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The Relationships between Adverse Childhood Experiences, Bully Victimization, Anxiety, Sleep, Depression, and Academic Performance among Thai Students in Bangkok, Thailand

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Abstract

This study investigated the mediation effect of sleep and mental health problems on the association between adverse childhood experiences (ACEs), physical bully victimization (PBV) and academic performance (AP) among Thai students in Bangkok, Thailand. Data from the 2019/20 round of the web-based, cross-sectional Bangkok Behavioral Surveillance Survey (BBSS) was analyzed, with a total sample of 6,167 students from Grade 8, Grade 11, and Year 2 vocational schools. The relationships between ACEs and AP are mediated by sleep deprivation and anxiety by controlling age and sex have been shown by binary logistic regression using odds ratios (ORs) and 95% CI. The direct effect of ACEs and PV on GPA and the indirect effects through sleep deprivation and anxiety have been tested by standardized coefficients (β) by linear regression (by the PROCESS macro version 3.4.1 function). The factors were female (AOR: 1.698), age 13-15 year -old (AOR: 1.613), had no ACE (AOR: 1.198), had 1-3 ACEs (AOR: 1.416) no PBV (AOR: 1.722) and sleep ≥ 6 hour (AOR: 1.649) had a highly likelihood of academic performance. Mediation analysis revealed that history of ACEs has a significant association with anxiety, less sleep, and low GPA. Sleep and anxiety have a significant mediation effect on the association between ACEs and GPA (total mediation effect = (-2.7%) while controlling for age and sex. The findings suggest that some of the relationship between ACEs and academic performance may be explained by the relationship between anxiety and sleep. Including measures to promote better sleep is recommended in future anti-PBV and ACEs strategies.

Keywords: ACEs, Sleep, Anxiety; Academic performance; Physical bully victimization; Depression

Introduction

Adverse childhood experiences (ACEs) refer to traumatic events during one's youth [1-3]. ACEs include multiple types of abuse, neglect, violence between parents and caregivers, serious household dysfunction (e.g., alcohol and substance abuse), and peer/community/collective violence [1,2]. Although some experience of these phenomena occurs in the early lives of many individuals, chronic, repeated exposure to ACEs can result in a stressed response [4] which may impact on mental and physical health of the child. This trauma can result in serious negative outcomes during adolescence, such as impaired academic performance [5], increased risk of criminal behavior [6], higher risk of anxiety and personality disorders [7], and risk of substance misuse including opioids [8]. History of ACEs also has a strong graded relationship with health risk in adulthood which is related to behavioral abnormalities and mental health as well [9]. This interaction implies two things. First, as with the ACEs effect in adulthood, the effects manifested at an early age also appear to be dose-dependent. Second, ACEs are obviously relevant -- not only from the physical and mental health point of view -- but from the educational point of view as well, as they are clearly linked to various academic and school-related problems.

Academic performance is very important for the child's on-going education and occupational opportunities. Poor academic performance during childhood and adolescence leads to higher risk

of negative lifetime outcomes such as conduct disorders/juvenile delinquency [10,11], substance use in adulthood [12], mental health problems in adulthood [13-15], and lower employment status in adulthood [16]. Generally, grade point average (GPA) is the most accessible indicator of academic performance of a student. A student's GPA involves a complex interaction between the student and their environment [17]. Intelligence, motivation, work ethic, personality, socioeconomic status, health problems, current and past school systems, course load, academic program, and test-taking abilities all influence GPA.

The association of internalizing (depression, anxiety, traumatic distress) and externalizing (aggression, delinquency, hyperactivity) symptoms with ACEs has been proved by previous studies (18, 19). Mental health condition accounts for 16% of the global burden of disease and injury in persons age 10-19 years, and the 3rd leading cause of death among 15-19 year-olds is suicide; depression is one of the leading causes of illness among adolescents [20,21]. Globally, depression is 4th leading cause of illness, and anxiety is the 9th leading cause of illness among 15-19 year-olds [20]. Anxiety can adversely affect the emotional, physical, and behavioral state of an individual. A prior study found that students with mental health problems (e.g., anxiety, depression) tend to do poorly in their academic work and are more likely to cheat in their academic studies compared to those who do not suffer from either mental health condition [22].

