Muscle Dysmorphic Disorder Inventory (MDDI) – Polish adaptation, women's version

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Summary

Aim. Muscle dysmorphia is a disorder in which one incorrectly assesses one's body as too thin and insufficiently muscular. Data on dysmorphia in the female population are still limited. The aim of the study was to culturally adapt and validate the Muscle Dysmorphic Disorder Inventory (MDDI) by Hildebrandt et al. (2004) in the female population.

Material and methods. The study included 204 women aged 18 to 35 years. In addition to the MDDI, the following were used: (1) a personal questionnaire to control secondary variables (e.g. BMI, sexual orientation, self-rated health), (2) the Body Image Questionnaire (BIQ) to check the validity of the validated tool, and (3) a subscale of the KOMPAN questionnaire to operationalise the variable "physical activity".

Results. It was noted that there are intergroup differences in the intensity of muscle dysmorphia symptoms in the studied sample between women involved in moderate and high levels of leisure-time physical activity. It was proven that the higher the BMI value and the greater the difference between actual and expected body weight, the greater the intensity of muscle dysmorphia symptoms in the studied women.

Conclusions. The results of the study confirmed the three-factor structure of the MDDIPL and demonstrated its satisfactory reliability both as a whole and in its separate subscales. MDDI-PL can be used as a screening tool, especially for examining women who engage in physical activity (including competitively).

Key words: women, physical activity, muscle dysmorphia

Introduction

Muscle dysmorphia (MD) is a form of body dysmorphic disorder (BDD) [1, 2]. It is commonly referred to as "bigorexia" (big – from English, orexis – from the Latin appetite), "reverse anorexia" [3] or "Adonis complex" [4]. People with MD perceive themselves as too thin, frail and insufficiently muscular, which in turn leads to a number of behaviours that are detrimental to their health [1, 5].

In the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders) classification [6], dysmorphic disorders are classified together with obsessive-compulsive and related disorders (OCD), because BDD is often accompanied by both compulsive behaviours and intrusive thoughts concerning one's own body [7, 8]. Moreover, some people with symptoms of bigorexia are simultaneously diagnosed with eating disorders, anxiety disorders [9], alcohol and/or drug abuse [10], as well as an abuse of drugs and parapharmaceuticals used to strengthen muscle tissue [8, 11, 12]. Puiu et al. [13] proved that there is a relationship between MD, dysmorphic disorders and the abuse of synthol (a synthetic substance consisting of oil, alcohol and lidocaine, injected directly into the muscle).

It should be emphasised, however, that among the listed problems in the field of mental functioning, eating disorders are most closely related to muscle dysmorphia, as indicated by the increased focus of patients on diet and body control [14–16]. Devrim et al. [17] established that there is a positive relationship between eating disorders and body dissatisfaction, dysmorphic disorders and bigorexia. Despite persistent exercise and dietary restrictions, people suffering from MD do not achieve satisfaction with their body image, which encourages them to intensify harmful activities aimed at increasing muscle mass. This condition may in turn lead to significant distress, decreased quality of life, suicidal thoughts, sacrificing close relationships, professional career, and financial stability to achieve the physical ideal [5].

Pope et al. [4] indicate the following diagnostic criteria for muscle dysmorphia: (1) focusing on one's appearance, especially body weight, and striving to improve it (e.g. through dietary restrictions, excessive physical activity); (2) neglecting social relations in order to comply with restrictions and maintain body weight (for example: giving up family events, trips with friends); (3) avoiding situations in which the body is particularly susceptible to social evaluation (swimming pool, beach); (4) continuing dietary restrictions, excessive exercise and use of medications (e.g. steroids) despite the negative consequences of their actions.

Although increased physical activity is a symptom of muscle dysmorphia, MD should be differentiated from exercise addiction (EA) [19]. Although in both cases there is a preoccupation with intense physical activity, a person with muscle dysmorphia wants to increase their musculature through exercise, while for an exercise addict, physical activity acts as an affect regulator [19].

