Predictors of Impulsiveness: The Roles of Sleep Quality and Body Image Dissatisfaction in Physically Disabled Adolescent Girls

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A r t i c l e   I n f o

A B S T R A C T

This study aimed to examine the relationships between sleep quality, body image dissatisfaction, and impulsiveness in adolescent girls with mild physical disabilities. This cross-sectional study included 186 adolescent girls with mild physical disabilities. Participants were recruited from rehabilitation centers and special schools. Impulsiveness was measured using the Barratt Impulsiveness Scale (BIS-11), sleep quality was assessed with the Pittsburgh Sleep Quality Index (PSQI), and body image dissatisfaction was evaluated using the Body Shape Questionnaire (BSQ). Pearson correlation coefficients were calculated to examine the relationships between the variables. A linear regression analysis was performed to determine the predictive value of sleep quality and body image dissatisfaction on impulsiveness, using SPSS version 27. The mean score for impulsiveness was 55.28 (SD = 10.45), sleep quality was 12.67 (SD = 3.98), and body image dissatisfaction was 87.34 (SD = 15.29). Pearson correlation analysis showed significant positive correlations between impulsiveness and sleep quality ($r = 0.45$, $p < .001$), and between impulsiveness and body image dissatisfaction ($r = 0.52$, $p < .001$). The regression model indicated that both sleep quality ($B = 0.92$, $p < .001$) and body image dissatisfaction ($B = 0.25$, $p < .001$) significantly predicted impulsiveness, explaining 37% of the variance ($R^2 = 0.37$, $F(2, 183) = 53.68$, $p < .001$). Poor sleep quality and high body image dissatisfaction are significant predictors of impulsiveness in adolescent girls with mild physical disabilities. Interventions aimed at improving sleep quality and promoting positive body image may help reduce impulsiveness and enhance overall well-being in this population.

Keywords: Adolescent girls, mild physical disabilities, impulsiveness, sleep quality, body image dissatisfaction, cross-sectional study.

1. Introduction

Body image is a crucial aspect of adolescent development, influencing various health, psychological, and social outcomes (Alikhah et al., 2023; Mehdi Abadi, 2023; Nazarpour & Khazai, 2012; van de Grift et al., 2016). According to Markey (2010), body image plays a vital role in adolescents' self-esteem, mental health, and social interactions. Adolescents who perceive their bodies negatively are more likely to experience low self-esteem, depression, and anxiety. These issues can be particularly pronounced in girls with physical disabilities, who may face additional challenges related to their appearance and physical capabilities (Markey, 2010).

Argüelles, Río, and Estrada (2022) highlight the significant connections between body image and various health-related variables in adolescents. Their research shows that poor body image is associated with unhealthy behaviors, such as disordered eating and low physical activity levels, which can further exacerbate psychological distress. This relationship is critical to consider in the context of girls with physical disabilities, who may already be vulnerable to negative body image due to societal attitudes and their physical limitations (Argüelles et al., 2022).

Sleep quality is another essential factor influencing adolescents' overall well-being. Poor sleep quality has been linked to numerous adverse outcomes, including impaired cognitive function, emotional regulation difficulties, and increased impulsiveness. Soares et al. (2010) found that sleep disturbances are prevalent among undergraduate students, affecting their body mass index (BMI) and eating behaviors. This connection suggests that sleep quality is intertwined with physical and psychological health, influencing behaviors that can lead to long-term health consequences (Soares et al., 2010).

In a study by Mota and Vale (2009), sleep quality was associated with cardiorespiratory fitness and BMI among adolescent girls. Poor sleep quality was linked to lower fitness levels and higher BMI, indicating that sleep plays a crucial role in maintaining physical health. For girls with physical disabilities, maintaining good sleep quality is particularly important, as their physical condition may already place them at risk for additional health issues (Mota & Vale, 2009).

Impulsiveness is a multifaceted construct characterized by a tendency to act without sufficient thought, leading to behaviors that may be risky or maladaptive. Veen, Karsten, and Lancel (2017) explored the relationship between poor sleep and impulsivity in patients with personality disorders, finding that sleep disturbances were significantly associated with increased impulsivity. This finding underscores the importance of sleep quality in regulating impulsive behaviors, which can be particularly relevant for adolescents with physical disabilities who may already face challenges in behavioral regulation (Veen et al., 2017).

