep Quality* adolescents were 5.02 times more likely to have clinical levels of PTSD. A history of childhood exposure to physical or psychological IPV was not associated with sleep classes. See Table 5 for detailed findings.

Objective 3a: Latent Sleep Classes, Dissociation, and Emotional Dysregulation

The adolescents in the *Moderate Quality Sleep* class reported significantly higher dissociation symptoms than those in the *High Sleep Quality* class ($M_{adj} = 1.56$ versus 1.06, $p = .049$). No significant differences in dissociation emerged between the *Poor Quality Sleep* and *Moderate Quality Sleep* classes, and between the *Poor Quality Sleep* and the *High Quality Sleep* classes. Adolescent girls in the *Poor Quality Sleep* ($M_{adj} = 52.81$) and the *Moderate Quality Sleep* ($M_{adj} = 53.78$) classes reported higher levels of emotional dysregulation than adolescent girls in the *High Quality Sleep* class ($M_{adj} = 44.41$; $p = .002$ and $p < .001$ respectively). No significant difference emerged between the *Poor* and *Moderate Quality Sleep* classes on this variable.

Objective 3b: Moderating Effect of Latent Sleep Classes

Exposure to community violence was only associated with greater levels of dissociation among

adolescent girls with *Poor Sleep Quality*. Clinical levels of PTSD were associated with greater levels of dissociation only among adolescent girls in the *Poor* or *Moderate Quality Sleep* classes, not among adolescents in the *Good Quality Sleep* class. These findings indicate a moderation effect of latent sleep classes in these relationships. Interestingly, none of our predictors were associated with dissociation symptoms among adolescent girls in the *Good Quality Sleep* class. Clinical levels of PTSD were significantly associated with increased emotional dysregulation among adolescent girls from all three classes, indicating that PTSD is related to emotional dysregulation no matter how well adolescent girls sleep. Across all three groups, no other variable was significantly associated with emotional dysregulation. See Table 6 for detailed findings.

Discussion

The current study aimed to identify patterns of sleep problems in adolescent girls, to better understand their relationship to interpersonal violence victimization and transdiagnostic mental health outcomes. Consistent with our hypothesis, our analyses pointed to three classes of sleep: *Poor Quality Sleep* (22% of girls)*, Moderate Quality Sleep* (50% of girls; normative class), and *High Quality Sleep* (18% of girls). This is consistent with past studies with adolescent samples (Troxel et al., 2019; Yue et al., 2022), supporting the presence of heterogeneous profiles of sleep among adolescents girls and that a large proportion of them report only poor to moderate sleep quality.

Sleep Classes and Interpersonal Violence

The second objective was to uncover associations among intrafamilial and extrafamilial interpersonal violence victimization and sleep classes, while accounting for PTSD. Girls belonging to the *Poor Quality Sleep* class in comparison to the *High Quality Sleep* class, were more likely to have been exposed to sexual abuse and community violence. Additionally, in contrast to their *Moderate Quality Sleep* class counterparts, they were more likely to have been exposed to community violence and emotional abuse. Our results are consistent with past findings showing that interpersonal violence is associated with sleep problems (Bobba et al., 2023; Brown et al., 2022; Kajeepeta et al., 2015).

However, they further our understanding by showing that when many forms of victimization are considered together, some of them appear more influential than others. Specifically, in our multivariate model, exposure to physical or psychological IPV did not differentiate between sleep classes. This finding contrasts with past studies of children and adolescent samples showing an association between exposure to IPV and sleep problems (Gartland et al., 2021; Turner et al., 2020). However, these studies did not model latent classes of sleep problems. They included boys, had children samples, or only considered a few dimensions of sleep, which could explain this discrepancy. Our results suggest that when it comes to child maltreatment, direct forms of violence (in which the child is personally involved), such as sexual or emotional abuse, are more salient for sleep profiles in adolescent girls than indirect forms such as witnessing interparental violence.

