Psychological Thought
psyct.swu.bg | 2193-7281
South-West University "Neofit Rilski"

Research Article

School Problems with Sleep Habits and Bullying Opportunity: A Structural Equation Modelling Analysis

Sandra Figueiredo*[a], Rodrigo Madureira[a]

[a] Department of Psychology, Universidade Autónoma de Lisboa Luís de Camões (UAL), Lisbon, Portugal.

Abstract

In a setting where the school has become a larger stage with regard to bullying practices (traditional and online) and victimization, it is important to understand the predictive and mediating factors of these disruptive behaviours within the school and considering the different schedules of teenage students. Extracurricular activities (outside school), enrichment activities (in school) and chronotype (sleep habits) should be analysed considering these behavioural problems inside and outside the classroom, maintaining the terminological line of the school aggression phenomenon. Thus, firstly, 117 Portuguese adolescents were aleatory recruited from the 5th to 9th grade and examined regarding chronotype and bullying/cyberbullying behaviours (in two dimensions of victimization and perpetration). The data collection was supported by the schools' board directors and teachers where the study took place. Afterwards, different models of structural equations were developed in order to examine how the responses determined the structural relationship between factors and, above all, to identify predictors and mediators of bullying, in its two opposite dimensions. The results of the multilevel structures revealed that adolescents with more aggressive behaviour had the following characteristics: they are more the evening type attend more curricular enrichment activities, spend more hours in the same school space, conduct fewer out-of-school activities, and have the average period of sleep altered during school days. Contrary to expectations, no expressive and significant relationships were found between gender and perpetration or victimization. Attending those results, schools should start with the review of schedules, school activities and family and student monitoring regarding perceived bullying behaviours.

Keywords: School quality; bullying; victimization; occupational activities; sleep; prevention.

Table of Contents

Psychological Thought, 2025, Vol. 18(1), 222-254, https://doi.org/10.37708/psyct.v18i1.1073
Received: 2024-11-05. Accepted: 2025-04-13. Published (VoR): 2025-05-02.
Handling Editor: Natasha Angelova, South-West University "Neofit Rilski", Blagoevgrad, Bulgaria. *Corresponding author at: Universidade Autónoma de Lisboa Luís de Camões, Portugal. E-mail: sfigueiredo@autonoma.pt

This study offers a new contribution regarding a more detailed identification of the mediating and moderating factors of bullying and victimization among adolescents. For this purpose, the analysis was determined using the structural equation model. Bullying is not approached solely through the traditional roles of perpetrator, victim, or perpetrator-victim, nor is it examined only through its genetic associations with sleep disorders. Rather, it is considered as a disruptive behavior situated within the school context, where it is widely recognized in the literature that bullying must be understood as a phenomenon shaped by the school environment. Within this framework, emphasis is placed on moderating variables—such as sleep patterns, chronotype, gender, and household dynamics—which are believed to significantly influence both the manifestation and consequences of bullying. Naturally, cyberbullying extends the situational context of bullying beyond the school. Traditional bullying is more easily observed and measured than cyberbullying due to its spread-out characteristics in terms of space (Wienrich et al., 2024).Considering the database of Health Behaviour of School-Aged Children (Wang et al., 2009), 7.508 students showed a prevalence for victimization or perpetration of bullying. Approximately 21% of participants reported experiencing physical bullying, 54% reported verbal bullying, and 14% were involved in cyberbullying as victims. The differences of gender were also denoted considering bullying and cyberbullying: males were more involved in perpetration of cyberbullying compared to females that were identified as victims. The parental investment was also correlated to rates of adolescents being bullied or authoring the bullying and cyberbullying. In other international report, we have knowledge about 77% adolescents that self-reported bullying in its several forms: physical and verbal. In the United States, 30% of

adolescents attending 6° to 10° grades have more tendency to be involved in moderate to severe bullying events. In the two dimensions: victimization and perpetration (Blakeslee et al., 2023; Statistics, 2010; Tosuntas et al., 2022).

Currently, data indicated that bullying and online bullying, in 42 countries, remains as a problem with significant numbers and more parental responsibility (Erdogan et al., 2022). In 2023 a study published the latest news for bullying rates in 18,003 adolescents from European Union – database from Health Behaviour in School-aged Children - and the percentages are still high for specific European countries such as Portugal (Blakeslee et al., 2023; Hasan et al., 2022). Despite of the geographical dimension of Portugal, there was great differences observed between adolescents from the North and the South: more practice of bullying in the schools of north (Silva et al., 2013). In Portugal, recent studies pointed out to prevalence of victimization in grades 4° and 5° and showing more involvement of males than young females (Marchante et al., 2022).

As new evidence, we will address other moderators or predictors such as curriculum enrichment activities (which take place outside regular school hours, but in schools), extracurricular activities (which take place outside the school), leisure activities associated with social support for families (which take place outside the school), gender, school year and average sleep duration on school days. This study pertinence is identified in the direct evidence provided for the intervention, especially for schools. Thus, our study will enable teachers, educational psychologists, special education therapists, school directors and members of the pedagogical council of schools (public and private) to more precisely identify causes and intervene more quickly. One way to do this is to monitor sleep habits or measure the adolescent's chronotype with parents or guardians, and then relate these habits to bullying behaviours or episodes. In a multidisciplinary approach, these data help, in advance, to achieve inclusion, academic success and good mental health of all students. In the literature review, bullying and cyberbullying will be defined in terms of space and perpetrators/victims; then the cross-cultural perspective will be mentioned considering the importance of sleep in adolescents to understand the phenomenon of bullying in various school populations; then the ratio of bullying behaviours considering the male and female groups; finally, the focus will be on studies that resorted to the method of structural equations to ascertain the connection and the magnitude of the relationship between bullying/cyberbullying/victimization/cybervictimization and other variables that can explain them with different effects in terms of moderation and mediation.

Bullying and Cyberbullying

First, it is important to understand the concept of bullying. Gladden et al. (2014) developed a different definition than the one proposed so far by Olweus (2009). The phenomenon of bullying should be analysed in a more comprehensive format. This format should refer to the school space but also integrate the online bullying among school students. Space here emerges as a variable that differentiates these two forms of bullying. On the more or less observed occurrence, it is important to mention school dimensions and spaces, besides the ubiquitous online sphere. Playgrounds are areas of high activity level, with few rules and reduced supervision (compared to a classroom), facilitating direct bullying behaviour, especially in the form of physical aggression (Hyndman et al., 2021; Massey et al., 2020). Classrooms are structured activity spaces, with limited area and supervision, which lead children to resort to indirect bullying, in the form of social exclusion and dissemination of rumours, in order to avoid detection of such behaviour by teachers (Reuland & Mikami, 2014; Marchante et al., 2022; Serdiouk et al., 2015). Victimization within the classroom varies from room to room and affects all students, regardless of whether they are directly and actively involved in bullying behaviour or not (Reuland & Mikami, 2014; Sampasa-Kanyinga et al., 2022). Bullying is more frequent in classes with peers who encourage aggressors and less frequent in classes with peers who defend victims. Children at risk of involvement in bullying behaviour may thus be favoured or harmed by the classroom context (Saarento et al., 2015; Sampasa-Kanyinga et al., 2022). The school environment and the teacher-student relationship may also influence bullying behaviour. Bullying tends to occur more frequently in schools where students consider that there is a bad environment and a poor relationship with teachers (Perron, 2015). Students who consider their school to have a bad environment have more reports of victimization and lower school achievement (Wang et al., 2014; Sheridan et al., 2022). Conversely, a good school environment provides children with a sense of safety and a bullying-free environment (Beaudoin & Roberge, 2015; Salem, 2022).

Bullying and cross-cultural perception: linearity of sleep patterns

The cross-cultural analysis of bullying practices (perpetration and victimization), virtual or not, should consider the sleep patterns of populations from various geographies and cultures. It is important to understand whether the relationship between altered sleep patterns (sleep quality and phase delay) in adolescence and bullying behaviour, as well as other misadjusted behaviours, in terms of transculturality, is linear. According to Peter (2018), research on bullying as disruptive behaviour rather than as a normal practice in a school group setting, began to be seriously conducted in Scandinavian countries and Japan. Only in the most recent decade have other countries seen the need to examine the effects of bullying and

cyberbullying on the mental health and the academic success (and social adjustment) of children, especially adolescents (Blakeslee et al., 2023; González-Cabrera et al., 2020) Studies with populations of different cultures and geographies, thus, identified this linearity and evidence explained above (Arhin et al., 2019; Gomes et al., 2019; Guzman-Holst et al., 2022; Hasan et al., 2022; Matsumoto et al., 2022; Wang et al.2020). The quality and amount of sleep affect children regarding behavioural and emotional regulation. Lack of sleep creates a neurophysiological deficit in executive functions that results in emotional reactivity and enduring devious behaviour, thus increasing hostile and aggressive conduct (Aronen et al., 2014; Gregory & Sadeh, 2012; Tosuntas et al., 2022). As regards behaviour regulation, the effects of sleep deprivation are manifested in the conduct of children through irritability, restlessness, depressiveness, aggression, and inattention (Quintero & Bianchi, 2017). Sleep deprivation is also involved in mood deregulation and decreasing emotional intelligence (Guzman-Holst et al., 2022; Vriend et al., 2013). It leads to the reduction of positive emotions and to the increase in negative emissions (Palmer et al., 2022). As a result, children become emotionally unstable and more reactive towards their peers, which generates conflicts, social difficulties and interaction issues (Palmer et al., 2022). Earlier study by Herge et al. (2016) and of Lepore and Kliewer (2013) examined associations between peer victimization and sleep problems. It was also observed that exposure to this type of violence is causally related to symptoms of anxiety, depression, low self-esteem, feelings of loneliness and suicidal thoughts and intentions (Blakeslee et al., 2023; Kulari, 2024; Sesar et al., 2016). Similarly, self-reported peer victimization was associated with subsequent self-reported sleep problems (sleep deficits, falling asleep/waking up problems) among elementary school) and secondary school students (Gradisar et al., 2022).