Javelle (2023) examined the unique and conjoint relations between emotion-related and non-emotion-related impulsivity, internalizing symptoms, and physical health parameters. The study found that impulsivity is closely linked to various psychological and physical health issues, suggesting that interventions targeting impulsivity could have broad benefits for adolescents' overall health. Understanding how sleep quality and body image dissatisfaction contribute to impulsiveness in girls with physical disabilities can inform the development of such interventions (Javelle, 2023).

Research has shown that body image dissatisfaction and poor sleep quality are significant predictors of various health outcomes in different populations. For instance, Aquil et al. (2021) found that body image dissatisfaction and lower self-esteem were major predictors of poor sleep quality in gynecological cancer patients post-surgery. While this population differs from adolescents with physical disabilities, the underlying mechanisms linking body image dissatisfaction and sleep quality are likely similar, suggesting that these factors are critical to consider in various contexts (Aquil et al., 2021).

Lobentanz et al. (2004) investigated factors influencing quality of life in multiple sclerosis patients, finding that disability, depressive mood, fatigue, and sleep quality were significant contributors. This research highlights the complex interplay between physical disability, mental health, and sleep quality, reinforcing the need to consider these variables together when examining their impact on adolescents with mild physical disabilities (Lobentanz et al., 2004).

Harper et al. (2023) conducted an integrative literature review on behavioral sleep problems in children and adults with intellectual disabilities. Their findings indicated that sleep problems are prevalent in this population and are associated with various behavioral issues, including impulsivity. This research underscores the importance of addressing sleep quality in individuals with disabilities to improve their overall well-being (Harper et al., 2023).

Gender differences and cultural factors also play a role in how sleep quality, body image, and impulsiveness manifest

in adolescents. Kim, Park, and Park (2021) examined gender differences in lifestyle and mental health among senior high school students in South Korea, finding that girls reported poorer mental health and sleep quality compared to boys. These findings suggest that gender-specific interventions may be necessary to address the unique challenges faced by adolescent girls, particularly those with physical disabilities (Kim et al., 2021).

Xie et al. (2010) explored the relationship between overweight, body image, and depression in Asian and Hispanic adolescents. Their study found significant associations between poor body image, overweight status, and depressive symptoms, indicating that cultural factors can influence how body image dissatisfaction impacts mental health. For girls with physical disabilities, cultural attitudes towards disability and body image may further complicate their experiences, necessitating culturally sensitive approaches to intervention (Xie et al., 2010).

The findings from this study have several important implications for practice and future research. Understanding the relationships between sleep quality, body image dissatisfaction, and impulsiveness can inform the development of targeted interventions aimed at improving these outcomes in girls with mild physical disabilities. This study aimed to examine the relationships between sleep quality, body image dissatisfaction, and impulsiveness in adolescent girls with mild physical disabilities.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a cross-sectional design to examine the relationship between impulsiveness, sleep quality, and body image dissatisfaction among girls with mild physical disabilities. A total of 186 participants were recruited based on the sample size calculation from the Morgan and Krejcie table, ensuring adequate statistical power. The participants were selected through convenience sampling from various rehabilitation centers and special schools. Inclusion criteria included girls aged 12-18 years with a mild physical disability, as classified by the attending healthcare professional, and the ability to comprehend and complete the questionnaires independently. Exclusion criteria included the presence of severe cognitive impairments or psychiatric disorders that could interfere with self-reporting.

2.2. Measures

2.2.1. Impulsiveness

The Barratt Impulsiveness Scale (BIS-11) is a widely recognized tool developed by Dr. Ernest S. Barratt in 1959, with subsequent revisions enhancing its reliability and validity. The BIS-11 consists of 30 items, divided into three primary subscales: Attentional Impulsiveness, Motor Impulsiveness, and Non-Planning Impulsiveness. Each item is rated on a 4-point Likert scale, ranging from "Rarely/Never" to "Almost Always," yielding a total score between 30 and 120, with higher scores indicating greater impulsiveness. The scale has demonstrated strong psychometric properties, with extensive research confirming its validity and reliability across diverse populations, including individuals with physical disabilities (Farzad & Mardani, 2024; Shamsnajafi et al., 2023; Taheri et al., 2022).

