



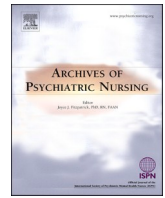
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# A preliminary study of body image and depression among adults during COVID-19: A moderation model

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## ABSTRACT

**Background:** Since many aspects of functioning can affect body image, the aim of our study was to assess whether the relationship between body image-related negative emotions or depression and body dissatisfaction was moderated by body image-related quality of life and to compare these analyses among participants with various body mass index during COVID-19.

**Subjects and methods:** One hundred and thirty-one adults participated in the study. Measurement tools included the Body Image Quality of Life Inventory, the short form of the Situational Inventory of Body-Image Dysphoria, the Beck Depression Inventory-II and the Contour Drawing Scale.

**Results:** The effects of body image-related negative emotions or depression on body dissatisfaction is moderated by body image-related quality of life, but only among obese participants.

**Conclusion:** Treatment of obese patients should focus on improving quality of life related to body image, while managing negative emotions and body dissatisfaction.

## Introduction

Obesity is a health problem of global dimensions that demands interdisciplinary solutions (Burlandy et al., 2020; Centers for Disease Control and Prevention, 2020; World Health Organization, 2020). Being obese may be associated with serious difficulties in mental functioning (Hemmingsson, 2014; Marks, 2015; Raman et al., 2020). Numerous studies (on the period before COVID-19) show that obese people are characterized by worse emotional functioning and have a more negative body image and lower quality of life, as well as a higher level of depression than people with normal body weight (e.g. Kass et al., 2019; Pimenta et al., 2015; Sarigiani et al., 2020; Weinberger et al., 2016). Moreover, obese people are at high risk of complications from developing COVID-19 (e.g. Wadman, 2020; World Obesity, 2021). With regard to mental health, many authors indicate that the epidemiological situation related to COVID-19 significantly disrupts mental functioning (including the quality of life, emotional functioning and body image) (e.g. Aksoy & Koçak, 2020; Bryson, 2020; Carbone, 2020; Fitzpatrick, 2020; Jakovljevic et al., 2020; Kamberi et al., 2020; Nurunnabi et al., 2021; Samlani et al., 2020; Shek, 2021; Swami et al., 2021). Therefore, in this study, we decided to analyze the relationship between various

aspect of body image and depression separately among people with normal body weight and obesity during COVID-19.

In psychological research on corporeality, there are many different concepts that are related to the perception as well as the assessment of one's own body (Cash & Smolak, 2012). In this article, we focused on the concept of body image (Schilder, 1950). Here we should mention such aspects of body image as the behavioral (e.g. excessive exercising or disordered eating as a means to change one's appearance), cognitive (e.g. beliefs about a perfect silhouette) and affective aspects (e.g. different emotions felt towards the body) (Cash & Pruzinsky, 2002; Levine & Piran, 2004; Markey & Gillen, 2016). When writing about body image, positive (PBI) and negative body image (NBI) should also be mentioned (e.g. Gillen & Markey, 2015; Markey & Gillen, 2016; Tylka & Wood-Barcalow, 2015). In this article, we focused on a negative body image and we it manifest itself, among other things, in negative emotions (e.g. shame) in relation to one's own body (Tiggemann, 2004). NBI has a negative impact on various aspects of functioning (including interpersonal relations), which may be associated with a reduction in quality of life (Wilson et al., 2013).

In relation to the above division, the research described in this article is mainly related to negative body image, which, as mentioned above, is

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associated with body image dissatisfaction (BID). BID is most often defined as a negative, subjective assessment of body weight and its shape (Xu et al., 2010). The research states that negative body image may be associated with a high level of body image-related negative emotions (e.g. anxiety, sadness, distress, self-blame, shame) and depression, as well as low self-esteem (Blashill & Wilhelm, 2014; Gan et al., 2011; Shin & Shin, 2008; Steg et al., 2008). Interestingly, when people face the ideal imposed by society and their figure differs from the expected one, they probably feel shame, sadness and anxiety, which are classified as negative self-conscious emotions (e.g. Thompson et al., 2003). These emotions can evoke a desire to hide one's bodily imperfections in the context of their exposure to others (e.g. Thompson et al., 2003). The above-mentioned emotions can contribute to the constant maintenance of and/or deterioration of negative body image. This may be related to the fact that experiencing negative emotions may be associated with the emergence and maintenance of cognitive distortions about oneself (and one's own body image) and engaging in avoidance behavior (e.g. avoidance of social situations that focus on appearance or eating) (e.g. Hosseini & Padhy, 2020; Jakatdar et al., 2006; Lydecker, 2015; Scardera et al., 2020).

In these circumstances, attention should be paid to the usefulness of the concept of quality of life, which may turn out to be a key aspect for explaining the functioning of an individual in everyday life. The quality of life level often reflects a person's sustained and global assessment of their own functioning (Kolman, 2002). We can talk about quality of life in a subjective and objective context. Objective components are primarily health assessment, as well as socio-economic position, while subjective are established by self-defined components, e.g. well-being, body image, self-esteem (Marks, 2015; Tobiasz-Adamczyk, 2000). Previous studies show that improving the quality of life in obese people is associated with improvement in many aspects of psychological functioning (e.g. Nickel et al., 2017). Overall, quality of life is also an important issue that can play a key role in the context of body image (e.g. Cash & Fleming, 2002; Nickel et al., 2017). In the literature, we can find the concept of body image-related quality of life which refers to the assessment of life satisfaction in the context of experiencing one's own body in various social situations (Cash & Fleming, 2002). Since many aspects of functioning can affect body image (e.g., social functioning, emotional well-being, eating, sexuality, exercise etc.; Cash & Fleming, 2002), it is worth considering whether a good quality of life can protect against the effects of negative emotions or depression on the maintenance or further development of body dissatisfaction among obese people during COVID-19.