Interestingly, community violence, an understudied form of violence, was the only form of violence that differentiated between the *Poor Quality Sleep* class and the other two classes. Bobba et al. (2023) use Bronfenbrenner's ecological model to explain the impact of the neighborhood characteristics on youth's sleep. The exo-system – in which neighborhood is nested – can shape the circumstances in which the meso- and micro-system of a family takes form and operates, subsequently affecting youth's adaptation (Bronfenbrenner & Morris, 2007). Indeed, a meta-analysis showed that community violence has a moderate effect on PTSD symptoms and externalizing and internalizing symptoms of youth (Fowler et al., 2009). These effects, along with the associations with sleep we uncovered, could be explained by the fact that community violence threatens youth's sense of security, possibly inducing a constant state of fear and hyperarousal (e.g. fear of sleep). The fact that community violence appears more influential than exposure to IPV, when other forms of in-home violence are considered, could be understood through the lens of polyvictimization research highlighting the synergistic effects on mental health of experiencing multiple forms of violence and in several domains of life (e.g., at home, at school, in the community) (Putnam et al., 2013; Turner et al., 2016). As explained by Turner and colleagues (2016), for individuals victimized in many of their life contexts,

there is no safe haven to get respite. Additionally, in-home experiences of violence (i.e., forms of child maltreatment) may compete more with one another than with community violence in our multivariate analysis. Clearly, there is a need for continued efforts to delineate the impact of community violence on adolescents' sleep.

Moderation Effect of Sleep Classes

Our third objective was to investigate the moderation of sleep classes in the relationship between interpersonal violence and emotional dysregulation and dissociation. Results partly confirmed our hypotheses as the association between exposure to community violence and dissociation was only significant at high levels of sleep problems, and PTSD was only associated with dissociation at high or moderate levels of sleep problems. No moderation effect was found for the other forms of violence investigated which may indicate that sleep is not as influential for these mental health outcomes when it comes to child maltreatment and complex traumatic experiences versus victimization outside of the home and the caregiver-child relationship. Thus, our results are in partial support of Lynn and colleagues' (2019) proposed model of dissociation as being caused by sleep problems. Future studies are needed to further conceptualize the role of sleep in dissociation among survivors of interpersonal violence. Interestingly, regardless of the sleep class, PTSD was related to emotional dysregulation, showing that sleep may not play a significant role in this association. This is consistent with the scientific literature confirming a strong association between PTSD and emotion regulation difficulties (Tull et al., 2020).

Limitations and Recommendations for Future Research

Although our study contributes to the clarification of the interplay between sleep, interpersonal violence victimization, and key mental health outcomes among adolescent girls, it is not without limitations. Our study is cross-sectional, which prevents us from drawing conclusions about causality. Furthermore, sleep is a dynamic process and can change over time, especially during adolescence, and a cross-sectional design does not allow for the quantification of such changes. Additionally, our sample

was not ethnically diverse, and there was a slight overrepresentation of adolescent girls living in very privileged neighborhoods compared to very underprivileged ones. Thus, our findings should be replicated with more diverse populations. Our focus on girls is a strength given the documented gendered patterns of interpersonal violence victimization, sleep problems, and mental health in adolescence. However, interpersonal violence victimization also impacts boys (e.g., Langevin et al., 2022) and investigations including boys are warranted. Future studies should incorporate other forms of interpersonal violence such as physical abuse, bullying, and neglect. They could also explore associations with common mental disorders such as depression or anxiety. Since our study only relied on self-reported measures, which are susceptible to various biases, future studies could incorporate multiple informants, objective measures of sleep (e.g., polysomnography, actigraphy), or observational and interview-based measures to provide other perspectives. A final limitation is that we did not inquire about a specific traumatic event for the PTSD measure.