Van Geel and colleagues (2016) conducted a meta-analysis whereby it was concluded that children who are bullied tend to report more sleep problems than children who are not. They also found evidence that there is a relationship between peer victimization and sleep problems and that the latter are more reported in younger children, not because they are more susceptible to these problems, but because victimization occurs on a larger scale.

Bullying, age and gender: differences in behaviour and the Portuguese case

In Portuguese schools, bullying behaviour is also observed, especially in primary and secondary education, as in other countries (Costa et al., 2013; González-Cabrera et al., 2020). There are no relevant differences between the first and second cycles of education, tending to decrease with advancing age (Almeida, 2011). It is estimated that 20% of children have been involved in bullying behaviour three or more times, mostly males (Almeida, 2011;

Zequinão et al., 2017). Regarding more recent research, physical (or direct) aggression is the most common method among primary school students, while secondary school students more commonly resort to verbal (or indirect) aggression. However, females tend to use verbal aggression earlier than males (Demir-Kaymak et al., 2022; Smith et al., 2019). Subsequently, with regard to gender differences, males practice and experience more direct bullying, while females experience more indirect bullying through insults (Yen et al., 2013; Zequinão et al., 2017). Females conduct less bullying, but when they do, it is mostly against the same gender (Demir-Kaymak et al., 2022; Smith et al., 2019). Most bullying is perpetrated by classmates or older classmates. Males are essentially victimized by older individuals, while females are victimized essentially within the same class (Almeida, 2011). According to Almeida (2011), the risk of a child becoming a victim of bullying at school varies depending on the gender and geographical area of the school. In short, evidence shows that males who attend primary schools in suburban areas are at higher risk of being victimized by their peers.

On the one hand, the year of schooling and socio-economic status did not present predictive value in the study of Almeida (2011); on the other hand, the risk of the child becoming aggressor seems to be influenced by the number of students who failed, year of schooling, school area and gender. Therefore, a class with a higher number of students who failed is more likely to show aggressive behaviour. From the perspective of analysing the profile of the aggressor, male individuals who attend primary schools in suburban areas, belonging to a family of low socio-economic status and to a class with some students repeating the year, are thus more likely to assault their colleagues (Almeida, 2011; Costa et al., 2013; Gradisar et al., 2022). It is important, however, to widen the samples and replicate these types of studies by including sleep patterns and chronotype as potential variables to influence bullies and victims. On the relationship between bullying and chronotype, there is less documented research, not only in Portugal, but also internationally (Demir-Kaymak et al., 2022).1.4 Structural Equation Modelling: examining the predictors of bullying behaviour.

Structural equations are important to test prediction models given the concrete identification of latent variables and observable variables in the models under analysis. With regard to bullying and victimization behaviours, one of the latent variables to be tested is the subjects' chronotype: the morning type determines the subjects' sleeping and waking habits. Specifically, in the case of adolescents, sleeping habits and waking behaviours become more decisive as moderators of the effect of bullying/cyberbullying attitudes. In adolescence, phase delay occurs, which will alter the acrophases and bathyphases in the subject's daily

life. Acrophase is the period of cognitive advantage, in neuropsychological terms, which varies according to the chronotype. The acrophase must be approached in a plural way, since there are several optimal periods that the subject shows during the 24-hour cycle. Specifically, in adolescence, the acrophase will undergo changes in terms of delaying the most advantageous moments for learning and for adolescents' waking states. This temporary alteration – with greater tendency at puberty – can have implications for sleep and academic performance, as well as influencing mood disturbances. These mood disturbances can result in aggressive behaviour which, when noticed, occurs more during puberty. This aggression is genetically determined and we could place it in line with the studies by Shakoor et al. (2021), who focus on the inherited trait of aggressive behaviour rather than on the influence of shared environments to explain bullying and sleep disturbances. In this section we will address to specific earlier studies with a purpose in this field.

Studies using structural equation analysis confirmed important associations between bullying and empathy and self-efficacy in adolescents (Gini et al., 2008). The latter act as regulation strategies in the face of episodes such as bullying and cyberbullying. Higher levels of empathy in the defensive response to the threat of bullying and greater emotional self-regulation in pubescents correlate with fewer episodes of victimization.

On the contrary, perpetration increases when there is less empathetic behaviour in the adolescent population (Gini et al., 2008). However, there was no moderation of effect by gender. Effectively, gender has been urgently addressed in the literature, relating the male sex with more physical aggression in the school context, while in the female gender, when perpetrating it, it is less evident because it makes threats in a more indirect and virtual way (Li et al., 2019; Smith et al., 2019).

Research such as that by Narayanan and Betts (2014) found, in a sample from India, that boys are more involved in bullying and victimization behaviours than girls. The analysis of structural equations revealed that resilience mediates the relationship between self-efficacy and bullying in males, more than in females. Dukes et al.(2010), in another sample of teenagers (North Americans), also identified latent variables in their models that indicated that teenage girls report more victimization than boys. However, the latter are often perpetrators as well as victims. This bully-victim relationship has already been attested by more recent literature (González-Cabrera et al., 2020). The perpetration, in this sample, was found to be more serious given the type of weapons used and reported by the male subjects. The injuries caused to colleagues were greater when firearms were used. Still on bully-victim relationship, several recent research indicators have supported the importance of bystanders

among aggressors and victims, although this is not the focus of our study (Doumaset al., 2019; Feng et al., 2022; Konishi et al., 2019). Although we focus on gender as an undoubted variable in the expression of effect regarding bullying and cyberbullying, we are interested in the referred interpretation of causes and prevention, more than the roles of those directly or indirectly involved (bystanders).

However, it is important to understand the role of bystanders, not only as the subjects who vicariously watch the events and do not participate in them, but also of the school as an active agent for the supervision and control of disruptive behaviour. By school we mean different professionals such as teachers and psychologists, as well as guardians. Parents are a key agent with a predominant role in understanding the causes and prevention of traditional bullying and cyberbullying. Regarding the family, and also the issue of the effect of gender on disruptive bullying/victimization behaviours, the Korean study by You et al. (2015) found, through structural equation analysis, that the most successful model was the one that always included a clear bond with the mother and mediation through empathy to reduce the occurrence of bullying.

In a first model, male motivation towards school was added, with a decrease in aggressive behaviour, and the relationship with the mother and with colleagues had indirect effects (positive in preventive terms) on bullying. Empathy also emerged as a strategy and regulatory variable with an impact on the reduction of bullying behaviours. For females, it was the relationship with the mother that had the most direct effect on the reduction of bullying. The relationship among peers, in female adolescents, had an indirect effect on bullying, but with a positively mediated effect provided by empathy.

The case of empathy as a mediator or predictor

The issue of affection, especially empathy, is one of the perspectives that has had the most effect in analysis and intervention to control disruptive behaviour in the classroom and outside it, such as bullying. Not by chance, also regarding the empathic relationship and moral evaluation of acts of bullying, Thornberg et al. (2017) found that females are more aware of the wrong effect (in terms of moral transgression) of bullying compared to males who are less morally aware of bullying when practiced (not when repeated).

Still on self-relationship strategies such as empathy and effective response, adolescents vary considerably in these strategies, which determines a hierarchy that deserves to be identified among peers. Based on a systematic review by Garandeau et al.(2014) with approximately 11,300 adolescents from the 8º and 9º grades, from 71 schools, an association was found

between the tendency towards bullying (in the perpetration category) and the hierarchical status observed in groups of adolescents.

This status meant individual variation in terms of the exercise of social power and regulation within groups. The main conclusion resided in the prediction that the problem of threat and perpetration increases in the following school year considering status as a latent variable. However, the hierarchy did not correlate with an increase in inter-individual variations in groups of adolescents in the following years. In a close study (Pozzoli & Gini, 2013), the variable of status and individual variation among adolescents (and children as well) was examined resorting to the multi-level model of structural equations. The magnitude of the relationship between this variation and bullying was significant in the results. In addition to identifying the causes and the importance of empathy to mediate and reduce victimization and cybervictimization behaviours, the need for prevention was verified through the use of the same structural equations' methodology. In the study by Ortiz et al. (2022), one of the ways to avoid the repetition of bullying behaviours (when these are identified a priori) is to introduce more sports activities during school hours, with no differentiation for genders. Another form of prevention identified by the same methodology, in a Scandinavian study, included a different group of adolescents that deserves the greatest attention in the educational phase we are living in: immigrant students (Fandrem et al.2009). According to this important study, immigrant adolescents are the most targeted, compared to natives. Again, the different status variable among individuals appears as a direct and moderating variable. Immigrant students, under study, are students identified as 'at risk' fin terms of suffering from bullying behaviour, with a male incidence.