Reduced sleep duration or poor sleep quality has been linked to many diseases and poor performance in children and adolescents [23,24]. Instability in a household or in a child's environment may impact the ability to get a full night's sleep [25,26]. ACEs also have a chronic impact on sleep deprivation until adulthood, with a time-dependent and dose-response nature [27]. Like ACEs, sleep disturbance has a negative impact on physical health by increasing risk of cardiovascular disease, obesity, diabetes [28,29], and mental health disorders, and can exacerbate anxiety and depression disorders [30]. Sleep is also vital for learning and memory consolidation. Negative change in youth performance has been attributed to the impact of sleep deprivation [31].

Only a few studies have examined sleep and health outcomes in the context of ACEs, and one study found that poor sleep quality mediated the association between cumulative ACEs and risk of metabolic syndrome diagnosis in adults [32]. There are very few studies focused on the association between ACEs and academic performance, and no known study has examined sleep and mental health as mediators of the association between ACEs and academic performance. Based on the above-mentioned relationship between ACEs, mental health, sleep, and academic performance, this study examined the potential mediation effect of sleep (duration/night) and mental health (anxiety) on the association between ACEs and GPA among Thai students in Bangkok. It was hypothesized that: (1) ACEs would be associated with poor sleep quality, later bedtimes, and poorer mental and physical health ratings; and (2) Poor sleep quality and later bedtimes would be associated with poorer mental and physical health ratings, and (3) Determining the factors related to academic performance among adolescents.

Materials and Methods

From October 2019 to January 2020, students age 13-19 years (M = 14.8 ± 1.4) from 18 government vocational schools and 25 high schools participated in the Bangkok Behavior Surveillance Survey (BBSS). The sample included 6,167 students from Grade 9 and Grade 11 of basic education schools, and Year 2 of vocational schools. The BBSS randomly selected schools and sought permission from school administrators to conduct the survey. Students and their parents/guardians were informed of the survey, and teachers obtained informed consent from parents/guardians for the student to participate in the survey. Participation was completely voluntary, and a student could withdraw from the survey at any time, for any reason. The survey used a web-based self-administered questionnaire since some of the questions on violence, sexual health, and mental health are sensitive. On the day of data collection, a special token was delivered to students in their computer lab class which they used to access the BBSS web site. No teachers were present in the classroom while students completed the online questionnaire. The questionnaire took around 40 minutes to complete on average, and the researchers checked the completeness of the questionnaires at the end of each day.

The survey questionnaire was developed based on the Youth Risk Behavioral Survey (YRBS) from the Centers for Disease Control and Prevention (CDC) [33]. The Hopkins Symptom Checklist-25 (HSCL-25) was used to assess anxiety and depression [34]. The reliability of the HSCL-25 for use with Thai adolescents has a Cronbach's α score = 0.794, which indicates good reliability. To measure history of ACEs, 11 questions were asked about abuse, neglect, violence, and family dysfunction based on a template from WHO (i.e., Adverse Childhood Experiences International Questionnaire). The 11-item ACEs section of the questionnaire has strong internal validity and internal consistency with a Cronbach's α score = 0.896. History of ACEs referred to lifetime experience, physical bullying experience (as a victim) in the past 12 months, and symptoms of anxiety or depression in the last week. Academic performance was measured by the GPA for the last semester (Table 1).

Data Analysis

The 2019/20 round of the BBSS included 6,167 students (mean age 14.8±1.4) of which 53.5% were female. Firstly, descriptive statistics are used to present frequency and percentage of socio-demographic characteristics, history of ACEs, mental health problems, bullying experience, and academic performance. For ACEs, the tabulation of ACEs presents cumulative score and prevalence of each individual ACE (e.g., abuse, neglect, violence,

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and family dysfunction). Complex sampling multiple logistic regression was performed to search for factors related to academic performance through 7 independent variables: sex, age, cumulative ACEs, Physical bully victimization, anxiety, depression, and sleep. Odds ratios (OR) and their 95% confidence intervals were calculated.

