

Sleeping Habits Amongst Riyadh Children: A Cross-Sectional and Validation Study

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Abstract

Background: To validate the Arabic translation of the Children's Sleep Habit Questionnaire and determine the behavioral prevalence of sleep habits amongst school aged children in Riyadh, Saudi Arabia.

Methods: This prospective cross sectional study involved a Linguistic validation involving 50 bilingual parent participants in each of the Arabic and English Surveys, with a cross sectional pilot involving 1546 parent participants regarding their children's Sleeping Habits. The Children's Sleep Habit Questionnaire was distributed via Survey Monkey and subjected to IBM-SPSS statistics. Parents of 1546 school aged children ranging from 3 years to 12 years of age completed the survey.

Results: The Total score of all domains ranged between 11 and 70. Mean Score of 35-37 in 11 % of this population. The Children's Sleep Habit Questionnaire scores were High in comparison to the Owen's article; greater research is needed to determine the underlying causes of the increased likelihood of sleep disorders.

Conclusion: Our findings, especially in sleep anxiety are alarming and warrant for more research to determine underlying causes of the more prevalent sleep disorders (Sleep Anxiety) and any other apparent or possible causes for sleep disturbances amongst children.

Background

In children, sleep is of major significance for brain development, growth, and information processing.¹ Sleeping plays an integral role in the bio-psycho-social aspects of individuals.² The modern general populace recognizes the importance of good quality sleep more than they ever have in past decades thanks to unlimited resources freely provided over the Internet.³ Citizens of first world countries pay great interest in all matters affecting their child's well-being equally with scientific communities; the latter of course examine topics through an analytical, and objective lens. Rigorous and consistent flow of studies flood research databases from wide demographics of diverse geopolitical backgrounds studied the matter thoroughly, with recommendations and renovations to sleeping guidelines published every where from governmental organizations such as the Centre's for Disease Control to academic institutions such as the American Academy for Sleep.⁴ Without sleep, children can't process information and fatigue takes a toll on physical ability and mental acuity.⁵ Significant evidence taken from multiple cross-sectional and cohort studies demonstrated the negative impact sleep deprivation has on cognitive and behavioral domains⁶; children might also suffer from even more problematic sleep disorders when they grow older, Dr. Al-Mamun, a professor of School of Population Health in University of Queensland, Australia "During childhood development, children who had Trouble Sleeping Behavior were 1.49 times more likely to experience difficulties sleeping at 14 years compared to those children without TSB"⁷. Al Mamun et al's main focus was to prove individuals who suffer in childhood of sleeping problems carry on suffering in their adult life, with greater risks of exacerbated sleeping disorders.⁷

With the barrage of portable gaming computers, smart phones and electronics making them accessible in the car, in bed and even at school there are concerning detrimental health risks on so young an age group including and not limited to sleep quality. A great example of which can be found in a paper published by Dr. Li of the Otolaryngology-Head and Neck Surgery department in Beijing's Children's hospital; he noted "Increased incidences of sleep loss in children are due to the accessibility of electronics. Habitual use of electronics before bed-time decreases sleep duration amongst children by 2 times in comparison with other children."²

Recently a study by Prado and colleagues evaluated factors in adolescents probable sleep bruxism and found that those who snored, as well as those that wore fixed orthodontic appliances were more prone to Sleep Bruxism than those that didn't.⁸

In several cases, determining duration and quality of sleep amongst children, depends on several factors.⁹ Researchers who attempted to qualify sleep noted multiple sociodemographic markers such as gender, age group, residential region, parental education, personal activities before bedtime, as well as biometrics such as BMI grouping, in addition to familial history and genetics such as Sleep Disordered Breathing, and other sleeping disorders, to be of relevant use during data collection.¹⁰

Sleep can be evaluated via multiple tools.^{11,12,13} The most popular of which is Polysomnography (PSG) which is an overnight multi parametric diagnostic tool assessing brain waves, blood oxygen levels, heart and pulse rate, along with eye and lower limb movements.¹⁴ Actigraphy, on the other hand, is a portable sleep tool and has an actimetry sensor that evaluates rest and activity sleep cycles.¹⁵

Although PSG is the gold standard in reliability and validity for assessing sleep behavior, followed closely by Actigraphy, their use is costly, both monetarily and time wise, also challenging when used on a wide scale. Sleep diaries are runners up as the preferred sleep evaluators, however, require the parents and/or guardians scheduled compliance in logging for longer durations of time.

