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ANTHROPOMETRIC INDICATORS, BODY MASS INDEX AND THEIR ASSOCIATIONS WITH BODY IMAGE AMONG ADULTS: A SYSTEMATIC REVIEW

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ABSTRACT

Obesity and overweight is still a public health problem that occurs throughout the world. Increasing prevalence of both obesity an overweight globally is linked with poor body image perception. The aim of the study was to evaluate the association between anthropometric indicators, body mass index, and body image in adults from the scientific literature. This systematic reviews using spesific keywords with inclusion and exclusion criteria also restricted for study that publish in the last 5 years in 2017-2022. A systematic review to all five studies that included from study selection based on PRISMA shows the result of there was an association between body mass index as anthropometric indicators in adults and body image with p <0.001. This study findings shows that there was significant statistic value of the assocation between BMI and BI. Both women and men has dissatisfaction with their body image and tend to do under-estimation or over-estimation as they want to have a desired body size then have an ideal body image. Some studies explained that women want to have a thiner body type and men want to have a heavier body type. The dissatsifaction of body image can develop into both mental disorder or other nutrition related diseases. Raising the awareness of good body image can help to reduce long-term consequences of dissatisfaction body size or specific body parts.

Keywords : anthropometry, body image, body mass index, obesity

INTRODUCTION

The global cases of obesity has placed obesity prevention and reduction among the most urgent public health issues. In Indonesia, based on Basic Health Research in 2018 shows the result that overweight and obesity still increase over the year. There was increased cases from 2013 with prevalence 13,5 and become higher in 2018 with prevalence 21.8 for all adults age more than 18 years (Ministry of Health, 2018).

Overweight and obesity, as defined by body mass index (BMI) commonly used to report weight status of adults. Body mass idex is one's weight in kilograms (kg) divided by his or her height in meters squared (Kantanista et al., 2017). BMI has been well documented as a negative biological component contributing to body image (BI). Body image is defined as a person's body related self perception and self attitudes, including body related thoughts, feelings, and behaviors (Cash, 2004). Other definition of body image is one of the components of personal identity and can be defined as the figure that one has on their own anthropometric measurement, shapres, and contours of the body, and

the feelings related to these factors that influence the satisfaction with the body shape or specific parts of the body (Monthuy-Blanc et al., 2022).

BI refers to people's cognitive and emotional evaluation of their boy size and shape and the degree to which they place importance on their physical appearance (Baker & Wertheim, 2003). Overweight and obese individuals tend to show negative affective feelings toward their body and more likely to report the sense of dread associated with being evaluated unfavorably while participants in social situations than their normal weight counterparts (Ahadzadeh et al., 2018).

Some instruments have been developed to asses the body image perception among individuals. In this study, the body image instrument will be focused on Stunkar's Figure Rating Scale (FRS) as the instrument to evaluate body image perception using anthropometric indicator such as body mass index that commonly used to determine the weight status among adults. FRS was originally developed in 1983 to indiate the weight status and adapted to asses body image (Stunkard et al., 1983). FRS s a valid and reliable consist of rating scale displaying 9 silhouettes ranging from very thin to very obese (Cardinal et al., 2006)

Moreover, several studies has found the correlation between BMI and BI. Overweight and obese individuals has made a statement that their weight status defined by BMI has an association with poor body image. Obese women and overweight explained that they did not have a satisfaction about their body image compared with normal weight women (Radwan et al., 2019). Other reseach found that in both gender tend to have dissatisfaction with their body image in individual with obese and overweight status (Weinberger et al., 2016).

Therefore, people nowadays have a concern with this issue about awareness of poor body image or negative perception body image with body mass index. The missperception between this body mass index with body image can develop into self dissatisfaction also the mental health disruption such as depression, eating disorder including anorexia nervosa and bulimia nervosa (Gardner, 2014).

Thus, we identified the need to better understand of how body mass index as anthropometric indicators correlate with body image among adults. The objective of this study is to evaluate the association between anthropometric indicators, body mass index, and body image in adults from a systematic review of the scientific literature.

METHODS

The present study is a systematic review of the literature, adopted the standards of Preferred Reporting Items for Systematc Reviews (PRISMA) for conducting the study, obtaining and presenting the result of the study (Page et al., 2021). The databases consulted were Scopus and Pubmed using boolean operators (and/or) for the combination of the following keywords “anthropometric indicators”, “body mass index”, “body image”, “adults”, and “obesity”. There was a restriction of the publish year, the article or study must be published in the last 5 years in 2017-2022.