The actual incidence of MD in the general population has not been determined yet. Meanwhile, it has been empirically shown that the criteria for bigorexia are met by 53.6% of fitness enthusiasts – men and women [20] and by approximately 26% to 58% of bodybuilders [17]. At the same time, it should be noted that although there is little data on muscle dysmorphia in the female population, its occurrence has also been confirmed in this group [21]. Moreover, it has been established that muscle dysmorphia affects people of various ethnic, socio-economic, educational and professional groups, and of various sexual orientations, which indicates that specific demographic characteristics do not predispose to its development. In recent years, an increase in the frequency of MD has been observed among teenagers [22]. Its development is facilitated by perfectionist attitudes and narcissism [23], addiction

to social media and eating disorders [24], parental control and authoritarianism of caregivers [25, 26].

Objective and methods

The objective of the study was the cultural adaptation and validation of the Muscle Dysmorphic Disorder Inventory (MDDI) [27] among young women (18–35 years old). The decision regarding the sample selection was related to the fact that in Poland there are tools with good psychometric parameters that allow for the diagnosis of muscle dysmorphia symptoms in men – the *Questionnaire for the Study of Eating Disorders and Body Image in Men* (KBZOMII) [28]. This tool consists of 50 items in seven scales, i.e.: (1) "Focus on muscle mass", (2) "Coping with emotions through overeating", (3) "Negative body image associated with the feeling of having excessive body weight", (4) "Addiction to training", (5) "Negative body image associated with the feeling of having an insufficiently muscular body", (6) "Purging", (7) "Acceptance". The task of the examined person is to respond to each statement by marking a selected answer: "never", "rarely", "sometimes", "often", "always", for which the respondent receives 0, 1, 2, 3 or 4 points, respectively. This tool has good psychometric properties (the value of Cronbach's alpha coefficient of individual scales ranges from 0.93 to 0.72).

Before starting the study, the authors of the *Muscle Dysmorphic Disorder Inventory* (MDDI) were contacted with a request for consent for its cultural adaptation and validation. After obtaining it, the Polish version of the tool was prepared, and an English philologist performed a back translation. Then, the translation of the MDDI-PL questionnaire was compared with the original and its Polish version was finally accepted based on its convergence with the English version.

In the next step, a personal questionnaire was developed to collect the necessary information about the study participants (including gender, age, sexual orientation). In addition, a tool was selected – *Kwestionariusz Wizerunku Ciała* (KWCO, *Body Image Questionnaire*) by Głębocka [29] – to verify the validity of the validated tool.

The research project was conducted online from February to March 2024 on a sample of 204 people. Purposive sampling was used, specifying the inclusion criteria for the sample: age from 18 to 35 years (early adulthood) and female gender. However, the study excluded those younger than 17 and older than 35 years and gender other than female. Ultimately, data collected from 198 people were analysed, because the rest did not meet the inclusion criteria for the sample.

In preparing and implementing the project, the highest possible ethical standards were maintained. First, the Ethics Committee for Scientific Research at the Faculty of Psychology of Kazimierz Wielki University in Bydgoszcz was contacted to give its opinion on the application; consent was obtained. The participants were informed about the purpose of the research, voluntary participation, the possibility of discontinuing the research at any time without giving a reason, and about confidentiality. Only people who gave their informed consent could participate in the study. Their task was to complete a personal questionnaire and two questionnaires; the average time of the study was 10 minutes. A safeguard was introduced to prevent multiple completion of the questionnaire.

Muscle Dysmorphic Disorder Inventory (MDDI) by Hildebrandt et al. [27] in the Polish adaptation by B. Ziółkowska, D. Łoboda and Ż. Żaczek (MDDI-PL) (Table 1) is a three-factor questionnaire consisting of 13 statements. The following subscales were distinguished in it: (1) Desired Size (DS); 2) Appearance Intolerance (AI) and (3) Functional Impairment (FI). The task of the examined person is to refer to the individual items on a five-point Likert scale, where 1 means "never" and 5 – "always". Both the global result and the results in the individual subscales are of diagnostic nature. The threshold for confirming the subject's tendency to muscle dysmorphia in the original studies was set at 39 points [27]. The measure shows satisfactory reliability. Cronbach's alpha coefficient in the original study [27] was: for DS – α = 0.85; for AI – α = 0.77; for FI – α = 0.80.