To sum up, as mentioned above, the coronavirus pandemic is related to serious mental and physical health consequences (Bryson, 2020; Carbone, 2020; Jakovljevic, 2020). This situation is especially unfavorable for obese people (Wadman, 2020; World Obesity, 2021). Therefore, it is worth checking whether by managing the quality of life we are able to improve the mental functioning of people with obesity during COVID-19. This will allow to identify those aspects that can be included in interventions to prevent the development of negative body image and depression, and as is known, these problems escalated during the COVID-19 period (Carbone, 2020; Jakovljevic et al., 2020; Kamberi et al., 2020). Well, the aim of our study was to assess whether the relationship between body image-related negative emotions or depression and body dissatisfaction was moderated by body image-related quality of life and to compare these analyses among participants with various body mass index during COVID-19. Body image-related quality of life was expected to moderate the relationship between body image-related negative emotions or depression and body dissatisfaction among obese participants; in other words, medium and high body image-related quality of life would mean a non-significant relationship between body image-related negative emotions or depression and body dissatisfaction among obese people during COVID-19.

## Subjects and methods

### Participants

This was a cross-sectional study. We used a volunteer sampling technique. Participants were recruited through advertisements in various workplaces and universities from June 2020 to November 2020 during COVID-19. After contacting the researchers, adults completed an online survey. Two hundred and three people contacted us and were sent the online survey. One hundred and eighty-three people completed the survey and confirmed that they agree to participate in the study (informed consent form). This sample turned out to be sufficient in relation to the earlier calculations ( $f^2 = 0.15$ ; minimum required sample size = 76).

The eligibility criteria for the present analysis were: (a) age: 18–64 years old; (b) BMI: normal body weight (18.5–24.99 kg/m<sup>2</sup>) and obesity ( $\geq 30$  kg/m<sup>2</sup>). Finally, 131 adults met the eligibility criteria and their data was included in the analysis. The reasons for exclusion from the analysis were: (a) missing data: 8; (b) BMI (underweight  $<18.5$  kg/m<sup>2</sup> and overweight 25–29.99 kg/m<sup>2</sup>): 61; (c) age: 3. With regard to the final sample ( $N = 131$ ), the mean age was 37.57 ( $SD = 10.88$ ) and the mean BMI 28.12 ( $SD = 6.97$ ). Most of the participants (50.38%) had high school education. Detailed participants' characteristics are shown in Table 1.

Compensation was not offered for participants. All participants were

**Table 1**  
Characteristics of normal body weight and obese participants.

Demographic characteristics		
	Normal body weight <i>N</i> = 66	Obesity <i>N</i> = 65
	<i>N</i> (%)	
Level of education		
Primary school	0 (0)	1 (1.53)
Trade school	1 (1.51)	17 (26.16)
High school	36 (54.55)	30 (46.15)
University graduates	29 (43.94)	17 (26.16)
	<i>M</i> ( <i>SD</i> )	
Weight (kg)	61.55 (7.94)	98.12 (15.46)
Height (m)	1.67 (0.08)	1.69 (0.08)
BMI (kg/m <sup>2</sup> )	22.13 (1.79)	34.19 (4.57)
Age (years)	34.41 (10.25)	40.79 (10.63)
Additional characteristics <sup>b</sup>		
	<i>N</i> (%)	
	Normal body weight	Obesity
Would you like to change what you look like?		
Yes	46 (69.70)	55 (84.62)
No	14 (21.21)	7 (10.77)
I do not know	6 (9.09)	3 (4.61)
Are you currently taking any action to change your appearance?		
Yes	27 (40.90)	30 (46.15)
No	39 (59.10)	35 (53.85)
What kind of action are you taking? <sup>a</sup>		
Physical activity	16 (24.24)	21 (32.31)
Diet	14 (21.21)	21 (32.31)
Weight loss supplements	1 (1.51)	0 (0)
Other	3 (4.55)	1 (1.53)

<sup>a</sup> Multiple choice.

<sup>b</sup> These questions were asked to gain additional insight into the cognitive and behavioral aspects of the body image.

treated in strict compliance with the Helsinki Declaration (2001). The Ethics Committee approved our study.

### Measurements

#### *The Body Image Quality of Life Inventory (BIQLI): body image-related quality of life*

The inventory consists of 19 items that yield one composite score - body image-related quality of life (Cash & Fleming, 2002). This tool evaluates the influence of body image to individuals' quality of life. Participants respond on a 7-point scale (from very negative [-3] to very positive [+3] effects). Example items are: "My basic feelings about myself — feelings of personal adequacy and self-regard", "My relationships with family members", "Enjoyment of my sex life". The higher the score, the higher the level of body image-related quality of life. BIQLI has demonstrated adequate validity (Cash & Fleming, 2002). In our study, Cronbach's alpha coefficient (reliability) was 0.97.

#### *The short form of the Situational Inventory of Body-Image Dysphoria (SIBID-S): body image-related negative emotions*

The questionnaire includes 20 items that yields one composite score - body image-related negative emotions (Cash, 2002). This tool assesses negative body-image emotions in the everyday situations of life. This self-report assessment uses a 5-point response format (ranging from never [0] to (almost) always [4]). Example items are: "At social gatherings where I know few people", "When anticipating or having sexual relations", "When I see myself in a photograph or videotape". Higher scores indicate a more intense feeling of negative emotion. SIBID-S had good validity (Cash, 2002). In our study, Cronbach's alpha coefficient (reliability) was 0.96.

#### *The Beck Depression Inventory-II (BDI-II): depression*

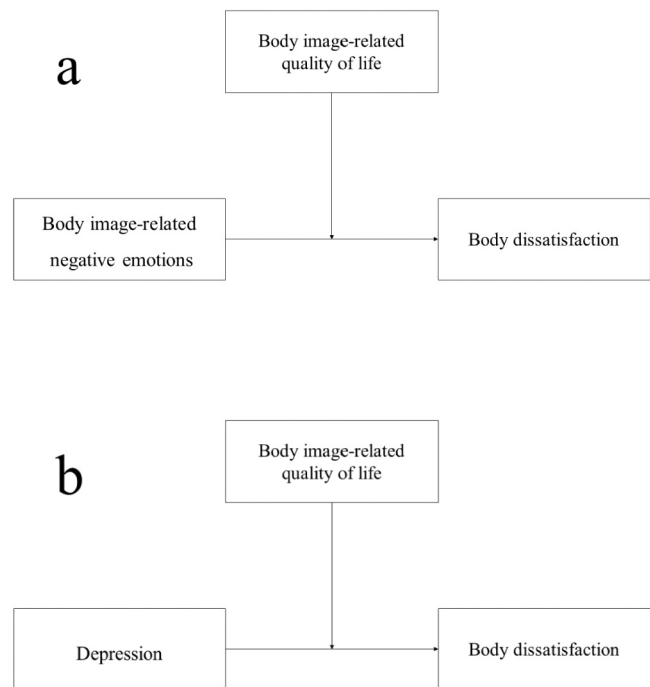
The inventory contains 21 items that form overall average score - depression (Beck et al., 1996). This tool uses to measure the intensity of depression symptoms. There is a 4-point scale (ranging from 0 to 3). Example items are: "Sadness: 0. I do not feel sad. 1. I feel sad most of the time. 2. I am sad all the time. 3. I am so sad or unhappy that I can't stand it.", "Crying: 0. I don't cry more than I used to. 1. I cry more than I used to. 2. I cry over every little thing. 3. I feel like crying, but I can't.". This inventory has demonstrated adequate validity (Beck et al., 1996). In our study, Cronbach's alpha coefficient (reliability) was 0.90.

