



Exploring the Mediating Role of Body Image in the Relationship Between Social Interaction Anxiety and Sleep Disturbance Among Overweight Individuals

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ARTICLE INFO

Article History:

Received: December 24, 2024
Revised: January 06, 2025
Accepted: January 08, 2025
Available Online: January 10, 2025

Keywords:

Social interaction anxiety, sleep disturbance, body image, overweight individuals, mediation analysis

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ABSTRACT

This study investigated the relationship between social interaction anxiety and general sleep disturbance among overweight individuals, emphasizing the mediating role of body image concerns. A total of 211 participants, aged 20 to 50 years, were recruited from gyms, clinics, and slimming centers in Multan, Pakistan. Participants completed the General Sleep Disturbance Scale (GSDS), Social Interaction Anxiety Scale (SIAS), and Body Shape Scale (BSS) to assess sleep disturbance, social interaction anxiety, and body image concerns, respectively. Results revealed a significant positive correlation between social interaction anxiety, body image concerns, and sleep disturbance. Furthermore, body image concerns were found to mediate the relationship between social interaction anxiety and sleep disturbance. Females and unmarried individuals reported higher levels of social interaction anxiety, body image concerns, and sleep disturbances compared to their counterparts, while age showed no significant impact on these variables. These findings highlight the need to address both psychological and physiological challenges in designing effective weight management interventions.



Introduction

Obesity is a highly emerging health issue (Fleming et al. 2013). Obesity is a a complex phenomenon as multiple factors interact and affect individuals. Ones' social and external environment has strong relationship. It is well reported in existing literature that obesity is linked with interpersonal relationships and skills. It was also reported that obesity-related risks are also related to patterns of interaction in social circle (Haye, Robins, Mohr, Wilson 2010). Disruptive sleep problems are becoming more common among obese adolescents and children. All these sleep related problems and sleep disturbances are becoming a huge cause of obesity (Korean et. al 2015).

In perspective on Western culture's demanding guidelines related to physical appearance of an individual and its biased "hostile to fat" frames of mind and practices, it ought to be nothing unexpected that psychosocial outcomes related to weight have been experienced by an individual. The most vulnerable factors for body dissatisfaction are obesity and overweight (Schwartz 7 Brownell, 2002, 2004; Sarwer, Wadden, & Foster, 1998). On the off chance that a person's social environment sees her or him as ugly or not attractive enough, it ought not to be astounding that this self-view have been adopted by the obese individual. Even though fat people could possibly be bound to contort the size of their body (Schwartz & Brownell, 2004), obese people are more conscious with their body appearance and are highly disappointed; that's why they mostly try to avoid interactions and social gatherings as compared to non-obese ones. (Rosen, 2002; Schwartz and Brownell, 2004) (Annis, Cash, and Hrabosky, 2004).

Social fear of the anxiety disorders, is one of the most ordinarily analyzed among fat people who gorge eat. Social fear is set apart by elevated social anxiety levels that is characterized as an absence of confidence in public circumstances trouble associating with others, and afraid of being assessed negatively by others (Sawaoka et al., 2012). Social uneasiness is the nervousness one encounters in social situation. Many researches by Koskina et al, (2011) and Sawaoka et al, (2012) were conducted in order to check the relation among the frequency of binge eating, social fear/anxiety or social uneasiness. While predominance rates of social fear have been assessed at around 6 to 9% among fat people (Petry, Barry, Pietrzak, & Wagner, 2008). People who are obese or overweight mostly try to follow society's guidelines regarding body weight and may encounter self-perception disappointment and face anxiety about their physical make-up (Ahrberg, Trojca, Nasrawi, & Vocks, 2011). A few investigations propose that hefty people experience elevated levels of self-image disappointment and low confidence, in spite of the fact that it might not be legitimately identified with Body Mass Index (BMI) (Kruger, Lee, Ainsworth, & Macera, 2008). To some extent justification of social anxiety can be done as obese and overweight individuals experience unavoidable discrimination due to increased weight (Puhl & Heuer, 2009). Among obese grown-ups, gorging and binge eating occur due to weight discrimination (Ostrovsky, Swencionis, Wylie-Rosett, and Isasi, 2013).