In short, despite several studies that positively relate sleep problems with greater perpetration of bullying, research relating the chronotype with bullying/victimization behaviours is almost rare. The chronotype has been very neglected, especially considering that the adolescent population is the most critical in terms of sleep phases. However, other factors may emerge in the explanation through the statistics of structural equation models.

Thus, the questions this study asks are: does the chronotype have a significant relationship with the perpetration or victimization of bullying? Do activities outside regular school hours influence bullying and cyberbullying behaviours? Do school activities within educational establishments moderate disruptive behaviour/bullying episodes? Is there a relationship between gender and perpetration and victimization behaviours?

Method

Objectives

- To provide comprehensive understanding about the sleep deprivation (or not) of adolescents as being victims of bullying.
- To identify differences, in a cross-cultural perspective, regarding gender and bullying perpetration, aiming to predict aggressive behaviors at Portuguese schools (considering adolescents).
- To examine if the phase delay (sleep stage in adolescence) influences the chronotype changes, and analyzing association with bullying and aggression in adolescent school population.

Participants

117 Portuguese adolescents (*M* = 12 years old; *SD* = 1.4), from the 5° to the 9° grades, were evaluated regarding their chronotype and bullying and cyberbullying behaviours, in terms of perpetration and victimization. With regard to gender, 41 (34.5%) were male and 76 (63.9%) were female. After authorization from schools in the Lisbon area, Portugal, and with the informed consent of the school and the family, parents completed the instrument that identifies the children's sleep habits and morning/evening profile; the same children answered the bullying/cyberbullying instrument. This sample showed the following average hours spent at school per day: 41 (34.5%) stayed at school for 8 hours, 25 (21%) for 9 hours, and 22 (18.5%) normally spend 10 hours there. Younger students (mainly 6º grade) reported more episodes of victimization than older students (9º grade). Socio-demographic data on the household (number of siblings at home; biological parents; single-parent families; siblings and type of room, shared or not) and on school schedules (time of entry, for example) were collected for the purpose of identifying covariates.

Materials and Procedure

Two instruments were administered with different specifications considering what they are measuring: first the sleep measurement with 27 questions distributed among three scales; second, the bullying and cyberbullying occurrences with 28 questions.

Measuring Sleep habits and the chronotype

Sleep habits, duration and midpoint of sleep were measured using the Children's Chronotype Questionnaire by Werner et al. (2009). In this sample, we used the Portuguese version of the Children's Chronotype Questionnaire by Couto et al. (2014) with α = .78. Parents of the

adolescents answered to three scales: Midpoint of Sleep with 16 items (1); morning and evening (M/E) with 10 items (α = .70) (2); and chronotype according to the parents' assessment, based in one item (3). In total, these scales contained 27 items. Concerning the calculation and statistics for the subscales that determined the chronotype and the sleeping habits, we found items as: "[in school days] "How alert is your child during the first half hour after having awakened in the morning?"; "Let's assume that you have decided to enroll your child in an athletic activity. The only class available meets twice a week at 7 to 8 am. How do you think he/she will perform?"; [in free days] "Considering your child's "feeling best" rhythm, at what time would your child go to bed if he/she is entirely free to plan the day?".

The Midpoint of Sleep (MPS) and the Corrected Midpoint of Sleep (CMPS) were computed, in addition to calculating sleep duration in days with schedules (SD) and free days (FD). For the evaluation of MPS we find items as: for example: "On Scheduled Days, my child wakes up at __:__am"; "On scheduled days, my child if fully awake by ___:__am"; "On Free Days, my child normally wakes up at __:__ am"; "On nights before Scheduled Days, my child goes to bed at __:__pm".

This calculation was prior to the computation of MPS and CMPS since sleep duration on different days of the week are determining factors for estimating MPS. The CMPS was a way to correct, in minutes, the two types of sleep duration (considering the shorter sleep times during the week and the extended bedtime on weekends). The calculation considered the CTIME 24-hour arithmetic of Roenneberg et al. (2011).

The chronotype was computed with the calculation of percentiles (considering the answers from question 17-26): a morningness and eveningness scale score was determined as follows, for the Portuguese version: 23 points (morning chronotype); intermediate type between 24 and 32 points; the evening type or chronotype was positioned at > 33 points. The morningness and eveningness type was determined by schedules of school days and of free days (weekends, normally). According to the original version (Werner et al., 2009), the coding was followed and 4 of all items were inversely coded (1=5). Accordingly, the chronotype can then be computed.

The category named "Chronotype" corresponds to Question 27, in a 5-point rating. Parents characterized, in that scale, the sleep behaviours of their adolescents. Those sleep behaviours referred to sleep and awake periods, therefore schedules for sleeping and for tasks performance are presented. Parents choose the best schedule they felt to be most adequate to the real routine of their children.

Measuring bullying and cyberbullying

Adolescents answered to the Bullying and Cyberbullying Behaviours Questionnaire: Short Form (BCBQ-SF) by Coelho et al. (2020). This instrument comprises two subscales, totalling 28 items, and utilizes a Likert-type response format: 1 – It hasn't happened to me; 2 – only once or twice a year; 3 – 2 to 3 times a month; 4 – once a week; 5 – several times a week. Only items 23 and 24 present options to answer in a different way (e.g., how many aggressors, where and when the events occurred).

Cyberbullying was assessed using four items and refer to the following descriptors or behaviours: defamation, flaming, online harassment and outing (gender discrimination). This instrument is reliable and with 28 items - Bullying (20 items, α = .77) and Victimization (4 items, α = .79) – and only to be used in adolescents in the 6° and 9° grades. Bullying items include, for example, "I hit, kicked or pushed another student violently" and cyberbullying can be, for example, "I put videos or photos of other students on the Internet without their permission". Cyberbullying subscale refers to four items in the bullying scale.

The instrument assesses bullying behaviour: verbal, physical, material, ethnic, sexual, or acts of a defamation and threating nature. Aggressors and victims were identified through descriptors coded after all items had been answered.

Administration

Regarding the administration of the two instruments, all steps of the empirical study took place during the 2021/2022 school year. The statistical analysis was conducted in 2023. Firstly, the study project was submitted to the Ethics Committee of the Psychology Research Centre (CIP). After obtaining ethical and legal approval, the school board was contacted and the informed consent was obtained. The research sessions with families and adolescents occurred in a controlled situation ensured by teachers and directors. The sample and their parents were informed regarding the objective of the study and the procedure and time to complete the instruments. Firstly, inclusion and exclusion criteria were defined: students should be in the adolescent age and attending public schools; the cases should not have diagnostic of pathologies. According to our statistical analysis plan, and regarding the research questions, firstly the chronotype questionnaire was answered. Then the adolescents were evaluated in terms of bullying and cyberbullying, considering victimization and perpetration. Finally, the data collected was encoded and examined using the Statistical Package for the Social Sciences (SPSS, version 28) and the AMOS programme. The school board was also assured that it would have access to the results if it so requested. The collected data will be kept anonymous in compliance with the standards imposed by the

GDPR (General Data Protection Regulation). For both instruments, as involving human participants, code of ethics was in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The consents were delivered and ensuring the anonymous principle of data collection, treatment and dissemination (for academic purposes only). All the participants accorded with the consent statement.

Data analysis

We used the G*Power 3 software version which provided accurate details about the percentage of power needed to achieve our analyses in an a priori computation. G*Power 3 enhances power analyses for the statistical tests used for this research: tests t, F, z and binomial tests. The effect size was established at 0.5 to consider the sample size as appropriate; and the power (1-β error probability) at 0.80 (equivalent to 80% of appropriateness of the sample). The effect size> .80 is the most referred as adequate attending in the previous literature and based in the Cohen' (large) effect size (1988; 1992). 0.05 was the maximum considered for the *p* value.

After, the post-hoc test was introduced at the G*Power by selecting the F tests and the MANOVA repeated measures between factors. The results indicated a sample of N98 as minimum required, after determined two tailed groups (considering the hypotheses) and the respective different means and standard deviation (gathered from the SPSS output and according to the G*Power guidelines). We met the criteria considering 117 cases examined. The critical F was 3.9381111. In sum, for all the tests, the sample size was in accordance to the main calculations required. After this phase, a multi-group structural equation analysis was completed with AMOS.

Results

In the context of a model-building approach, multiple-group structural equation modelling was conducted to test the models best suited to explain the bullying/cyberbullying and victimization of adolescents. Only the adolescents involved in aggression episodes (perpetration or victimization) were considered during the analysis. Attending to this point, Table 1 presents the descriptive information for gender and age regarding specifically the two dimensions of the scale.