#### *The Contour Drawing Scale (CDRS): body dissatisfaction*

The scale consists of nine male and female silhouettes, ranked from the skinniest to the fattest (Thompson & Gray, 1995). We asked them to answer two questions: (a) real figure: "Which silhouette reflects what you look like now?"; (b) ideal figure: "Which silhouette reflects what you would like to look like?". Body dissatisfaction was calculated by subtracting the number of the silhouette indicated as "real figure" from the number of the silhouette indicated as "ideal figure". The higher the discrepancy between the real figure and the ideal figure, the greater body dissatisfaction.

### Data analyses

Moderation analyses were carried out to examine whether the relationships between body image-related negative emotions (X) or depression (X) and body dissatisfaction (Y) were moderated by body image-related quality of life (W) (Fig. 1). We conducted separate analyses for participants with normal body weight and obesity. We used the macro PROCESS for IBM SPSS and followed the procedure described by Hayes (2018). By analysing confidence interval (not including zero) and tests of significance ( $p < .05$ ), we were able to answer the question of whether body image-related quality of life moderated the effect of body image-related negative emotions or depression on body dissatisfaction. To examine the conditional effect of body image-related negative



**Fig. 1.** Moderations diagram displaying the effect of body image-related negative emotions (a) or depression (b) on body dissatisfaction by body image-related quality of life.

emotions or depression on body dissatisfaction at medium (50th percentile), low (16th percentile), and high (84th percentile) levels of moderator, we used the pick-a-point approach (Bauer & Curran, 2005; Rogosa, 1980).

## Results

### *Descriptive statistics and correlation analysis*

Table 2 shows the descriptive statistics and the results of correlation analysis for all variables separately in the group of people with normal body weight and obesity.

### *Moderation analysis*

Moderation analysis with one moderator shows that the effects of body image-related negative emotions or depression on body dissatisfaction is moderated by body image-related quality of life, but only among obese participants (Table 3).

Only among obese adults do body image-related negative emotions have a positive impact on body dissatisfaction when participants have medium and low levels of body image-related quality of life (Table 4; Fig. 2). In relation to the same group, depression has a positive impact on body dissatisfaction when participants have a low level of body image-related quality of life (Table 4; Fig. 3). Among people with normal body weight, no similar results were observed (Fig. 4 and Fig. 5).

## Discussion

The aim of our study was to assess whether the relationship between body image-related negative emotions or depression and body dissatisfaction were moderated by body image-related quality of life and to compare these analyses among participants with various body mass indices during COVID-19. Only among obese adults does a body image-related quality of life significantly moderate the relationship between body image-related negative emotions or depression and body

**Table 2**

Means, standard deviations, and the bivariate Pearson correlation between body image-related negative emotions, depression, body dissatisfaction and body image-related quality of life.

	Normal body weight					Obesity				
	2	3	4	M	SD	2	3	4	M	SD
1. Body image-related negative emotions	0.535***	0.505***	-0.418***	30.91	18.63	0.607***	0.566***	-0.615***	29.71	20.04
2. Depression		0.404**	-0.511***	9.70	8.30		0.471***	-0.519***	10.59	8.80
3. Body dissatisfaction			-0.331**	1.73	1.49			-0.275*	2.37	1.28
4. Body image-related quality of life				19.64	26.67				11.52	23.63

\*  $p < .05$ .  
 \*\*  $p < .01$ .  
 \*\*\*  $p < .001$ .

**Table 3**

Moderation analysis: results of models summaries (I) and tests of higher orders of unconditional interactions (II).

Model	
	Normal body weight
X = body image-related negative emotions	I: $R = 0.53, F(3, 62) = 7.76, p > .001, MSE = 1.70, R^2\text{-chg} = 0.27$
Y = body dissatisfaction	
W = body image-related quality of life	II: $F(1,62) = 0.001, p > .05$
X = depression	I: $R = 0.43, F(3, 62) = 4.67, p > .01, MSE = 1.91, R^2\text{-chg} = 0.18$
Y = body dissatisfaction	
W = body image-related quality of life	II: $F(1,62) = 0.005, p > .05$
	Obesity
X = body image-related negative emotions	I: $R = 0.62, F(3, 61) = 12.81, p > .001, MSE = 1.06, R^2\text{-chg} = 0.39$
Y = body dissatisfaction	
W = body image-related quality of life	II: $F(1,61) = 5.74, p < .05$
X = depression	I: $R = 0.58, F(3, 61) = 10.10, p > .001, MSE = 1.15, R^2\text{-chg} = 0.33$
Y = body dissatisfaction	
W = body image-related quality of life	II: $F(1,61) = 9.94, p < .01$

Note. The statistically significant interactions were highlighted in bold.

dissatisfaction. According to our results for obese participants in low body image-related quality of life, both higher body image-related negative emotions and depression are associated with higher body dissatisfaction. For obese people in medium body image-related quality of life, only higher body image-related negative emotions are associated

with greater body dissatisfaction. These results therefore confirm that high level of quality of life can be protective factors for the effects of negative emotions or depression on the maintenance or further development of body dissatisfaction among obese people during COVID-19.