Body image is an individual's very own impression of their body. Actual body composition, body esteem related to sociocultural environment, body related encounters, ideals, and reaction of society towards body appearance. According to Western culture, the concept of male ideal body is like strong and muscular figure whereas the concept of female body is thin and flimsy who fail—or feel that they come up short—to arrive at these beliefs might experience the ill effects of lower self-esteem (Brixval, Rayce, Rasmussen, Holstein, and Due, 2011).

At the start and during the progression of obesity, there has been seen an extra relation between sleep duration (Fox & Farrow, 2009) and quality (Bond et al., 2001). The time an individual may take while sleeping is sleep onset latency (SOL); except for the one where an individual try to compensate for his sleep time by postponing wakeup time. Different studies indicated that short sleep durations may lead to an increase in diet which then turns into weight gain. Many

laboratories based researchers also found this relation and how the hormone ghrelin stimulates hunger and then a decrease in the hormone leptin that works to induce satiation (Spiegel, Tasali, Penev, & Van Cauter, 2004) and expanded eating/hunger following short sleep. Snacking and irregular meal patterns were also associated with deficient sleep (Imaki et al., 2002). Sleep unsettling influences have been additionally linked with anxiety or uneasiness. Gregory and colleagues (2005) in one of their reports investigated that in adolescence issues related to sleep remained persistent till adulthood (60% chance that they will face anxiety issues in adulthood). Meta-analysis of literature indicated that there was a significant association of anxiety, uneasiness and sleep disturbance among kids (Nguyen-Rodriguez, McClain and Spruijt-Metz, 2010).

A unimodal association between BMI and sleep duration was observed in the Wisconsin Sleep Cohort Study (WSCS). Previously it was detailed that lower leptin and higher ghrelin levels related to short sleep span, which might enhance the dietary intake, unhealthy selection of food, and consequent obesity (Taheri et al., 2004). Several different components for the relationship among sleep and leanness or obesity have been suggested, comprising of expanded chance to eat, expanded exhaustion and diminished bodily action, and mental misery, yet these stay to be confirmed (Taheri, 2006). Polysomnographic proportions of quality of sleep in WSCS were related with ghrelin levels. A relationship among the poor sleep quality, increased BMI and the metabolic disorder was indicated by Jennings and colleagues, where the poor sleep quality was estimated by using Pittsburgh Sleep quality index. There is a bidirectional relation among obesity, sleep quality and sleep span. When leanness or obesity happens, there will be a chance that sleep will be disturbed and weight reduction causes to diminish sleep unsettling influence and obesity related sleep disturbed breathing. (Vgontzas et al., 2008; Araghi, Jagielski, Neira, Brown, Higgs, Thomas and Taheri, 2013)

For years, depression and anxiety has been considered as main reason of sleep disturbance. Obesity is a type of disorder that is the combination of many aspects such as a nutritious, combination of the genetic, some contingent factors and the style of living. In this present study among obese people the level of sleep disturbance, social interaction anxiety and body shape have been examined. It has also been elaborated in this research the relation between the social interaction anxiety, general sleep disturbance and the implications related to body mass index. The basic aim of this study was to explore the relationship of general sleep disturbance and social interaction anxiety, and also to check the mediating effect of body shape.

