Evaluation of the relationship between Body Dysmorphic Disorder, rumination, Self-esteem and exercise addiction

Abstract

This study investigates the relationship between Body Dysmorphic Disorder (BDD), rumination, self-esteem, and exercise addiction among international students studying at North Cyprus. A total of 352 participants were selected using purposive sampling. The Yale-Brown Obsessive Compulsive Scale Modified for BDD (BDD-YBOCS), Exercise Addiction Inventory (EAI), Ruminative Response Scale (RRS) and Rosenberg Self-esteem Scale (RSE) were used to collect data. Findings indicate that rumination is a key predictor of BDD, but self-esteem, and exercise addiction did not have a predictive effect. On the other hand self-esteem had predictive relationship with exercise addiction. It was further revealed that depression has a predictive relationship with rumination. The outcomes show a strong relationship between rumination and BDD, suggesting underlining cognitive mechanisms involved in BDD. The study found that individuals who do not use social media have significantly lower levels of BDD and self-esteem compared to users, and that those who engage in strength training have higher self-esteem than individuals who perform aerobic exercise. This research highlights the need to address psychological, behavioral, and culture-related aspects while understanding body image disturbances among various populations of students and the influence of exercise modalities employed by individuals on mental health outcomes.

Key Words: Body Dysmorphic Disorder (BDD), Rumination, Self-Esteem, Exercise Addiction, Social media

Introduction

Nowadays people idealize the pursuit of physical fitness;attaining a toned physique has become equated with success, though it remains difficult to achieve. Physical fitness is associated with higher self-control (Boat & Cooper, 2019) and self-esteem and body image (2016). This situation has led to the emergence of Exercise Addiction (EA) as well as conditions like Body Dysmorphic Disorder (BDD) (Corazz et al., 2019). BDD is a mental illness characterized by excessive concern over minor or imagined flaws in one's appearance, which can significantly impair daily functioning and social interactions (Phillips, 2005). People with BDD often spend extensive time pondering their appearance, checking mirrors, comparing themselves to others, and making frequent alterations to their looks (Veale et al., 2016).Diagnosis of BDD typically involves spending several hours daily fixated on appearance-related concerns, accompanied by significant life disruptions (Brennan et al., 2023).

Rumination is a prevalent cognitive phenomenon among patients with Body Dysmorphic Disorder (BDD), exacerbating poor self-perception(Salehi & Aleyasin, 2024). Rumination is characterized by the repetitive contemplation of negative thoughts and emotions without taking any action to address them (Nolen-Hoeksema, 1991). Rumination significantly contributes to worsening and prolonging BDD by heightening the emotional distress linked to perceived flaws (Phillips, 2014). Individuals constantly fixate on perceived flaws, often resorting to behaviors aimed at concealing or enhancing their appearance (Phillips., 2014). Recurring negative thoughts, including rumination, is a common feature across disorders like depression, anxiety, and BDD. This underscores the importance of addressing rumination in a broad spectrum of mental health conditions (Arditte et al., 2016).Studies have shown that people who ruminate about their perceived imperfections are more likely to develop BDD. This repetitive thinking might worsen their negative self-image and intensify BDD symptoms (Veale et al., 2014).

Individuals with BDD often experience low self-esteem due to their constant self-criticism and dissatisfaction with their appearance. This creates a cyclical relationship where low self-esteem exacerbates BDD symptoms, and BDD symptoms further diminish self-esteem. (Kuck et al., 2020). Self-esteem is the evaluation of one's self-worth, which may be either good or negative (Eshqobilov &Toxirov, 2023). A study by Kuck et al. (2021) underscores the significance of addressing self-esteem in treating BDD. Additionally, research by Dyl et al. (2006) suggests that adolescents struggling with body image problem and low self-esteem may be at an increased risk of developing BDD. Research demonstrates

that adolescents with Body Dysmorphic Disorder experience significant anxiety, functional impairment, and notably elevated rates of suicide ideation and attempts (Phillips et al., 2006). Early identification and management focused on enhancing self-esteem and fostering a positive body image are crucial for minimizing the emergence and persistence of BDD and its related consequences (Tros et al., 2023).

Exercise addiction is a form of behavioral addiction marked by a depletion of behavioral regulation, leading to compulsive engagement in exercise (Weinstein et al., 2023). Exercise addictioninvolves an obsessive commitment to physical activity, often driven by a desire to achieve an idealized body image (Graves et al., 2004; Morgan, 2020). For individuals with BDD, exercise can start as a coping mechanism to alleviate distress over their appearance. However, this can escalate into addictive behaviors, as temporary relief or perceived improvements fuel a cycle of increased exercise frequency and intensity (Corazza et al., 2019). The initial relief provided by exercise can lead to a dependency, where more exercise is required to achieve the same emotional relief, characteristic of addictive behaviors.