Previous research interests in body image have focused primarily on adverse effects, such as low self-esteem, eating disorders and depressive mood (Neumark-Sztainer et al., 2006). But it is important to pay attention to the relationship between body image and quality of life because many studies confirm these associations (e.g. Medeiros de Morais et al., 2017; Tylka & Wood-Barcalow 2015). Researchers from Northeast Brazil the show that there is a significant relationship between quality of life and body image among women who declare dissatisfaction with their body image due to excessive body weight (Medeiros de Morais et al., 2017). Interestingly, in other studies we also read that high socio-economic factors (which can be consider as component of quality of life) have a protective effect on body dissatisfaction in women (Dinsa et al., 2012; Tobiasz-Adamczyk, 2000; Wardle et al., 2006). Another study also indicates that the positive body image is more strongly associated with quality of life than negative body image (preoccupation with being overweight) (Tylka & Wood-Barcalow 2015). In the same study, we read that the greater body satisfaction, the greater the investment in appearance and the higher the assessment of appearance, which correlates with the psychological and physical assessment of quality of life (Tylka & Wood-Barcalow 2015). Our research results also overlap with other reports. Researchers from Australia show that the occurrence of a higher level of body dissatisfaction is associated with a worse quality of life (Mond et al., 2013). Moreover, Rodgers et al. (2011) highlight that body satisfaction is related to a higher quality of life in the context of social functioning. In turn, Duarte et al. (2015) establish that body dissatisfaction and the feeling of inferiority that is based on body image

**Table 4**

Linear models of predictors of body dissatisfaction.

Model		B	SE	t	p	LLCI	ULCI
	<b>Normal bodyweight</b>						
X = body image-related negative emotions	Constant	0.79	0.45	1.74	0.09	-0.12	1.70
Y = body dissatisfaction	Body image-related negative emotions	0.04	0.10	3.45	0.001	0.02	0.06
W = body image-related quality of life	Body image-related quality of life	-0.01	0.01	-0.68	0.50	-0.03	0.02
	X x W	0.00	0.0003	0.03	0.98	-0.001	0.001
X = depression	Constant	1.37	0.40	3.43	0.001	0.57	2.17
Y = body dissatisfaction	Depression	0.06	0.03	2.31	0.02	0.01	0.11
W = body image-related quality of life	Body image-related quality of life	-0.01	0.01	-0.94	0.35	-0.03	0.01
	X x W	0.0001	0.0007	0.07	0.94	-0.001	0.002
	<b>Obesity</b>						
X = body image-related negative emotions	Constant	0.84	0.34	2.47	0.02	0.16	1.51
Y = body dissatisfaction	Body image-related negative emotions	0.04	0.01	5.08	0.0000	0.03	0.06
W = body image-related quality of life	Body image-related quality of life	0.03	0.01	2.49	0.02	0.01	0.05
	X x W	-0.001	0.003	-2.40	0.02	-0.001	-0.0001
X = depression	Constant	1.27	0.31	4.17	0.0001	0.66	1.88
Y = body dissatisfaction	Depression	0.08	0.02	4.21	0.0001	0.04	0.11
W = body image-related quality of life	Body image-related quality of life	0.03	0.02	2.42	0.02	0.01	0.05
	X x W	-0.003	0.001	-3.15	0.003	-0.004	-0.001

Note. The statistically significant interactions were highlighted in bold.

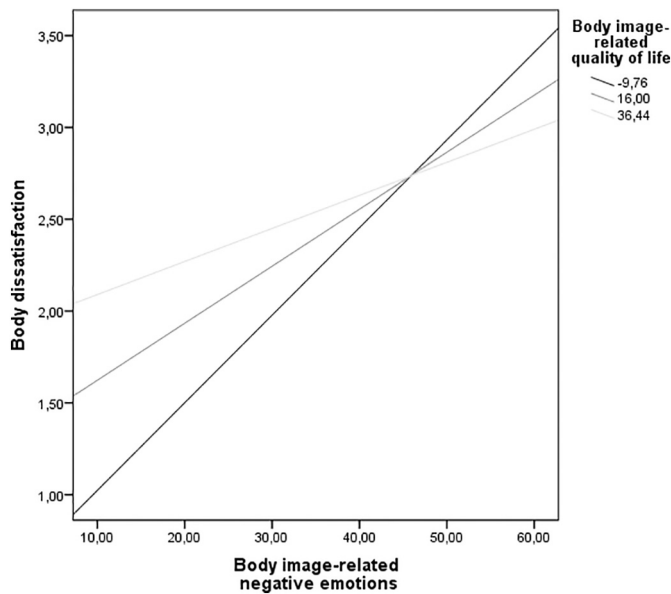


Fig. 2. Moderation analysis: the effect of body image-related negative emotions on body dissatisfaction by body image-related quality of life among obese participants.

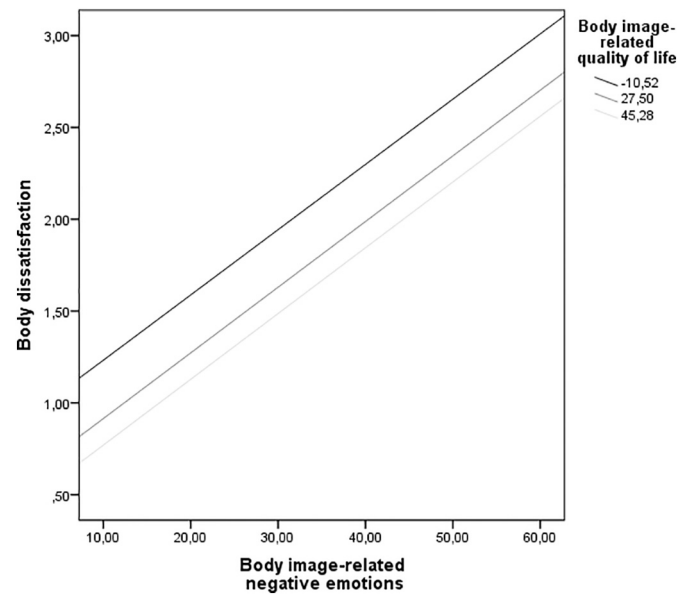


Fig. 4. Moderation analysis: the effect of body image-related negative emotions on body dissatisfaction by body image-related quality of life among normal weight participants.