A study conducted by Owens and Colleagues in 2000, designed a questionnaire that psychometrically analyses the personality and attitude of children whilst asleep. It is a valid and reliable tool to assess both behaviorally based and medical sleep disorders.¹⁶ This tool is based on 35 questions and these are entailed to one of 8 domains, to be completed by the parent and or guardian of the child. Initially this questionnaire was designed for children aged 4 to 10 years of age. The older age group wasn't recommended to be included to avoid hormonal pubertal changes affecting the domains. However, in our study, we included children from both the Phallic and Latent stage. That is, according to Freudian Psychoanalysis, children between the ages of 3 and 12 whom are categorized into Phallic and Latent stage. The former encompasses the ages 3 to 6 which is the third stage of psychosexual development, subsequently the latter known as the Latent stage consists of age 6 to puberty and is the fourth stage of psychosexual development.¹⁰

During our search we concluded there isn't sufficient literature to measure sleeping habits amongst Riyadh's children nor has the Owens Children's Sleep Habit Questionnaire (CSHQ) been translated into the Arabic language. Hence, this study was conducted to assess the prevalence of sleep disorders and translate the CSHQ ¹⁶ into an Arabic questionnaire.

Methods

Participants and data collection

Validation participants

The Research Proposal was initially registered via the following: FRP/2018/228 at the Institutional Review Board of Riyadh Elm University. The Proposal was further reviewed and approved by IRB Number: RC/IRB/2018/1185. There was a choice for each participant whether they wanted to participate or not as dictated by the Declaration of Helsinki.

A total of 50 parents from Riyadh region participated in the survey.

Each parent filled the survey once in Arabic and another time in English (total of English and Arabic surveys were 100). Potential participants were briefed about the purposes and procedures of the study and a verbal consent was taken as well as an electronic consent before completing the electronic survey. Inclusion criteria were as follows, parents of male and female medically fit children from 3-12 years of age. Children more than the age of 12 and less than the age of 3, children with hearing or visual impairment, children with learning disabilities, major psychiatric illnesses, or with maxillofacial deformities were excluded from the survey. ² Exclusion and inclusion criteria's were mentioned with the consent.

The correlation coefficient was computed to examine the correlation between responses of English and Arabic questionnaires. For continuous variables, Pearson correlation coefficient (r) was used. The Pearson coefficient of correlation (r) measure the degree of association between quantitative variables. The values of r lie between -1 and +1, a coefficient of +1 indicates that the two variables are perfectly positively correlated, so as one variable increases, the other increases by a proportionate amount. Conversely, a coefficient of -1 indicates a perfect negative relationship: if one variable increases the other decreases by a proportionate amount. A coefficient of zero indicates no linear relationship at all and so if one variable changes, the other stays the same. Pearson coefficient of correlation calculated using the following formula:

$$r = \frac{N \sum XY - \sum X \sum Y}{\sqrt{[N \sum X^2 - (\sum X)^2][N \sum Y^2 - (\sum Y)^2]}}$$

Where Xs are observed values of the independent variable, Ys are observed values of the dependent variable, and N is the sample size.

Spearman rank correlation was used for categorical variables.

A value of 0.70 and above correlation was considered as indication of consistency in responses.

The Saudi Arabic version of Owens (CSHQ) ¹⁶ was adapted in the following six stages. Fig.1

Stage I Forward translation

Three bilingual translators, with Arabic as their mother tongue independently completed three forward translations of the original English version into the Saudi Arabic version. The translators aimed for a literal and conceptual translation. A written report with their comments on any difficulties and the rationale for their choices for problematic questions was completed.

Stage II Synthesis

A meeting between the forward translators was arranged, and the three translators compared both translated documents. The translators synthesized both translated documents into one Arabic version by resolving any discrepancies on their reports.

Stage III Backward translation

Three bilingual translators with English as their mother tongue, back- translated the Arabic version into English. The three back-translation versions were then compared. The discrepancies were discussed and resolved by agreement.

Stage IV Expert review

An expert forward translator, a specialist in Orofacial pain from the Oral Maxillofacial Surgery department at Riyadh Elm University, reviewed all translated versions. The result was Pre-finalized Saudi Arabic version of the Owens Children's Sleep Habits Questionnaire. The Pre-final version was compared to the original English version to ensure semantic equivalences.

Stage V Pilot Study

The Pre-finalized version was tested on a sample of 50 Saudi parents with medically fit children from age 3-12 years of age. Parents were asked to complete the questionnaire twice, once in the original English version and secondly in the pre-final Arabic version. An expert reviewed the answers of both completed questionnaires of each individual parent and no changes were needed.

Stage VI Prevalence of affected sleep domains

Both English and Arabic versions of the Owens CSHQ were distributed separately on a different sample of 1546 parents. The choice was up to each participant whether to solve the English or the Arabic version of the standard Questionnaire.

Prevalence participants

A total of 1546 parents from Riyadh region participated in the survey. Participants were made aware regarding the purposes and procedures of the study and an electronic consent was attained before conducting the electronic survey. Inclusion criteria were as follows, parents of male and female medically fit children from ages 3-12 years old. Children more than the age of 12 and less than the age of 3, children with hearing or visual impairment, children with learning disabilities, major psychiatric illnesses, or with maxillofacial deformities were excluded from the survey.² Exclusion and inclusion criteria's were mentioned with the consent. These participants had the choice of completing the questionnaire in their preferred language (Arabic or English).