Research suggests a connection between low self-esteem and BDD and exercise addiction (Gori et al., 2021). Furthermore, studies conducted in fitness environments have found a strong correlation between appearance anxiety, low self-esteem, and the risk of Exercise addiction, highlighting the influence of self-esteem on the probability of being addicted to exercise (Corazza et al., 2019). Individuals with BDD may resort to excessive exercise as a strategy to manage their anxieties and insecurities (Graves & Welsh, 2004). Exercise addiction is a multifaceted condition linked to several psychological aspects. Research has identified associations between EA and issues such as body image concerns, eating disorders, and BDD (Gori et al., 2021).

The purpose of this research is to investigate the relationship between BDD, rumination, self-esteem and exercise addiction.

Methodology

Research Design

This study uses a correlational research design to investigate the links between Body Dysmorphic Disorder (BDD), rumination, self-esteem, and exercise addiction in a sample of foreign students who participate in regular physical activity.

Sample and data collection

This study employed purposive sampling to recruit 352 participants, the inclusion criteria was being an international student and being a member of a gym in North Cyprus. Participants are sampled from gyms around Lefkosa in North.

Research instruments

The study implements a structured questionnaire. The survey included a socio-demographic form as well as four standardized scales to be specific: Yale-Brown Obsessive Compulsive Scale Modified for BDD (BDD-YBOCS), Exercise Addiction Inventory (EAI), Ruminative Response Scale (RRS) and Rosenberg Self-esteem Scale (RSE).

Demographic Form

This questionnaire gathered information on participants' basic socio-demographic factors such ashow long spend time in the social media,and what kind of the exercise do you do.

Yale-Brown Obsessive Compulsive Scale Modified for BDD (BDD-YBOCS):

The scale consists of items evaluating obsessions and the subsequent five assessing compulsions associated with Body Dysmorphic Disorder (BDD). The final two items measure insight and avoidance behaviors. Each item is rated individually on a 5-point scale from 0 (None) to 4 (Extreme), with higher scores indicating more severe symptoms of BDD. This survey demonstrates high reliability, with a reported reliability coefficient of 0.88, and strong internal consistency, reflected in a Cronbach's alpha coefficient of 0.80. It has been validated as a benchmark tool for assessing the severity of BDD (Phillips et al., 1997).

Ruminative Response Scale (RRS):

The RRS assesses levels of ruminative responses to depressive feelings and consists of 22 items categorized into 'Brooding' and 'Reflection' subscales. Respondents rate each item on a 4-point scale ranging from 1 (almost never) to 4 (almost always), where higher scores indicate more intense rumination. This scale is widely utilized and demonstrates strong psychometric properties for evaluating rumination in mood disorders (Nolen-Hoeksema et al., 2008). It is recognized for its validity and reliability in capturing the multidimensional aspects of rumination (Schoofs et al., 2010). The RRS showed a Cronbach's alpha of 0.94 for

the full scale and ranged from 0.78 to 0.90 for its subscales measuring rumination, thinking, and depression.

Exercise Addiction Inventory (EAI):

The Exercise Addiction Inventory (EAI) was developed by Terry, Szabo, and Griffiths in 2004 as a self-report questionnaire to evaluate the likelihood of exercise addiction based on symptoms associated with exercise dependence. This concise scale consists of 6 items and assesses key aspects such as salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse. Each item is rated on a 5-point scale from 0 (Strongly disagree) to 4 (Strongly agree), where higher scores indicate a greater risk of exercise addiction. The EAI demonstrates robust psychometric properties, establishing it as a reliable tool for screening exercise addiction. Scores from the questionnaire provide a total measure of exercise dependence, calculated by summing ratings across its seven components. Initial reports indicated internal consistencies (Cronbach's α) ranging from .78 to .95, internal reliability was notably high at .98 (Terry et al., 2004).

Rosenberg self-esteem scale (RSE):

The Rosenberg Self-Esteem Scale, developed by Rosenberg in 1965, is a 10-item assessment tool designed to measure overall self-esteem by evaluating both positive and negative perceptions individuals have about themselves. It is considered a unidimensional scale. Respondents rate each item on a 4-point Likert scale ranging from 1 (strongly agree) to 4 (strongly disagree). Scores are totaled to generate a global score ranging from 10 to 40, with higher scores indicating higher self-esteem. The scale has demonstrated good reliability with a test-retest correlation coefficient of 0.85 over a 2-week interval, a Cronbach's alpha coefficient of 0.90(Rosenberg, 1965).

Data Collection Procedure

The initial step in the study involved obtaining ethical approval from the Near East University Social Science Ethics Committee (application number NEU/SS/2024/1782). Following this, the structured questionnaire was then delivered to the participants either online or using pen and paper. The researcher collected data at gyms and sports saloons as well as other areas where people go for exercise activities. A ~~clear~~ consent form was sent to participants along with the questionnaire, and they subsequently gave their approval to participate in the study. The questionnaire took roughly 15 to 20 minutes to complete.