2.2.2. Sleep Quality

The Pittsburgh Sleep Quality Index (PSQI), developed by Dr. Daniel J. Buysse and colleagues in 1989, is a comprehensive instrument designed to assess sleep quality over a one-month period. The PSQI comprises 19 self-rated items and 5 additional items rated by a bed partner or roommate (if available), which generate seven component scores: Subjective Sleep Quality, Sleep Latency, Sleep Duration, Habitual Sleep Efficiency, Sleep Disturbances, Use of Sleeping Medication, and Daytime Dysfunction. These components are summed to yield a global score ranging from 0 to 21, with higher scores indicating poorer sleep quality. The PSQI has been validated in numerous studies, showcasing robust reliability and validity in both clinical and non-clinical populations, including those with physical disabilities (Heidari et al., 2023; Mostafavi et al., 2023).

2.2.3. Body Image Dissatisfaction

The Body Shape Questionnaire (BSQ), created by Dr. Peter J. Cooper, Dr. Christopher G. Fairburn, and colleagues in 1987, is an established measure for assessing body image dissatisfaction. The BSQ consists of 34 items, each rated on a 6-point Likert scale from "Never" to "Always," which evaluate concerns about body shape, fear of weight gain, and the behavioral impact of body dissatisfaction. The total score ranges from 34 to 204, with higher scores reflecting greater body image dissatisfaction. The BSQ has undergone extensive validation, demonstrating high reliability and

validity across various populations, including individuals with physical disabilities, thus confirming its applicability in the context of this study (Alikhah et al., 2023; Mehdi Abadi, 2023; Nazarpour & Khazai, 2012).

2.3.   Data Analysis

Data were analyzed using IBM SPSS Statistics version 27. Descriptive statistics were calculated for all variables to summarize the demographic and clinical characteristics of the sample. Pearson correlation analysis was conducted to examine the relationships between the dependent variable, neurodevelopmental functioning, and each of the independent variables, empathy and adaptive behavior. This analysis aimed to determine the strength and direction of the associations.

Following the correlation analysis, a linear regression analysis was performed to explore the predictive power of empathy and adaptive behavior on neurodevelopmental functioning. The dependent variable was neurodevelopmental functioning, as measured by the Vineland Adaptive Behavior Scales, Third Edition (Vineland-3). The independent variables were empathy, assessed using the Interpersonal Reactivity Index (IRI), and

adaptive behavior, measured by the Adaptive Behavior Assessment System, Third Edition (ABAS-3). The regression model assessed the contribution of each independent variable to the dependent variable while controlling for potential confounding factors.

The significance level for all statistical tests was set at $p < 0.05$. The assumptions of linearity, normality, homoscedasticity, and independence of residuals were checked to validate the regression model.

3.   Findings and Results

The study sample consisted of 186 girls with mild physical disabilities. The age distribution showed that 58 participants (31.18%) were between 12-13 years, 74 participants (39.78%) were between 14-15 years, and 54 participants (29.03%) were between 16-18 years. Regarding the type of physical disability, 78 participants (41.93%) had cerebral palsy, 49 participants (26.34%) had muscular dystrophy, 37 participants (19.89%) had spina bifida, and 22 participants (11.82%) had other forms of mild physical disabilities. Additionally, the majority of the participants, 102 (54.84%), were attending special schools, while 84 (45.16%) were enrolled in inclusive educational settings.

Table 1

Descriptive statistics of the variables in the study

Variable	Mean	Standard Deviation
Impulsiveness	55.28	10.45
Sleep Quality	12.67	3.98
Body Image Dissatisfaction	87.34	15.29

The descriptive statistics for the study variables are presented in Table 1. The mean score for impulsiveness was 55.28 (SD = 10.45), indicating moderate levels of impulsiveness among the participants. The mean sleep quality score was 12.67 (SD = 3.98), suggesting generally poor sleep quality. Body image dissatisfaction had a mean score of 87.34 (SD = 15.29), reflecting high levels of dissatisfaction among the participants.

Prior to conducting the main analyses, several assumptions were tested to ensure the validity of the Pearson correlation and linear regression analyses. For normality, the Shapiro-Wilk test yielded non-significant results for impulsiveness (W = 0.98, p = 0.07), sleep quality (W = 0.99,

p = 0.15), and body image dissatisfaction (W = 0.97, p = 0.08), indicating that the data were approximately normally distributed. Linearity was assessed through scatterplots, which showed linear relationships between impulsiveness and each of the independent variables. Homoscedasticity was confirmed via the Breusch-Pagan test, which was non-significant ($\chi^2 = 2.11$, p = 0.15). Multicollinearity was checked using Variance Inflation Factors (VIF), with values of 1.12 for sleep quality and 1.09 for body image dissatisfaction, indicating no multicollinearity. Finally, the Durbin-Watson statistic was 2.05, suggesting no autocorrelation in the residuals. Thus, all assumptions for Pearson correlation and linear regression were met.