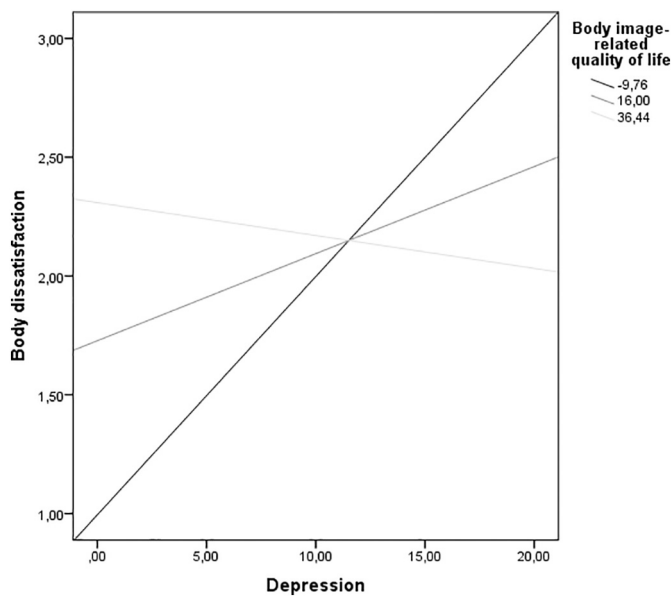


Fig. 3. Moderation analysis: the effect of depression on body dissatisfaction by body image-related quality of life among obese participants.

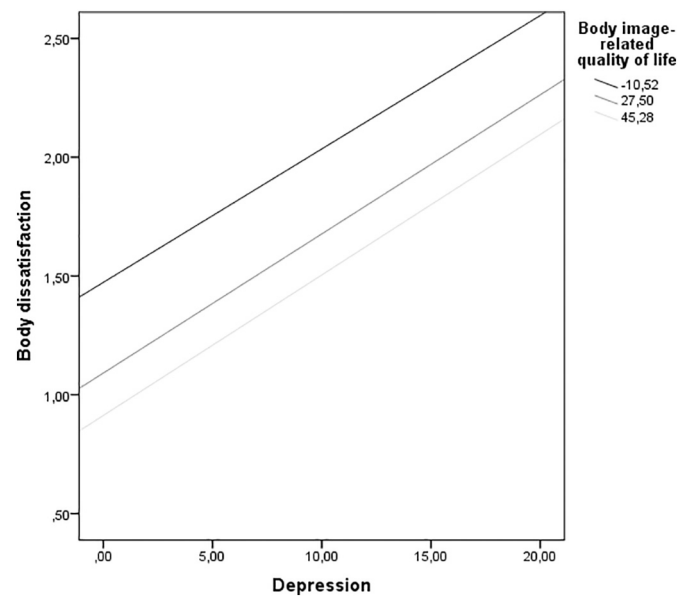


Fig. 5. Moderation analysis: the effect of depression on body dissatisfaction by body image-related quality of life among normal weight participants.

is associated with a poorer quality of life in all its dimensions.

Many studies have shown that there is a strong link between depression, BMI and body image (e.g. Goldschmidt et al., 2016; Paans et al., 2018; Richard et al., 2016). Moreover, it is confirmed that we can observe a strong relationship between depression and weight gain (e.g. Simon et al., 2006), which in turns can very often cause a negative body image (Brechan & Kvaem, 2015). Body dissatisfaction may coexist with stress and other negative emotional states (Dhurup & Nolan, 2014). The most common negative emotions related to negative body image are disgust (Spreckelsen et al., 2018) and shame (Thompson et al., 2003). The dominance of such emotions is often observed in patients with increased levels of depression symptoms. This state of affairs can be explained according to the classic Beck's Theory of Depression, which says that distortions of body image are classified as cognitive symptoms

of depression (Beck, 1976; Noles et al., 1985). Thus, a higher intensity of depression symptoms in obese people may predispose them to be more dissatisfied with the body compared to people with normal body weight (McIntyre et al., 2006; Sarigiani et al., 2020).

Regarding the clinical implications, treatment of obese patients during COVID-19 should focus also on improving quality of life related to body image, while managing negative emotions and body dissatisfaction. Improving quality of life can help reduce body dissatisfaction and improve emotional functioning in the context of experiencing one's own body. Therefore, prevention programs and clinical life programs dealing with obesity should take into account the development of a positive body image in populations. Educational programs should also deal with such topics. Behavioral intervention is important here, which requires that patients introduce new behaviors into their life (Lau et al.,

2007; Vallis et al., 2013), therefore, it is necessary to provide help consisting of, e.g., implementing healthy eating, appropriate physical activity, supplementation as part of the normal routine (Vallis et al., 2013). We read in literature that weight reduction programs that are multidisciplinary, i.e. they rely on cooperation between the patient, doctor, dietitian and other specialists are the most effective methods of improving psychophysical well-being and facilitate lifestyle changes (Powell et al., 2007; Pratt et al., 2013). The obesity prevention guidelines should cover not only specialist and psychological treatment, but also various therapies, health educators and pedagogues. Appropriate education of specialized staff is a chance for professional prevention and consequently for an effective fight against obesity at every stage of human development.

Finally, it is worth emphasizing once again that the current epidemiological situation related to the COVID-19 pandemic poses a serious threat to our mental health. Recent research suggests that negative emotions related to a pandemic may negatively affect various aspects of human functioning, including body image (e.g. Swami et al., 2021). This in requires that we analyze these relationships and create interventions based on the results obtained to help counteract the negative effects of the pandemic.

This study also has some limitations: (1) the sample size can be larger; (2) this is a cross-sectional study (causality cannot be inferred); (3) BMI was calculated based on self-reported data; (4) we used only self-reported questionnaires. These limitations should be taken into account in interpreting our results and planning further studies.

#### CRedit authorship contribution statement

K. C—B., A. M., J. M. and M.P: study design, data collection, first draft, approval of the final version, statistical analysis.

#### Funding statement

The authors received no funding from an external source.

#### Informed consent

Informed consent was obtained from all individual participants included in the study.

#### Ethics approval

The research was approved by the Ethics Committee (no. 2020/11/1/1). All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study.

#### Declaration of competing interest

No conflict of interest.