Furthermore, participants were told of the study's aims and guaranteed that their answers would be treated with utmost secrecy and anonymity. Participants received no monetary compensation for their participation, as participation was entirely voluntary.

Data Analysis Procedure

The study employed IBM's version 27.0 statistical software, a sophisticated tool favored by social scientists and other professionals for performing statistical analyses, (IBM Corp, 2011). The primary statistical approach involved descriptive statistics, which help in summarizing the data to represent the entire population effectively. Pearson correlation analyses were then conducted to assess the relationships among these variables. Finally, two multiple regression analyses were performed. The first examined whether rumination, depression, self-esteem, and exercise addiction predicted body dysmorphic symptom. The second regression tested the same predictors for exercise addiction.

ResultsandAnalysis

The aim of this study is to examine the relationship between BDD and rumination, self-esteem and exercise addiction among international students in North Cyprus.

Table 1
Pearson Correlations Between Study Variables

Variable	1	2	3	4	5
1. Body Dysmorphic	—				
2. Rumination	.15**	—			
3. Depression	.12*	.93***	—		
4. Self-Esteem	.07	–.13**	–.13**	—	
5. Exercise Addiction	.05	.10*	.08	–.31***	—

Note.N = 352.
p< .05 (*, p < .01 (**, **p < .001 (*****).
Values are Pearson correlation coefficients (1-tailed).

Correlations Between Variables

Table 1 shows how the main things we studied are connected. Rumination was very strongly linked to depression (r = .932, p < .001). Rumination was also a little bit linked to feeling bad about your body (r = .152, p = .002), but not as strongly. Self-esteem was linked in the

opposite way to exercise addiction (r = -.312, p < .001). The other connections were not as strong and most were not important."

Table 2. Regression Analysis Predicting Body Dysmorphic disorder

Predictor	B	SE	Beta	t	p
(Constant)	7.052	3.104	—	2.272	.024
Rumination	.207	.095	.317	2.179	.030
Depression	–.181	.156	–.169	–1.163	.245
Self-Esteem	.198	.105	.105	1.881	.061
Exercise Addiction	.089	.081	.061	1.103	.271

A multiple regression was conducted to determine if rumination, depression, self-esteem, and exercise addiction predicted body dysmorphic disorder. As shown in Table 3, the model was significant:F(4,347) = 3.41, p = .009, with R^2 = .038, indicating that about 3.8% of the variance in body dysmorphic disorderwas explained by the predictors.

Only rumination was a significant predictor (β = .317, p = .030). Depression, self-esteem, and exercise addiction were not statistically significant.

Table 3. Regression Analysis Predicting Exercise Addiction.

Predictor	B	SE	Beta	t	p
(Constant)	22.266	1.688	—	13.189	.000
Rumination	.057	.063	.126	.893	.372
Depression	–.060	.103	–.082	–.586	.558
Self-Esteem	–.400	.067	–.309	–6.014	.000
Body Dysmorphic	.039	.035	.057	1.103	.271

As presented in Table 3, the multiple regression model examining the extent to which body dysmorphic symptoms, self-esteem, depression, and rumination predict exercise addiction was statistically significant, F(4, 347) = 10.18, p < .001, accounting for approximately 10.5% of the variance in exercise addiction scores (R^2 = .105). Among the predictors, only self-

esteem emerged as a significant contributor (β = –.309, p < .001), indicating that individuals with lower levels of self-esteem tend to report higher levels of exercise addiction.

Table 4. Regression Analysis Predicting Rumination

Predictor	B	SE	Beta	t	p
(Constant)	9.098	1.326	—	6.863	.000
Depression	1.525	.032	.930	47.621	.000
Self-Esteem	–.045	.056	–.015	–.791	.430

The **Table 4**shown was highly significant:**F(2,349) = 1157.56, p < .001**, with a large **R^2 = .869**. This indicates that depression and self-esteem together explain 86.9% of the variance in rumination.Only **depression** was a significant predictor (**β = .930, p < .001**), while self-esteem was not significant.

