

Early Detection of Child Abuse Victim Through Sleep Quality: Results of the Korean Children & Youth Panel Survey

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Abstract

Background: A victim of child abuse can often develop mental illness. The early detection of mental illness of children could be supported by observing sleep quality. Therefore, we examined the relationship between sleep quality and the changes in child abuse by the child's own parents over the study period.

Methods: Data from the 2011-2013 Korean Children and Youth Panel Survey was used and 2012 was set as the baseline. Adolescents who had poor sleep quality in 2011 were excluded from the analysis to obtain the final study population of 1,276 adolescents aged 14 and 15 years. The generalized estimating equation model (GEE) was used for statistical analysis.

Results: Children who had experienced and/or were currently experiencing child abuse showed significantly poorer sleep quality (current year abuse only: odds ratio [OR] = 0.57, 95% confidence interval [CI] = 0.41, 0.79; prior year abuse only: OR = 0.72, 95% CI = 0.52, 0.99; continuous abuse: OR = 0.56, 95% CI = 0.39, 0.80) compared to children who had no experience of child abuse.

Conclusion: Child abuse remains a traumatic experience that influences the quality of sleep and hinders the child's proper psychological development. We suggest approaching this issue at both the community and national levels to protect the victims.

Introduction

Child maltreatment is a universal problem that causes severe damage to children, with long-term consequences. The increasing number of reports of child maltreatment has become a major concern children's well-being [1, 2]. Child maltreatment occurs in the forms of child abuse and neglect of those younger than 18 years [3]. When broken down further, child abuse can be classified into physical abuse, sexual abuse, emotional or psychological abuse, and abandonment [1, 3, 4]. Attention to child maltreatment is rising in South Korea, with the proportion of cases reported to official agencies having increased noticeably. In 2015, there were a total of 11,715 cases reported to the National Child Protection Agency, compared to only 2,105 in 2001 [5]. These cases comprised 37.7% physical abuse, 40.7% emotional or psychological abuse, 3.6% sexual abuse, and 18.0% neglect or abandonment. The highest rate appeared in the school children age between 7 to 15 years [5]. This group accounted for 62.6% and the age group of 13 to 14 years were 23.0% of cases, which was the highest age group [5]. In the Child Maltreatment 2015 report by the Children's Bureau of the United States, it was estimated that there are 4 million children who have experienced maltreatment. Among them, 17.2%, 6.9%, 8.4%, and 75.3% were cases of physical abuse, emotional or psychological abuse, sexual abuse, and neglect, respectively. The highest number of child maltreatment occurred in children younger than 3 years [6]. The childhood memory of abuse continues to be a traumatic event, even into adulthood [1, 7, 8]. Children exposed to even a single type of maltreatment are more prone to high-risk and unhealthy behaviors [1, 5, 6].

The World Health Organization defines health in three dimensions, namely complete physical, mental, and social well-being [9]. Sleep quality is directly related to health and functioning [2, 10, 11], and it is important for both adults and adolescents. Poor sleep can cause negative effects on health by leading to sleep disorders, such as insomnia and sleep apnea, as well as other chronic health problems such as obesity, arthritis, diabetes, stroke, and immune system disorders [2, 12–14]. The relationships between sleep, cognitive function and mental health have been demonstrated for many years in previous studies on depression, mood disorders, and dementia [10, 12, 15–19]. Lack of sleep causes malfunction. Moreover, associations with dangerous health and social behaviors, including drug and alcohol use, interpersonal issues, suicidal thoughts, and violence, have been reported [10]. Sleep quality can influence both social behavior and daily life [2, 15, 17]. The mentioned health problems are critically linked to adolescents' development and will appear in adulthood even if it is not currently exhibited.

One factor that causes sleep complaints or discomforts is traumatic events [14, 20–23]. Especially on child and adolescents, abused experience lead to poor sleep quality that transitioning from childhood to adulthood, child abuse leaves a huge impact on their lives [1, 7, 19, 23, 24]. Child abuse from their own parents is generally not an acute trauma, but rather occurs

chronically and negatively influences their development [24]. Many previous studies on child abuse focused on its effects on physical and mental health issues in adulthood with sleep problems [7, 9, 22, 24, 25]. The results of those studies show consistent findings that child abuse victims have suffered in their daily living and it influenced negatively on health behaviors. More specifically studies by Bader K et al. reported an association between insomnia in adulthood and childhood neglect and abuse experience [26]. Noll JG et al. found sexual abused children experience can lead to sleep problem [27]. Libby AM et al. examined the two types of childhood abuse, physical and sexual, and their relationship to depressive and anxiety disorders [28]. The correlation among child abuse, sleep quality, and psychiatric illness in long term effect were well explained. Also, Turner S et al. studies on association between child maltreatment and sleep problems that preventing child maltreatment may related to improve the child's health outcome and well-being [11].