The inclusion criteria adopted were studied with adults aged 18 to 60 years of both gender, a cross-sectional, case control, or cohort study design are allowed, the study must be shows body image instrument specifically the Figure Rating Scale (FRS) from previous study conducted by Stunkard (Cardinal et al., 2006). The study also has a correlation between Body Mass Index (BMI) and Body Image (BI) with a significant statistical value.

We excluded studied performed with specific groups or that included individuals with associated medical and clinical conditions, pregnant women, women in postpartum, and hospitalized population. The study also excluded if it was an opinion articles, letters, summaries of congresses, and not discuss the topic about anthropometry indicators such as BMI and body image. Article duplication in some databases and did not open to full text access also excluded.

The selection process comprised to identification of titles, abstract, and the ready of the studies in full version. Information about the authors, year of publication, place of the study, age of the population, instrument used to asses body image, anthropometric indicators investigated, objectives of the study, measures of association, the findings or main result were extracted from the studies selected.

RESULTS AND DISCUSSIONS

The search process resulted in 156 scientific articles, which 72 were from Scopus and 84 from Pubmed. After the assessment by the inclusion and exclusion criteria, 51 studies were reading in full and five studies were included in this systematic review. The reasons for exclusion were studies not shows relevant outcomes (10/51), not suitable study design (8/51), not use Stunkard’s Figure Rating Scale as body image instrument (17/51), and had average age during adolexcents and elderly (11/51). The process of selection of articles is described in Figure 1.

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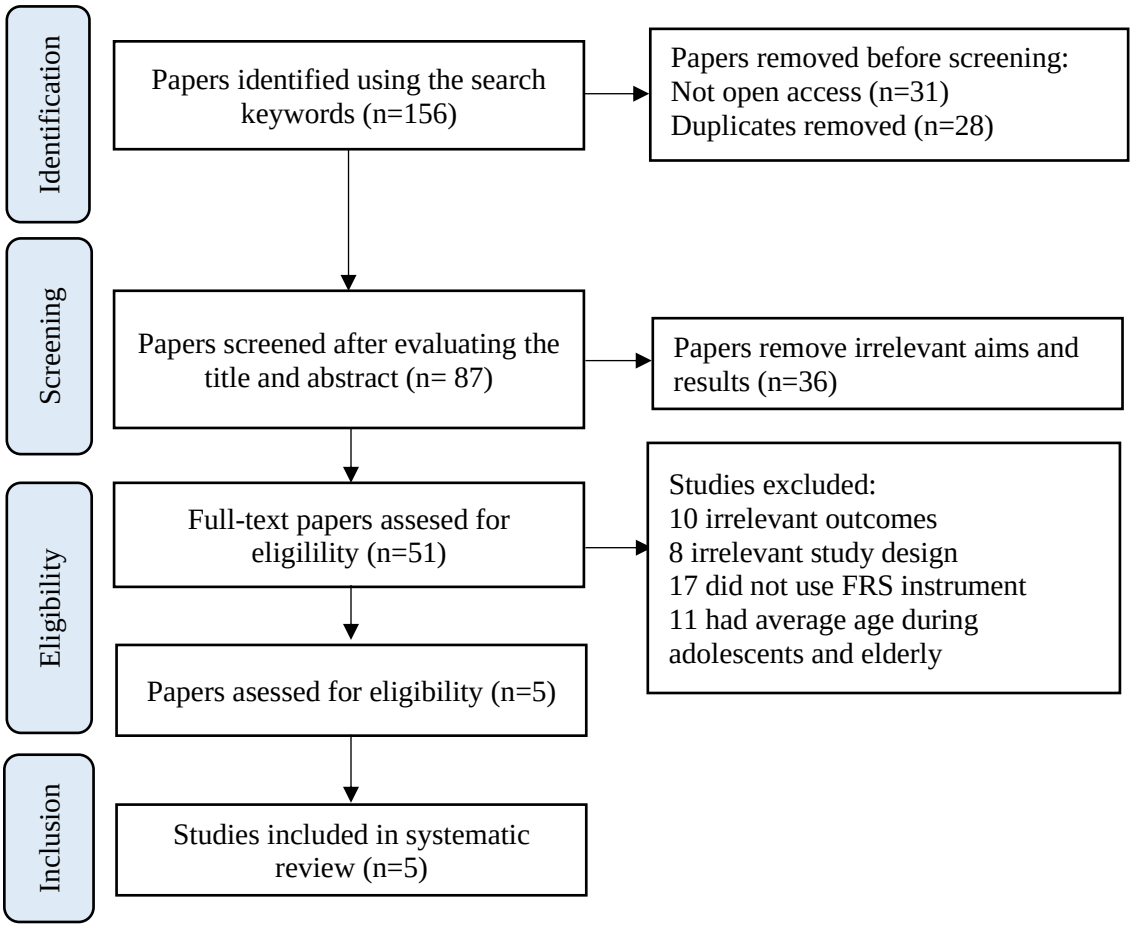