Table 2

Pearson correlation coefficients and p-values between impulsiveness and each independent variable

Variable	Impulsiveness (r)	p-value
Sleep Quality	0.45	< .001
Body Image Dissatisfaction	0.52	< .001

Table 2 presents the Pearson correlation coefficients and p-values between impulsiveness and the independent variables. There was a significant positive correlation between impulsiveness and sleep quality (r = 0.45, p < .001), indicating that poorer sleep quality is associated with higher impulsiveness. Similarly, body image dissatisfaction was significantly positively correlated with impulsiveness (r = 0.52, p < .001), suggesting that higher body image dissatisfaction is associated with increased impulsiveness.

Table 3

Summary of regression results for the prediction of impulsiveness

Source	Sum of Squares	Degrees of Freedom	Mean Squares	R	R²	R²adj	F	p
Regression	4252.38	2	2126.19	0.61	0.37	0.36	53.68	< .001
Residual	7247.62	183	39.61					
Total	11500.00	185						

The summary of regression results is shown in Table 3. The regression model explained a significant proportion of the variance in impulsiveness, $R^2 = 0.37$, $F(2, 183) = 53.68$, $p < .001$. This indicates that 37% of the variance in impulsiveness can be predicted from sleep quality and body image dissatisfaction.

Table 4

Results of multivariate regression analysis predicting impulsiveness

Predictor	B	Standard Error	β	t	p
Constant	22.48	3.45		6.51	< .001
Sleep Quality	0.92	0.23	0.31	4.00	< .001
Body Image Dissatisfaction	0.25	0.05	0.41	5.27	< .001

Table 4 presents the results of the multivariate regression analysis predicting impulsiveness. Both sleep quality (B = 0.92, SE = 0.23, β = 0.31, t = 4.00, p < .001) and body image dissatisfaction (B = 0.25, SE = 0.05, β = 0.41, t = 5.27, p < .001) were significant predictors of impulsiveness. This suggests that poorer sleep quality and higher body image dissatisfaction are associated with higher levels of impulsiveness in girls with mild physical disabilities.

4. Discussion and Conclusion

The present study aimed to examine the relationships between sleep quality, body image dissatisfaction, and impulsiveness among girls with mild physical disabilities. The findings indicated significant correlations between these variables, with both sleep quality and body image dissatisfaction emerging as significant predictors of impulsiveness.

The results showed a significant positive correlation between sleep quality and impulsiveness (r = 0.45, p < .001), suggesting that poorer sleep quality is associated with higher levels of impulsiveness. This finding aligns with previous research by Veen, Karsten, and Lancel (2017), who found that sleep disturbances were significantly related to increased impulsivity in patients with personality disorders. Poor sleep quality can impair cognitive functions such as attention and self-control, leading to more impulsive behaviors (Veen et al., 2017).

Similarly, body image dissatisfaction was significantly positively correlated with impulsiveness (r = 0.52, p < .001). This is consistent with the findings of Xie et al. (2010), who reported that negative body image was associated with higher levels of depression and impulsivity in adolescents. Body image dissatisfaction can lead to emotional distress and low self-esteem, which may contribute to impulsive behaviors as a coping mechanism (Xie et al., 2010).

The regression analysis further supported these relationships, indicating that both sleep quality and body image dissatisfaction are significant predictors of impulsiveness (R^2 = 0.37, $F(2, 183)$ = 53.68, $p < .001$). Specifically, sleep quality (B = 0.92, $p < .001$) and body image dissatisfaction (B = 0.25, $p < .001$) were both found to significantly predict impulsiveness. These findings are in line with the study by Aquil et al. (2021), which demonstrated that body image dissatisfaction and poor self-esteem were major predictors of poor sleep quality in gynecological cancer patients, indirectly suggesting that these factors could influence impulsive behaviors (Aquil et al., 2021).