Practical Implications

Our study has some implications for practice and policy, especially if replicated. Interpersonal violence, in any form, is highly prevalent and detrimental to children and adolescents' health. Our study confirms, again, its negative impact on adolescent girls' sleep and mental health. In this context, universal prevention campaigns are warranted to reduce interpersonal violence and foster positive relationships within families, but also within communities. For girls suffering from sleep problems following a traumatic event, it may be relevant to combine elements of sleep-focused and trauma-focused interventions (e.g., CBT for insomnia; CBT-i) into treatment planning (Isaac et al. 2022). Such interventions could foster the resilience of youth given that good sleep is related to emotion regulation and adaptive functioning. Finally, our results align with past studies in showing that many adolescent girls, victimized or not, have suboptimal sleep. Thus, given the major implications of sleep for health, universal campaigns to educate adolescents on positive sleep habits may contribute to fostering a healthy development for all.

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Table 1

Sociodemographic Characteristics of Participants

Characteristic		*M*/n	*SD*/%
Mean Age		16.04	1.28
Ethnicity			
	Canadian	621	88%
	Indigenous/Metis	24	3.4%
	Latinx	28	4.0%
	Black	26	3.7%
	Asian	20	2.8%
	West European	62	8.8%
	East European	15	2.1%
	Caribbean	18	2.5%
	North African/Middle Easterner	18	2.5%
	Other	2	0.3%
Neighbourhood's Material Deprivation Index			
	Very Privileged	171	24.2%
	Privileged	136	19.3%
	Average	121	17.1%
	Underprivileged	132	18.7%
	Very underprivileged	111	15.7%

Table 2

Descriptive Statistics for the Full Sample

Variable			
Sleep Dimensions Used for Class Creation		N	M *(SD)*
	Subjective Sleep Quality (range 0-3)	705	1.48 (0.73)
	Sleep Latency (range 0-3)	683	1.67 (1.01)
	Sleep Duration (range 0-3)	680	0.44 (0.75)
	Habitual Sleep Efficiency (range 0-3)	675	0.49 (0.82)
	Sleep Disturbances (range 0-3)	705	1.38 (0.58)
	Use of Sleep Medication (range 0-3)	704	0.69 (1.11)
	Daytime Dysfunction (range 0-3)	705	1.78 (0.86)
Predictor and Control Variables		N	% (n)
	Child Sexual Abuse (presence/absence)	705	37.8 (267)
	Community Violence (presence/absence)	705	29.3 (207)
	Emotional Abuse (presence/absence)	704	45.6 (322)
	Physical IPV (presence/absence)	704	19.8 (140)
	Psychological IPV only (presence/absence)	704	52.3 (369)
	Clinical PTSD (presence/absence)	682	36.3 (256)
Distal outcomes		N	M (*SD*)
	Dissociation (range 0 – 7.80)	706	2.22 (1.82)
	Emotion Dysregulation (range 23.98 – 83.00)	706	56.29 (10.78)

Note. IPV = intimate partner violence, PTSD = post-traumatic stress disorder.

Table 3

Model Fit Statistics/Indices

Model	AIC	BIC	SABIC	LMR LR p-value	ALMR LR p-value	BLRT p-value	Entropy
Two-class LCA	9657.926	9853.990	9717.455	<0.0001	<0.0001	<0.0001	.713
Three-class LCA	9577.89	9874.265	9667.875	0.0073	0.0076	<0.0001	.704
Four-class LCA	9559.377	9956.064	9679.819	0.8718	0.8729	0.005	.728
Five-class LCA	9543.989	10040.987	9694.888	0.6700	0.6702	<.00001	.766

Note. AIC = Aikake's information criterion; BIC = Bayesian information criterion; SABIC = sample-size adjusted Bayesian information criterion; LMR LR = Lo-Mendell-Rubin likelihood ratio test; ALMR LR = adjusted Lo-Mendell-Rubin likelihood ratio test; BLRT = bootstrap likelihood ratio.