Figure 1. Flowchart of The Process For Selection of Papers : Identification, Screening, Eligibility, and

Inclusion of Scientific Papers in The Sytematic Review Based on PRISMA

The characterization and the main methodological aspects include body image instrument and anthropometric indicators of the five studies included in this review are presented in Table 1. We observed that all publications started in 2018 and two studies were published in 2019. The five studies conducted in Korea, Malaysia, Netherlands, UAE, and Saudi.

The instrument used for the assessment for body image was the Stunkard's Figure Rating Scale (FRS). The two dimensions of body image were the perception of body image (estimation of one's body size, which can be distirted when different from actual body size and satisfaction with body image (Paans et al., 2018). The FRS ranging from 1 to 9 with category very thin until very obese. All studies used BMI as an anthropometric indicators and this index was calculated from the weight and height of participants. The body mass index was measured by the researcher in three studies and the two other studies, BMI was

measured by the participants or self reported. All studies included in this systematic review is cross sectional study design.

Objectives, measure of association, and the main result of the five studies are described in Table 2. All five studies has an objective to investigate and evaluate the association between body mass index and body image also perception

Table 1. Characterization of the Studies Included in the Systematic Review

Author	Country	Study design	Sample	BI Instrument	Anthropometric indicator
Kim et al. (2018)	South Korea	Cross sectional	3.318 participants of Knhanes VI-2 from 19 to 60 years old	Using Stunkard Figure Rating Scale (FRS) with question "How would you describe your body image?" (Very thin ot slightly thin, normal, slightly or very obese) Comparison of body self-image with BMI measured: - Accurate perception (perceived weight = measured); - Overestimation (perceived weight > measured) - Underestimation (perceived weight < measured).	BMI (measured weight and height)
Paans et al. (2018)	Netherlands	Cross sectional	1,452 participants of the Wave 9 of Nesda, from 18 to	Using Stunkard Adult Figure Rating Scale, specific for sex, containing 9 figures (very thin=1 and very heavy=9) - Circle the figure that shows your body today	BMI (measured weight and height)

			60 years old	(Self-perception of body image) - Circle the figure that shows the body that you would like to have (idealized body image) Categories: 1) Individuals who would like to have a larger silhouette 2) Individuals who were satisfied with their body 3) Individuals who would like to have a smaller silhouette Satisfaction with body image	
Ahadzadeh et al. (2018)	Malaysia	Cross sectional	318 malaysian young adults (115 males and 203 females	The Figure Rating Scale (FRS), the instrument comprises two dimensions of positive affect and negative affect related to the influence of the body and physical appearance. Items were scored on a 9-point likert type scale ranging from 1 (not at all) to 9 (extremely)	BMI (self-reported weight and height)
Radwan et al. (2019)	UAE	Cross sectional	308 university student (150 males and 158 females) aged	Self and body sizes were assessed by Stunkard Figure Rating Scale (FRS). It consists of nine silhouettes ranging from very thin (a value of 1) to very obese (a value of 9)	BMI (measured weight and height)

			between 18-25 years old	Participants were asked to rate how they perceived their current body shape or "how they look" by choosing a score that corresponded to their figure on a scale ranging from 1 to 9. The participants were also required to state the 'ideal' figure they desired or "how they would like to look".	
Aljadani et al. (2019)	Saudi	Cross Sectional	226 young saudi woman aged 18-25 years old	The Figure Rating Scale (FRS) were used for the assessment of BID and body image perception. The numbers on the FRS were classified based on BMI categories as follows: - Underweight (1 and 2) - Healthy weight (3 and 4) - Overweight (5-7) - Obese (8 and 9)	BMI (self-reported weight and height)

Table 2. Objectives, Measures of Association, and Main Results of the Studies Included in the Systematic Review