Questionnaire

Demographics

Demographics containing the following questions, how old is the mother, how old is the father, what is the education level of the mother, what is the education level of the father, average household income per month, which of the parents is currently working, which parent spends more time with the children, the marital status of the parents, how many children do you have, how old is your child, what gender is your child, which grade is your child in, does your child go to a private or public school, when does your child sleep during the weekdays, and when does your child sleep during the weekends (specifying that the participant should only choose one child to fill the survey).

Owens Children's Sleep Habits Questionnaire

The Owens Children's Sleep Habits Questionnaire¹⁶ consists of 8 sub-scales including Bedtime Resistance (6 items) with two reversed scores, Sleep Onset Delay (1 item) has a reversed score, Sleep Duration (3 items) with two reversed scores, Sleep Anxiety (4 items), Night Wakings (3 items), Parasomnias (7 items), and Sleep Disordered breathing (3 items) all with no reversed scores, and Daytime Sleepiness (8 items) with one reversed score. Total Sleep Disturbance score (33 items), scoring from 1-3 where 1 is Never/Rarely, 2 is sometimes, and 3 is usually. Missing data were treated according to developer guidelines.

All Questionnaires were distributed through survey monkey and subjected to IBM-SPSS statistical analysis.

Psychometric measurements and statistical analysis

Sample size estimation

Estimation of sample size was established within Riyadh with a population size of 621272 and a confidence level of 95% with 5% margin of error, suggesting a sample size of 384 in total.

Floor and sealing effect

When 15% or more of the participants score the lowest or highest possible sub-scale scores and this is called "Floor and sealing effect".

Results

Table (1) Consistency of socioeconomic and demographic characteristics of respondents.

Characteristic	Correlation coefficient	P value	Consistency
How old is the mother?	0.978	0.000	Consistent
How old is the father?	0.967	0.000	Consistent
What is the education level of the mother?	0.781	0.000	Consistent
What is the education level of the father?	0.863	0.000	Consistent
Average household income per month?	0.912	0.000	Consistent
Which of the parents is currently working?	0.779	0.000	Consistent
Which parent spends more time with the children?	0.586	0.000	Not consistent
Marital status of the parents?	0.644	0.000	Not consistent
How many children do you have?	0.855	0.000	Consistent
How old is your child?	0.985	0.000	Consistent
Which grade is your child in?	0.741	0.000	Consistent
Does your child go to a private or public school?	-0.242	0.098	Not consistent

The figures in the table above show the correlation results for consistency between English and Arabic versions of socioeconomic questions in the questionnaire. The value of correlation coefficient equal or above 0.70 is considered as indication of consistency in responses between two versions of questionnaire. The results above, confirm consistency for all characteristics except for three variables namely, the parent who spends more time with the children, marital status and type of school. The responses on the three aforementioned characteristics were different between two collection time points.

Table (2) Child Gender Consistency:

English questionnaire

Arabic questionnaire	Male	Female	Total
Male	19	1	20
female	1	27	28
Total	20	28	48

The cross tabulation of child gender show high consistency in responses between English and Arabic version of the questionnaire.

Table (3) consistency of measure statement:

Characteristic	Correlation coefficient	P value	Consistency
When does your child sleep during weekdays? (Sunday-Thursday)	0.875	0.000	Consistent
When does your child sleep during weekends? (Friday & Saturday)	0.724	0.000	Consistent
child goes to bed at the same time at night	0.509	0.000	Not consistent
child falls asleep within 20 minutes after going to bed	0.534	0.000	Not consistent
child falls asleep alone in own bed	0.448	0.001	Not consistent
child falls asleep in parent's or sibling's bed	0.552	0.000	Not consistent
child needs parent in the room to fall asleep	0.462	0.000	Not consistent
Child struggles at bedtime (cries, refuses to stay in bed, etc.)	0.606	0.000	Not consistent
child is afraid of sleeping in the dark	0.673	0.000	Not consistent
child is afraid of sleeping alone	0.492	0.000	Not consistent
child's usual amount of sleep each day	0.738	0.000	Consistent
child sleeps to little	0.585	0.000	Not consistent
child sleeps the right amount	0.602	0.000	Not consistent
child sleeps about the same amount each day	0.713	0.000	Consistent
child wets the bed at night	0.680	0.000	Not consistent
child talks during sleep	0.542	0.000	Not consistent
child is restless and moves a lot during sleep	0.604	0.000	Not consistent
child sleepwalks during the night	0.478	0.000	Not consistent
Child moves to someone else's bed during the night (parent, brother, sister, etc.)	0.771	0.000	Consistent