Table 1.
Cases of males and females' adolescents: victims and perpetrators (bullies)

	Gender	*M*	kurtosis	*N*
Victims	Males	9.83	-.057	17
	Females	10.71	2.37	31
Bullies	Males	8.79	.777	17
	Females	8.82	26.9	31
	Age			
Victims	10 yrs old	.71		
	11 yrs old	.78		
	12 yrs old	.77		
	13 yrs old	.57		
	14 yrs old	.50		
	15 yrs old	.25		
Bullies	10 yrs old	.33		
	11 yrs old	.43		
	12 yrs old	.28		
	13 yrs old	.43		
	14 yrs old	.38		
	15 yrs old	.25		

Thus, it was possible to make correlations, identify multiple regressions between independent and dependent variables, that is, the effect of one factor on another and predict dependent variables through extended path analyses. The models follow below.

Model 1: Chronotype and disruptive behaviour

When testing the first model, the latent variable used was the chronotype, and a significant impact of the chronotype was confirmed (score variation between intermediate and eveningness), but this impact had a significant variation regarding the two bullying/victimization behaviours ($\chi^2(31) = 5$, $p < .05$, CMIN = .613, $p > .05$, CFI = 0.99, TLI = 1.126, $p = .000$, RMSEA = .000 [L0 90 =.110, H 190 = .110]). The estimate values were very high, which confirmed the discriminant analysis, that is, that the chronotype determines well the variance regarding the disruptive behaviour. Bullying was better explained by the chronotype than victimization in terms of variance.

Through the standardized estimates, we found the regression values with statistically significant values for the variable bullying (perpetration: .707), but not in the same way for victimization (.089). However, the chronotype also explained the variability in victimization behaviours ($p < .05$). The standardized regression weights analyses revealed a better model fit for bullying than for victimization, given that the estimated values are expected to be close to 1 (bullying is at .707) to explain the large variance produced by the latent variable in the observed variable. That is, variations in the chronotype are more directly influencing aggressive behaviours and not so much victimization.

With regard to the variances, the coefficients were significant for both observed variables (perpetration and victimization), although with divergent direct and indirect effects as expected (victimization is less measured by the chronotype than bullying). Here, the squared multiple correlations showed values that indicate that the chronotype explained the variance in 50% regarding bullying, but not in terms of victimization (low variance: 8%).

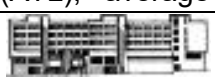
In the values of intercepts and estimates, the variable bullying/cyberbullying was significant to explain the relationship between the sample and the data on display (z = .379/.132 = 2,877). The indirect (i.e. mediated) effect by F1 (chronotype score) explains victimization and bullying differently. The higher the chronotype (i.e., the more evening the subject is), the more episodes of perpetration occurred.

As for covariances, the chronotype presented the following values: Estimate = 31.085; S.E.= .119; C.R. = .260.8; $p < .05$. Thus, the correlations were high considering the value of $p < .05$.

In short, the model showed a good fit regarding the relationship between chronotype and perpetration. However, about 66% of the sample reported having been victims of bullying, with 38% perpetrating it. Hence, the chronotype influenced both assessed (observed) dimensions, but in a different way. The RMSEA value presented a close fit with a very acceptable value ($p < .05$) which complements the suitability of the structural model.

Models 2 and 3: Effect of extracurricular activities and extended hours on disruptive behaviour

Two more models were produced, first for bullying and cyberbullying, then for victimization (which we will call model 3 considering the order of models in the Ongoing Results section). In the first model, the variables that affect students' school schedules in terms of extending them or adding other extracurricular schedules were introduced: "extracurricular activities", "curricular enrichment activities", "social support activities outside school" (ATL), “average



sleep period on school days". There were also covariances between the two latent constructs (Figure 1).

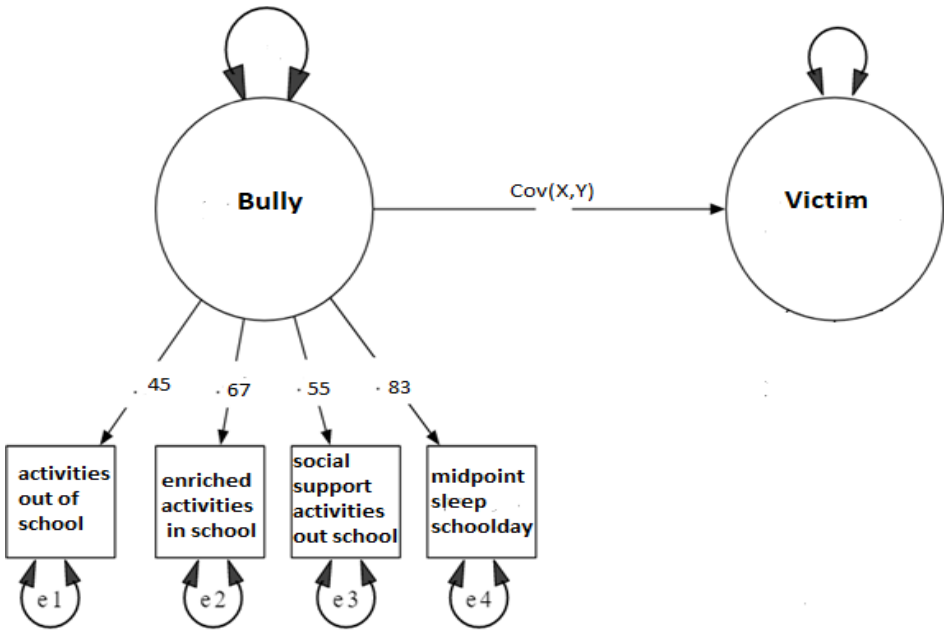


Figure 1. *Relationships between bullying (bully and victim) and the independent variables. The standard regression coefficients were described previously.*

The model's regression data revealed that the estimate values were almost all high and significant ($p < .05$) with regard to bullying, for weekly extracurricular activities, daily and weekly curriculum enrichment activities, social support activities outside school (ATL), but not in the case of the average period of sleep on school days. Observing the standardized values, the curricular enrichment activities - therefore the activities that take place at school outside the regular schedule - showed a high and positive correlation with bullying. Thus, the more adolescents were involved in activities of this type, the more likely they were to have aggressive behaviour.

The other variables showed a high but negative correlation with bullying. In other words, bullying practices were lower in individuals who attended leisure activities (in support centres outside the school) and extracurricular activities – the latter not taking place at school and which are usually identified as additional activities that students carry out on their own initiative, or their parents', such as music, dance, and sports that are not practiced in school. The average period of sleep, regarding the construct of sleep duration, did not show an expressive or significant correlation with bullying behaviour, despite the results observed in the relationship between sleep and chronotype.

As for the covariances, bullying presented the following values: extracurricular activities: SE= 466,972; C.R. = .289; p < .05; curriculum enrichment activities at school: SE= 119,253; C.R. = .290; p < .05; free time activities (of social support): SE= 3,545; C.R. = .266; p < .05. Perpetration variance, however, was more explained by curricular enrichment activities than by extracurricular activities. It is reiterated that more hours spent at school led to more aggression episodes.

In short, the model showed a good fit for the relationship between chronotype and perpetration ($\omega > 0.90$). The same variables of the structural equation model showed different results for victimization, as can be seen in the next results section.

Regarding victimization, in this third confirmatory model, the variables gender, school year, “extracurricular activities”, “curricular enrichment activities”, “free time activities associated with social support” (ATL), and “average sleep period on school days” were introduced.

The standardized values of the factors (variables) revealed that curriculum enrichment activities also explained the high variance for victimization. These data are in logical line with the model conducted for the path diagram of bullying and the respective variables observed with school enrichment activities. If students are more aggressive in school and stay there longer, then there will also be greater cases of reported victimization. In the case of students who attended extracurricular activities – outside school – they were the ones who least indicated suffering behaviours due to bullying or cyberbullying (S.E.= .242; C.R. = 7.295; p < .05). The other variables did not reveal such high predictive values, although they were all significant, including regarding the gender of adolescent students (p < .05).

The year of schooling was also introduced in the model and reported high and significant estimate values (S.E.= .425; C.R. = 6.629; p < .05). The model showed good fit (χ^2 =17, $p < .05$; CMIN = 13.246, $p > .05$, CFI = .990, TLI = -.172, $p = .000$, RMSEA = .063 [L0 90 =.000, HI .131 = .333]). It is interesting to note that regarding victimization as opposed to bullying, the average period of sleep (the duration of sleep during the week of school activities) showed significant and positive values. That is, people who reported victimization due to bullying showed greater levels of variation in their average sleep period. This indicator suggests disturbance in the victims' sleep schedule (of at least one reported episode). It should be noted that average sleep period is not synonymous with chronotype, as observed in the model results in 3.1.

Model 4: Cyberbullying and other variables

Specifically, for the cyberbullying items (four items in the scale), model 4 showed a χ^2 = 533.9, p < .05. In order to compose this structural model, the items for perpetrated cyberbullying and experienced cyberbullying were first computed. Thus, in addition to the independent variables, these two dependent variables were also introduced in the model: year of schooling of the child, gender, participation (or not) in free time activities associated with social support (ATL), in curricular enrichment activities, in extracurricular activities and the average period of sleep during school days. All independent variables indicated a moderate to high and significantly (p < .05) predictive value for cyberbullying. It was desirable to maintain, in the model, the same variables observed for traditional bullying, in addition to inserting the two cyberbullying factors (perpetrated and experienced), as mentioned.