Authors	**Objectives**	**Measure of Association**	**Main Results**
Kim et al. (2018)	To investigate the association between perception of body weight among Korean adults and potential differential association by gender	- Regression coefficient (β) - Confidence interval (CI)	**Women** - Underestimation weight status (vs accurate perception) Total sample: β =0.19; C**I 95% -0.40; 0.76** - Overestimation of weight status (vs accurate perception)

Authors	Objectives	Measure of Association	Main Results
			Total sample: β =0.45; **CI 95% 0.10; 0.79** **Men** - Underestimation of weight status (vs accurate perception) Total sample: β =0.14; **CI 95% -0.25; 0.52** - Overestimation of weight status (vs accurate perception) Total sample: β =-0.09; **CI 95% -0.62; 0.44**
Paans et al. (2018)	- To examine BMI are associated with the self-perception of body image and dissatisfaction with body image - To evaluate the association between obesity along with body size, perception of body image, and dissatisfaction with body image	- Regression coefficient (β) - Odd Ratio (OR) - P-value	- Adjusted linear regression showed that participants with a higher BMI also perceived their body size as being larger (β=1,13 ; **p=<0,001**), - Higher BMI were also associated to greater dissatisfaction of body image (β=0,60 ; **p=<0,001**). - All categories of BMI (normal weight, overweight, and obesity showed that overweight and obese BMI categories tend to have largest perceptual body size and highest frequency of dssatisfaction (OR = 6,00 ; **p= <0,001**)
Ahadzadeh et al. (2018)	To test correlation between body mass index and body	Tested with SEM and average variance extracted	The results indicate that BMI has a negative correlation with BI (β = −0.090, p < 0.05. Strong correlation showed with R^2 = 0,291, means that

Authors	Objectives	Measure of Association	Main Results
	image and fear of negative evaluation	(AVE)) using Smart PLS	BMI has a correlation with body image.
Radwan et al. (2019)	To identify body image dissatisfaction and its association with real and perceived body mass index among university students	- Correlation (R^2) - P-value - Odd ratio (OR	- There was a significant, positive, strong correlation (R2 = 0.84, **p < 0.001**) between perceived BMI and actual BMI. - The actual BMI showed a highly significant strong correlation with BID (r =0.57, **p < 0.001**). - In general, the majority of the participants in all BMI categories perceived their BMI correctly. - The majority of the participants were dissatisfied with their body. - More than half of the females (59.3%) wanted to be thinner, whereas the majority of males (66.7%) desired to be heavier (OR = 0,34 ; **p < 0.001**).
Aljadani et al. (2019)	Explore the existence of BID, and body image perception across Body Mass Index (BMI) categories; and explore the correlation between BMI and BID	P-value	- The majority of participant (61.5%, n= 139) classified with a healthy weight (BMI 18 to 24.9 kg/m2), while 17.7% (n=40) were overweight and 15.3% (n=35) were underweight and only 5.3% (n=13) were obese. - Of 226 participants, 182 (80.5%) were dissatisfied with body image. Most of them desired to lose weight, 135 (59.7%).

Authors	Objectives	Measure of Association	Main Results
			- The BMI and BID correlated positively (r=0.135, **p<0.05**). Those with greater BMI were less satisfied with their current body image.

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of body image based on weight status among adults in many countries. The Stunkard Figure Rating Scale shows score of actual perception body size and desired perception body size. The differences between scores interpreted as body image dissatisfaction. Both positive of negative scores indicates individuals perception to be more overweight or underweight. Zero scores interpreted as body image satisfaction.

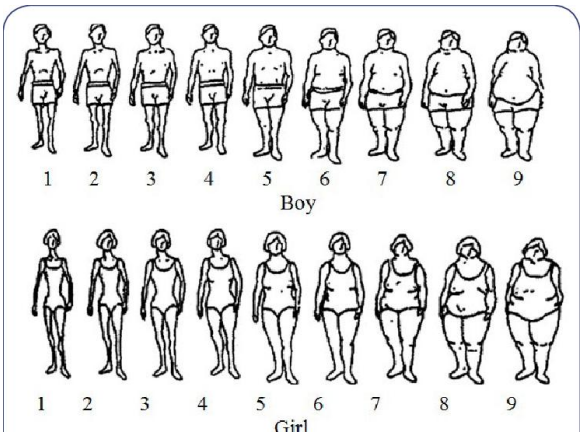

Figure 2. Stunkard Figure Rating Scale (FRS) (Stunkard et al., 1983)

Previous study conducted by (Kim et al., 2018) shows the result underestimation and overestimation of boy image perception in both gender. In women, there are significant association between underestimation (perceived weight < measured) and accurate percerption (perceived weight = measured) (CI 95% -0.40;0.76) and there are significant of overestimation (perceived weight > measured) and accurate perception (perceived weight = measured) (CI 95% 0.10;0.7). In men, there are no significant correlation between perceived weight and measured. Underestimation shows result (CI 95% -0.25;0.52) and overestimation (CI 95% -0.62;0.44).