Hypotheses

1. There will be a positive relationship between social interaction anxiety, body image concern and general sleep disturbance.
2. Body image concern will mediate the relationship between social interaction anxiety and general sleep disturbance
3. There will be a significant difference in social interaction anxiety, body image concerns, and sleep disturbance with respect to gender
4. There will be a significant difference in social interaction anxiety, body image concerns, and sleep disturbance with respect to marital status
5. There will be a significant difference in social interaction anxiety, body image concerns, and sleep disturbance with respect to age

Methodology

Participants

The study comprised 211 male and female overweight individuals, aged 20 to 50 years, from Southern Punjab, Pakistan. The mean age was ($M = 31.85 \pm S.D = 7.13$). Participants were recruited from gyms, clinics, and slimming centers using a purposive sampling strategy. The inclusion criteria included individuals with a Body Mass Index (BMI) in the overweight or obese range ($\geq 25 \text{ kg/m}^2$), those who were literate and able to understand the questionnaires, and individuals without any chronic illness or diagnosed sleep disorders. Exclusion criteria included individuals undergoing psychiatric treatment, pregnant women, or those who had recently undergone bariatric surgery. Prior to data collection, participants were briefed about the study's objectives, and informed consent was obtained.

Instruments

General Sleep Disturbance Scale (GSDS)

The General Sleep Disturbance Scale (GSDS), developed by Kate, Wilkinson, and Shai Marcu (2004), assesses the frequency and severity of sleep problems. The scale consists of 21 items rated on a 7-point Likert scale, ranging from 0 (never) to 7 (always). This scale is widely recommended for identifying sleep disturbances in various populations and provides a comprehensive evaluation of sleep quality.

Social Interaction Anxiety Scale (SIAS)

The Social Interaction Anxiety Scale (SIAS), formulated by Mattick and Clarke (1998), measures levels of social interaction anxiety. This scale consists of 20 items designed to assess anxiety experienced during social interactions. Responses are measured on a 5-point Likert scale, ranging from 0 (not at all characteristic or true of me) to 4 (extremely characteristic or true of me). This scale is validated for use in clinical and non-clinical populations.

Body Shape Questionnaire (BSQ)

The Body Shape Questionnaire (BSQ), developed by Cooper, Taylor, Cooper, and Fairburn (1987), evaluates individuals' perceptions and concerns about their body shape. It consists of 34 items rated on a 6-point scale ranging from "never" to "always." The BSQ assesses body dissatisfaction and identifies the psychological impact of body image concerns, particularly in relation to eating behaviors and weight management.

Procedure

The study employed a correlational research design to examine the relationships between social interaction anxiety, body image concerns, and general sleep disturbance among overweight individuals. Participants were recruited from gyms, clinics, and slimming centers after obtaining permissions from the respective authorities. The study's objectives were explained to the participants, and informed consent was obtained. Participants were assured of confidentiality and anonymity throughout the study. Data collection involved the completion of a demographic information sheet, including gender, age, marital status, education level, relationship status, weight, height, and the number of children. This was followed by the administration of three standardized questionnaires: the GSDS, SIAS, and BSQ. Each participant took approximately 10 to 15 minutes to complete the instruments. Data were collected in a controlled environment to

ensure minimal distractions and uniformity. To control for potential biases, individuals with known psychiatric disorders or sleep-related medical conditions were excluded. Once all questionnaires were completed, data were analyzed statistically to identify correlations and mediating effects between the variables, with results reported in alignment with the study's objectives.

Results

All the responses from the participants were analyzed using SPSS, frequencies and demographics of the data were measured, reliabilities of the scales were checked, furthermore, mediation analysis was run on smart PLS software.

Table 1: Frequencies of demographic variables (N=211)

Variables	Frequency	Percent
Gender		
Male	98	46.4
Female	113	53.6
Marital Status		
Married	137	64.9
Unmarried	74	35.1
No. of Child		
No Child	84	39.8
One Child	16	7.6
Two Child	34	16.1
Three Child	31	14.7
Four Child	26	12.3
Five Child	16	7.6
Six Child	4	1.9
Age		
Between 20 to 30 Years	98	46.4
Between 31 to 40 Years	82	38.9
Between 41 to 50 Years	31	14.7

Table 1 showed the frequencies of demographic variables which are age, gender, marital status, and no. of children. This table explained all the frequencies of both main and sub categories of these variables and also showed the percentage of these.