#### References

- Aksoy, Y. E., & Koçak, V. (2020). Psychological effects of nurses and midwives due to COVID-19 outbreak: The case of Turkey. *Archives of Psychiatric Nursing*, 34(5), 427–433. <https://doi.org/10.1016/j.apnu.2020.07.011>
- Bauer, D. J., & Curran, P. J. (2005). Probing interactions in fixed and multilevel regression: Inferential and graphical techniques. *Multivariate Behavioral Research*, 40(3), 373–400. [https://doi.org/10.1207/s15327906mbr4003\\_5](https://doi.org/10.1207/s15327906mbr4003_5)
- Beck, A. (1976). *Cognitive therapy and the emotional disorders*. International Universities Press.
- Beck, A., Steer, R., & Brown, G. (1996). *Beck Depression Inventory* (2nd ed.). Psychological Corporation.
- Blashill, A. J., & Wilhelm, S. (2014). Body image distortions, weight, and depression in adolescent boys: Longitudinal trajectories into adulthood. *Psychology of Men & Masculinity*, 15(4), 445–451. <https://doi.org/10.1037/a0034618>
- Brechan, I., & Kvalem, I. L. (2015). Relationship between body dissatisfaction and disordered eating: Mediating role of self-esteem and depression. *Eating Behaviors*, 17, 49–58. <https://doi.org/10.1016/j.eatbeh.2014.12.008>
- Bryson, W. J. (2020). Long-term health-related quality of life concerns related to the COVID-19 pandemic: A call to action. *Quality of Life Research*. <https://doi.org/10.1007/s11136-020-02677-1>
- Burlandy, L., Prado Alexandre-Weiss, V., Silva Canella, D., Feldenheimer da Silva, A. C., Maranhã Paes de Carvalho, C., & Rugani Ribeiro de Castro, I. (2020). Obesity agenda in Brazil, conflicts of interest and corporate activity. *Health Promotion International*. Article daaa085. <https://doi.org/10.1093/heapro/daaa085>. Advance online publication.
- Carbone, S. R. (2020). Flattening the curve of mental ill-health: The importance of primary prevention in managing the mental health impacts of COVID-19. *Mental Health & Prevention*, 19, Article 200185. <https://doi.org/10.1016/j.mhp.2020.200185>
- Cash, T. F. (2002). The situational inventory of body-image dysphoria: Psychometric evidence and development of a short form. *International Journal of Eating Disorders*, 32, 362–366. <https://doi.org/10.1002/eat.10100>
- Cash, T. F., & Fleming, E. C. (2002). The impact of body-image experiences: Development of the body image quality of life inventory. *International Journal of Eating Disorders*, 31, 455–460. <https://doi.org/10.1002/eat.10033>
- Cash, T. F., & Pruzinsky, T. (2002). *Body image: A handbook of theory, research, and clinical practice*. Guilford Press.
- Cash, T. F., & Smolak, L. (2012). *Body image. A handbook of science, practice and prevention*. The Guilford Press.
- Centers for Disease Control and Prevention. (2020). Strategies to prevent obesity. <https://www.cdc.gov/obesity/strategies/index.html>.
- Dhurup, M., & Nolan, V. T. (2014). Body image coping strategies among university students and variations in terms of gender in a developing country. *The Anthropologist*, 18(1), 217–225. <https://doi.org/10.1080/09720073.2014.11891539>
- Dinsa, G. D., Goryakin, Y., Fumagalli, E., & Suhreke, M. (2012). Obesity and socioeconomic status in developing countries: A systematic review. *Obesity Reviews: an Official Journal of the International Association for the Study of Obesity*, 13(11), 1067–1079. <https://doi.org/10.1111/j.1467-789X.2012.01017.x>
- Duarte, C., Ferreira, C., Trindade, I. A., & Pinto-Gouveia, J. (2015). Body image and college women's quality of life: The importance of being self-compassionate. *Journal of Health Psychology*, 20(6), 754–764. <https://doi.org/10.1177/1359105315573438>
- Fitzpatrick, J. J. (2020). Science, mental health and the pandemic. *Archives of Psychiatric Nursing*, 34(6). <https://doi.org/10.1016/j.apnu.2020.11.004>
- Gan, W. Y., Mohd Taib, M. N., Mohd Shariff, Z., & Abu Saad, H. (2011). Disordered eating behaviours, depression, anxiety and stress among Malaysian University students. *45(2)*, 296–309.
- Gillen, M. M., & Markey, C. N. (2015). Body image and mental health. In H. S. Friedman (Ed.), *Encyclopedia of mental health* (2nd ed., pp. 187–192). Elsevier.
- Goldschmidt, A. B., Wall, M., Choo, T. H., Becker, C., & Neumark-Sztainer, D. (2016). Shared risk factors for mood-, eating-, and weight-related health outcomes. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, 35(3), 245–252. <https://doi.org/10.1037/hea0000283>
- Hayes, A. F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). The Guilford Press.
- Hemmingsson, E. (2014). A new model of the role of psychological and emotional distress in promoting obesity: Conceptual review with implications for treatment and prevention. *Obesity Reviews: an Official Journal of the International Association for the Study of Obesity*, 15(9), 769–779. <https://doi.org/10.1111/obr.12197>
- Hosseini, S. A., & Padhy, R. K. (2020). *Body image distortion*. StatPearls Publishing.
- Jakatdar, T. A., Cash, T. F., & Engle, E. K. (2006). Body-image thought processes: The development and initial validation of the assessment of body-image cognitive distortions. *Body Image*, 3(4), 325–333. <https://doi.org/10.1016/j.bodyim.2006.09.001>
- Jakovljevic, M. (2020). COVID-19 crisis as a collective hero's journey to better public and global mental health. *Psychiatria Danubina*, 32(1), 3–5. <https://doi.org/10.24869/psyd.2020.3>
- Jakovljevic, M., Bjedov, S., Jaksic, N., & Jakovljevic, I. (2020). COVID-19 pandemia and public and global mental health from the perspective of global health security. *Psychiatria Danubina*, 32(1), 6–14. <https://doi.org/10.24869/psyd.2020.6>
- Kamberi, F., Jaho, J., Mechili, E. A., Sinaj, E., & Skendo, H. (2020). Effect of Covid-19 pandemic on mental health among Albanian people residing in the country and abroad - Implications for mental care. *Archives of Psychiatric Nursing*, 34(6), 507–512. <https://doi.org/10.1016/j.apnu.2020.08.003>
- Kass, A. E., Wildes, J. E., & Cocco, E. F. (2019). Identification and regulation of emotions in adults of varying weight statuses. *Journal of Health Psychology*, 24(7), 941–952. <https://doi.org/10.1177/1359105316689604>
- Kolman, R. (2002). *Jakość życia na co dzień. O umiejętności kształtowania jakości swojego życia*. Oficyna Wydawnicza Ośrodka Postępu Organizacyjnego.
- Lau, D. C., Douketis, J. D., Morrison, K. M., Hramiak, I. M., Sharma, A. M., Ur, E., & Obesity Canada Clinical Practice Guidelines Expert Panel. (2007). 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children [summary]. *CMAJ: Canadian Medical Association journal = Journal de l'Association Medicale Canadienne*, 176(8), S1–S13. <https://doi.org/10.1503/cmaj.061409>
- Levine, M. P., & Piran, N. (2004). The role of body image in the prevention of eating disorders. *Body Image*, 1(1), 57–70. [https://doi.org/10.1016/S1740-1445\(03\)00006-8](https://doi.org/10.1016/S1740-1445(03)00006-8)
- Lydecker, J. A. (2015). Body Image Avoidance Questionnaire (BIAQ). In T. Wade (Ed.), *Encyclopedia of feeding and eating disorders*. Springer. [https://doi.org/10.1007/978-981-287-087-2\\_130-1](https://doi.org/10.1007/978-981-287-087-2_130-1).