Instead, it was found that the standardized loads increase, proportionally and negatively, between the variables cyberbullying/perpetration and cyberbullying/victimization. This proportional relationship is being mediated by manifest (observable) factors in the model under analysis. Incidentally, this was the model, after testing it with the chronotype, that most presented high estimates and strong (and positive) correlations between most of the factors introduced to explain the latent variable (cyberbullying).

However, *p* only proved to be significant for the perpetration of cyberbullying and not for victimization, given the coefficients obtained in the dependent variables. There was a greater relationship for acts of cyberbullying and not for victims, produced by the effect of variables that were thus identified: the year of schooling of the child, gender, frequency of participation in ATL, curricular enrichment activities, extracurricular activities and the average period of sleep during school days. It should be noted that the effect of curriculum enrichment activities was negative for cyberbullying, which suggests that more cyberbullying occurs when the student is not at school, therefore attending curriculum enrichment activities (these, it is reiterated, only occur at school unlike other activities such as extracurricular or ATL).

As for the model fit: χ^2 =13, *p* < .05; CMIN = 1.690, *p* >.05, CFI = .990, TLI = -.32.734, RMSEA = .076 [L0 90 =.440.354, HI 90 =.109, PCLOSE = .099]. Thus, when examining the values of model 4, we note that there was an adequacy and there is no significant *p*, which would mean that the degrees of freedom, in the model, would be revealing a discrepancy that would violate the assumptions for the latent structure. However, the values of RMSEA and even TLI were not high in terms of model fit, so it was decided to remove one of the parameters: the average period of sleep on school days. This decision arose from the fact that it was a variable that was increasing values, in some cases, exaggeratedly, probably because it is based on computing the average of minutes and seconds, unlike the other

variables. By adjusting the model without this variable, we were able to find more positive values, especially for RMSEA. See resumed Figure 2 and detailed Table 2.

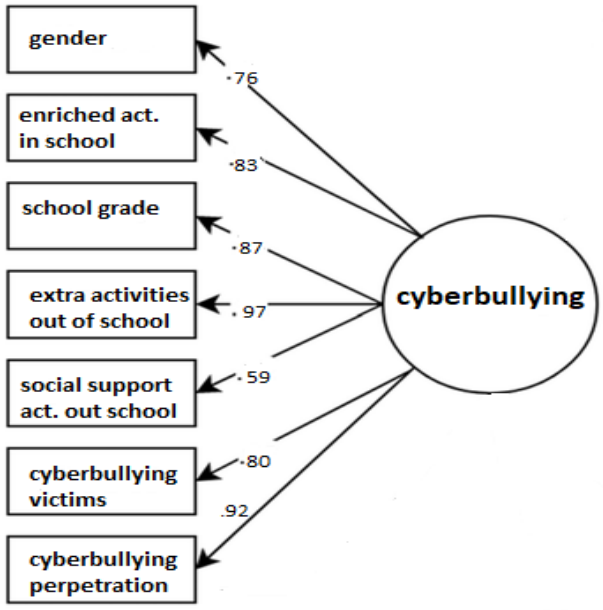


Figure 2. Relationships between cyberbullying and the independent and dependent variables. Standard regression coefficients were described previously

Table 2.

Structural Equation Modelling: regression for covariates on bullying and cyberbullying (final model)

	Chronotype	Bullying	School grade	Cyberbullying
Bullying (perpetration)	.707	1.00	.425	.242
Activities out of school	.37 (.08)	.29	.07	–.56
Enrichment activities in school	.49 (.08)	.29	.05	–.20
School grade	.70 (.08)	*	*	–.32
χ^2	31	46	17	13
RMSEA	0.0613	*	0.063	0.076
CFI	0.99	*	0.99	0.99
TLI	1.12	*	-.172	-.32

*not applicable values. Note: all regression coefficients are calculated at p < .05.

These results, originating from the four structural equation models, will be discussed based on the literature studied with the aim of answering the study's questions.

Discussion

The objective of this study was to answer the three main questions that guided it: does the chronotype have a significant relationship with the perpetration or victimization of bullying? Do activities outside regular school hours influence bullying and cyberbullying behaviours? Do school activities within educational establishments moderate disruptive behaviour/bullying episodes? Is there a relationship between gender and perpetration and victimization behaviours?

The result of our study attested that chronotype (sleep behaviour related) influences the perpetration of bullying and the sleep duration, with prejudice for bullies, more when compared to victims; sleep duration was affected in free days and schooldays for victims also; extracurricular activities are good predictors to reduce bullying episodes; long school schedules – adolescents at the same space for several hours – empowered more opportunities of bullying; 6° grade was most affected. All results are compared with research previous published, in the next paragraphs.

As the analysis of structural equations developed, four models allowed attesting the moderating and predictive effect of observable variables and indicating the robustness of models considering latent variables. The relationships between bullying and specific factors confirmed, regarding the first question, that according to the chronotype, there were more or less situations of aggression among peers at school. Thus, through a previous analysis of linear logistic regression, it was verified that the evening students were more perpetrators (that is, students who prefer activities later in the day and also have later sleep habits). The model results revealed that the variation observed in the two behaviours – perpetration and victimization – is affected by chronotype, and it affects bullying more. This means that the bullying variance (.707) is better explained by the chronotype than victimization (.008). It is important to refine this argument, because when the chronotype is so directly related to bullying and not to victimization, regression analyses confirmed that older subjects have greater chronotype variability (fluctuation in sleeping and waking hours, which generates imbalance).

This evidence is in line with more recent studies such as those by Tosuntas et al. (2020) and Lariche & Haghayegh (2018) who, although with an older school population, detected a correlation between evening subjects and perpetration (not so much regarding victimization).

The same occurred in the current Portuguese sample, the adolescent population causing more concern. This relationship, in adolescents, between chronotype and perpetration of bullying and cyberbullying has, in more recent research, confirmed the importance of also checking the duration of sleep of perpetrators and victims, as both are affected (Sampasa-Kanyinga et al., 2022). Only a few studies have really explored intervention practices with adolescent victims or perpetrators of bullying, because of the perceived relationship between practiced/suffered aggression and persistent and repetitive thoughts during sleep/wake periods during the night on school days (Gradisar et al., 2022).

Therefore, in addition to the issue of chronotype or daytime type, informing the relationship between evening subjects and increased bullying practices, it is important to analyse the sleep period in detail. Sleep length, specifically the average number of hours slept per night on school days, was analysed resorting to structural equation models. However, it was noticed that the average period of sleep was expressive only in one of the tested models. In this model, the relationship between victimization (of bullying) and alteration in sleep duration (fewer hours of sleep per night compared to the adolescent norm) was seen. This data is in line with similar statistics by Quante et al. (2019). With regard to bullying, the variable in question did not report significant regression values or standardized coefficients. This was seen in the same year of the study that we carried out in Portugal, namely in the study by Leary et al. (2022).

This relationship is in line with previous research that examined the relationship between sleep habits and mood disorders in prepubescents with direct consequences for disruptions in the classroom (Aronen et al., 2014; Gregory & Sadeh, 2012; Marchante et al., 2022;Vriend et al., 2012). These people are more reactive, therefore more prone to acts of bullying (Henderson et al., 2019;). To these data, we add the genetic trait of acrophase, which has a normative delay in early adolescence and which is more related to mood disorders and school maladjustment (norms, schedules, peer relationships). On the other side of the 'coin', victimization - resulting from bullying - causes problems in children's sleep and disturbance in daily emotional regulation (Gradisar et al., 2022). However, this relationship between bullying/being a victim of bullying and affected sleep patterns has been mainly analysed in primary school populations (Van Geel et al., 2016) and needs to be examined in pubescent populations.

With regard to the second and third questions, extracurricular activities (in the context of ATL or not) had a positive influence, that is, fewer episodes of bullying. On the contrary, the perpetration of bullying was more frequent in cases of extended hours - therefore during

curricular enrichment activities - when these take place in the same educational space after regular hours, as students remain longer at school. This result is in line with previous studies that correlated the frequency of bullying with the spaces and dimensions of school groupings (Hyndman et al., 2021; Massey et al., 2020). The size and environment of the classrooms were also confirmed as a significant moderating effect of bullying, especially considering the dissemination of negative rumours (indirect bullying) among young people (Reuland & Mikami, 2014; Serdiouk et al., 2015). Moreover, schools perceived by students as prone to such disruptive behaviour are the ones with the greatest problems of academic underachievement (Perron, 2015; Wang et al., 2014). The physical and social environment of the school structure, as well as the relationship between teachers and students are extremely important to explain the origin and perpetuation of bullying and victimization behaviours (Perron, 2015; Wang et al., 2014).