Table 1. *Muscle Dysmorphic Disorder Inventory* **(MDDI) – original and Polish version**

Item	Scale	Original version	Polish version
1.	DS	I think my body is too skinny/slender	Uważam, że moje ciało jest zbyt chude/szczupłe
2.	AI	I wear loose clothing so that people can't see my body	Noszę luźne ubrania, żeby ludzie nie dostrzegali mojej sylwetki
3.	AI	I hate my body	Nienawidzę swojego ciała
4.	DS	I wish I could be heavier	Chciałabym być cięższa
5.	DS	I find my chest to be too small	Uważam, że moja klatka piersiowa jest zbyt mała
6.	DS	I think my legs are too thin	Uważam, że mam zbyt szczupłe nogi
7.	AI	I feel like I have too much body fat	Odnoszę wrażenie, że mam zbyt dużo tkanki tłuszczowej
8.	DS	I wish my arms were stronger	Chciałabym mieć silniejszą górną część ciała
9.	AI	I am embarrassed to let people see me without a shirt or T-shirt	Krępuję się, gdy ludzie widzą mnie bez koszulki
10.	FI	I feel anxious when I miss one or more days of exercise	Czuję niepokój, kiedy opuszczę jeden lub więcej dni treningu/aktywności
11.	FI	I cancel social activities with friends (e.g. watching football, invitations to dinner, going to the movie theatre, etc.) because of my workout/exercise schedule.	Rezygnuję ze spotkań towarzyskich z przyjaciółmi (np. oglądanie meczu, zaproszenia na obiad, wypady do kina, itd.) z powodu mojego harmonogramu treningów
12.	FI	I feel depressed when I miss one or more days of exercise	Czuję się przygnębiona, gdy opuszczę jeden lub więcej dni treningu/aktywności
13.	FI	I miss opportunities to meet new people because of my workout schedule.	Przegapiam okazję do poznania nowych ludzi z powodu mojego harmonogramu treningów

DS – Desired Size; AI – Appearance Intolerance; FI – Functional Impairment

As mentioned, in addition to the MDDI-PL questionnaire, the subjects completed the *Kwestionariusz Wizerunku Ciała* (KWCO) [29]. This is a tool consisting of 40 statements that are part of four subscales: (1) Cognition – Emotions – PE (measuring opinions about one's own appearance), (2) Behaviour – Z (referring to a healthy lifestyle), (3) Ambient Criticism – KO (allowing to determine the subjective level of acceptance of the subject by the environment), and 4) Pretty – Ugly Stereotype – ŁB (measuring the degree of internalisation of contemporary beauty standards). This questionnaire is the first measure in Poland designed for people experiencing psychosocial problems that are clearly related to body shape and weight [29]. The task of the subject is to respond to subsequent statements on a 5-point scale (from 1 – "definitely not" to 5 – "definitely yes"). The maximum score that can be achieved in the questionnaire is 200, and the minimum is 40 points. The higher the score, the more negative the body image of the examined person. The reliability measure of the tool expressed by the Cronbach's alpha coefficient is 0.93 in total, for the PE subscale – 0.93, Z – 0.83, KO – 0.67, and ŁB – 0.88 [29].

In addition, the surveyed women answered questions about: height and body mass (allowing for calculating the BMI – mass/height^2), ideal/expected body mass (thanks to which the difference between the actual and ideal body mass expressed in kg was calculated) and physical activity. For this purpose, two questions from the KOMPAN tool [30] were used: (1) "How do you assess your physical activity during everyday activities (work/school)?", possible answers: (a) "Low: more than 70% of the time in a sitting position", (b) "Moderate: about 50% of the time in a sitting position and about 50% of the time in movement", (c) "High: about 70% of the time in movement or physical work associated with strenuous physical activity; (2) "How do you rate your physical activity in your free time?", possible answers: (a) "Low: mostly sitting, watching TV, reading newspapers, books, light housework, walking 1–2 hours a week", (b) "Moderate: walking, cycling, gymnastics, gardening or other light physical activity performed 2–3 hours a week", (c) "High: cycling, running, working in the allotment or garden and other recreational sports activities requiring physical effort performed more than 3 hours a week". Answers to the remaining questions of the personal survey allowed for the characterisation of the sample.

Sample characteristics

The study involved 198 women aged 18 to 35, including students of psychology, pedagogy, physical culture, and tourism, as well as women staying at home and raising children and working. Heterosexual orientation was declared by 176 respondents (88.9%), 12 respondents declared (6.1%) homosexual orientation, 8 (4%) – bisexual, and 2 (1%) – other. The analysis of the results concerning self-assessment of health shows that 163 women (82.3%) do not have problems with mental functioning, the rest – 35 women (17.7%) have been diagnosed with mental disorders, including depression, anxiety, eating disorders, and obsessive-compulsive disorders. 33 women (16.7%) assessed their mental condition as very good, 87 (43.9%) as good, 60 as average (30.3%), 13 (6.6%) as bad, and 5 (2.5%) as very bad.