- Markey, C. H., & Gillen, M. M. (2016). Body image. In R. Levesque (Ed.), *Encyclopedia of adolescence*. Springer. [https://doi.org/10.1007/978-3-319-32132-5\\_25-2](https://doi.org/10.1007/978-3-319-32132-5_25-2).
- Marks, D. F. (2015). Homeostatic theory of obesity. *Health Psychology Open*, 1–30. <https://doi.org/10.1177/2055102915590692>
- McIntyre, R. S., Konarski, J. Z., Wilkins, K., Soczynska, J. K., & Kennedy, S. H. (2006). Obesity in bipolar disorder and major depressive disorder: Results from a national community health survey on mental health and well-being. *Canadian Journal of Psychiatry. Revue Canadienne de Psychiatrie*, 51(5), 274–280. <https://doi.org/10.1177/070674370605100502>
- Medeiros de Moraes, M. S., Andrade do Nascimento, R., Vieira, M., Moreira, M. A., Câmara, S., Campos Cavalcanti Maciel, Á., & Almeida, M. (2017). Does body image perception relate to quality of life in middle-aged women? *PLoS One*, 12(9), Article e0184031. <https://doi.org/10.1371/journal.pone.0184031>
- Mond, J., Mitchison, D., Latner, J., Hay, P., Owen, C., & Rodgers, B. (2013). Quality of life impairment associated with body dissatisfaction in a general population sample of women. *BMC Public Health*, 13, 920. <https://doi.org/10.1186/1471-2458-13-920>
- Neumark-Sztainer, D., Paxton, S. J., Hannan, P. J., Haines, J., & Story, M. (2006). Does body satisfaction matter? Five-year longitudinal associations between body satisfaction and health behaviors in adolescent females and males. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine*, 39(2), 244–251. <https://doi.org/10.1016/j.jadohealth.2005.12.001>
- Nickel, F., Schmidt, L., Bruckner, T., Büchler, M. W., Müller-Stich, B. P., & Fischer, L. (2017). Influence of bariatric surgery on quality of life, body image, and general self-efficacy within 6 and 24 months—a prospective cohort study. *Surgery for Obesity and Related Diseases: Official Journal of the American Society for Bariatric Surgery*, 13(2), 313–319. <https://doi.org/10.1016/j.soard.2016.08.017>
- Noles, S. W., Cash, T. F., & Winstead, B. A. (1985). Body image, physical attractiveness, and depression. *Journal of Consulting and Clinical Psychology*, 53(1), 88–94. <https://doi.org/10.1037/0022-006X.53.1.88>
- Nurunnabi, M., Almusharraf, N., & Aldeghaither, D. (2021). Mental health and well-being during the COVID-19 pandemic in higher education: Evidence from G20 countries. *Journal of Public Health Research*, 9(s1). <https://doi.org/10.4081/jphr.2020.2010>
- Paans, N., Bot, M., Brouwer, I. A., Visser, M., & Penninx, B. (2018). Contributions of depression and body mass index to body image. *Journal of Psychiatric Research*, 103, 18–25. <https://doi.org/10.1016/j.jpsychires.2018.05.003>
- Pimenta, F. B., Bertrand, E., Mograbi, D. C., Shinohara, H., & Landeira-Fernandez, J. (2015). The relationship between obesity and quality of life in Brazilian adults. *Frontiers in Psychology*, 6, 966. <https://doi.org/10.3389/fpsyg.2015.00966>
- Powell, L. H., Calvin, J. E., 3rd., & Calvin, J. E., Jr. (2007). Effective obesity treatments. *The American Psychologist*, 62(3), 234–246. <https://doi.org/10.1037/0003-066X.62.3.234>
- Pratt, K. J., Lazoric, S., Lamson, A. L., Ivanescu, A., & Collier, D. N. (2013). Quality of life and BMI changes in youth participating in an integrated pediatric obesity treatment program. *Health and Quality of Life Outcomes*, 11, 116. <https://doi.org/10.1186/1477-7525-11-116>
- Raman, J., Spirou, D., Jähren, L., & Eik-Nes, T. T. (2020). The clinical obesity maintenance model: A theoretical framework for bariatric psychology. *Frontiers in Endocrinology*, 11, 563. <https://doi.org/10.3389/fendo.2020.00563>
- Richard, A., Rohrmann, S., Lohse, T., & Eichholzer, M. (2016). Is body weight dissatisfaction a predictor of depression independent of body mass index, sex and age? Results of a cross-sectional study. *BMC Public Health*, 16(1), 863. <https://doi.org/10.1186/s12889-016-3497-8>
- Rodgers, R., Chabrol, H., & Paxton, S. J. (2011). An exploration of the tripartite influence model of body dissatisfaction and disordered eating among Australian and French college women. *Body Image*, 8(3), 208–215. <https://doi.org/10.1016/j.bodyim.2011.04.009>
- Rogosa, D. (1980). Comparing nonparallel regression lines. *Psychological Bulletin*, 88, 307–321. <https://doi.org/10.1037/0033-2909.88.2.307>
- Samlani, Z., Lemfadi, Y., Ait Errami, A., Oubaha, S., & Krati, K. (2020). The impact of the COVID-19 pandemic on quality of life and well-being in Morocco. *Archives of Community Medicine and Public Health*, 6(2), 130–134. <https://doi.org/10.17352/2455-5479.000091>