Characteristic	Correlation coefficient	P value	Consistency
child grinds teeth during sleep	0.389	0.006	Not consistent
child snores loudly	0.687	0.000	Not consistent
child seems to stop breathing during sleep	0.642	0.000	Not consistent
child snorts and\or gasps during sleep	0.600	0.000	Not consistent
child has trouble sleeping away from home (visiting relatives, vacation)	0.497	0.000	Not consistent
child awakens during night screaming, sweating, and inconsolable	0.596	0.000	Not consistent
child awakens alarmed by a frightening dream	0.739	0.000	Consistent
child awakes once during the night	0.546	0.000	Not consistent
child awakes more than once during the night	0.556	0.000	Not consistent
Write in the time of day child usually wakes in the morning	0.397	0.005	Not consistent
child wakes up by him\herself	0.707	0.000	Consistent
child wakes up in negative mood	0.484	0.000	Not consistent
adults or siblings wake up child	0.606	0.000	Not consistent
child has difficulty getting out of bed in the morning	0.408	0.004	Not consistent
child takes a long time to become alert in the morning	0.346	0.016	Not consistent
child seems tired	0.512	0.000	Not consistent
During the past week, your child has appeared very sleepy or fallen asleep during the watching TV	0.053	0.719	Not consistent
During the past week, your child has appeared very sleepy or fallen asleep during the riding in car	0.555	0.000	Not consistent

As presented in the table above, the results of correlation between responses on English and Arabic questionnaires show a remarkable inconsistency. The consistent responses were found mainly in the

questions about the time of sleeping and walking up.

We recorded the responses of 1546 participants in a total of 8 domains of the CSHQ. In each individual domain, we recorded response frequency and their respective frequency with the maximum, minimum and mean scores.

Descriptive analysis

Table (4) Descriptive measures of Age:

Variable	Min	Max	Mean	SD
Mother age	23	50	34.1	7.4
Father age	23	70	40.5	11.1
Child age	1	12	5.0	3.4

The maximum age of children was 12 years with mean ages 5.0 years.

Table (5) percentage distribution of measure statement:

Characteristic	Rarely/never	Sometimes	Usually
child goes to bed at the same time at night	2.1	33.3	64.6
child falls asleep within 20 minutes after going to bed	14.6	35.4	50.0
child falls asleep alone in own bed	25.0	33.3	41.7
child falls asleep in parent's or sibling's bed	37.5	41.7	20.8
child needs parent in the room to fall asleep	27.1	43.8	29.2
Child struggles at bedtime (cries, refuses to stay in bed, etc.)	43.8	47.9	8.3
child is afraid of sleeping in the dark	47.9	25.0	27.1
child is afraid of sleeping alone	37.5	45.8	16.7
child sleeps to little	52.1	37.5	10.4
child sleeps the right amount	0.0	43.8	56.2
child sleeps about the same amount each day	0.0	37.5	62.5
child wets the bed at night	56.2	33.3	10.4
child talks during sleep	62.5	31.2	6.2
child is restless and moves a lot during sleep	37.5	39.6	22.2
child sleepwalks during the night	77.1	16.7	6.2
Child moves to someone else's bed during the night (parent, brother, sister, etc.)	52.1	39.6	8.3
child grinds teeth during sleep	77.1	18.8	4.2
child snores loudly	52.1	45.8	2.1
child seems to stop breathing during sleep	81.2	18.8	0.0
child snorts and/or gasps during sleep	77.1	18.8	4.2
child has trouble sleeping away from home (visiting relatives, vacation)	39.6	45.8	14.6
child awakens during night screaming, sweating, and inconsolable	68.8	25.0	6.2
child awakens alarmed by a frightening dream	60.4	35.4	4.2
child awakes once during the night	52.1	37.7	10.4
child awakes more than once during the night	64.6	31.2	4.2
child wakes up by him\herself	29.2	39.6	31.2

Characteristic	Rarely/never	Sometimes	Usually
child wakes up in negative mood	43.8	47.9	8.3
adults or siblings wake up child	27.1	35.5	37.4
child has difficulty getting out of bed in the morning	39.6	43.8	16.7
child takes a long time to become alert in the morning	64.6	29.2	6.2
child seems tired	54.2	39.6	6.2
Characteristic	Not sleepy	Very sleepy	Falls asleep
During the past week, your child has appeared very sleepy or fallen asleep during the watching TV	56.2	29.2	14.6
During the past week, your child has appeared very sleepy or fallen asleep during the riding in car	43.8	37.5	18.8

In the first domain, Bedtime Resistance (BR) score with its scale between - 2 to + 10 we found 122 individuals (7.9%) scored a minimum score of -2, with 3 individuals (0.2%) having a maximum score of 10, with a mean score of 4 in 151 (9.8%) individuals.

In the second domain, Sleep Onset Delay (SOD) score with its scale between - 3 to -1, 826 (53.4%) scored the minimum score of -3, and 145 (9.4%) a maximum score of -1, with 575 (37.2%) scoring a mean of -2.