Table 5

Comparison of BDD, rumination, self-esteem and exercise addiction across amount time spent with social medias

Variable	time spent with social medias	N	Mean Rank.	X^2	df	P
Body Dysmorphic	not at all	42	116.32	20.978	3	**0.001***
	less than 2 h	106	179.61			
	2 to 5 h	147	178.56			
	more than 5	57	209.75			
Rumination	not at all	42	187.08	1.667	3	0.642
	less than 2 h	106	170.73			
	2 to 5 h	147	173.19			
	more than 5	57	187.97			
Self Esteem	not at all	42	122.17	19.582	3	**0.001***
	less than 2 h	106	182.09			
	2 to 5 h	147	195.43			
	more than 5	57	157.32			
Exercise Addiction	not at all	42	188.49	0.836	3	0.841
	less than 2 h	106	176.39			

	2 to 5 h	147	172.46
	more than 5	57	178.29

p £ 0.05 * p £ 0.01 **

Table 6 displays the results from the Kruskal-Walli's test which indicates that there is significant difference between the mean of the BDD and the self-esteem across amount time spent with social medias ($p<0.05$). But there is no significant difference between the mean of the rumination and the exercise addiction across amount time spent with social medias ($p>0.05$). Analysis with pairwise comparisons of BDD shows significant differences between the not at all group and individuals who use social media for less than 2 hours group, the not at all group and individuals who use social media for 2-5 hours group and the not at all group and individuals who use social media more than 5 hours group. Individuals who do not use social media have significantly lower BDD than these groups. Also, analysis with pairwise comparisons of self-esteem shows significant differences between the not at all group and individuals who use social media for less than 2 hours as well as the not all group and 2-5 hours group. Individuals who do not use social media have significantly lower self-esteem than both groups.

Table 6

Comparison of BDD, rumination, self-esteem and exercise addiction across the kind of exercise

Variable	Kind of exercise	N	Mean Rank	Sum of Ranks	U	P
Body Dysmorphic	Aerobic	113	177.29	20034.00	13414.00	0.920
	Strength	239	176.13	42094.00		
Rumination	Aerobic	113	177.12	20014.50	13433.500	0.937
	Strength	238	176.21	42113.50		
Self Esteem	Aerobic	112	159.74	18050.50	11609.500	**0.033***
	Strength	239	184.42	44077.50		
Exercise Addiction	Aerobic	113	184.26	20821.00	12627.000	0.324
	Strength	239	172.83	41307.00		

p £ 0.05 * p £ 0.01 **

Table 6 displays the results from the Mann-Whitney test which indicates that there is no significant difference between the mean of the BDD, rumination and exercise addiction across kind of exercise ($p>0.05$). But there is significant difference between the mean of the self-esteem across kind of exercise ($p<0.05$). In the other hand, we can conclude that the mean self-esteem for people who do strength isgreater than the mean of self-esteem foe people who do aerobic.

Discussion

The study aimed to explore the relationship between BDD, rumination, exercise addiction, and self-esteem. The results reveal that BDD is significantly correlated to rumination and depression but not exercise addiction and self-esteem. The relationship between BDD and rumination is similarly seen in research by Veale (2001) who suggests that repetitive negative thinking significantly contributes to maintaining and intensifying BDD symptoms.Kollei and Martin (2014) suggest that individuals with BDD often engage in repetitive, negative thoughts that can worsen depressive symptoms. Mellman (2010) noted that people with BDD spend hours daily worrying about appearance, leading to distress and impairment, as Veale et al. (1996) found that BDD sufferers often have intrusive, recurrent thoughts, increasing anxiety and depression. Persistent rumination on perceived flaws is a defining feature of BDD, negatively impacting mental health (APA, 2013).This aligns with the predictive relationship seen between rumination and BDD in the current study.

The results that BDD has no significant correlation with exercise addictionaligning with research by Hausenblas et al. (2002), which also reported no significant association between the variables. This may be due to the complex nature of both conditions; exercise addiction often stems from motives unrelated to BDD, such as fitness goals or stress relief. Thus, having BDD doesn't necessarily lead to exercise addiction. However, Gabriel et al. (2020) found that body dissatisfaction can increase the likelihood of exercise addiction and related risky behaviors, contrasting with this study's results.Weinstein and Szabo assert that Exerices addiction is morbid with body-image disorders. The study also found no link between BDD and self-esteem, consistent with Ahmadpanah et al. (2019), indicating that while low self-esteem is common in BDD, it may not strongly predict the disorder. Biby (1998) suggested that while low self-esteem relates to obsessive-compulsive tendencies in BDD, self-esteem alone isn't a reliable BDD indicator. Phillips (2005) explained that self-esteem covers broader self-perception and personal value, while BDD focuses on physical appearance concerns.

The results show that exercise addiction is significantly correlated with rumination, and self-esteem. These results support the transdiagnostic view of rumination (Wong et al., 2023), in the light rumination is not limited to thoughts about the self as seen in depression. The idea that rumination is associated with lower self-esteem is also seen in research by Li et al., 2024) which revealed that the relationship was bidirectional. According to Li et al. (2024)

daily changes in rumination predict subsequent self-esteem scores while self-esteem also predicts rumination. the idea that self-esteem predicts rumination is also reveals in the results of this study.