Due to the model that highlights the prolonged stay at school as a strong predictor for the occurrence of bullying, the year of schooling arose as an important predictor in the structure of the analysed models. Through the latent variables, we realize how subjects from different schooling years (especially from the 2nd cycle, the youngest adolescents in the sample) were attacked in school at least once. Still, it was the youngest who reported, in greater numbers, this victim behaviour. However, the average period of sleep, regarding the construct of sleep duration, did not show an expressive or significant correlation with bullying behaviour. The relationship and regression indicators of mean sleep time were not directly related to chronotype or daytime type. It is important to clarify this point, bearing in mind that the average period of sleep refers to the average number of hours slept per week (in terms of school days). On the contrary, the average period of sleep affected the victims (adolescents and pubescents who reported being victimized), and there was a significant relationship between the duration of nocturnal sleep and students as victims of some form of bullying (verbal, physical).

With regard specifically to the cyberbullying construct, within the bullying construct, the fourth model completed in this study confirmed the perpetration (and not victimization) originating from online bullying with an effect directly caused by: school year, gender, frequency (or not) in ATL, curriculum enrichment activities, extracurricular activities, and the average sleep period during school days.

Participation and frequency in curricular enrichment activities at school and at extended hours had a negative relationship with cyberbullying. That is, there is a greater chance that adolescents will produce more negative and disruptive behaviours online because they are

not directly in the same space and time as their peers. The research is not clear when referring to the significant relationship between extracurricular activities and bullying, hence the pertinence of this finding among the results of this study. On the one hand, Sheridan et al. (2022) associate extracurricular activities with an increase in bullying episodes. On the other hand, in the same year, Hong et al. (2022) and Salem Al-Amri (2022) report such activities as having a negative proportional relationship with bullying and cyberbullying. In our view, it is important to clarify what is meant by extracurricular activities, and how they are differentiated, as we believe that the aforementioned studies refer to curricular enrichment activities that take place during extended hours at school and not to extracurricular activities as they are classified in Portugal, conducted outside the traditional school space.

For the fourth question, as seen, no significant and predictive relationship was confirmed between traditional and online bullying and the gender of adolescents. This is new evidence compared to most of the literature that has attested that the male group, in the adolescent range, is the one that perpetrates acts of bullying the most, while the female gender starts later and does it indirectly and online. This study, however, shows little or no differentiating difference in terms of gender with regard to the predictive value and effect on bullying/cyberbullying (Demir-Kaymak et al., 2022).

Practical implications

In general, implications and applications for practice can be suggested such as fast identification of bullying and cyberbullying events. The school staff should empower leadership and more social awareness for the bullying problem and their mental health potential consequences. This is about policy on civility of students, mostly regarding the 2nd Cycle (from 6° to 7° grade). In this policy, tutors should be called to school and more engaged with educational sessions about bullying and sleep hygiene. This coaching should be leaded by psychologists and teachers. Students must attend and, in those group sessions, some behaviour cues can be identified since the beginning. The directors and teachers' leadership should be distributive and participative to generate empathy with student' community in such young and critical age for emotional regulation. These techniques will avoid costs for schools, for general educational public system and for families that will have less problems with mental health issues of their children. Additionally, a balanced environment improves the academic achievement and the public school will attain greater reputation, avoiding the stigma that divides private and public schools.

In specific points regarding practical implications, this study contributes to greater clarity about the factors that affect and that can be controlled in the pubescent population,

especially in the first years of schooling of the 2nd cycle. It pays greater attention to the assessment of chronotypes and sleeping habits, as well as to the routine assessment of students' practices in order to verify whether they are permissive or bullying. As for cyberbullying, practices may involve the increased role of the family in terms of controlling digital technologies and sleeping behaviours at home. More importantly, school professionals and psychologists should pay attention to the type and number of school hours and curriculum enrichment activities.

These activities may be too long and require an analysis of their time distribution. Mainly because our multi-level analyses revealed how extracurricular or curricular enrichment activities (inside the school, after the regular hours that everyone attends) are positively related to the probability of bullying. This does not happen so much regarding cyberbullying, which denotes a common logic in that the less they attend school activities or schedules, the more time adolescents may have outside school to perpetrate acts of violence online. Still on the construct of bullying, considering that this is only defined and limited to the educational space, the role of parents is of crucial importance in cases of students who have neither extracurricular activities, nor curricular enrichment activities, nor social support activities in their free time (ATL).

After the identification of bullying and cyberbullying episodes in schools approached in this research, board directors, psychologists and teachers perceived that counselling at school will be the first intervention and including students and parents. Additionally, sessions of informal seminars – conducted by teachers and psychologists - about the concepts and results here studied were recommended as an immediate solution *in loco.* From the point of view of methodological research, it would be important to extend and validate the chronotype questionnaire for adolescent populations and not just up to eleven years old. This is because not only there are morning/intermediate/evening differences in this age group, identified through the instrument used, but also because children aged <11 years have recently shown to be increasingly heterogeneous in terms of daytime type. Therefore, children in the 1st cycle are no longer exclusively morning, and there is evidence of an evening population at an early age.

Conclusion

In short, the four models point to a positive and significant relationship between the morning chronotype, extracurricular activities and less bullying. In reverse order, the evening chronotype and curriculum enrichment activities influence increased bullying and

cyberbullying. The average period of sleep revealed a relationship, as expected, with victimization and not with perpetration.

Concluding with limitations of this study, to notice the sample size should be higher considering the resistance of parents for the examination of sleep habits and aggression events among children. The sample size was also a limitation for the structural equation analysis. Lastly, in further studies, we suggest a briefing session as also a formal session about sleep and bullying themes. Distinguishing different aggression behaviours among school students. Mostly focusing the cyberbullying because still is the less controlled according to the workplace question. Future investigation should examine also the differences between natives and immigrants toward bullying and cyberbullying events.

Abbreviations:

MPS: Midpoint of Sleep

CMPS: Corrected Midpoint of Sleep

SD: Sleep Duration

SD: days with schedules

FD: free days

Funding

This work was funded by national funds through FCT - Fundação para a Ciência e a Tecnologia (Foundation for Science and Technology) - as part of the project CIP/UAL – Ref. UIDB/04345/2020; and the University Center for Research in Psychology (CUIP).

Other Support/Acknowledgement

The authors have no support to report.

Competing Interests

The authors have declared that no competing interests exist.

References

Dellinger, A. B., & Leech, N. L. (2007). Toward a unified validation framework in mixed methods research. *Journal of Mixed Methods Research, 1*, 309-332. https://doi.org/10.1177/1558689807306147

Almeida, A. M. T. (2011). Portugal. In P. K. Smith, Y. Morita, J. Junger-Tas, D. Olweus, R. Catalano & P. Slee (Eds.), *The nature of school bullying: A cross-national perspective* (pp. 174-186). Routledge.

Arhin, D., Oppong, K., Asante, N., Kugbey, et al. (2019). The relationship between psychological distress and bullying victimisation among school-going adolescents in Ghana: a cross-sectional study. *BMC Res Notes, 12*, 1-5, 10.1186/s13104-019-4300-6

Aronen, E. T., Lampenius, T., Fontell, T., & Simola, P. (2014). Sleep in children with disruptive behavioral disorders. *Behavioral Sleep Medicine, 12*(5), 373-388. https://doi.org/10.1080/15402002.2013.821653

Beaudoin, H., & Roberge, G. (2015). Student perceptions of school climate and lived bullying behaviours. *Procedia-Social and Behavioral Sciences*, *174*, 321-330. https://doi.org/10.1016/j.sbspro.2015.01.667

Blakeslee, T., Snethen, J., Schiffman, R. F., Gwon, S. H., Sapp, M., & Kelber, S. (2023). Adolescent characteristics, suicide, and bullying in high school. *The Journal of School Nursing*, *39*(6), 463-474. https://doi.org/10.1177/10598405211038235

Coelho, V. A., & Sousa, V. (2020). Bullying and Cyberbullying Behaviors Questionnaire: Validation of a short form. *International Journal of School & Educational Psychology*, *8*(1), 3-10. https://doi.org/10.1080/21683603.2018.1522282

Costa, P., Farenzena, R. C., Simões, H., & Pereira, B. (2013). *Violence, bullying and indiscipline at school; a longitudinal study about vitimization.* Annals of IX International Symposium of Physical Activity, Leisure and Health [*Violência, bullying e indisciplina na escola: bullying escolar: um estudo longitudinal sobre vitimização. Atas do IX Seminário Internacional de Educação Física, Lazer e Saúde*], (pp.421-450). http://hdl.handle.net/1822/26341

Couto, D., Allen Gomes, A., Pinto de Azevedo, M.H., Bos, S.M.C., Leitão, J.A., & Silva, C.F. (2014). The European Portuguese version of the Children ChronoType Questionnaire (CCTQ): Reliability and raw scores in a large continental sample. *J. Sleep Res., 23,* 160.