Third domain, Sleep Duration (SD) score with its scale between - 5 to + 1, 712 (46.1%) scored a minimum score of -5, and 4 (0.3%) a maximum score of + 1, with 139 (9%) scoring a mean of -2.

Fourth domain, Sleep Anxiety (SA) score, 112 (7.2%) scored a minimum score of 4, and 45 (2.9%) a maximum score of 12, with 263 (17%) scoring a mean of 8.

Fifth domain, Night Waking (NW) score with its scale between + 3 to + 9, 438 (28.3%) scored a minimum score of 3 and, 16 (1%) a maximum score of 9, with 13.9% scoring a mean of 6.

Sixth domain, Parasomnias score with its scale between + 7 to + 20 ,216 (16.9%) scored a minimum score of 7, and 2 (0.1%) a maximum score of 20, with 27 and 15 (1.7%- 3.3%) scoring a mean range of 13–14.

Seventh domain, Sleep Disordered Breathing (SDB) score with its scale between + 3 and + 9, 914 (59.1%) scored a minimum score of 3, and 6 (0.4%) a maximum score of 9, with 61 (3.9%) scoring a mean of 6.

Eighth domain, Daytime Sleepiness (DS) score with its scale between + 4 and + 20, 46 (3%) scored a minimum score of 4, and 1 (0.1%) a maximum score of 20, with 164 (10.6%) scoring a mean of 12.

The total score of all domains ranges with their respective individual questions of CSHQ was calculated, with results between 11 and 70 where 2% of our population scored a minimum of 11–12 and 1% with a maximum of 63. Between 0% and 1% of the population scored from 64–70 with a mean score of 35–37 in 11% of our population.

Discussion

The current study aimed to translate and evaluate the properties of the Saudi Arabic version of Children's Sleep Habits Questionnaire in children from 3–12 years old. This paper reports the development and preliminary validation of Owens Children's Sleep Habits Questionnaire. A cognitive straight forward structure has been established for validating the Questionnaire as in Fig. 1

The reported psychometric properties of the sleep screening questionnaire was designed primarily for survey the sleep habits and sleep disturbances in community populations.¹⁶ Owens States that the higher the score the worse the result is.

To relatively determine the most prevalent domain in our community, we've taken into consideration two items: the first is the number of respondents in each category and the second, the frequency of their scores. According to our data, Sleep Anxiety Domain with a score range of 4 to 12 with 45 (2.9%) individuals scoring the maximum at 12 and the minimum with individuals 112 (7.2%) scoring 4, had the highest density in its scale with the upper 95% mean being 7.72/12 in addition to 45 individuals receiving a score of 12. Upon close inspection of this domain's questions, we can see 33.1% of respondents agreed their child cannot sleep without their parents in the room, 36.1% agreed their child is afraid from sleeping alone, 31.2% agreeing their child is afraid to sleep in the dark, but only 14.1% agreed their child has difficulty sleeping when they are away from home. This would mean sleep anxiety is the highest domain in prevalence amongst children within Riyadh Province. Stress can negatively affect sleep quality and is associated with dental conditions such as bruxism as pointed out by Alamoudi¹⁸ yet alarmingly, very little research conducted in the Kingdom assesses the stress levels of our age group. Sleep quality in late childhood and early adolescence is critical and literature is laced with evidence that heightens this age group to stress.¹⁹

A recent review of sleep disturbance in children has confirmed there to be a reciprocal nature to sleep disorders and anxiety; that is the presence of one catapults the development of the second. Whether an individual begins with a sleep disorder or anxiety; he or she will have a higher comorbid condition of both.²⁰

Next is Daytime Somnolence Domain with a score ranging from 4–20 with 1 (0.1%) individual scoring the maximum at 20 and the minimum with 46 (3%) individuals scoring 4 was the second leading in prevalence although other articles such as Bahamaam et.al²¹ studying an age group similar to ours seem to have more substantiated claims that Daytime is more prevalent than we have measured. Both the 4th domain (Sleep Anxiety) and 8th domain (Daytime Sleepiness) is consistently mentioned with

copious amounts of literature supporting both of these especially in Youth which is included in our age sample.¹⁹

Parasomnias Domain with a score ranging from 7–20 with 2 (0.1%) individual scoring the maximum at 20 and the minimum with 262 (16.9%) individuals scoring 7. Sleep Disordered Breathing with a score ranging from 3–9 with 6 (0.4%) individual scoring the maximum at 9 and the minimum with 914 (59.1%) individuals scoring 3. Night Wakings with a score ranging from 3–9 with 16 (1%) individual scoring the maximum at 9 and the minimum with 438 (28.3%) individuals scoring 3.