In the study sample, 154 women (77.8%) did not have a diagnosis of chronic somatic diseases, the remaining 44 (22.2%) suffered from Hashimoto's thyroiditis, polycystic ovary syndrome, celiac disease, and insulin-dependent diabetes. In their self-assessment of physical health, 30 women (15.2%) assessed it as very good, 93 (47%) as good, 65 (32.8%) as average, 9 (4.5%) as bad, and 1 (0.5%) as very bad. 58 of the surveyed women (29.3%) take medications on a regular basis (including contraceptives and those related to the treatment of a chronic disease/disorder), the effects of which are related to weight gain, slower metabolism, increased appetite, etc. On the other hand, 20 women (10.1%) take preparations to reduce appetite, burn fat and increase muscle mass.

The majority of the surveyed women – 87 (43.9%) – engage in moderate physical activity in their free time, and 91 women (46%) during everyday tasks related to study and work. 45 respondents (22.7%) declare high activity in their free time and 30 (15.2%) during everyday activities. 66 women (33.3%) practice low activity in their free time, while 77 (38.9%) do so on a daily basis.

Results

First, descriptive statistics were calculated for the MDDI-PL (Table 2). In the study sample, the maximum score for the entire scale was 47, the minimum was 13 and the mean was 27.2. In the DS factor, the maximum obtained value was 21, the minimum was 5 and the mean was 9. In the case of the AI factor, these values were 20, 4 and 10.7, respectively, and for the FI factor – 20, 4 and 7.5.

Table 2. **MDDI-PL – descriptive statistics**

	MDDI SUM	DS	AI	FI
Mean	27.226	8.971	10.683	7.541
Std. dev.	6.885	3.203	4.449	3.964
Skewness	0.093	1.124	0.378	1.206
Std. error of skewness	0.169	0.169	0.169	0.169
Kurtosis	-0.156	1.413	-0.761	0.963
Std. error of kurtosis	0.336	0.336	0.336	0.337
Minimum	13.000	5.000	4.000	4.000
Maximum	47.000	21.000	20.000	7.541

DS – Desired Size; AI – Appearance Intolerance; FI – Functional Impairment

Then, the factor structure of the MDDI-PL was verified using the confirmatory factor analysis with the Lavaan package. Partial correlation coefficients were also generated (Table 3).

Table 3. **Factor loadings for MDDI-PL**

	FI	AI	DS	Uniqueness	MSA
MDDI 12	0.869			0.236	0.789
MDDI 11	0.836			0.297	0.745
MDDI 10	0.828			0.315	0.829
MDDI 13	0.802			0.357	0.795
MDDI 8	0.407			0.763	0.823
MDDI 3		0.867		0.259	0.817
MDDI 9		0.849		0.287	0.761
MDDI 2		0.840		0.275	0.731
MDDI 7		0.777		0.286	0.683
MDDI 6			0.797	0.377	0.761
MDDI 4			0.781	0.371	0.795
MDDI 1			0.766	0.354	0.778
MDDI 5			0.545	0.692	0.733

DS – Desired Size; AI – Appearance Intolerance; FI – Functional Impairment

The performed analyses, including structural equation modelling (Figure 1), confirm the three-factor structure of the tool obtained in the original studies [27]. The chi-square test and the values of the CFI (0.913), TLI (0.891) and RMSEA (0.0082) indices (Table 4) indicate a good fit of the model. The only reservation is the value of the SRMR index (0.077) which is higher than 0.06.