Demir-Kaymak, Z., Duman, I., Randler, C., & Horzum, M. (2022). The Effect of Gender, Grade, Time and Chronotype on Computational Thinking: Longitudinal Study. *Informatics in Education*, *21*(3), 465-478. https://doi.org/10.15388/infedu.2022.22

Doumas, D. M., Midgett, A., & Watts, A. D. (2019). A pilot evaluation of the social validity of a bullying bystander program adapted for high school students. *Psychology in the Schools*, *56*(7), 1101-1116. https://doi.org/10.1002/pits.22249

Dukes, R. L., Stein, J. A., & Zane, J. I. (2010). Gender differences in the relative impact of physical and relational bullying on adolescent injury and weapon carrying. *Journal of School Psychology*, *48*(6), 511-532. https://doi.org/10.1016/j.jsp.2010.08.001

Erdogan, Y., Hammami, N., & Elgar, F. J. (2022). Bullying, Family Support, and Life Satisfaction in Adolescents of Single-Parent Households in 42 Countries. *Child Indicators Research*, *16,* 739–753. https://doi.org/10.1007/s12187-022-09996-4

Fandrem, H., Strohmeier, D., & Roland, E. (2009). Bullying and victimization among native and immigrant adolescents in Norway: The role of proactive and reactive aggressiveness. *The Journal of Early Adolescence*, *29*(6), 898-923. 10.1177/0272431609332935

Feng, T., Wang, X., Chen, Q., Liu, X., Yang, L., Liu, S., & Zhang, Y. (2022). Sympathy and active defending behaviors among Chinese adolescent bystanders: A moderated mediation model of attitude toward bullying and school connectedness. *Psychology in the Schools*, *59*(9), 1922-1936. https://doi.org/10.1002/pits.22736

Garandeau, C. F., Lee, I. A., & Salmivalli, C. (2014). Inequality matters: Classroom status hierarchy and adolescents' bullying. *Journal of youth and adolescence*, *43*(7), 1123-1133. https://doi.org/10.1007/s10964-013-0040-4

Gini, G., Albiero, P., Benelli, B., & Altoe, G. (2008). Determinants of adolescents' active defending and passive bystanding behavior in bullying. *Journal of Adolescence*, *31*(1), 93-105. 10.1016/j.adolescence.2007.05.002

Gladden, R. M., Vivolo-Kantor, A. M., Hamburger, M. E., & Lumpkin, C. D. (2014). *Bullying surveillance among youths: Uniform definitions for public health and recommended data elements, version 1.0.* National Center for Injury Prevention and Control, (U.S.). Division of Violence Prevention. https://stacks.cdc.gov/view/cdc/21596

Gomes, A. M., Figueiredo, S., Silva, B., Ferreira, E., Castro Caldas, A., & Cercatti, J. (2019). Quality of infant sleep, electronic devices and bullying behaviors in schools. *The European Proceedings of Social & Behavioural Sciences,* 58-72.

González-Cabrera, J., Sánchez-Álvarez, N., Calvete, E., León-Mejía, A., Orue, I., & Machimbarrena, J. M. (2020). Psychometric properties of the triangulated version of the European Bullying Intervention Project Questionnaire: Prevalence across seven roles. *Psychology in the Schools*, *57*(1), 78-90. https://doi.org/10.1002/pits.22320

Gradisar, M., Kahn, M., Micic, G., Short, M., Reynolds, C., Orchard, F., & Richardson, C. (2022). Sleep's role in the development and resolution of adolescent depression. *Nature Reviews Psychology*, *1*(9), 512-523. https://doi.org/10.1038/s44159-022-00074-8

Gregory, A. M., & Sadeh, A. (2012). Sleep, emotional and behavioural difficulties in children and adolescents. *Sleep Medicine Reviews, 16*(2), 129-36. https://doi.org/10.1016/j.smrv.2011.03.007

Guzman-Holst, C., Zaneva, M., Chessell, C., Creswell, C., & Bowes, L. (2022). Research Review: Do antibullying interventions reduce internalizing symptoms? A systematic review, meta-analysis, and meta-regression exploring intervention components, moderators, and mechanisms. *Journal of Child Psychology and Psychiatry*, *63*(12),1454-1465. https://doi.org/10.1111/jcpp.13620

Hasan, M. M., Fatima, Y., Smith, S. S., Tariqujjaman, M., Jatrana, S., & Mamun, A. A. (2022). Geographical variations in the association between bullying victimization and sleep loss among adolescents: a population-based study of 91 countries. *Sleep Medicine*, *90*, 1-8. https://doi.org/10.1016/j.sleep.2021.12.014

Henderson, S. E., Brady, E. M., & Robertson, N. (2019). Associations between social jetlag and mental health in young people: A systematic review. *Chronobiology International*, *36*(10), 1316-1333. 10.1080/07420528.2019.1636813

Herge, W. M., La Greca, A. M., & Chan, S. F. (2016). Adolescent peer victimization and physical health problems. *Journal of Pediatric Psychology, 41*(1), 15-27. https://doi.org/10.1093/jpepsy/jsv050

Hong, J. S., Song, E. J., Tan, K., Peguero, A. A., Sohn, Y., & Espelage, D. L. (2022). Extracurricular activities and bullying perpetration and victimisation in early and middle adolescence. *Journal of Psychologists and Counsellors in Schools*, 1-12. https://doi.org/10.1017/jgc.2022.8

Hyndman, B. (2021). Bullying in the School Playground: Design and Supervision. *The Wiley Blackwell Handbook of Bullying: A Comprehensive and International Review of Research and Intervention*, *2*, 303-316. https://doi.org/10.1002/9781118482650.ch50

Konishi, C., Hymel, S., Wong, T. K., & Waterhouse, T. (2021). School climate and bystander responses to bullying. *Psychology in the Schools*, *58*(8), 1557-1574. https://doi.org/10.1016/j.appdev.2022.101412

Kulari, G. (2025), Getting by with a little help from friends and family: mediation model between loneliness and depressive symptoms amongst Portuguese students. *Journal of Applied Research in Higher Education*,17(2), 807-818. https://doi.org/10.1108/JARHE-11-2023-0547

Lariche, Z., & Haghayegh, S. A. (2018). The comparison of executive functions, risk behaviors, and academic motivation among adolescents with chronology type morningness and eveningness. *Iranian Journal of Psychiatry and Clinical Psychology*, *23*(4), 438-453. https://doi.org/10.29252/nirp.ijpcp.23.4.438

Leary, M., Pursey, K. M., Verdejo-Garcia, A., Smout, S., McBride, N., Osman, B.& Burrows, T. L. (2022). Socio-demographic, self-control, bullying, parenting, and sleep as

proximal factors associated with food addiction among adolescents. *Behavioral Sciences*, *12*(12), 488. https://doi.org/10.3390/bs12120488

Lepore, S. J., & Kliewer, W. (2013). Violence exposure, sleep disturbance, and poor academic performance in middle school. *Journal of Abnormal Child Psychology, 41*, 1179-1189. https://doi.org/10.1007/s10802-013-9709-0

Li, J., Sidibe, A. M., Shen, X., & Hesketh, T. (2019). Incidence, risk factors and psychosomatic symptoms for traditional bullying and cyberbullying in Chinese adolescents. *Children and Youth Services Review*, *107*, 104511. https://doi.org/10.1016/j.childyouth.2019.104511

Marchante, M., Coelho, V. A., & Romão, A. M. (2022). The influence of school climate in bullying and victimization behaviors during middle school transition. *Contemporary Educational Psychology*, *71*, 102111. https://doi.org/10.1016/j.cedpsych.2022.102111

Massey, W. V., Perez, D., Neilson, L., Thalken, J., & Szarabajko, A. (2021). Observations from the playground: Common problems and potential solutions for school-based recess. *Health Education Journal*, *80*(3), 313-326. https://doi.org/10.1177/0017896920973691

Matsumoto, Y., Kaneita, Y., Itani, O., Otsuka, Y., & Kinoshita, Y. (2022). Longitudinal epidemiological study of subjective sleep quality in Japanese adolescents to investigate predictors of poor sleep quality. *Sleep and Biological Rhythms*, *20*(1), 87-96. https://doi.org/10.1007/s41105-021-00343-8

Narayanan, A., & Betts, L. R. (2014). Bullying behaviors and victimization experiences among adolescent students: The role of resilience. *The Journal of Genetic Psychology*, *175*(2), 134-146. https://doi.org/10.1080/00221325.2013.834290

Olweus, D. (2009). Understanding and researching bullying: Some critical issues. In *Handbook of bullying in schools* (pp. 9-33). Routledge.