Bedtime Resistance domain with a score ranging from – 2 to 10 with 3 (0.2%) individuals scoring the maximum at 10 and the minimum with 112 (7.9%) individuals scoring – 2. (SOD) with a score range from – 3 to -1 with 145 (9.4%) individuals scoring the maximum at -1 and the minimum with 826 (53.4%) individuals scoring – 3. (SD) with a score range from – 5 to 1 with 4 (0.3%) individuals scoring the maximum at 1 and the minimum with 712 (46.1%) individuals scoring – 5.

Early period of adolescence (10–12 years of age) as in our age included group plays a critical role in determining emotional health. That is poor sleep might trigger negatively with resultant anxiety, in turn, paving the road to depression.²²

This is seen in older age group where those aged 12–18 had depression rather than anxiety when their circadian rhythm was affected.²³

Our study corroborates the risk of poor sleep in increased likelihood to anxiety in early adolescence.

The tell tale signs of sleep disorders is concerning for they define a trajectory of developmental impact and poor emotional well being. Awareness of parents on the impact of poor sleep on health might be the simplest yet most efficient of measures. This study, didn't only assess the prevalence of sleep quality and /or disorders in children but unintentionally raised the alarm for parents/guardians to take their children's sleep more seriously. In the Kingdom of Saudi Arabia, the young aged 20 and below account for over half of the Kingdoms Population. If this generations sleep disorders not addressed, it will indeed be ubiquitous that this generation will be riddled with concerning health problems both developmentally and most importantly psychologically. This will impact not only the economy, but be a burden on the healthcare system.

Limitations

The study was conducted during an academic semester and the researchers had a strict timeline within which to complete survey distribution. Better reliability was examined through test retest and not limited to the internal consistency tests.^{24,25}

Validation limitations

The limitations we have encountered included a low response rate, missing entries, recall bias, reporting bias, and selection bias.

Prevalence limitations

The limitations we have encountered were, missing demographics for the prevalence sample only due to a technical issue saving it on survey monkey, some missing entries, recall bias, reporting bias, and selection bias.

Conclusion

CSHQ scores were high in comparison with Owen's article, even though we are missing key demographic data, our findings, especially in sleep anxiety are alarming and warrant for more research to determine underlying causes of the more prevalent sleep disorders (Sleep Anxiety) and any other apparent or possible causes for sleep disturbances amongst children.

Abbreviations

PSG Polysomnography

CSHQ Children's Sleep Habit Questionnaire

BR Bedtime Resistance

SOD Sleep Onset Delay

SD Sleep Duration

SA Sleep Anxiety

NW Night Waking

SDB Sleep Disordered Breathing

DS Daytime Sleepiness

Declarations

Ethics approval and consent to participate

The Research Proposal was initially registered via the following: FRP/2018/228 at the Institutional Review Board of Riyadh Elm University. The Proposal was further reviewed and approved by IRB Number: RC/IRB/2018/1185. There was a choice for each participant whether they wanted to participate or not as

dictated by the Declaration of Helsinki. If they agreed to participate they were on board with the questionnaire, otherwise they withdrew. It was written consent for all those who agreed to participate.

Consent for publication

Applicable

Availability of Data and Material

All further material is available and can be acquired upon request.

Competing Interests

The Authors declare no conflict of interest.

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Authors Contribution

We all contributed substantially to this study. M.W. conceived and presented the idea, conceived and planned the data collection, devised the project, designed and directed the project, contributed to the design and implementation of the study, suggested the analytical component post processing of the data. M.W and S.A. provided significant constructive feedback to each other, which helped define this study taking into account their different specialties and backgrounds thereby amalgamating their individual expertise in the subject. SA, H.A, A.A. and R.M. carried out the fieldwork whereby collected the data, tabulated it, designed the model and computational framework as well as helped shape the overall product where they assisted in its interpretation.