Table 2: Correlation Matrix between SIAS and GSDS

Variables	GSDS	SIAS	BSS
General Sleep Disturbance (GSDS)	-	0.381**	0.260*
Social Interaction Anxiety (SIAS)	-	-	0.370**
Body Shape (BSS)	-	-	-

Note: *p<.05, **p<.01, ***p<.001

Table 2 displayed the correlation between GSDS and SIAS. The results indicates a significant positive relationship. A significant positive correlation has been seen between GSDS and SIAS. As a result, if the scores of GSDS increases then it causes an increase in SIAS scores as well. It showed significant positive correlation between GSDS and SIAS.

Table 3: Hypothesis Path coefficients for Mediation Analysis

Pathway	Coefficient (β)	SD	t-Statistic	p-Value
Direct Effects				
SIAS \rightarrow GSDS	0.285	0.104	2.750	0.006**
SIAS \rightarrow BSS	0.370	0.103	3.604	0.000**
BSS \rightarrow GSDS	0.260	0.125	2.091	0.037*
Indirect Effects (Mediation)				
SIAS \rightarrow BSS \rightarrow GSDS	0.0962	—	—	—

Note: Indirect effect calculated as (SIAS \rightarrow BSS) \times (BSS \rightarrow GSDS). GSDS= General Sleep Disturbance Scale, SIAS= Social Interaction Anxiety Scale, BSS= Body Shape Scale *p<.05, **p<.01, ***p<.001

In model I and II the results of PLS-SEM has been shown. Positive impact of SIAS shown on BSS along with GSDS whereas SIAS showed a direct impact on GSDS in Model I. Furthermore, in model II significant mediating role of BSS has been displayed through hypothesis analyzing it also has been displayed in table 8. Although, in Model II positive impact of SIAS has been shown on BSS and positive effect of BSS has been shown on GSDS whereas SIAS showed direct positive effect on GSDS. Furthermore, BSS plays significant mediating role display in Model 2 and it also displayed through hypothesis testing given in Table 3.8. The coefficient of determination (R^2) was significant in both models. Table 8 displayed the hypothesis in which SIAS shown significant impact on BSS is ($\beta=0.370, t=3.604, p<0.01$), SIAS shown significant impact on GSDS is ($\beta=0.285, t=2.750, p<0.01$), BSS showed significant mediating impact on GSDS is ($\beta=0.260, t=2.091, p<0.05$) and the results are supported to the hypothesis of our study.