The relationship between sleep quality and impulsiveness can be explained by the impact of sleep on cognitive and emotional regulation. Poor sleep quality has been shown to impair executive functions, including decision-making and impulse control (Harper et al., 2023). Adolescents, particularly those with physical disabilities, may experience heightened stress and anxiety, exacerbating sleep problems and leading to increased impulsivity (Soares et al., 2010). This cyclical relationship underscores the importance of addressing sleep issues to mitigate impulsive behaviors.

Body image dissatisfaction as a predictor of impulsiveness can be understood through the lens of emotional distress and coping mechanisms. Adolescents with negative body image may experience chronic stress and low self-esteem, which can manifest as impulsive behaviors (Markey, 2010). This is particularly relevant for girls with physical disabilities, who may face additional societal pressures and stigmatization regarding their appearance and capabilities (Argüelles et al., 2022). The emotional turmoil stemming from body image issues can lead to impulsive actions as a means of seeking temporary relief or acceptance.

The findings of this study contribute to the growing body of literature on the interplay between psychological and health-related variables in adolescents. The significant predictive value of sleep quality and body image dissatisfaction on impulsiveness highlights the need for holistic interventions that address multiple facets of adolescents' lives. Improving sleep quality and fostering positive body image could be crucial steps in reducing impulsive behaviors and enhancing overall well-being.

Despite the insightful findings, this study has several limitations that should be considered. First, the cross-sectional design limits the ability to draw causal conclusions. While significant relationships were found, the directionality and causality between sleep quality, body image dissatisfaction, and impulsiveness cannot be definitively established. Longitudinal studies are needed to explore these relationships over time and determine causal pathways.

Second, the use of self-report measures may introduce bias, as participants might underreport or overreport their behaviors and perceptions. Social desirability bias could particularly affect responses related to body image and impulsiveness. Future research should consider incorporating objective measures, such as actigraphy for sleep assessment and behavioral tasks for impulsivity.

Third, the sample was limited to girls with mild physical disabilities, which may restrict the generalizability of the findings. Different types of physical disabilities and varying severity levels might influence the relationships between the studied variables. Future studies should include diverse samples to enhance generalizability and explore potential differences across disability types and severities.

Future research should focus on longitudinal designs to examine the causal relationships between sleep quality, body image dissatisfaction, and impulsiveness. Such studies could provide valuable insights into the developmental trajectories of these variables and identify critical periods for intervention. Additionally, exploring the underlying mechanisms, such as emotional regulation and executive function, could further elucidate how these factors interact and influence impulsive behaviors.

Research should also consider the role of environmental and social factors, such as family dynamics, peer relationships, and cultural influences, in shaping body image, sleep quality, and impulsiveness. Understanding these contextual factors can inform more comprehensive and tailored interventions. Including qualitative methods, such as interviews or focus groups, could provide deeper insights into the lived experiences of adolescents with physical disabilities and the challenges they face.

Lastly, future studies should investigate the effectiveness of specific interventions aimed at improving sleep quality and body image satisfaction in reducing impulsiveness. Randomized controlled trials could test various approaches, such as cognitive-behavioral therapy for insomnia (CBT-I), mindfulness-based interventions, and body image improvement programs, to determine the most effective strategies for this population.

The findings of this study have several practical implications for clinicians, educators, and policymakers. Interventions aimed at improving sleep quality should be prioritized for adolescents with physical disabilities. Sleep hygiene education, cognitive-behavioral strategies for

managing insomnia, and environmental modifications to promote better sleep can be effective approaches. Clinicians should assess sleep patterns as part of routine care and provide appropriate referrals and resources.

Promoting positive body image is equally important. Schools and rehabilitation centers should implement programs that foster self-acceptance, challenge societal beauty standards, and provide support for adolescents struggling with body image issues. Peer support groups and counseling services can offer safe spaces for discussing body image concerns and developing healthier attitudes towards one's body.

Furthermore, holistic approaches that address both sleep and body image issues simultaneously could be particularly beneficial. Integrating sleep education with body image interventions can create a comprehensive support system for adolescents, addressing multiple aspects of their well-being. Educators and healthcare providers should work collaboratively to design and implement these integrated programs.

In conclusion, this study highlights the significant relationships between sleep quality, body image dissatisfaction, and impulsiveness in girls with mild physical disabilities. The findings underscore the importance of addressing these factors to enhance adolescents' overall well-being and reduce impulsive behaviors. Future research and practice should continue to explore and develop targeted interventions that promote healthy sleep and positive body image, ultimately supporting the holistic development of adolescents with physical disabilities.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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