The study also reveals that rumination had a negative correlation with self-esteem, but a positive correlation with depression and exercise addiction. The relationship between rumination and self-esteem is similar to findings by Kolubinski et al. (2016) that rumination links to lower self-worth, worsening depressive symptoms. Self-esteem was the only significant of exercise addiction in the current study. The relationship between rumination and depression is well established literature, rumination is a common feature of depression were the individual has constant negative thoughts about the self (Alderman et al., 2015). Furthermore, individuals with exercise addiction are more prone to brooding, a negative, passive form of rumination tied to maladaptive behaviors, as noted by Watkins (2008).

This result is agreed with the findings of Khan et al. (2022) that indicates a strong link between social media use and BDD symptoms. Regular use of image-focused platforms such as Instagram and Snapchat is associated with higher rates of BDD and greater acceptance of cosmetic surgery. Social media can exert pressure that influences individuals' perceptions of their bodies (Tiggemann and Zaccardo, 2015). The result from this study also differences in self-esteem between participants who do not use social media at all and individuals who use social media for less than 2 hours as well as the 2-5 hours group. Individuals who do not use social media have lower self-esteem than both groups. Research on the relationship between social media use, self-esteem, and well-being has produced mixed findings. Some studies indicate that active Instagram use can positively affect self-esteem and well-being, with this effect being influenced by the intensity of usage (Trifiro & Prena, 2021). The results are contrary to the study conducted by Midgley et al. (2021) that social media use is linked to lower self-esteem. Frequent and intense comparisons with others on social media quickly reduce self-evaluations, which over time harms self-esteem, mood, and life satisfaction. According to Colak et al. (2023), the mixed results of the relationship between social media and self-esteem suggests the presence of mediating factors in the relationship.

The results show that there are significant differences in self-esteem according to the nature of exercise employed. Individuals who reported engaging frequently in strength training had high self-esteem than those in the aerobic group. These results are similar to other research that shows that, the average self-esteem of people who engage in strength

training is higher than the average self-esteem of people employs cardio exercise (Bhave et al., 2024). According to Seguin et al. (2015), strength training is associated with improvements in body image, comfort and satisfaction. Contrary to the current study Ginis et al. (2014) found that aerobic exercise produced greater improvements in body image. Physical activity and self-esteem are positively connected, and this relationship is mediated by physical self-efficacy and physical self-worth (Batista et al., 2022).

Conclusions

This study explored the relationships between BDD, rumination, exercise addiction, and self-esteem among international students in North Cyprus, offering insights into the complex interplay of these factors within a diverse, young adult population. Notably, no relationship was found between BDD and exercise addiction, suggesting that exercise addiction is often driven by motivations unrelated to BDD, such as fitness or social interaction. However, a strong correlation between BDD and rumination was observed, consistent with literature indicating that repetitive, negative thinking about appearance exacerbates BDD symptoms. Although low self-esteem is common among those with BDD, no direct link was found, suggesting that self-esteem alone may not be a reliable indicator of BDD, with cognitive processes like rumination playing a more critical role. The study also highlighted the impact of social media on self-esteem and BDD, with excessive use correlating with higher BDD scores, indicating that reducing social media exposure could benefit individuals with body image concerns. No significant association was found between gym attendance frequency and psychological variables, though moderate exercise duration (45 minutes to 2 hours) correlated with higher self-esteem, underscoring the mental health benefits of balanced exercise. Additionally, strength training was linked to greater self-esteem than cardio, suggesting varied psychological effects across exercise types.

Reference

Alderman, B. L., Olson, R. L., Bates, M. E., Selby, E. A., Buckman, J. F., Brush, C. J., Panza, E. A., Kranzler, A., Eddie, D., & Shors, T. J. (2015). Rumination in major depressive disorder is associated with impaired neural activation during conflict monitoring. *Frontiers in Human Neuroscience*, *9*, 269. https://doi.org/10.3389/fnhum.2015.00269

Boat, R., & Cooper, S. B. (2019). Self-Control and Exercise: A Review of the Bi-Directional Relationship. *Brain Plasticity*, *5*(1), 97. https://doi.org/10.3233/BPL-190082

Corazza, O., Simonato, P., Demetrovics, Z., Mooney, R., Van De Ven, K., Roman-Urrestarazu, A., Rácmolnár, L., De Luca, I., Cinosi, E., & Santacroce, R. (2019). The emergence of Exercise Addiction, Body Dysmorphic Disorder, and other image-related psychopathological correlates in fitness settings: A cross sectional study. *PloS one*, *14*(4), e0213060. https://doi.org/10.1371/journal.pone.0213060

Phillips, K. A. (2005). The broken mirror: understanding and treating body dysmorphic disorder. In. Oxford University Press, USA.