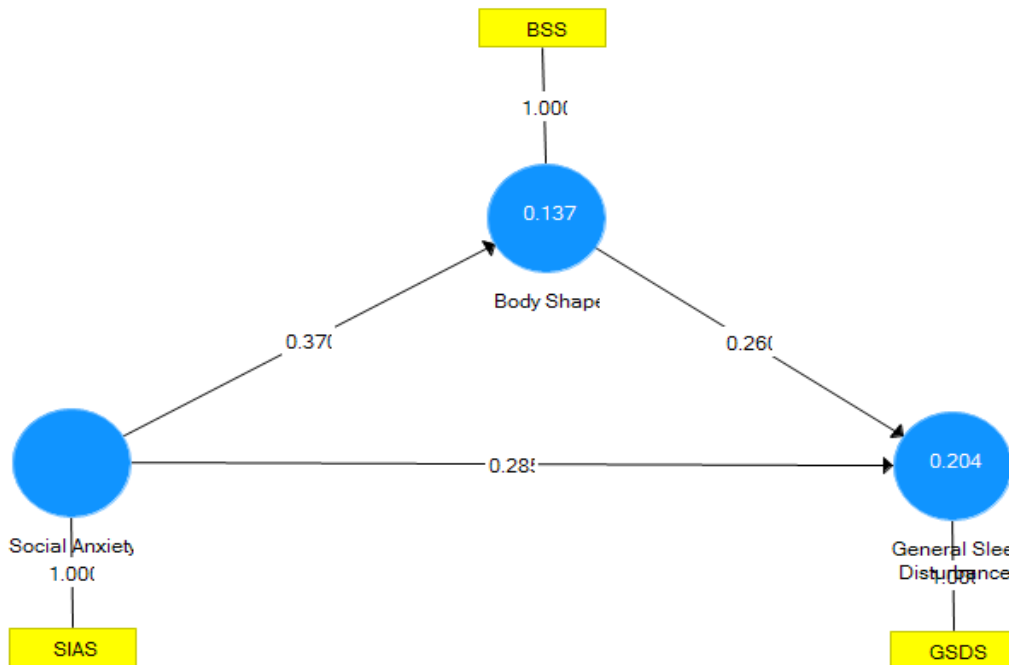


Figure 1: General Model-I for Mediation

The conceptual model has been represented in figure 1. In this model mediating role is being played by body shape scale(BSS), social interaction anxiety(SIAS) as a predictor whereas general

sleep disturbance(GSDS) worked as dependent variable. By using smart PLS-SEM software, path coefficient was analyzed. Positive effect of SIAS (0.370) has been shown on BSS, whereas positive impact of BSS (0.260) has been shown on GSDS. When SIAS is used directly as a predictor variable on GSDS with coefficient of determination ($R^2 = 0.204$). When SIAS is used as indirect via mediating with coefficient of determination ($R^2 = 0.137$).

Table 4: Independent Sample t-test Results for General Sleep Disturbance Scale (GSDS), Body Shape Scale (BSS), and Social Interaction Anxiety Scale (SIAS) by Gender

Variables	Gender	N	Mean	SD	t-statistic	p-value
GSDS	Male	98	3.260	0.640	6.851	0.000***
	Female	113	3.935	0.784		
BSS	Male	98	3.656	0.448	7.947	0.000***
	Female	113	4.170	0.491		
SIAS	Male	98	42.174	7.343	3.429	0.001**
	Female	113	46.097	9.206		

Note: GSDS= General Sleep Disturbance Scale, SIAS= Social Interaction Anxiety Scale, BSS= Body Shape Scale * $p < .05$, ** $p < .01$, *** $p < .001$

Table 4 indicates the difference in gender among general sleep disturbance, social interaction anxiety and body shape. Results in the above table indicates that there is a significant difference in gender with all variables. Average score for females in GSDS is (3.935) and is higher than average score of males in GSDS (3.260). A very high level of significance has been shown in GSDS in gender difference ($t=6.851$, $p=0.000$). Average score for females in BSS is (4.170) and is higher than average score of males in BSS (3.656). A very high level of significance has been shown in BSS in gender difference ($t=7.947$, $p=0.000$). Average score for females in SIAS is (42.174) and is higher than average score of males in SIAS (46.097). A very high level of significance has been shown in SIAS in gender difference ($t=3.429$, $p=0.000$). Hence all the scores of the above variables such as GSDS, BSS, SIAS supported the hypothesis.

Table 5: Independent Sample t-test Results for General Sleep Disturbance Scale (GSDS), Body Shape Scale (BSS), and Social Interaction Anxiety Scale (SIAS) by Marital Status

Variables	MS	N	Mean	SD	t-statistic	p-value
GSDS	Married	137	3.219	0.687	2.26	0.025*
	Unmarried	74	3.451	0.760		
BSS	Married	137	3.650	0.407	3.146	0.002**
	Unmarried	74	3.885	0.571		
SIAS	Married	137	42.365	8.577	2.328	0.021*
	Unmarried	74	43.930	7.045		

Note: GSDS= General Sleep Disturbance Scale, SIAS= Social Interaction Anxiety Scale, BSS= Body Shape Scale * $p < .05$, ** $p < .01$, *** $p < .001$

Table 5 showed the difference in marital status among general sleep disturbance, social interaction anxiety and body shape. Results in the above table indicates that there is a significant difference in marital status with all variables. Average score for unmarried participants in GSDS is (3.451) and is higher than average score of married participants in GSDS (3.219). A very high level of significance has been shown in GSDS in marital status ($t=2.260$, $p=0.025$). Average score for

unmarried participants in BSS is (3.885) and is higher than average score of married participants in BSS (3.650). A very high level of significance has been shown in BSS in marital status ($t=3.14$, $p=0.002$). Average score for unmarried participants in SIAS is (43.930) and is higher than average score of married in SIAS (42.365). A very high level of significance has been shown in SIAS in marital status ($t=2.238$, $p=0.021$). Hence all the scores of the above variables such as GSDS, BSS, and SIAS supported the hypothesis.