Table 4. **Model fit indices**

Model	X²	Df	P
Base	1083.526	78	
factor	149.330	62	<0.001
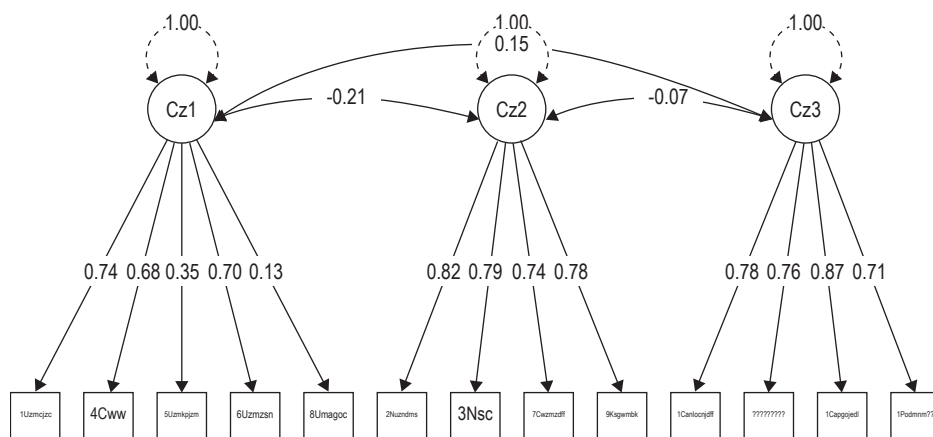
Cz1: DS – Desired Size; Cz2: AI – Appearance Intolerance, Cz3: FI – Functional Impairment

Figure 1. **Structural equation modelling for the MDDI-PL**

Next, correlations between the overall MDDI-PL and KWCO scores as well as their subscales were checked (Table 5).

Table 5. **Pearson's r correlations between MDDI-PL and KWCO**

	1. DS	2. AI	3. FI	4. MDDI	5. PE	6. Z	7. KO	8. ŁB	9. KWCO	10. BMI	11. MR-MI
1. DS	—										
2. AI	0.071	—									
3. FI	**0.203****	-0.072	—								
4. MDDI	**0.536***	**0.658***	**0.538***	—							
5. PE	0.017	**0.870***	0.011	**0.601***	—						

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	1	2	3	4	5	6	7	8	9	10	11
6. Z	0.038	-0.515*	0.466*	-0.005	-0.489*	—					
7. KO	0.235*	0.584*	-0.008	0.474*	0.597*	-0.397*	—				
8. ŁB	0.061	0.453*	0.031	0.370*	0.527*	-0.204**	0.226*	—			
9. KWCO	0.088	0.779*	0.114	0.646*	0.906*	-0.285*	0.616*	0.790*	—		
10. BMI	-0.236*	0.335*	-0.012	0.096	0.303*	-0.147***	0.104	0.075	0.225*	—	
11. MR-MI	-0.095	0.577*	-0.128	0.287*	0.586*	-0.420*	0.436*	0.305*	0.521*	0.381*	—

DS – Desired Size; AI – Appearance Intolerance; FI – Functional Impairment; MDDI – sum; PE – Cognition – Emotions; Z – Behaviour; KO – Ambient Criticism; ŁB – Pretty – ugly stereotype; KWCO – sum; BMI – body mass index; MR-MI – the difference between ideal and actual body weight; *** $p < 0.05$; ** $p < 0.01$; * $p < 0.001$

The analysis of the results indicates that in the studied sample there are a number of statistically significant relationships, of varying intensity, including between the general results of the KWCO and MDDI-PL. This relationship is positive, which means that with increasing body dissatisfaction, the intensity of muscle dysmorphia symptoms increases. Moreover, it was proven that striving to achieve a Desired Size (DS, MMDI-PL subscale) correlates positively with Ambient Criticism (KO, KWCO subscale). The strength of the relationship is weak, but statistically significant. AI, or Appearance Intolerance, correlates with all KWCO subscales, and therefore PE – Cognition – Emotions, Z – behaviour, KO – Ambient Criticism, ŁB – pretty – ugly stereotype. These relationships are weak, but statistically significant and in most cases (except for the Z subscale) are positive. This means that only in the case of one scale, with the increase of the Appearance Intolerance score (AI, MDDI-PL subscale), the Behaviour score (Z, KWCO subscale) decreases. Functional Impairment (FI) correlates positively, although weakly, with the score in the Z subscale.

In addition, it turned out that the BMI value remains in a weak, yet statistically significant relationship with two subscales of the MDDI-PL – striving to achieve

a Desired Size (DS) and Appearance Intolerance (AI). Therefore, the higher the BMI value, the greater the lack of acceptance of one's own body and the greater the striving to control one's figure. The BMI value in the studied sample also remains in a statistically significant, positive relationship with two subscales of the KWCO – Cognition – Emotions and Behaviour (the first of them is weak and positive, while the second is negative and strong) and with the overall result of this tool (positive, weak relationship).