Veale, D., Gledhill, L. J., Christodoulou, P., & Hodsoll, J. (2016). Body dysmorphic disorder in different settings: A systematic review and estimated weighted prevalence. *Body image*, *18*, 168-186. https://doi.org/10.1016/j.bodyim.2016.07.003

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of abnormal psychology*, *100*(4), 569. https://doi.org/10.1037//0021-843x.100.4.569

Brennan, S. N., Rossell, S. L., Rehm, I., Thomas, N., & Castle, D. J. (2023). A qualitative exploration of the lived experiences of Body Dysmorphic Disorder. *Frontiers in Psychiatry*, *14*, 1214803. https://doi.org/10.3389/fpsyt.2023.1214803

Donaldson, C., Lam, D., & Mathews, A. (2007). Rumination and attention in major depression. *Behaviour research and therapy*, *45*(11), 2664-2678. https://doi.org/10.1016/j.brat.2007.07.002

Kuck, N., Cafitz, L., Bürkner, P.-C., Hoppen, L., Wilhelm, S., & Buhlmann, U. (2021). Body dysmorphic disorder and self-esteem: a meta-analysis. *BMC psychiatry*, *21*(1), 310. https://doi.org/10.1186/s12888-021-03185-3

Dyl, J., Kittler, J., Phillips, K. A., & Hunt, J. I. (2006). Body dysmorphic disorder and other clinically significant body image concerns in adolescent psychiatric inpatients: prevalence and clinical characteristics. *Child psychiatry and human development*, *36*, 369-382. https://doi.org/10.1007/s10578-006-0008-7

Weinstein, A., & Szabo, A. (2023). Exercise addiction: A narrative overview of research issues. *Dialogues in Clinical Neuroscience*, *25*(1), 1-13. https://doi.org/10.1080/19585969.2023.2164841

Graves, B. S., & Welsh, R. L. (2004). Recognizing the Signs of Body Dysmorphic Disorder and Muscle Dysmorphia. *ACSM's Health & Fitness Journal*, *8*(1), 11-13. https://doi.org/10.1097/00135124-200401000-00007

Morgan, S. (2020). Mental Disorders: Obsessive-Compulsive Disorder and Body Dysmorphic Disorder. *FP essentials*, *495*, 17-22.

Phillips K. A. (2014). Body dysmorphic disorder: common, severe and in need of treatment research. *Psychotherapy and psychosomatics*, *83*(6), 325–329. https://doi.org/10.1159/000366035

Arditte, K. A., Shaw, A. M., & Timpano, K. R. (2016). Repetitive negative thinking: A transdiagnostic correlate of affective disorders. Journal of Social and Clinical Psychology, 35(3), 181–201. https://doi.org/10.1521/jscp.2016.35.3.181

Gori, A., Topino, E., Pucci, C., & Griffiths, M. D. (2021). The relationship between alexithymia, dysmorphic concern, and exercise addiction: The moderating effect of self-esteem. *Journal of personalized medicine*, *11*(11), 1111. https://doi.org/10.3390/jpm11111111

Veale, D., Anson, M., Miles, S., Pieta, M., Costa, A., & Ellison, N. (2014). Efficacy of cognitive behaviour therapy versus anxiety management for body dysmorphic

disorder: a randomised controlled trial. *Psychotherapy and psychosomatics*, *83*(6), 341-353. https://doi.org/10.1159/000360740

Polit, D. F., & Beck, C. T. (2010). Generalization in quantitative and qualitative research: myths and strategies. *International journal of nursing studies*, *47*(11), 1451–1458. https://doi.org/10.1016/j.ijnurstu.2010.06.004

Gravetter, F. J., & Forzano, L. B. (2018). *Research methods for the behavioral sciences* (6th ed.). Cengage Learning

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students*. Pearson education.

Phillips, K. A., Hollander, E., Rasmussen, S. A., & Aronowitz, B. R. (1997). A severity rating scale for body dysmorphic disorder: development, reliability, and validity of a modified version of the Yale-Brown Obsessive Compulsive Scale. *Psychopharmacology bulletin*, *33*(1), 17.

Schoofs, H., Hermans, D., & Raes, F. (2010). Brooding and reflection as subtypes of rumination: Evidence from confirmatory factor analysis in nonclinical samples using the Dutch Ruminative Response Scale. *Journal of Psychopathology and Behavioral Assessment*, *32*, 609-617. https://doi.org/10.1007/s10862-010-9182-9

Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking Rumination. *Perspectives on psychological science : a journal of the Association for Psychological Science*, *3*(5), 400–424. https://doi.org/10.1111/j.1745-6924.2008.00088.x

Terry, A., Szabo, A., & Griffiths, M. (2004). The exercise addiction inventory: A new brief screening tool. *Addiction Research & Theory*, *12*(5), 489-499. https://doi.org/10.1080/16066350310001637363

Rosenberg, M. (1965). Rosenberg self-esteem scale(RSES) *APA PsycTests*. https://doi.org/10.1037/t01038-000

Martin Ginis, K. A., Strong, H. A., Arent, S. M., Bray, S. R., & Bassett-Gunter, R. L. (2014). The effects of aerobic- versus strength-training on body image among young women with pre-existing body image concerns. *Body Image*, *11*(3), 219-227. https://doi.org/10.1016/j.bodyim.2014.02.004