Table 6: Analysis of variance (ANOVA) Results for General Sleep Disturbance Scale (GSDS), Body Shape Scale (BSS), and Social Interaction Anxiety Scale (SIAS) by age groups

		Sum of Squares	df	Mean Square	F	p-value
GSDS	Between Groups	2.150	2	1.075	2.096	.126
	Within Groups	106.672	208	0.513		
	Total	108.822	210			
BSS	Between Groups	0.252	2	0.126	0.569	.567
	Within Groups	46.163	208	0.222		
	Total	46.415	210			
SIAS	Between Groups	26.295	2	13.147	0.186	.831
	Within Groups	14740.483	208	70.868		
	Total	14766.777	210			

Note: GSDS= General Sleep Disturbance Scale, SIAS= Social Interaction Anxiety Scale, BSS= Body Shape Scale * $p<.05$, ** $p<.01$, *** $p<.001$

The table 6 represented the analysis of variance for different age groups with variable such as GSDS, BSS, and SIAS. No significant age difference has been shown with GSDS ($F=2.096$, $p=0.126$). This means that the scores for GSDS in all age groups is same and the p value is the strong evidence against the hypothesis. Moreover, no such significant age difference has been seen with BSS ($F=0.569$, $p=0.567$). This means that the scores for BSS in all age groups is same and the p value is the strong evidence against the hypothesis. Lastly, no significant age difference has been seen with SIAS ($F=0.186$, $p=0.831$). This means that the scores for SIAS in all age groups is same and the p value is the strong evidence against the hypothesis. Hence, researcher conclude that this research provide the evidence for significant age groups difference exist in GSDS, BSS and SIAS scale. Therefore, the effect of GSDS, BSS and SIAS is same in all categories of age.

Discussion

The aim of this study is to investigate the relationship between social interaction anxiety and general sleep disturbance among overweight individuals, emphasizing the mediating role of body image concerns. Several researches have been conducted on general sleep disturbance social interaction anxiety and body shape relation in different ways, in-relation with different variables. But very few researches have been found on obese population, the present research has been done to investigate the effect of general sleep disturbance social interaction anxiety and body shape among obese obesity on these variables and the results revealed that most of the hypothesis of the study were accepted.

The hypothesis was that sleep disturbance is high among female obese as compared to male. Researchers suggested that Gender is the main factor in sleep disturbance and many studies have revealed that sleep disturbance level is high among females as compared to males (Ford and Kamerow, 1989). Results of the presented study have revealed the same so, the hypothesis is accepted. The hypothesis was that male are more conscious about their body image than female

but the results of the presented study revealed that female showed higher scores on BSS than males which rejected the hypothesis. There could be several reasons for the rejection of the hypothesis like the sample size could be larger or the culture or other factors could have affected the results.

It was hypothesized that Social interaction anxiety is high among females as compared to males few researches have also suggested the same (Romero-Corral A, 2008). Results revealed that females face more difficulty while interacting with others than males while Males can easily interact with others. This interactional problem may lead females towards anxiety. That's why most females avoid interactions to get rid of this difficulty. Hence, the hypothesis was accepted. The hypothesis was that Marital status affects General Sleep Disturbance, body shape, and social interaction anxiety. Previous research suggested that obesity, gender, age, and marital status affect these variables (McAllister et al. 2009). Results revealed that married and unmarried have showed a significant mean differences in which unmarried showed a higher level with all three variables which means hypothesis was accepted.