Table 1: Summary of study variables, questions, low and high anchors, and categories following recoding.

Variables	Categories	Question	Answer	Final coding
Adverse Childhood Experience (ACE)	Abuse	Did a parent or other adult in the household often swear at you, insult you, put you down, or humiliate you?	Yes =1, No =0	0 =No ACEs, 1-3 ACEs =Low ACEs and > 3 ACEs =Multiple Aces Cronbach's α score = 0.896
		Did a parent or other adult in the household often push, grab, slap, you, or throw something at you?		
		Did a parent or other adult in the household ever…touch or fondle you or have you touch their body in a sexual way?		
	Neglect	Did you often feel that… No one in your family loved you or thought you were important or special?		
		Did you often feel that you didn't have enough to eat, had to wear dirty clothes, or had no one to protect you?		
	Violence	Did your parent or other adult in the household: often push, grab, slap, or threw something at another?		
		Was your mother or other adult in the household: often pushed, grabbed, slapped, or had something thrown at her?		
	Family disfunction	Were your parents ever separated or divorced?		
		Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?		
		Was a household member depressed or mentally ill, or did a household member attempt suicide?		
		Did a household member ever go to prison?		
Bullying victimization	Physical	Have you ever been physically bullied in school in the past 12 months? If yes please specify How often? ……. times	Yes =1, No =0	0=No ,1=yes (≥1 times)
Sleep	Average hours	On the normal school day, how many hours of sleep do you get on average? …..... hours	1 -10 hours	0 = less (< 6), 1 = normal (≥ 6)
Anxiety and depression	15 Items	Anxiety and depression symptoms were measured using the Hopkins Systems Checklist (HSCL)	1 – 4	≤ mean 1.75 = low, > 1.75 =High Cronbach's α score = 0.794
GPA	Last semester	GPA was calculated as the average of the student's grades for the last semester. Respondent self-reported	1 - 4	0= High GPA (≥3), 1=Low GPA (1-2.99)

To investigate the hypothesized relationship between ACEs, anxiety, sleep duration, and GPA, regression models were generated by using logistic regression with binary outcomes by applying SPSS version 21. The mediation effect of anxiety and sleep duration on the relation between ACEs and GPA was analyzed by linear regression using PROCESS macro version 3.4.1. For the model, the dependent variable is GPA (high GPA, low GPA=reference); predictor variables include ACEs (lower than 4 ACEs=reference, 4 ACEs and higher), anxiety (no anxiety=reference, anxiety), sleep (≥ 6 hour per night=reference, < 6 hour per night), controlling for age and sex. Anxiety and sleep duration variables are then specified as dependent variables, with ACEs as the predictor. Odds ratios and their 95% confidence intervals (CI) are presented for all pathways (significance set at 95% CI) that did not cross unity. Tests of mediation effects were conducted by linear regression using PROCESS macro version 3.4.1 with model 6 with interval scale for all variables. Parameter estimates (coefficients) are presented with 95% CI for indirect and direct effects, along with the proportion of the total effect that is mediated.

Results

Table 2 represents the overall distribution of participant characteristics in each category of variables by sex. History of multiple ACEs is higher in females, while males have a higher percentage of no ACEs experience. Moreover, individual ACEs (e.g., abuse, neglect, violence, family dysfunction) are also more common in females. All types of mental health problems are higher in females. A higher proportion reporting sleep duration of less than six hours per night is found among the female participants. A larger proportion of the male participants have experience of bullying victimization, (in-school and out-of-school) compared to females, and males had a lower GPA than their female counterparts.