- Sarigianni, P. A., Olsavsky, A. L., Camarena, P. M., & Sullivan, S. M. (2020). Obesity and depressive symptoms in college women: Analysis of body image experiences and comparison to non-obese women. *International Journal of Adolescence and Youth*, 25(1), 765–779. <https://doi.org/10.1080/02673843.2020.1740751>
- Scardera, S., Sacco, S., Di Sante, J., & Booi, J. (2020). Body image-related cognitive fusion and disordered eating: The role of self-compassion and sad mood. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*. <https://doi.org/10.1007/s40519-020-00868-w>
- Schilder, P. (1950). *The image and appearance of the human body: Studies in the constructive energies of the psyche*. International Universities Press.
- Shek, D. T. L. (2021). COVID-19 and quality of life: Twelve reflections. *Applied Research Quality Life*. <https://doi.org/10.1007/s11482-020-09898-z>
- Shin, N. Y., & Shin, M. S. (2008). Body dissatisfaction, self-esteem, and depression in obese Korean children. *The Journal of Pediatrics*, 152(4), 502–506. <https://doi.org/10.1016/j.jpeds.2007.09.020>
- Simon, G. E., Von Korff, M., Saunders, K., Miglioretti, D. L., Crane, P. K., van Belle, G., & Kessler, R. C. (2006). Association between obesity and psychiatric disorders in the US adult population. *Archives of General Psychiatry*, 63(7), 824–830. <https://doi.org/10.1001/archpsyc.63.7.824>
- Spreckelsen, P. V., Glashouwer, K. A., Bennik, E. C., Wessel, I., & de Jong, P. J. (2018). Negative body image: Relationships with heightened disgust propensity, disgust sensitivity, and self-directed disgust. *PLoS One*, 13(6), Article e0198532. <https://doi.org/10.1371/journal.pone.0198532>
- Steg, L., Buunk, A. P., & Rothengatter, T. (2008). *Applied social psychology: Understanding and managing social problems*. Cambridge University Press.
- Swami, V., Horne, G., & Furnham, A. (2021). COVID-19-related stress and anxiety are associated with negative body image in adults from the United Kingdom. *Personality and Individual Differences*, 170, Article 110426. <https://doi.org/10.1016/j.paid.2020.110426>
- Thompson, M. A., & Gray, J. J. (1995). Development and validation of a new body image assessment scale. *Journal of Personality Assessment*, 64(2), 258–269. [https://doi.org/10.1207/s15327752jpa6402\\_6](https://doi.org/10.1207/s15327752jpa6402_6)
- Thompson, T., Dinnel, D. L., & Dill, N. J. (2003). Development and validation of a body image guilt and shame scale. *Personality and Individual Differences*, 34(1), 59–75. [https://doi.org/10.1016/S0191-8869\(02\)00026-0](https://doi.org/10.1016/S0191-8869(02)00026-0)
- Tiggemann, M. (2004). Body image across the adult life span: Stability and change. *Body Image*, 1(1), 29–41. [https://doi.org/10.1016/S1740-1445\(03\)00002-0](https://doi.org/10.1016/S1740-1445(03)00002-0). PMID: 18089139.
- Tobiasz-Adamczyk, B. (2000). *Wybrane elementy socjologii zdrowia i choroby*. Wydawnictwo Uniwersytetu Jagiellońskiego.
- Tylka, T. L., & Wood-Barcalow, N. L. (2015). What is and what is not positive body image? Conceptual foundations and construct definition. *Body Image*, 14, 118–129. <https://doi.org/10.1016/j.bodyim.2015.04.001>
- Vallis, M., Piccinini-Vallis, H., Sharma, A. M., & Freedhoff, Y. (2013). Clinical review: Modified 5 as: Minimal intervention for obesity counseling in primary care. *Canadian Family Physician Medecin de Famille Canadien*, 59(1), 27–31.
- Wadman, M. (2020). Why COVID-19 is more deadly in people with obesity—even if they're young. <https://www.sciencemag.org/news/2020/09/why-covid-19-more-deadly-people-obesity-even-if-theyre-young>.
- Wardle, J., Haase, A. M., & Steptoe, A. (2006). Body image and weight control in young adults: International comparisons in university students from 22 countries. *International Journal of Obesity*, 30(4), 644–651. <https://doi.org/10.1038/sj.ijo.0803050>
- Weinberger, N. A., Kersting, A., Riedel-Heller, S. G., & Luck-Sikorski, C. (2016). Body dissatisfaction in individuals with obesity compared to normal-weight individuals: A systematic review and meta-analysis. *Obesity Facts*, 9(6), 424–441. <https://doi.org/10.1159/000454837>
- Wilson, R. E., Latner, J. D., & Hayashi, K. (2013). More than just body weight: The role of body image in psychological and physical functioning. *Body Image*, 10(4), 644–647. <https://doi.org/10.1016/j.bodyim.2013.04.007>. PMID: 23726517.
- World Health Organization. (2020). Obesity and overweight. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>.
- World Obesity. (2021). Coronavirus (COVID-19) & obesity. Retrieved from <https://www.worldobesity.org/news/statement-coronavirus-covid-19-obesity>.
- Xu, X., Mellor, D., Kiehne, M., Ricciardelli, L. A., McCabe, M. P., & Xu, Y. (2010). Body dissatisfaction, engagement in body change behaviors and sociocultural influences on body image among Chinese adolescents. *Body Image*, 7(2), 156–164. <https://doi.org/10.1016/j.bodyim.2009.11.003>