Ortiz-Marcos, J. M., Lendínez-Turón, A., Solano-Sánchez, M. Á., & Tomé-Fernández, M. (2022). Bullying in adolescents practising sport: a structural model approach. *International Journal of Environmental Research and Public Health*, *19*(20), 13438. https://doi.org/10.3390/ijerph192013438

Palmer, C. A., Powell, S. L., Deutchman, D. R., Tintzman, C., Poppler, A., & Oosterhoff, B. (2022). Sleepy and secluded: Sleep disturbances are associated with connectedness in early adolescent social networks. *Journal of Research on Adolescence*, *32*(2), 756-768. https://doi.org/10.1111/jora.12670

Perron, T. (2015). Looking at the factors associated with bullying and visits to the school nurse, in the United States. *British Journal of School Nursing*, *10*(6), 288-295. https://doi.org/10.12968/bjsn.2015.10.6.288

Peter K, S. (2018). Commentary: Types of bullying, types of intervention: reflections on Arseneault. *Journal of Child Psychology and Psychiatry*, *59*(4), 422-423. https://doi.org/10.1111/jcpp.12897

Pozzoli, T., & Gini, G. (2013). Why do bystanders of bullying help or not? A multidimensional model. *The Journal of Early Adolescence*, *33*(3), 315-340. https://doi.org/10.1177/0272431612440172

Quante, M., Khandpur, N., Kontos, E. Z., Bakker, J. P., Owens, J. A., & Redline, S. (2019). “Let's talk about sleep”: a qualitative examination of levers for promoting healthy sleep among sleep-deprived vulnerable adolescents. *Sleep Medicine*, *60*, 81-88. https://doi.org/10.1016/j.sleep.2018.10.044

Quintero, A. M., & Bianchi, S. B. (2017). Hábitos de sueño, desempeño académico y comportamento en niños de básica primaria. *Pensando Psicología, 13*(21), 5-17. https://doi.org/10.16925/pe.v13i21.1710

Reuland, M. M., & Mikami, A. Y. (2014). Classroom victimization: Consequences for social and academic adjustment in elementary school. *Psychology in the Schools*, *51*(6), 591-607. https://doi.org/10.1002/pits.21770

Roenneberg, T., Kuehnle, T., Juda, M., Kantermann, T., Allebrandt, K., Gordijn, M., & Merrow, M. (2011). Epidemiology of the human circadian clock. *Sleep Med. Rev., 11,* 429–438. https://doi.org/10.1016/j.smrv.2007.07.005

Saarento, S., Boulton, A. J., & Salmivalli, C. (2015). Reducing bullying and victimization: Student-and classroom-level mechanisms of change. *Journal of Abnormal Child Psychology*, *43*, 61-76. https://doi.org/10.1007/s10802-013-9841-x

Salem, Al-Amri, S. (2022). The degree of contribution of extra-curricular activities in reducing school bullying from the viewpoint of secondary school students in Madinah Munawarah. *Journal of Education Studies and Humanities*, *14*(3), 179-230. 10.21608/JEHS.2022.275763

Sampasa-Kanyinga, H., Lien, A., Hamilton, H. A., & Chaput, J. P. (2022). Cyberbullying involvement and short sleep duration among adolescents. *Sleep Health*, *8*(2), 183-190. https://doi.org/10.1016/j.sleh.2021.11.009

Serdiouk, M., Rodkin, P., Madill, R., Logis, H., & Gest, S. (2015). Rejection and victimization among elementary school children: The buffering role of classroom-level predictors. *Journal of Abnormal Child Psychology*, *43*, 5-17. https://doi.org/10.1007/s10802-013-9826-9

Sesar, K., Dodaj, A., Simic, N., & Sesar, D. (2016). Coping specificities in children and adolescent dealing with bullying behaviour. *International Journal of Humanities and Social Science*, *21*(11), 43-53. 10.9790/0837-2111040106

Shakoor, S., MS Zavos, H., Gregory, A. M., & Ronald, A. (2021). The association between bullying-victimisation and sleep disturbances in adolescence: Evidence from a twin study. *Journal of Sleep Research*, *30*(5), e13321. https://doi.org/10.1111/jsr.13321

Sheridan, S., Clary, L. K., Webb, L., Stuart, E. A., & Mendelson, T. (2022). Associations of extracurricular activity participation with bullying victimization among US middle and high school students: A nationally representative sample. *Journal of School Violence*, *21*(4), 475-490. https://doi.org/10.1080/15388220.2022.2114487

Silva, M. A. I., Pereira, B., Mendonça, D., Nunes, B., & Oliveira, W. A. D. (2013). The involvement of girls and boys with bullying: an analysis of gender differences. *International Journal of Environmental Research and Public Health*, *10*(12), 6820-6831. https://doi.org/10.3390/ijerph10126820

Smith, P. K., López-Castro, L., Robinson, S., & Görzig, A. (2019). Consistency of gender differences in bullying in cross-cultural surveys. *Aggression and Violent Behavior*, *45*, 33-40. https://doi.org/10.1016/j.avb.2018.04.006

Statistics, B. (2010). *Bullying statistics*. Retrieved April, 24, 2023, aahperd.confex.com

Talbot, L. S., McGlinchey, E. L., Kaplan, K. A., Dahl, R. E., & Harvey A. G. (2010). Sleep deprivation in adolescents and adults: Changes in affect. *Emotion, 10*(6), 831-841. https://doi.org/10.1037/a0020138

Thornberg, R., Pozzoli, T., Gini, G., & Hong, J. S. (2017). Bullying and repeated conventional transgressions in Swedish schools: How do gender and bullying roles affect students' conceptions? *Psychology in the Schools*, *54*(9), 1189-1201. https://doi.org/10.1002/pits.22054

Tosuntaş, Ş. B., Balta, S., Emirtekin, E., Kircaburun, K., & Griffiths, M. D. (2020). Adolescents' eveningness chronotype and cyberbullying perpetration: the mediating role of depression-related aggression and anxiety-related aggression. *Biological Rhythm Research*, *51*(1), 40-50. https://doi.org/10.1080/09291016.2018.1513132

van Geel, M., Goemans, A., & Vedder, P. H. (2016). The relation between peer victimization and sleeping problems: A meta-analysis. *Sleep Medicine Reviews*, *27*, 89-95. https://doi.org/10.1016/j.smrv.2015.05.004

Vriend, J. L., Davidson, F. D., Corkum, P. V., Rusak, B., McLaughlin, E. N., & Chambers, C. T. (2013). Sleep quantity and quality in relation to daytime functioning in children. *Children's Health Care, 41*(3), 204-222. https://doi.org/10.1080/02739615.2012.685039

Wang, J., Iannotti, R. J., & Nansel, T. R. (2009). School bullying among adolescents in the United States: Physical, verbal, relational, and cyber. *Journal of Adolescent Health*, *45*(4), 368-375. https://psycnet.apa.org/doi/10.1016/j.jadohealth.2009.03.021

Wang, Q., Liu, Y., & Mati, K. (2020). Bully victimization is a correlate of sleep loss over worry (SLOW) among adolescents in four South-East Asian countries. *Sleep Medicine*, *69*, 179-188. 10.1016/j.sleep.2020.01.022

Wang, W., Vaillancourt, T., Brittain, H. L., McDougall, P., Krygsman, A., Smith, D., ... & Hymel, S. (2014). School climate, peer victimization, and academic achievement: results from a multi-informant study. *School Psychology Quarterly*, *29*(3), 360. https://doi.org/10.1037/spq0000084

Wienrich, C., Horn, V., Krauss, J., & Bürger, A. (2024). Personal space invasion to prevent cyberbullying: design, development, and evaluation of an immersive prevention measure for children and adolescents. *Virtual Reality*, *28*(2), 75. https://doi.org/10.1007/s10055-024-00964-7

Werner, H., LeBourgeois, M. K., Geiger, A., & Jenni, O. G. (2009). Assessment of chronotype in four-to eleven-year-old children: reliability and validity of the Children's Chronotype Questionnaire (CCTQ). *Chronobiology International*, *26*(5), 992-1014. https://doi.org/10.1080/07420520903044505

Yen, C. F., Huang, M. F., Kim, Y. S., Wang, P. W., Tang, T. C., Yeh, Y. C., ... & Yang, P. (2013). Association between types of involvement in school bullying and different dimensions of anxiety symptoms and the moderating effects of age and gender in Taiwanese adolescents. *Child Abuse & Neglect*, *37*(4), 263-272. https://doi.org/10.1016/j.chiabu.2013.01.004

You, S., Lee, J., Lee, Y., & Kim, A. Y. (2015). Bullying among Korean adolescents: The role of empathy and attachment. *Psychology in the Schools*, *52*(6), 594-606. https://doi.org/10.1002/pits.21842

Zequinão, M. A., Cardoso, A. A., da Silva, J. L., de Medeiros, P., Silva, M. A. L., Pereira, B., & Cardoso, F. L. (2017). Academic performance and bullying in socially vulnerable students. *Journal of Human Growth and Development*, *27*(1), 19-27. https://doi.org/10.7322/jhgd.127645

About the Authors

Sandra Figueiredo has a Degree in Languages Teaching and PhD in Psychology, accomplished at University of Aveiro, Portugal. She is Principal Investigator of the several and also funded scientific projects. Currently she is Associate Professor of Psychology of Department of Psychology of UAL and she is integrated as Researcher in University Center for Reasearch in Psychology (CUIP), Portugal. The themes she is developing are related to the second language learners' assessment, cognition and students' achievement, instruments validation for schools and for skills evaluation, experimental studies in educational field, chronobiology and school performance, refugees' empirical studies, among others. She published already more than 60 papers at international publications with peer-

review and supervised two multimedia project for immigrants' education support at international level.

Rodrigo Madureira has a degree in Psychology and a Master in Clinical Psychology and Counselling.

Corresponding Author's Contact Address[TOP]

Palácio Dos Condes Do Redondo,
R. de Santa Marta 56, 1169-023 Lisbon, Portugal
Email: sfigueiredo@autonoma.pt