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Table 2: Participant characteristics and frequency of each response by sex and age

Variables	Levels	Total (n=6167) (N%)	Male (n=2,869) N (%)	Female (n=3,298) N (%)	p value	13-15 year (n=2,150) N (%)	16-19 year (n=4,017) N (%)	p value
Cumulative ACEs	No ACEs	3,386 (54.9)	1,779 (62.0)	1,607 (48.7)	<0.001	1,219 (56.7)	2,167 (53.9)	0.005
	1 -3 ACEs	1,883 (30.5)	740 (25.8)	1,143 (34.7)		660 (30.7)	1,223 (30.4)	
	4-11 ACEs	898 (14.6)	350 (12.2)	548 (16.6))		271 (12.6)	627 (15.6)	
PV	Yes	718(11.6)	462 (16.1)	256 (7.8)	<0.001	424 (19.7)	294 (7.3)	<0.001
	No	5,449 (88.4)	2,407 (83.9)	3,042 (92.2)		1,726 (80.3)	3,723 (92.7)	
Anxiety	Low	2,897 (47.0)	1,473 (51.3)	1,488 (45.1)	<0.001	1,110(51.6)	1,787(44.5)	<0.001
	High	3,270 (53.0)	1,396 (48.7)	1,810 (54.9)		1,040 (48.4)	2,230 (55.5)	
Depression	Low	3,051 (49.5)	1,534 (53.5)	1,517 (46.0)	<0.001	1,208 (56.2)	1,843 (45.9)	<0.001
	High	3,116 (50.5)	1,335 (46.5)	1,781 (54.0)		942 (43.8)	2,174 (54.1)	
Sleep	≥ 6 hours	4,662 (75.6)	2,205 (76.9)	2,457 (74.5)	0.032	1,786 (83.1)	2,876 (71.6)	<0.001
	<6 hours	1,505(24.4)	664 (23.1)	841 (25.5)		364 (16.9)	1,141 (28.4)	
Academic performance	High GPA	1,607 (26.1)	572 (19.9)	1,035 (31.4)	<0.001	764 (35.5)	843 (21.0)	<0.001
	Low-medium GPA	4,560 (73.9)	2,297 (80.1)	2,263 (68.6)		1,386(64.5)	3,174 (79.0)	

Note: ACEs = Adverse childhood experiences, PV = physical bullying victimization, GPA = Grade point average

The distribution of participant characteristics for each variable by age group. (Table 2). History of ACEs increased by age: 15.6% of 16-19 year-olds have multiple ACEs compared to 12.6% of 13-15 year-olds. Prevalence of individual ACEs (abuse, neglect, violence, family dysfunction) is higher for the age group 16-19 years. The proportion of participants reporting anxiety and depression increased by age: 55.5% of 16-19 year-olds reported anxiety compared to 48.4% of 13-15 year-olds; 54.1% of 16-19 year-olds reported depression compared to 43.8% of the younger-age group. A larger proportion of older students reported sleep duration of less than six hours per night, and GPA of less than 3.00 compared to younger students. Experience of being physically bullied was more common among younger students: 7.3 % of 16-19 year-olds have bullying experiences compared to 19.7 % of 13-15 year-olds.

Complex sampling multiple logistic regression models (Table 3) revealed AOR of factors related to high academic performance among students in Bangkok, Thailand. The factors were female (AOR: 1.698), age 13-15 year -old (AOR: 1.613), had no ACE (AOR: 1.198), had 1-3 ACEs (AOR: 1.416) no physical bully victimization (AOR: 1.722) and sleep ≥ 6 hour (AOR: 1.649) had a highly likelihood of academic performance. In other words, adolescents who were exposed to >4 adverse childhood experience, had physical bully victimization and sleepless than 6 hours had a lower likelihood of academic performance than the adolescents who did report no adverse childhood experience or 1-3 ACEs, no bully victimization and sleep ≥ 6 hour.

Table 3: Statistical significance of academic performance among Bangkok adolescents.