This study aimed to focus on the children who are experiencing or experienced abuse by their own parents in recent years (current year and prior year) and its effect on those children's sleep quality. The study utilized a longitudinal study design to examine the effects of child abuse on sleep quality by examining the relationships between changes in child abuse year-to-year during the study period and sleep quality.

Methods

Study Population

This study was conducted using data from the Korean Children & Youth Panel Survey (KCYPs), conducted by the National Youth Policy Institute. We analyzed 3 waves of the survey (2011-2013). The KCYPs is a longitudinal survey that is representative of Korean youth. The survey is conducted to assess the growth and development of children and youth at both the individual development and environmental levels, along with the influencing factors. The survey started in 2010 among first grade elementary school students, fourth grade elementary school students and first grade middle school students. The sample was selected through stratified multi-stage clustering and random sampling from 16 administrative districts.

Our target study population in this study was first-year middle school students who entered the survey in 2011 at the age of 13 years and who were followed until 2013 aged 15 years. A baseline study population comprising 1,276 students was selected for the analysis after eliminating 521 students who reported experiencing poor sleep quality in 2011 or who had missing values for sleep-related questions. The elimination allowed our population to be set with adolescents who did not have sleep problems.

Outcome Variables

The main outcome variables in the present study were sleep quality and sleep duration. Sleep quality is reported each year and was measured by the question, "Do you have difficulty in falling asleep or do you wake up during the night?", with the following options: "strongly agree", "agree", "disagree," and "strongly disagree". The responses were grouped into "good" ("disagree" and "strongly disagree") and "bad" ("very well" and "well") to indicate sleep quality (figure 1). Sleep duration was calculated by the question "What time did you go to sleep and get up on average on weekdays (Monday-Friday) this semester?"

Changes in Child Abuse Experience Year-to-year

In order to obtain the incidences of child abuse experience, there were four questionnaires regarding the experience of "excessive discipline," "physical abuse with no reason," "physical abuse causing injury," and "verbal/emotional abuse" by their own parents in the current year. For this study, four possible responses were rated on a 4-point scale from 1 to 4 (figure 2). Using a combination of those responses, we set the cut-off score for child abuse experience at 8. If the score was 8 or above, it was considered that the child had experienced abuse. To examine the changes in child abuse experience year-to-year during the study period, we created 4 categories, as follows: no—no (no experience of child abuse in the prior year and current year), no—yes (no experience of child abuse in the prior year, but experience of child abuse the current year), yes—no (experienced

child abuse in the prior year, but no experience of child abuse the current year), and yes—yes (experienced child abuse in the prior year and current year).

Covariates

For the study, variables focusing on the child and family were chosen. Child-related variables included sex (male or female), residency region (capital city, metropolitan area, or others), academic record (low, middle, or high), perceived health status (good or bad), depressive symptoms (yes or no), and mobile phone addiction score (low, middle, or high). Family-related variables included household income level in quartiles and the education level of the parents: high school graduate/below or college graduate/above. Further, the year (2012 or 2013) was also adjusted for in this study. All covariates were collected from self-reported survey data.

Statistical Analysis

To observe the general characteristics of the population according to sleep quality and sleep duration, we used chi-square tests, t-test and ANOVA. To evaluate the relationships of changes in child abuse experiences with sleep quality and sleep duration during the study period, a generalized estimating equation model was used to measure repeated data using the statistical program SAS 9.4. All statistical tests were two-sided and a P value <.05 was considered statistically significant.

Ethical Statement

This data used de-identified survey data that is available for public study. Therefore, consent from participants was not needed.

Results

General characteristics of study population

The general baseline characteristics of the study population in 2012 according to the sleep quality and sleep duration, and divided by the changes in the child abuse experience year-to-year, are presented in Table 1.