Table 4

Unconditional and Conditional Probabilities

Variable	Latent class		
	1-Poor Quality Sleep (*n* = 157)	2-Moderate Quality Sleep (*n* = 420)	3-High Quality Sleep (*n* = 129)
Conditional probabilities			
Subjective Sleep Quality			
Very good	0.006	0.000	0.322
Mostly good	0.039	0.593	0.634
Mostly bad	0.687	0.399	0.008
Very bad	0.268	0.007	0.035
Sleep Latency			
0	0.038	0.093	0.389
1-2	0.065	0.373	0.476
3-4	0.324	0.317	0.118
5-6	0.572	0.217	0.017
Sleep Duration			
7h +	0.270	0.792	0.991
6-7h	0.313	0.177	0.000

5-6h	0.330	0.032	0.009
Less than 5h	0.086	0.000	0.000
Habitual Sleep Efficiency			
85% +	0.402	0.712	0.934
75-84%	0.269	0.224	0.024
65-74%	0.159	0.060	0.042
64%	0.170	0.005	0.000
Sleep Disturbances			
0	0.000	0.011	0.065
1-9	0.347	0.622	0.891
10-18	0.549	0.361	0.044
19-27	0.104	0.006	0.000
Use of Sleep Medication			
Not in the past month	0.474	0.688	0.864
Less than once a week	0.068	0.134	0.101
1-2 times per week	0.111	0.073	0.000
3 times + per week	0.347	0.099	0.035
Daytime dysfunction			
0	0.000	0.034	0.204
1-2	0.160	0.331	0.532
3-4	0.390	0.443	0.214
5-6	0.450	0.192	0.050

Table 5

Associations Between Interpersonal Violence and Latent Sleep Classes

	Poor versus Moderate sleep quality	**Poor versus Good sleep quality**	**Moderate versus Good sleep quality**
		OR (95% CI)	
Exposure to psychological IPV	0.716 (0.326 - 1.572)	1.539 (0.558 - 4.244)	2.150 (0.953 - 4.851)
Exposure to physical IPV	1.306 (0.520 - 3.279)	3.634 (0.605 - 21.820)	2.782 (0.410 - 18.867)
Sexual abuse	1.653 (0.889 - 3.074)	3.184 (1.286 - 7.879)*	1.926 (0.855 - 4.339)
Emotional abuse	1.991 (1.031 - 3.847)*	2.205 (0.746 - 6.514)	1.107 (0.379 - 3.236)
Exposure to community violence	1.936 (1.030 - 3.638)*	5.408 (1.177 - 24.855)*	2.793 (0.576 - 13.556)
PTSD	4.612 (2.370 - 8.976)***	23.141 (5.967 - 89.748)***	5.018 (1.277 - 19.710)*

Note. OR = odds ratio, CI = confidence intervals, IPV = intimate partner violence, PTSD = post-traumatic stress disorder. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 6

Moderating Effect of Latent Sleep Classes

	Class 1: Poor Quality		**Class 2: Moderate Quality**		**Class 3: Good Quality**	
	Dissociation	Emotional dysregulation	Dissociation	Emotional dysregulation	Dissociation	Emotional dysregulation
	Estimate (SE)		Estimate (SE)		Estimate (SE)	
Exposure to psychological IPV	0.834 (0.658)	3.075 (1.594)	-0.125 (0.267)	1.225 (1.593)	0.138 (0.240)	3.260 (3.125)
Exposure to physical IPV	0.211 (0.659)	0.346 (2.322)	0.534 (0.369)	2.644 (2.788)	-0.017 (0.430)	2.000 (13.674)
Sexual abuse	0.653 (0.479)	1.421 (1.620)	-0.097 (0.235)	-2.351 (1.326)	-0.396 (0.279)	3.491 (3.365)
Emotional abuse	0.207 (0.582)	1.146 (1.761)	0.239 (0.224)	1.364 (1.401)	0.211 (0.267)	1.407 (5.754)
Exposure to community violence	0.962 (0.457)*	3.081 (1.759)	0.145 (0.233)	-1.962 (1.512)	-0.030 (0.422)	-4.661 (8.278)
PTSD	1.282 (0.535)*	7.872 (2.388)**	1.190 (0.258)***	6.484 (1.224)***	0.230 (0.913)	8.184 (3.478)*

Note. IPV = intimate partner violence, PTSD = post-traumatic stress disorder.
* $p < .05$, ** $p < .01$, *** $p < .001$.