Factors	Category	HAP n (row%)	AOR	B(S.E.)	95% CI	
					Lower	Upper
Sex	Male	1,460(50.9)	1			
	Female	2,154 (65.3)	1.698***	.625 (.055)	1.676	2.083
Age	13.-15-year-old	1,390 (64.7)	1.613***	.478 (.060)	1.434	1.814
	16-19-year-old	2,224 (55.4)	1			
Cumulative ACEs	No ACEs	1,971 (58.2)	1.198*	.180 (.083)	1.017	1.410
	1 -3 ACEs	1,183 (62.8)	1.416***	.348(.087)	1.195	1.678
	4-11 ACEs	4,60 (51.2)	1			
Physical victimization	No	3,284 (60.3)	1.722***	.543(.087)	1.450	2.043
	Yes	330 (46.0)	1			
Anxiety	Low	1,755 (60.6)	1.093	.088(0.74)	0.945	1.263
	High	1,859 (56.9)	1			

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Factors	Category	HAP n (row%)	AOR	B(S.E.)	95% CI	
					Lower	Upper
Depression	Low	1,846 (60.5)	1.005	.005(0.75)	0.868	1.164
	High	1,768 (56.7)	1			
Sleep	< 6 hours	698 (48.8)	1			
	≥ 6 hours	2,834 (62.1)	1.649***	.500(.063)	1.457	1.867

Remarks: ACE = adverse childhood experience; CI = confidence interval; AOR = adjust odds ratio. Adjust Odds Ratios are from logistic regression models predicting high academic performance (HAP) measure with each factor measure, adjusting for covariates. *p < .05, **p < .01;***p < .001.

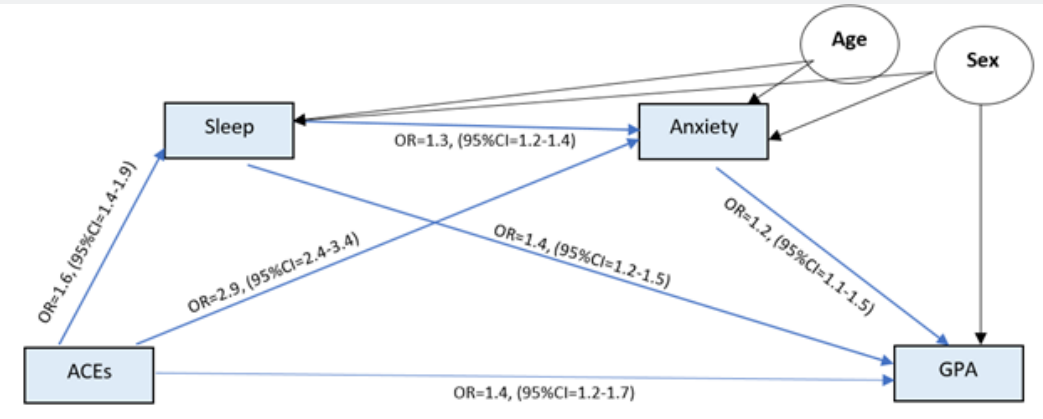

Figure 1: Model of cumulative ACEs as a predictor of GPA, mediated by sleep duration and anxiety, adjusted for age and sex.
Note: ORs and confidence interval (CI) are reported. GPA = grade point average; ACEs= adverse childhood experience; ACEs (lower than 4 ACEs =reference, 4 ACEs and higher), anxiety (no anxiety=reference, anxiety), average sleep (≥ 6 hour per night=reference, <6 hour per night). Direct, indirect, and total effects of the Path Model

Figure 1 displays the results of regression modelling, marked by OR and 95% CI on each pathway. Multiple ACEs (compared to a score of < 4 ACEs) was significantly associated with less sleep duration and anxiety, with 60% increase in the odds of having less sleep (<6 hours per night) and nearly 3 times the odds of having anxiety. History of multiple ACEs is also significantly associated with the odds of having a low GPA: risk of a low GPA is 1.4 times higher in those with multiple ACEs experiences.

Table 4 shows the binary logistic regression modelling of the relationship between ACEs (0 denotes <4 ACEs, 1 denotes ≥4 ACEs) and GPA (0=High GPA, 1=low GPA) mediated by duration of sleep per night (0=≥ 6 hours, 1= <6 hours), depression (0=No depression, 1= depression), PV (0=No, 1=yes) and anxiety (0=No anxiety, 1=Anxiety) controlling for age (0=13-15 year, 1=16-19 year) and sex (0=female, 1=male). Path weights are provided as odds ratios (OR), with 95% confidence intervals (95% CI).