A total of 1,276 subjects were selected at baseline after eliminating children who had poor sleep quality in the prior year. Of these, 975 children (76.4%) reported having good sleep quality and 301 children (23.6%) reported having poor sleep quality. The pattern of change in the child abuse experience during the study period showed a statistical association with sleep quality. Within this variable, children with no experience of child abuse in the prior year and the current year accounted for the biggest proportion, at 63.9%, while the remaining categories shared similar proportion sizes of between 10% to 13%. The child's academic record, perceived health status, depressive symptoms, and mobile phone addiction score, as well as the mother's education, showed statistically significant relationships with sleep quality. In terms of sleep duration, the mean sleep duration in the total study population was 7.126 hours; the academic record showed a statistical association.

Result of main analysis

After adjustment for possible confounders, the results of the generalized linear model of sleep quality and sleep duration are shown on Table 2.

Children who had experienced and/or were experiencing child abuse were more likely to have poor sleep quality (no—yes: odds ratio [OR] = 0.57, 95% confidence interval [CI] = 0.41, 0.79; yes—no: OR = 0.72, 95% CI = 0.52, 0.99; yes—yes: OR = 0.56, 95% CI = 0.39, 0.80). Children with higher academic records had better sleep quality (middle: OR = 1.37, 94% CI = 1.05, 1.78; high: OR = 1.31, 95% CI = 1.00, 1.73). Children with poor perceived health status (OR = 0.67, 95% CI = 0.46, 0.98) and with depressive symptoms (OR = 1.31, 95% CI = 1.00, 1.73) had relatively poor sleep quality. In terms of the analysis results for sleep duration, there was no variable associated with the patterns of change in the child abuse experience during the study period.

Subgroup analysis with parent's education level, perceived health status, and depressive symptom

Stratified subgroup analyses by the parents' education level, perceived health status, and depressive symptom are recorded in Table 3. Children who experienced child abuse had decreased sleep quality, regardless of the time point of child abuse. Children experiencing child abuse in the current year showed statistically significant results. Children experiencing child abuse in the current year, but not in prior year, and who had parents with lower educational levels showed significantly decreased sleep quality (father's education: OR = 0.48, 95% CI = 0.30, 0.77; mother's education: OR = 0.54, 95% CI = 0.35, 0.81). Similarly, among children experiencing child abuse in both the prior year and the current year and who had parents with a lower educational level, the sleep quality also decreased, with statistical significance (father's education: OR = 0.55, 95% CI = 0.33, 0.92; mother's education: OR = 0.57, 95% CI = 0.36, 0.91). Regarding the children's perceived health status and depressive symptoms, in children experiencing child abuse in the current year, statistical associations were found with good perceived health status (no—yes: OR = 0.54, 95% CI = 0.39, 0.76; yes—yes OR = 0.56, 95% CI = 0.39, 0.81) and with depressive symptoms (no—yes: OR = 0.47, 95% CI = 0.30, 0.72; yes—yes OR = 0.63, 95% CI = 0.41, 0.97).

Discussion

In this study, we aimed to discover the associations between different patterns in the changes of child abuse year-to-year and sleep quality among Korean adolescents aged 13 to 15 years. As a result, the sleep quality of children who experienced child abuse was found to be low. Children who were victims of child abuse in the current year were more likely to have lower sleep quality, as did those who were victims of child abuse in the prior year, but not in the current year. Thus, child abuse can be considered a chronic factor related to poor sleep quality in adolescents.

A considerably large number of children are suffering from child abuse, which can lead to insufficient sleep, consequently leading to an unhealthy state. In our study, children with child abuse had a poorer sleep quality compared to children without child abuse. We divided the pattern of change in child abuse experience year-to-year into two groups: children who had no experience of child abuse in the prior year and those who had experience of child abuse. However, when a child who had not been abused by their parents in the prior year, but experienced child abuse in the current year, the quality of sleep dropped by about half. On the contrary, among children who had been abused by parents in the prior year, but not in the current year, their sleep quality was still low but showed an improvement compared to those experiencing steady abuse by their parents

We interpreted the results of our study to indicate that child abuse is a traumatic event for adolescences and that it impacted their sleep quality. As a child, abuse becomes a traumatic event [1, 29] that can trigger reduced sleep quality. Child abuse and poor sleep quality have negative effects on children; previous studies have demonstrated these relationships [7, 22, 24, 29, 30] and our result shared the consistent findings. In our results, the sleep quality seemed to be improved when the abuse stopped; however, in children continuously abused, the event is no longer an acute trauma but rather becomes a chronic trauma. Among our study population, those who experienced abuse in congestive years have the lowest sleep quality. For children who experienced abuse from their own parents, the child abuse remains a traumatic event that affects their sleep, even if they are no longer receiving abuse [7, 14, 20, 25].