Khan, W., Zafar, Y., & Khalid, M. (2022). Social media and body dysmorphic disorder : Is there any link? *J Pak Med Assoc*, *72*(2), 393. https://doi.org/10.47391/jpma.4145

Tiggemann, M., & Zaccardo, M. (2015). "Exercise to be fit, not skinny": The effect of fitspiration imagery on women's body image. *Body image*, *15*, 61–67. https://doi.org/10.1016/j.bodyim.2015.06.003

Trifiro, B. M., & Prena, K. (2021). Active Instagram use and its association with self-esteem and well-being. *2*(3). https://doi.org/10.1037/tmb0000043

Midgley, C., Thai, S., Lockwood, P., Kovacheff, C., & Page-Gould, E. (2021). When every day is a high school reunion: Social media comparisons and self-esteem. *Journal of personality and social psychology*, *121*(2), 285–307. https://doi.org/10.1037/pspi0000336

Nguyen, N. (2023). Exercise and Health: Examination of the Relationship between Gym Attendance, Mental Health, and Perceptions of Body Image. *Psi Beta Research Journal - Brief Reports*, *3*, 44-49. https://doi.org/10.54581/IYOX4962

Lichtenstein, M., Christiansen, E., Bilenberg, N., & Støving, R. (2014). Validation of the exercise addiction inventory in a D anish sport context. *Scandinavian Journal of Medicine & Science in Sports*, *24*(2), 447-453. https://doi.org/10.1111/j.1600-0838.2012.01515.x

Kirkby, R. J., & Adams, J. (1996). Exercise dependence: The relationship between two measures. *Perceptual and motor skills*, *82*(2), 366-366. https://doi.org/10.1177/003151259608200201

Simón Grima, J. S., Estrada-Marcén, N., & Montero-Marín, J. (2019). Exercise addiction measure through the Exercise Addiction Inventory (EAI) and health in habitual exercisers. A systematic review and meta-analysis. Adicción al ejercicio medida a través del Exercise Addiction Inventory (EAI) y salud en deportistas habituales. Una revisión sistemática y meta-análisis. *Adicciones*, *31*(3), 233–249. https://doi.org/10.20882/adicciones.990

Hausenblas, H. A., & Fallon, E. A. (2006). Exercise and body image: A meta-analysis. *Psychology and health*, *21*(1), 33-47. https://doi.org/10.1080/14768320500105270

Willow, J. P. (2022). Physical activity motives in the exercise and self-esteem relationship. *Sport Exerc Med Open J*, *8*(1), 10-14. https://doi.org/10.17140/SEMOJ-8-185

Batista, M., Ramos, L., Santos, J., Serrano, J., Petrica, J., & Honório, S. (2022). Exercise Influence on Self-Concept, Self-Esteem and Academic Performance in Middle-School Children. *Revista Romaneasca pentru Educatie Multidimensionala*, *14*(4 Sup. 1), 369-398. https://doi.org/10.18662/rrem/14.4Sup1/678

Bhave, D., Pradeep, M., Mota, J., Mane, D., Bhalla, D., & Karia, D. (2024). Self-esteem: A study on the relationship between self-esteem and factors affecting student life. *Journal of Pediatrics & Neonatal Care*, *14*, 21-27. https://doi.org/10.15406/jpnc.2024.14.00536

Mayville, S., Katz, R. C., Gipson, M. T., & Cabral, K. (1999). Assessing the prevalence of body dysmorphic disorder in an ethnically diverse group of adolescents. *Journal of child and family studies*, *8*, 357-362. https://doi.org/10.1023/A:1022023514730

Akinboro, A. O., Adelufosi, A. O., Onayemi, O., & Asaolu, S. O. (2019). Body dysmorphic disorder in patients attending a dermatology clinic in Nigeria: sociodemographic and clinical correlates. *Anais brasileiros de dermatologia*, *94*, 422-428. https://doi.org/10.1590/abd1806-4841.20197919

Hausenblas, H. A., & Fallon, E. A. (2002). Relationship among body image, exercise behavior, and exercise dependence symptoms. *International Journal of Eating Disorders*, *32*(2), 179-185. https://doi.org/10.1002/eat.10071

Gabriel, G. L. M., Paulo, J. R. S., Silva, A. A., Batista, R. P. R., Alves, J. F. N., & Nascimento Junior, J. R. A. (2020). Body dissatisfaction, addiction to exercise and risk behaviour for eating disorders among exercise practitioners. *Journal of Eating Disorders*, *8*, 23. https://doi.org/10.1186/s40337-020-00300-9

Kollei, I., & Martin, A. (2014). Body-related cognitions, affect and post-event processing in body dysmorphic disorder. *Journal of behavior therapy and experimental psychiatry*, *45*(1), 144-151. https://doi.org/10.1016/j.jbtep.2013.09.005

Veale, D. (2001). Cognitive–behavioural therapy for body dysmorphic disorder. *Advances in psychiatric treatment*, *7*(2), 125-132. https://doi.org/10.1192/apt.7.2.125

Tajikzadeh, F., Sadeghi, R., & Raiskariman, F. (2013). The relationship between body dysmorphic concern and rumination among the girl university students. *Sadra Medical Journal*, *1*(3), 189-198.