The upper rows of the Table 4 show OR and 95% CI lower limit (95% CI LL) and upper limit (95% CC UL) for the effects of the covariates on each of the dependent variables (DV). The lower rows show results of mediation analysis testing the direct effect from ACEs to GPA and the indirect effects via anxiety and sleep duration. Standardized regression weights are shown (β) with bias-corrected, bootstrapped confidence intervals (95% CI LL+, 95% CI UL+).

Sleep duration was related to anxiety and low GPA: those with sleep duration of less than six hours per night have 30% higher odds of having anxiety and 1.4 times higher risk of being bullied. Anxiety was significantly associated with multiple ACEs and low GPA: those having anxiety were 1.2 times higher risk of having low GPA. Mediation analysis indicated that the indirect (via anxiety and sleep variables) and the direct pathways from multiple ACEs to GPA were all significant (bootstrapped, standardized upper and lower bound of 95% confidence interval did not cross zero). The proportion of total effect mediated was estimated to be (-2.7%) for the dependent variable of low GPA.

Increasing age was associated with increased odds of having less sleep (1.5 times compared to the younger group) and more anxiety (20% increase by age) and low GPA (1.8 times higher risk compared to the younger group). Being male was also significantly associated with significant change in odds of less sleep, having anxiety and having a low GPA, 20% increased risk of having less sleep, 30% increased odds of having anxiety and 1.9 times higher risk of a low GPA.

Discussion

The main finding of the present study is that history of ACEs is significantly associated with having less sleep duration and anxiety. A number of previous studies have shown that ACEs

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impacted on mental health [35,36], and sleep has a significant mediation effect on association between ACEs and anxiety [37]. There is a weak correlation between sleep and anxiety (r = -0.1), and that indicates that these variables are independent of each other and should be investigated in further related studies. History of ACEs was also associated with poor academic performance (i.e., low GPA) which is consistent with previous research (5). Anxiety and inadequate sleep are strong predictors of lower GPA. This study found that almost half of the sample of students reported symptoms of anxiety and having less than six hours of sleep per night, while nearly half also reported having had at least one ACE in their lifetime. This finding indicates that getting enough sleep and being free from anxiety can mitigate the effects of ACEs. It is possible that the detrimental effect of ACEs on sleep may lead to poor mental health or, conversely, poor mental health may make adolescents more vulnerable to impacts of ACEs. ACEs are broadly implicated for sleep disturbance, insomnia, and lower subjective sleep quality which all can lead to less sleep duration [27] and insomnia is frequently associated with anxiety disorders [38].

Table 4: Direct, indirect, and total effects of the Path Model.

	DV	Variable	OR	95% CI LL	95% CI UL
Covariates	Sleep	Age	1.5	1.4	1.72
		Sex	1.2	1.09	1.33
	Anxiety	Age	1.2	1.07	1.32
		Sex	1.3	1.14	1.39
	GPA	Age	1.8	1.67	2.14
		Sex	1.9	1.73	2.2
Mediation	**Effects**	**Variable**	**β**	**95%CILL+**	**95% CIUL+**
	Indirect	(ACE->sleep->GPA)	-0.004	-0.007	-0.002
		(ACE->anxiety->GPA)	-0.01	-0.01	-0.007
		(ACE->sleep->anxiety->GPA)	-0.003	-0.0006	-0.0001
	Direct	(ACE -> GPA)	-0.02	-0.02	-0.009

Total effect mediated = -0.027 (-0.03 - -0.01)

Apart from its relationship with ACEs, a large proportion of the respondents reported less sleep (<6 hours/night) (48.1% for males and 53.8% for females). This is consistent with the findings of a gender-specific sleep duration study which found that more girls had shorter sleep duration than boys [39]. Sleep duration is also age-specific: results from the current study show that 58% of late adolescents (16-19 years) compared to 46.7% of middle adolescents (13-15 years) had sleep deprivation. That finding is consistent with previous research on sleep duration among children and adolescents [39,40]. This may be due to the fact that, as a child grows older, there are more demands on their time and distractions which compete with sleep [41]. However, that finding is contrary to the objective measurement of sleep duration which found that, other things being equal, sleep duration increases from mid- to late-adolescence [42].