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Figures

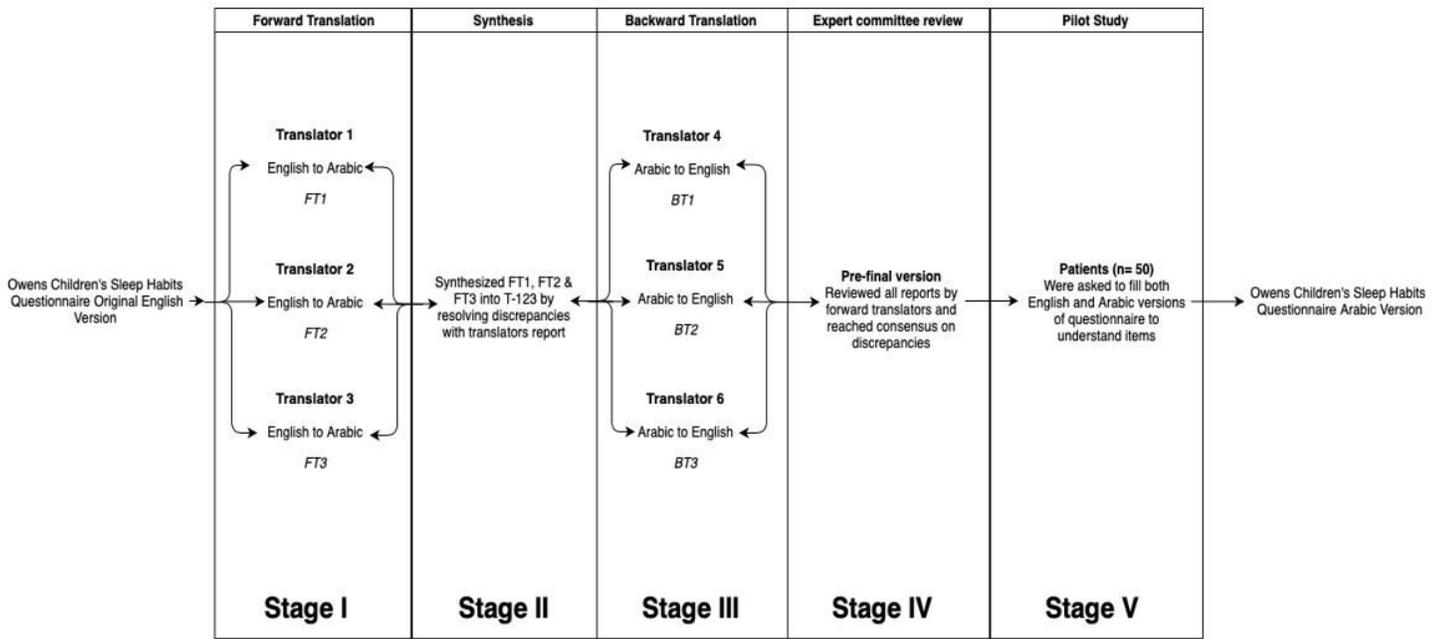


Figure 1

Flowchart of translation and linguistic adaptation

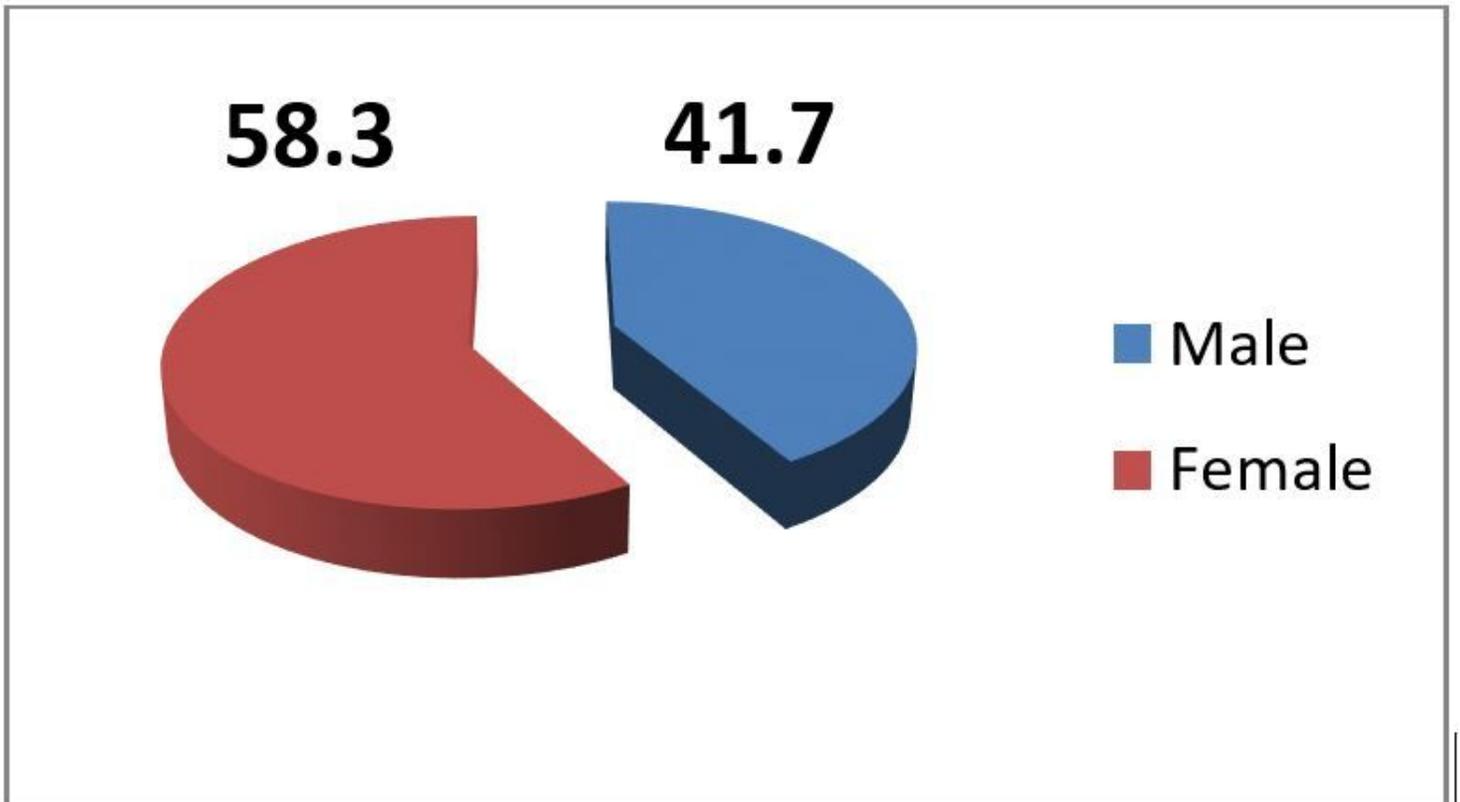


Figure 2