Mellman, L. A. (2010). Understanding body dysmorphic disorder: An essential guide. In: Am Psychiatric Assoc.

Veale, D., Gournay, K., Dryden, W., Boocock, A., Shah, F., Willson, R., & Walburn, J. (1996). Body dysmorphic disorder: a cognitive behavioural model and pilot randomised controlled trial. *Behaviour research and therapy*, *34*(9), 717-729. https://doi.org/10.1016/0005-7967(96)00025-3

Association, A. P. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed.).

Ahmadpanah, M., Arji, M., Arji, J., Haghighi, M., Jahangard, L., Sadeghi Bahmani, D., & Brand, S. (2019). Sociocultural attitudes towards appearance, self-esteem and symptoms of body-dysmorphic disorders among young adults. *International Journal of Environmental Research and Public Health*, *16*(21), 4236. https://doi.org/10.3390/ijerph16214236

Biby, E. L. (1998). The relationship between body dysmorphic disorder and depression, self-esteem, somatization, and obsessive-compulsive disorder. *J Clin Psychol*, *54*(4), 489-499. https://doi.org/10.1002/(sici)1097-4679(199806)54:4<489::aid-jclp10>3.0.co;2-b

Phillips, K. A. (2005). The broken mirror: understanding and treating body dysmorphic disorder. In. Oxford University Press, USA.

Kolubinski, D. C., Nikčević, A. V., Lawrence, J. A., & Spada, M. M. (2016). The role of metacognition in self-critical rumination: An investigation in individuals presenting with low self-esteem. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *34*, 73-85. https://doi.org/10.1007/s10942-015-0230-y

Watkins, E. R. (2008). Constructive and unconstructive repetitive thought. *Psychological bulletin*, *134*(2), 163. https://doi.org/10.1037/0033-2909.134.2.163

Salehi, M., & Aleyasin, S. A. (2024). The Effectiveness of Cognitive Behavioral Therapy on Rumination, and Quality of Life among Girls with Body Dysmorphic Symptoms. *Deleted Journal*, *2*(2), 95–102. https://doi.org/10.61838/kman.hn.2.2.11

Eshqobilov, S., & Toxirov, D. D. o'g'li. (2023). *Self-esteem* (pp. 125–139). Elsevier eBooks. https://doi.org/10.1016/b978-0-323-91497-0.00185-5

Seguin, R. A., Eldridge, G., Lynch, W., & Paul, L. C. (2013). Strength Training Improves Body Image and Physical Activity Behaviors Among Midlife and Older Rural Women. *Journal of Extension*, *51*(4), 4FEA2. https://pmc.ncbi.nlm.nih.gov/articles/PMC4354895/

Phillips, K. A., Didie, E. R., Menard, W., Pagano, M. E., Fay, C., & Weisberg, R. B. (2006). Clinical features of body dysmorphic disorder in adolescents and adults. *Psychiatry research*, *141*(3), 305–314. https://doi.org/10.1016/j.psychres.2005.09.014

Tros, B. G., Kemperman, P. M. J. H., Kuckulus, J., Hoekzema, R., & Vulink, N. C. C. (2023). Body Dysmorphic Disorder and Self-esteem in Adolescents and Young Adults with Acne Vulgaris. *Acta dermato-venereologica*, *103*, adv6232. https://doi.org/10.2340/actadv.v103.6232

Zamani Sani, S. H., Fathirezaie, Z., Brand, S., Pühse, U., Holsboer-Trachsler, E., Gerber, M., & Talepasand, S. (2016). Physical activity and self-esteem: Testing direct and indirect relationships associated with psychological and physical mechanisms. *Neuropsychiatric Disease and Treatment*, *12*, 2617. https://doi.org/10.2147/NDT.S116811

Wong, S. M., Chen, E. Y., Lee, M. C., Suen, Y. N., & Hui, C. L. (2023). Rumination as a Transdiagnostic Phenomenon in the 21st Century: The Flow Model of Rumination. *Brain Sciences*, *13*(7), 1041. https://doi.org/10.3390/brainsci13071041

Weinstein, A., & Szabo, A. (2023). Exercise addiction: A narrative overview of research issues. *Dialogues in Clinical Neuroscience*, *25*(1), 1. https://doi.org/10.1080/19585969.2023.2164841