Children with experience of abuse tend to develop sleep problems more frequently, which may continue in their adulthood [22, 27]. The sleep problem appeared regardless of abuse type. The study of Greenfield et al. reported the association between child abuse and higher risk of global sleep pathology and also they found abuse is more related to the sleep quality than sleep quantity, similar to our study. Greenfield et al. and Noll et al. conducted analyses on sexually abused children and sleep disturbance that showed such an experience is integrated to sleep quality. The impact of poor sleep quality on health can trigger various health issues including psychological issues in adolescents and adulthood [10, 15, 17, 19]. The effect of sleep is essential to maintaining good health. Without sufficient sleep, sleep disorders, depression, mood disorders, low self-esteem, and weight problems may ensue [10, 12, 13, 15-18, 21]. Foley et al. studied the association between sleep disturbance and chronic disease and Gregory and Sadeh reviewed the linkage of adolescents' sleep disturbance and emotional behavior difficulties. Kamphuis et al. addressed poor sleep as the potential risk factor for aggressive and violence behavior. Similarly,

Bower et al.'s study have analyzed the affection of sleep quality and daily life which resulted in finding that poor sleep quality is related to a low positive affect on daily life. Through these problems, it becomes hard for abuse victims to adjust to their surroundings and develop unhealthy outcomes [1, 6, 29]. Moreover, poor sleep quality influences towards psychological problems [31, 32] which hinder adolescents from achieving the proper psychological development. Such cases show that abused children are more likely to suffer from depression, emotion regulation disorders, aggressive behaviors, post-traumatic stress disorder, and sleep disorders; these develop as they grow [5, 8, 22, 28, 29]. To a child, the experience of abuse can become embedded as a chronic stressor with consistent abuse or as an acute stressor after only a short-term experience. Regardless of its duration and stress level, the experience negatively affects the child.

Sleep quality is closely related to the early detection of child abuse and psychological development. Monitoring the sleep quality of abused children allows the prevention of developing psychological issues, which can potentially lead to mental illness. In order to help children in family abuse, protection should be provided. Furthermore, sleep quality could be considered as indicator to diagnosis medical and/or social problems. Once the child has access to effective support from their family and a secure environment, their sleep quality is expected to improve. In turn, this should improve health and encourage positive social behavior [16, 19]. However, it may be hard to change the parents' behavior, even though this would be the best solution. In addition to family support, social support mediates between the experience of abuse and its consequences [33]. Many studies have demonstrated that social support can help children with an experience of abuse to feel protected [34]. These children also face additional stressors as a result of abuse, such as separation from their family, experiences in foster care, and life-long victimization [35]. Moreover, government level of intervention should be reinforced. Child abuse is hard to detect, and the rate of reported child abuse has increased about five times between 2001 to 2015 in Korea [5]. The possible reason Korea and the United States have different age pattern in child abuse is due to the report system. As child abuse reporting is not highly motivated in Korea, the detection of child abuse at an early age is difficult. Therefore, more cases are reported in school aged children and adolescents. The abuse experience remains a traumatic event in the long-term. Therefore, within the community, the public should pay attention to abused children and provide safe shelters. The government enacted the Act on Punishment of Child Abuse Crime in 2014, which has resulted in a huge increment in reported child abuse cases to national agencies in Korea [5]. There are many promotions and campaigns to advocate child abuse and child protection regulations and laws worldwide. The government should develop and implement detailed policies and regulations to prevent child abuse. To protect the victims of child abuse, such policies should have a practical approach and consistent support.

The study was conducted using longitudinal data comprising a large number of children selected for the survey panel. This design provided a strong validity to examine sleep quality and its causality. The use of random sampling by stratification at the national level also adds strength to the validity of this study. While previous studies focused on discovering the long-term effects of child abuse [1, 4, 7], we focused on the effects of child abuse shortly after the event. In addition, we applied a lag time effect to the child abuse experience to determine the effects of changes in the event. We set the baseline population after eliminating those who had poor sleep quality previously and analyzed cases of new-onset poor sleep quality. Furthermore, we analyzed the effects of child abuse on the quality of sleep and sleep duration. We concluded that sleep quality is more related to the incidence of child abuse than sleep duration.