Correlation analysis also revealed statistically significant, weak positive relationships between the difference in the actual and expected body weight and Appearance Intolerance (AI) and the global MDDI-PL score. Thus, the greater the discrepancy between the current and expected body weight in the examined women, the higher the global MDDI-PL score and the greater the appearance intolerance. This difference also correlated statistically significantly, although at a weak level, with all the KWCO subscales and with the overall result of this tool. These relationships (except for the Z subscale) were positive.

Next, using the analysis of variance, intergroup comparisons were conducted. Their aim was to check how the intensity of the MDDI-PL result was shaped depending on the level of physical activity of the examined women (Table 6).

Table 6. **ANOVA analysis of variance with physical activity criterion**

Observation	Sum of squares	df	Medium square	F	p	η²
CZ	124.453	2	62.227	1.468	0.233	0.013
CzW	351.375	2	175.687	4.144	0.017	0.038
CZ ⚹ CzW	63.857	4	15.964	0.377	0.825	0.007
Residuals	8436.463	199	42.394	1.468		

CZ – physical activity during daily activities; CzW – physical activity in free time

It turned out that there are statistically significant differences at the level of $p < 0.05$, between people who are physically active in their free time. To deepen the analysis, a post-hoc test was performed (Table 7).

Table 7. **Post-hoc tests for the comparison of low, moderate and high physical activity groups**

Groups	Difference in means	Standard error	t	p_{tukey}	$p_{scheffe}$	p_{bonf}
1 and 2	3.332	1.770	1.770	0.182	0.211	0.235
1 and 3	-0.536	-0.271	-0.271	0.960	0.964	1.000
2 and 3	-3.868	-2.706	-2.706	0.020*	0.027*	0.022*

* $p < 0.05$; 1 – low activity; 2 – moderate activity; 3 – high activity

The results of the conducted analysis proved that statistically significant differences between groups were revealed only between people describing their leisure time activity as moderate and high. For this reason, it was decided to check what was

the body image of women from the compared subgroups (2 and 3) and the difference in the scope of real and ideal body weight, assuming that a worse body image and a greater difference between the actual and expected body weight could coexist with a higher intensity of muscle dysmorphia symptoms (Tables 8 and 9, Figures 2 and 3).

Table 8. **Post-hoc comparisons – leisure-time physical activity**

Groups	Difference in means	Standard error	t	p_{tukey}	$p_{scheffe}$	p_{bonf}
1 2	14.640	3.923	3.732	<0.001	0.001	<0.001
3 1	15.638	4.569	3.423	0.002	0.003	0.002
2 3	0.998	4.237	0.236	0.970	0.973	1.000

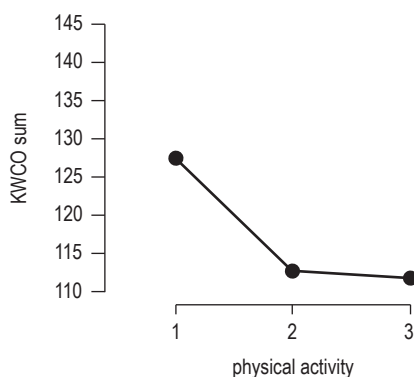*P* value adjusted for family of 3 comparison

Figure 2. **Post-hoc comparisons – descriptive graph**

It turns out that the body image measured by the KWCO questionnaire is significantly different in subgroups 1 and 2, i.e. women with low and moderate activity. This effect does not occur between groups 2 and 3, i.e. women active at a moderate and high level.

Table 9. **Post-hoc comparisons – difference in actual and ideal body weight**

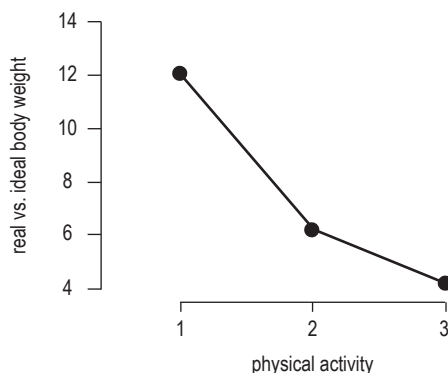| Groups	Difference in means	Standard error	t	p_{tukey}	$p_{scheffe}$	p_{bonf}
1 2	5.929	1.241	4.778	<0.001	<0.001	<0.001
3 1	7.949	1.445	5.501	<0.001	<0.001	<0.001
2 3	2.021	1.340	1.508	0.289	0.323	0.399