It was hypothesized that young obese have less sleep disturbance, are more concerned with body image, and have more social interaction anxiety than late adults. In previous researches both sided reviews have been found regarding this hypothesis some have said that young adults and teenagers have more sleep disturbance (Mantz et al., 2000). While others have said that late adults have more sleep problems (Wolfson and Carskadon, 1998). Findings revealed that youngsters have more sleep disturbance higher level of consciousness about body image and are less socially interacted which means they have more social interaction anxiety, which means the hypothesis was partially accepted.

It was hypothesized that that body shape plays a mediating role for general sleep disturbance and social interaction anxiety, and there is positive relationship of general sleep disturbance and social interaction anxiety. Results showed that body shape played mediating role and it has positive impact on general sleep disturbance and the direct positive impact on social interaction anxiety results also revealed that there is a significant positive relationship of general sleep disturbance and social interaction anxiety which means the hypothesis was completely accepted.

Limitations and Suggestions

The main limitation of the study was criterion social interaction anxiety for which the participants were asked to reveals their honest information hence, it was a self-report measure so, it could have been done in experimental settings. Other demographics variables could have been examined like parenting styles could play a vital role in social interaction anxiety. Body mass index was also self-reported the participant could have under-estimated their weight and age while over-estimated their height so, these could have been checked manually by the researcher. Since, the study has been done on obese, all other weight categories have also been examined.

References

1. Ahrberg, M., Trojca, D., Nasrawi, N., & Vocks, S. (2011). Body image disturbance in binge eating disorder: A review. *European Eating Disorders Review*, 19(5), 375-381.
2. Annis, N. M., Cash, T. F., & Hrabosky, J. I. (2004). Body image and psychosocial differences among stable average weight, currently overweight, and formerly overweight women: the role of stigmatizing experiences. *Body image*, 1(2), 155-167.

3. Araghi, M. H., Jagielski, A., Neira, I., Brown, A., Higgs, S., Thomas, G. N., & Taheri, S. (2013). The complex associations among sleep quality, anxiety-depression, and quality of life in patients with extreme obesity. *Sleep*, 36(12), 1859-1865.
4. Bond, L., Carlin, J. B., Thomas, L., Rubin, K., & Patton, G. (2001). Does bullying cause emotional problems? A prospective study of young teenagers. *Bmj*, 323(7311), 480-484.
5. Brixval, C. S., Rayce, S. L., Rasmussen, M., Holstein, B. E., & Due, P. (2011). Overweight, body image and bullying—an epidemiological study of 11-to 15-years olds. *The European Journal of Public Health*, 22(1), 126-130.
6. Cash, T. F. (2002). In TF Cash, & T. Pruzinsky. *Body Image: A Handbook of Theory, Research, and Clinical Practice*. (pp. 200–209). New York: Guilford Press
7. De la Haye, K., Robins, G., Mohr, P., & Wilson, C. (2010). Obesity-related behaviors in adolescent friendship networks. *Social Networks*, 32(3), 161-167.
8. Ford, D. E., & Kamerow, D. B. (1989). Epidemiologic study of sleep disturbances and psychiatric disorders: an opportunity for prevention?. *Jama*, 262(11), 1479-1484.
9. Fox, C. L., & Farrow, C. V. (2009). Global and physical self-esteem and body dissatisfaction as mediators of the relationship between weight status and being a victim of bullying. *Journal of adolescence*, 32(5), 1287-1301.
10. Gregory, A. M., Caspi, A., Eley, T. C., Moffitt, T. E., O'Connor, T. G., & Poulton, R. (2005). Prospective longitudinal associations between persistent sleep problems in childhood and anxiety and depression disorders in adulthood. *Journal of abnormal child psychology*, 33(2), 157-163.
11. Imaki, M., Hatanaka, Y., Ogawa, Y., Yoshida, Y., & Tanada, S. (2002). An epidemiological study on relationship between the hours of sleep and life style factors in Japanese factory workers. *Journal of physiological anthropology and applied human science*, 21(2), 115-120.
12. Koren, D., O'Sullivan, K. L., & Mokhlesi, B. (2015). Metabolic and glycemic sequelae of sleep disturbances in children and adults. *Current diabetes reports*, 15(1), 562.
13. Koskina, A., Van den Eynde, F., Meisel, S., Campbell, I. C., & Schmidt, U. (2011). Social appearance anxiety and bulimia nervosa. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, 16(2), e142-e145.
14. Kruger, J., Lee, C. D., Ainsworth, B. E., & Macera, C. A. (2008). Body size satisfaction and physical activity levels among men and women. *Obesity*, 16(8), 1976-1979.
15. M, Fleming T, Robinson M, Thomson B, Graetz N, Margono C, et al. Global, regional, and national prevalence of overweight and obesity in children and adults during 1980–2013: a systematic analysis for the Global Burden of Disease Study 2013.
16. Mantz, J., Muzet, A., & Winter, A. S. (2000). The characteristics of sleep-wake rhythm in adolescents aged 15-20 years. A survey made at school during ten consecutive days. *Archives de pediatrie: organe officiel de la Societe francaise de pediatrie*, 7(3), 256-262.
17. Nguyen-Rodriguez, S. T., McClain, A. D., & Spruijt-Metz, D. (2010). Anxiety mediates the relationship between sleep onset latency and emotional eating in minority children. *Eating Behaviors*, 11(4), 297-300.
18. Ostrovsky, N. W., Swencionis, C., Wylie-Rosett, J., & Isasi, C. R. (2013). Social anxiety and disordered overeating: An association among overweight and obese individuals. *Eating behaviors*, 14(2), 145-148.
19. Petry, N. M., Barry, D., Pietrzak, R. H., & Wagner, J. A. (2008). Overweight and obesity are associated with psychiatric disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Psychosomatic medicine*, 70(3), 288-297.