Despite the strengths of this study, there are some limitations to consider. First, the data was collected via self-report, and there is hence a risk of bias occurring during the data collection. Also, study population's age is limited to 13 – 15 because there was no national survey regarding child abuse experience for younger aged children. Second, the measure of sleep quality was not based on a diagnosis of sleep disorders, claims data, or obtained through the scientific method. However, sleep quality is a highly subjective element by the individual, for which it is acceptable to utilize self-reported data in children and adolescents [30]. However, further investigations with a quantitative measure such as a sleep quality index or using clinically proven data are suggested. Third, in our study, we found that a cell phone addiction related to poor sleep quality, similar to in previous research [36]. As cell phone addiction is increasing in adolescents, we recommend conducting further studies to elucidate the relationship between child abuse and cell phone addiction and to study the inverse relation, that is, whether child abuse triggers extreme use of cell phones, since we observed a non-significant tendency.

The analyses of the relationships between the patterns of change in the child abuse experience year-to-year and sleep quality provided a consistent implication that the abuse by their parents affected the children negatively, regardless of whether it was discontinued.

Declarations

Ethics approval and consent to participate: Not applicable

Consent for publication: Not applicable

Availability of data and material: The datasets generated and/or analyzed during the current study are available in the NYPI Youth and Children Data Archive repository, <http://archive.nypi.re.kr>

Competing interests: none

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Authors' contributions: WC and JJ presented the idea and developed the theory. ECP and SIJ improved the theory and supervised the study. JJ conducted the initial analysis and WC conducted the further analysis. WC wrote the paper with input from all authors.

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Tables

Table 1. General characteristics according to sleep quality in 2012.

Variables	Total		Sleep quality				P-value	Sleep duration		P-value
	N	%	Good		Poor			Mean±SD		
			N	%	N	%				
Total	1,276		975	76.4	301	23.6	7.126	1.129		
Changes in child abuse experience							<.0001		0.4449	
No→No	815	63.9	657	80.6	158	19.4	7.294	0.946		
No→Yes	167	13.1	114	68.3	53	31.7	7.373	1.019		
Yes→No	166	13.0	122	73.5	44	26.5	7.495	0.880		
Yes→Yes	128	10.0	82	64.1	46	35.9	7.388	1.067		
Gender							0.3618		<.0001	
Men	644	50.5	499	77.5	145	22.5	7.497	0.931		
Women	632	49.5	476	75.3	156	24.7	7.180	0.967		
Residency region							0.9658		0.3062	
Capital city	282	22.1	214	75.9	68	24.1	7.233	1.001		
Metropolitan areas	436	34.2	333	76.4	103	23.6	7.395	0.953		
Others	558	43.7	428	76.7	130	23.3	7.351	0.946		
Household income level							0.083		0.0470	
Quartile 1 (lowest)	285	22.3	215	75.4	70	24.6	7.491	0.948		
Quartile 2	345	27.0	250	72.5	95	27.5	7.442	0.967		
Quartile 3	366	28.7	283	77.3	83	22.7	7.287	0.970		
Quartile 4 (highest)	280	21.9	227	81.1	53	18.9	7.130	0.920		
Academic record							0.0035		<.0001	
Low	384	30.1	271	70.6	113	29.4	7.536	0.939		
Middle	361	28.3	279	77.3	82	22.7	7.378	0.955		
High	531	41.6	425	80.0	106	20.0	7.173	0.955		
Father's education							0.0841		0.3805	
High school grade/lower	547	42.9	405	74.0	142	26.0	7.471	0.961		
College grade/higher	729	57.1	570	78.2	159	21.8	7.242	0.952		
Mother's education							0.0321		0.3010	
High school grade/lower	703	55.1	521	74.1	182	25.9	7.438	0.967		
College grade/higher	573	44.9	454	79.2	119	20.8	7.219	0.943		

Perceived health status							0.0026		0.3855
Good	1179	92.4	913	77.4	266	22.6		7.344	0.948
Bad	97	7.6	62	63.9	35	36.1		7.293	1.122
Depressive symptoms							<.0001		0.5892
Yes	513	40.2	320	62.4	193	37.6		7.336	0.915
No	763	59.8	655	85.8	108	14.2		7.346	1.029
Mobile phone addiction score							<.0001		0.1071
Low(0-17)	435	34.1	358	82.3	77	17.7		7.415	0.904
Middle(8-11)	427	33.5	335	78.5	92	21.5		7.334	0.902
High(12-21)	414	32.4	282	68.1	132	31.9		7.268	1.072

Table 2. Generalized linear model with sleep quality in 2012-2013.