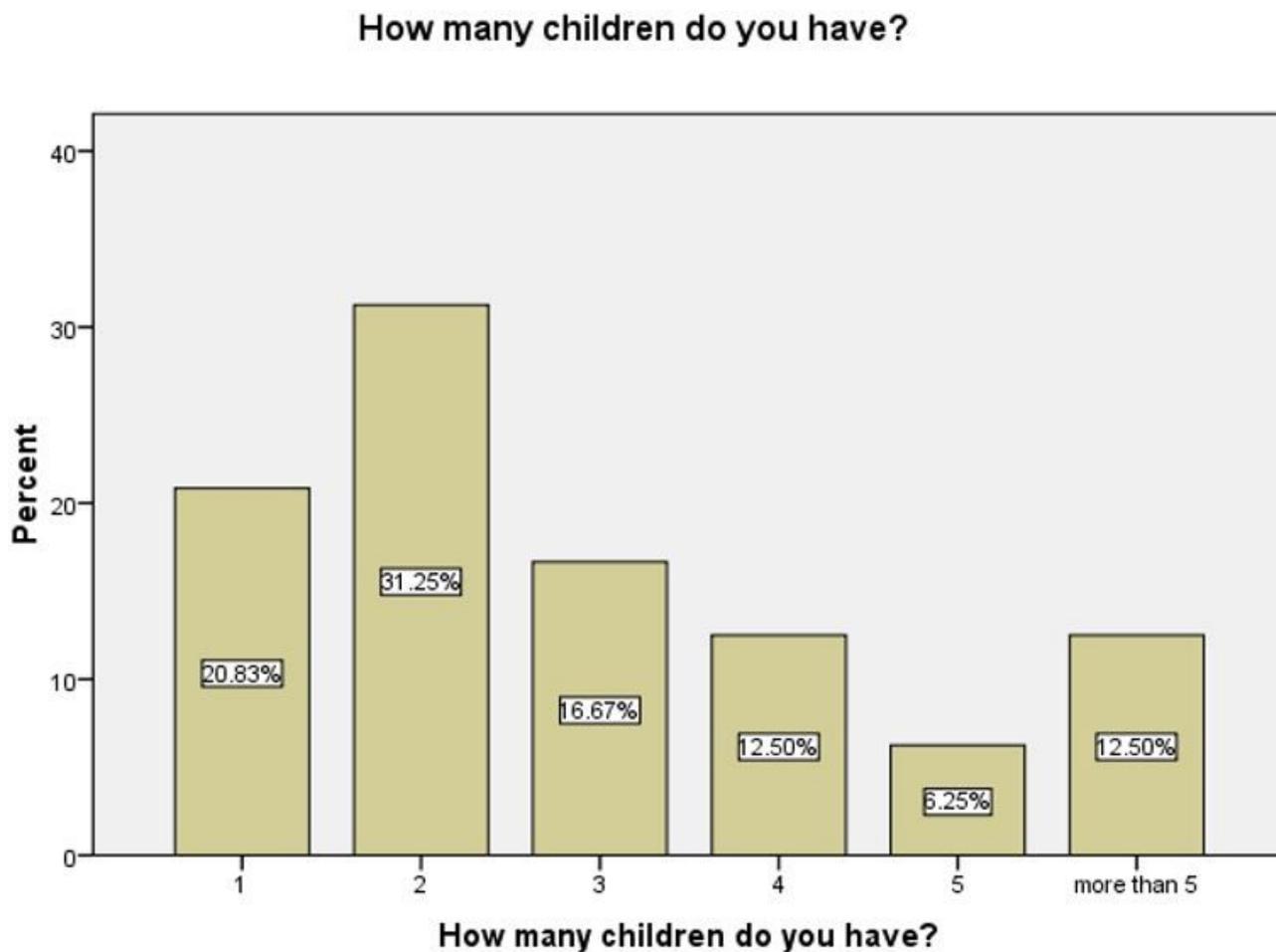


Figure 3

Number of children

Supplementary Files

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- [APPENDIX.docx](#)
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