High prevalence of anxiety symptoms was reported by the respondents from the present study which is consistent with previous findings, in that about one-third of the students reported having symptoms of anxiety [43,44]. Consistent findings on gender difference were also observed: females reported more anxiety symptoms compared to males (54.9% vs 48.9%) [45,46]. This could be explained by the fact that physiological changes during puberty have a greater impact on mood/feeling in girls. In this study, anxiety increased by age: 50.1% in adolescents aged 13-15 years compared to 54.9% in those aged 16-19 years, and that finding is contrary to previous studies [47,48]. One explanation is that different cultures have different methods of coping with mood changes during puberty.

The mean score of ACEs in this study is 1.39 which is consistent with another study on ACEs among adolescents [37]. Among ACE sub-types, family dysfunction (e.g., parental separation/divorce, having household members who use street drugs/have mental health problems/have ever been in prison) is the most common type; physical or emotional neglect had the lowest prevalence among ACEs in the present study. This finding may reflect the current situation of Thai families in which there is increased incidence of divorce and substance use or crime, and increased incidence of mental health problems among family members. According to Eastern culture, parents hardly neglect their children even in difficult situations. ACEs bring some negative stimuli to youths' life which may disturb their sleep and result in poor mental health, thus creating stress/strain which leads to decline in academic performance. This association is based on general Strain Theory [49]. From the present study, it could be posited that those students with a history of ACEs had higher risk of less sleep, and less sleep leads to higher odds of anxiety,

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and anxiety increased the risk of lower GPA. Moreover, ACEs had a direct association with sleep deprivation, anxiety, and lower GPA since ACEs could increase odds of unfavorable values for those variables in this study.

Findings from this study may have limitations since the data are self-reported and, thus, are potentially affected by a number of biases. History of ACEs referred to lifetime experience, and there may be recall bias and under-reporting of actual experience [50]. Further, only one measure of sleep quality (i.e., duration in hours per night) has been included in the current study and it could be affected by other factors like mobile phone/media usage, consumption of alcohol or addictive substances. Stress from academic study was not included in this study. Other objective measures of sleep quality should be considered for further studies. GPA was also measured by self-reports, and some students may have inflated their actual GPA. Objectively recording GPA based on school data should be used in further research. Despite these limitations, this study had a number of strengths. The sample size is large and covers both middle and late adolescent years. There is a wide distribution of schools included in the BBSS, and students come from all socio-economic levels. Thus, this sample of students should be somewhat representative of urban students throughout the country.

Conclusion

The objective of this study was to determine the impact of ACEs and physical bully victimization on academic performance among students in Bangkok, Thailand. Sleep duration and anxiety could significantly mediate the association between ACEs and academic performance of students. Moreover, the impact of ACEs on mental health, sleep, and academic performance has been proved in this study. In conclusion, history of ACEs is a well-established risk factor for mental health and quality of sleep which are important predictors of good academic performance.

The findings from this study suggest that there is a need for programs which mitigate the influence of ACEs and physical bully victimization to improve adolescent mental health and sleep quality in order to produce better academic performance. ACEs prevention and response programs should be targeted for parents, and that will require collaboration and coordination between parents, teachers, and students. Students with poor academic performance should be screened for mental health disorders, sleep problems, and history of ACEs.

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Declaration of Conflicting Interests

There is no conflict of interest to be reported about this article. The author got approval from the principal investigators of 2019 Bangkok Behavioral Surveillance Survey to analyze the data. 2019 BBSS has been conducted with ethical approval from Mahidol University Social Science Independent Review Board (MUSSIRB). (Certificate of approval No: 2019/056).

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