20. Puhl, R. M., & Heuer, C. A. (2009). The stigma of obesity: a review and update. *Obesity, 17*(5), 941-964.
21. Rosen, J. C. (2002). Obesity and body image. *Eating disorders and obesity: A comprehensive handbook, 2*, 399-402.
22. Sarwer, D. B., Wadden, T. A., & Foster, G. D. (1998). Assessment of body image dissatisfaction in obese women: specificity, severity, and clinical significance. *Journal of consulting and clinical psychology, 66*(4), 651.
23. Sawaoka, T., Barnes, R. D., Blomquist, K. K., Masheb, R. M., & Grilo, C. M. (2012). Social anxiety and self-consciousness in binge eating disorder: associations with eating disorder psychopathology. *Comprehensive psychiatry, 53*(6), 740-745.
24. Sawaoka, T., Barnes, R. D., Blomquist, K. K., Masheb, R. M., & Grilo, C. M. (2012). Social anxiety and self-consciousness in binge eating disorder: associations with eating disorder psychopathology. *Comprehensive psychiatry, 53*(6), 740-745.
25. Schwartz, M. B., & Brownell, K. D. (2004). Obesity and body image. *Body image, 1*(1), 43-56.
26. Spiegel, K., Tasali, E., Penev, P., & Van Cauter, E. (2004). Brief communication: sleep curtailment in healthy young men is associated with decreased leptin levels, elevated ghrelin levels, and increased hunger and appetite. *Annals of internal medicine, 141*(11), 846-850.
27. Taheri, S. (2006). The link between short sleep duration and obesity: we should recommend more sleep to prevent obesity. *Archives of disease in childhood, 91*(11), 881-884.
28. Taheri, S., Lin, L., Austin, D., Young, T., & Mignot, E. (2004). Short sleep duration is associated with reduced leptin, elevated ghrelin, and increased body mass index. *PLoS medicine, 1*(3), e62.
29. Vgontzas, A. N., Bixler, E. O., Chrousos, G. P., & Pejovic, S. (2008). Obesity and sleep disturbances: meaningful sub-typing of obesity. *Archives of physiology and biochemistry, 114*(4), 224-236.
30. Wolfson, A. R., & Carskadon, M. A. (1998). Sleep schedules and daytime functioning in adolescents. *Child development, 69*, 875-887.