Variables	Sleep quality			Sleep duration			
	Adjusted OR	95%CI		β^*	S.E	P-value	
Changes in child abuse experience							
No→No	1.00	-		Ref.			
No→Yes	0.57	(0.41	-	0.79)	0.171	0.070	0.0155
Yes→No	0.72	(0.52	-	0.99)	0.183	0.061	0.0028
Yes→Yes	0.56	(0.39	-	0.80)	0.067	0.079	0.3924
Gender							
Men	1.00	-		Ref.			
Women	1.05	(0.82	-	1.35)	-0.259	0.045	<.0001
Residency region							
Capital city	1.00	-		Ref.			
Metropolitan areas	1.03	(0.75	-	1.41)	-0.039	0.061	0.5257
Others	0.92	(0.67	-	1.26)	0.009	0.060	0.8874
Household income level							
Quartile 1 (lowest)	1.00	-		Ref.			
Quartile 2	0.92	(0.67	-	1.25)	-0.028	0.062	0.6545
Quartile 3	1.10	(0.79	-	1.53)	-0.195	0.065	0.0029
Quartile 4 (highest)	1.28	(0.87	-	1.89)	-0.302	0.070	<.0001
Academic record							
Low	1.00	-		Ref.			
Middle	1.37	(1.05	-	1.78)	-0.013	0.051	0.7922
High	1.31	(1.00	-	1.73)	-0.178	0.053	0.0007
Father's education							
High school grade/lower	1.00	-		Ref.			
College grade/higher	1.16	(0.84	-	1.60)	-0.099	0.060	0.0998
Mother's education							
High school grade/lower	1.00	-		Ref.			
College grade/higher	1.02	(0.74	-	1.42)	-0.060	0.059	0.3093
Perceived health status							
Good	1.00	-		Ref.			
Bad	0.67	(0.46	-	0.98)	-0.010	0.087	0.9080

Depressive symptoms							
Yes	0.35	(0.28	-	0.44)	-0.045	0.045	0.3115
No	1.00		-		Ref.		
Mobile phone addiction score							
Low(0-17)	1.00		-		Ref.		
Middle(8-11)	0.91	(0.69	-	1.20)	-0.031	0.047	0.5093
High(12-21)	0.67	(0.50	-	0.90)	-0.001	0.057	0.9888
Year							
2012	1.00		-		Ref.		
2013	1.90	(1.55	-	2.34)	-1.041	0.034	<.0001

Table 3. Subgroup analysis of sleep quality with child abuse experience change in 2012-2013.

Variables	Changes in child abuse experience											
	No→No			No→Yes			Yes→No			Yes→Yes		
	OR	OR	95% CI	OR	OR	95% CI	OR	OR	95% CI	OR	OR	95% CI
Father's education												
High school grade/lower	1.00	0.48	(0.30 - 0.77)	0.67	(0.43 - 1.05)	0.55	(0.33 - 0.92)					
College grade/higher	1.00	0.67	(0.43 - 1.06)	0.79	(0.50 - 1.24)	0.57	(0.35 - 0.94)					
Mother's education												
High school grade/lower	1.00	0.54	(0.35 - 0.81)	0.60	(0.40 - 0.89)	0.57	(0.36 - 0.91)					
College grade/higher	1.00	0.63	(0.37 - 1.05)	0.94	(0.55 - 1.63)	0.53	(0.31 - 0.93)					
Perceived health status												
Good	1.00	0.54	(0.39 - 0.76)	0.76	(0.54 - 1.06)	0.56	(0.39 - 0.81)					
Bad	1.00	0.71	(0.20 - 2.55)	0.48	(0.15 - 1.51)	0.48	(0.14 - 1.69)					
Depressive symptoms												
Yes	1.00	0.47	(0.30 - 0.72)	0.64	(0.41 - 1.00)	0.63	(0.41 - 0.97)					
No	1.00	0.78	(0.45 - 1.32)	0.83	(0.51 - 1.34)	0.40	(0.23 - 0.70)					
Mobile phone addiction score												
Low(0-17)	1.00	0.43	(0.23 - 0.81)	0.67	(0.38 - 1.20)	0.32	(0.16 - 0.66)					
Middle(8-11)	1.00	0.62	(0.35 - 1.08)	0.99	(0.55 - 1.77)	0.49	(0.26 - 0.91)					
High(12-21)	1.00	0.62	(0.36 - 1.04)	0.56	(0.34 - 0.94)	0.70	(0.41 - 1.19)					

* Adjusted for gender, residency region, household income level and academic level.