P value adjusted for family of 3 comparison

Figure 3. **Post-hoc comparisons – descriptive graph**

No differences were noted in the disproportion between actual and ideal body weight in groups 2 and 3 – i.e. women practicing moderate and high physical activity, as opposed to groups 1 and 2 and 1 and 3. It was found that the greatest disproportion in the discussed range was demonstrated by people with low physical activity.

Discussion

Muscle dysmorphia is becoming a growing, global mental health problem [31]. At the same time, it turns out that children, female teenagers and adult women are critical of their own physicality, and to a significantly greater extent than men [32, 33].

Analysis of previous research reports does not allow to determine what percentage of the general female population may exhibit symptoms of bigorexia. The authors of the MDDI [27] indicate 39 points as the cut-off point for diagnosing muscle dysmorphia. In our own research conducted in a population of non-competitive women, a high score (39 and >) was obtained by 27 people, which constitutes 13% of the sample.

At the same time, positive correlations were found between the attitude of the surveyed women towards their bodies, especially in terms of expressing opinions about their own appearance (PE), feeling accepted by the environment due to their appearance (KO) and the degree of internalisation of beauty canons (ŁB) with the tendency to bigorexic behaviours measured by the MDDI-PL. This result is consistent with, among others, the empirical works of Arslan et al. [34] and Almeida et al. [35].

Similar correlations were revealed between the BMI, value and the disproportion in the real and ideal body mass and the symptoms of muscle dysmorphia. Interestingly, the higher the BMI value, the higher the intensity of the results on the AI scale, but lower in the DS range. This means that the higher the BMI value, the greater the lack of acceptance of one's appearance in the studied women, but at the same time the smaller the desire to achieve a figure typical of men manifesting symptoms of muscle dysmorphia (an expanded chest, muscular legs, higher total body mass, etc.). The result of our own research is therefore in line with the reports of researchers who indicate that bigorexia in women has a slightly different presentation than in men – the latter

are primarily interested in developing the body musculature while increasing its total mass, while women are interested in developing the chest while maintaining slimness [36, 37]. It was also proven that the greater the discrepancy between the current and expected body weight, the more the examined women manifested intolerance of their own appearance (AI). This result also corresponds to the results of empirical works of other researchers [38, 39].

The study also included self-assessment of women's physical activity in their free time. Significant intergroup differences were revealed in terms of muscle dysmorphia symptoms, but only between women who declared moderate and high activity. This result is intriguing; while moderate physical activity undertaken in free time may be an indicator of a healthy lifestyle, its high intensity may constitute a risk factor for developing muscle dysmorphia symptoms. However, these differences in the studied sample cannot be explained either by the quality of body image or the size of the disproportion between real and ideal body weight. Susanto et al. [40] indicate, however, that predictors of muscle dysmorphia may include internalisation of patterns concerning musculature, percentage of adipose tissue in total body weight and dissatisfaction with one's own appearance. In turn, Orrit et al. [41] prove the importance of deficiencies in emotional control in people developing symptoms of bigorexia.

Conclusions

The project of our own research allowed us to:

– confirm the three-factor structure of the MDDI-PL and prove the satisfactory reliability of both the tool as a whole and its separate subscales;

– note that there are intergroup differences in the intensity of muscle dysmorphia symptoms in the study sample between women involved in moderate and high levels of leisure-time physical activity;

– prove the relationship between MDDI-PL results and the BMI value and the difference between actual and expected body weight; the higher the BMI value and the greater the difference between actual and expected body weight, the greater the intensity of muscle dysmorphia symptoms;

– the MDDI-PL scale can be used as a screening tool, especially for examining women who engage in high levels of physical activity (including competitive activity), and preventively – at a moderate level; revealing a significant disproportion between current and expected body weight; with an above-standard BMI and at the same time manifesting dissatisfaction with their body;

– further work of the research team will serve the theoretical and research exploration of the area of striving to achieve a Desired Size (DS) in the population of women and men, in order to learn and specify the qualitative differences between male and female muscle dysmorphia in this area.

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