Figures

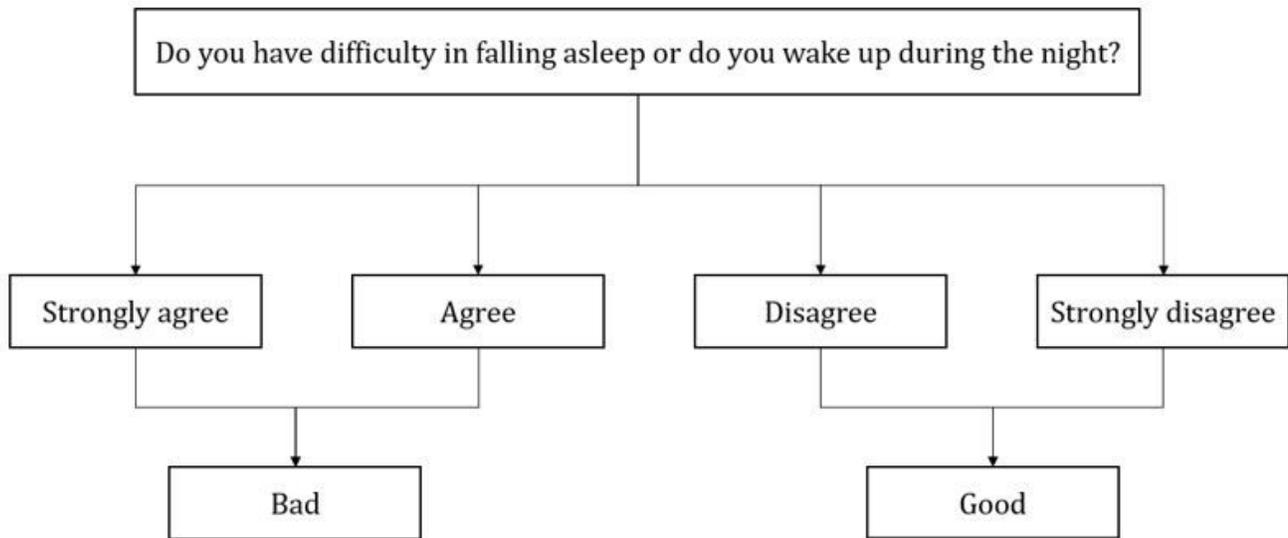


Figure 1

Sleep quality measure based on survey responses

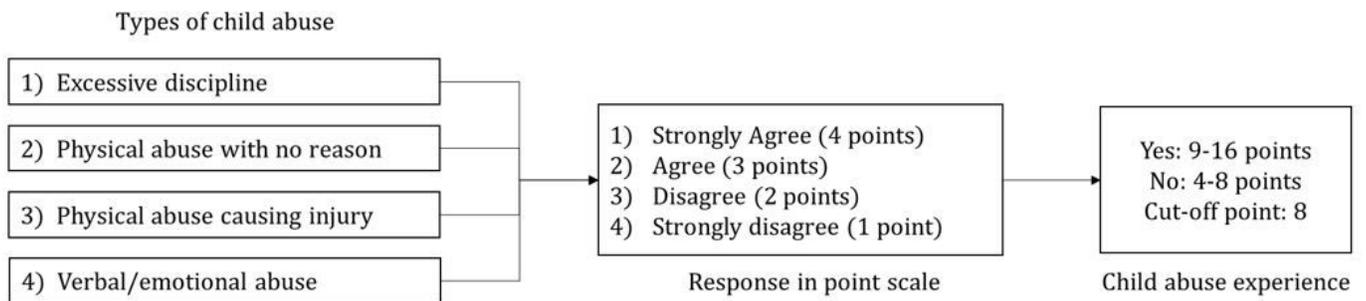


Figure 2

Child abuse experience based on survey responses

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [appendix.docx](#)