Meanwhile, study from (Paans et al., 2018) to examine the association between obesity along with body size and perception of body image shows the result that participants with a higher BMI also perceived their body size as being larger (p= <0.001) and higher BMI followed by greater dissatisfaction of body image statistically significant (p= <0.001). In this study, all categories of BMI including normal, overweight and obesity showed that overweight and obese BMI categories tend to have largest perception of body size and highest frequency of dissatisfaction (p= <0.001).

The correlation between BMI and body image has been supported by the study from (Ahadzadeh et al., 2018) which explained about negative affect and positive affect of body image. This study shoed that BMI has a negative effect to body image of each individuals with p-value <0.05. Strong correlation between body mass index and body

image with $R^2 = 0.291$, means that BMI has a correlation with body image. The differences between perceived BMI and actual BMI interpreted as body dissatisfaction. Study conducted by (Radwan et al., 2019) try to identify body image dissatisfaction with real and perceived BMI among univeristy students. There was a positive and strong correlation between perceived BMI and actual BMI ($R^2 = 0.84$ and $p<0.001$). Moreover, the actual BMI showed a highly significant strong correlation with the BID ($p<0.001$). The dissatisfaction of body image in females caused by more than alf of the females wanted to be thinner an majority of males desired to be heavier ($p<0.0001$).

Correlation between body mass index and body image also explained by (Aljadani, 2019) in young saudi woman to explore the existence of body image dissatisfaction and body image perception accross BMI. Figure Rating Scale (FRS) used for determine the body image perception. 182 of 226 total participants (80.5%) were dissatisfied with their body image. Most of them (59.7%) desired to lose weight to meet their body image satisfaction. There were positive correlation between BMI and body image with $p <0.005$. Participants with greater value of BMI were less satisfied with their current body image.

The adult age group is an age group that pays attention to their weight and body size. This help prevent an increase in health problems and misconseptions regarding ideal body size and can contribute to increasing awareness of good nutritional status with the aim of achieving the desired body image satisfaction. Body image reflects a person's subjectivity to the degree of satisfaction with his or her body size or other specific body parts. BMI values gives an idea of how their body image appearance. Although the prevalence of overweight and obesity is not too dominant in the participants, dissatisfaction with their body image is quite high as evidenced by the difference between actual and desired body image. Women and men are bth dissatisfied with their body image (Kim et al., 2018). Dissatisfaction with body image is closely related to depression and eating disorders such as anorexia nervosa, bulimia nervosa, even another types of mental disorders (Schuck et al., 2018).

Overestimation or underestimation between the actual BMI value and the ideal BMI indicates a tendency towards dissatisfaction with the body image of eac individual. Participants who suffer from obesity, normal or underweight prefer a thinner body shape or slim body as a rule of beauty standars for the wider community. In addition to the lack or excess weight, this forms of dissatisfaction with the body structure, size of certain parts of the boy or fat distribution (Silva et al., 2019).

Desired to prefer smaller body size causes them to want lose weight by skipping meals, reducing the frequency of large meals, self induced vomiting, taking unlicensed diet pills such as laxative and diuretic pills, and so on (Sonneville et al., 2016). The research of (Paans et al., 2018) also states that the higher value of BMI, the higher dissatisfaction with one's body image. Individuals who have a BMI >25 kg/m^2 tend to under-estimate their actual body image and actual body image for fear of being judged negatively by other people such as being critized or commented on related to their body size and body shape.

CONCLUSION

This review identified an association between body mass index as anthropometric indicators in adults and body image from different parts of the world in both gender. We found that the higher BMI value, the more they under-estimate their body size. However, in several studies both obese and normal weight status of each individuals were dissatisfied with their body image. Intervention program such as education should be carried out to reduce body image dissatisfaction in those with a high BMI. This is important because body image dissatisfaction can develop to a long-term consequences on both mental health and physical health.

REFERENCES

Ahadzadeh, A. S., Rafik-Galea, S., Alavi, M., & Amini, M. (2018). Relationship between body mass index, body image, and fear of negative evaluation: Moderating role of self-esteem. *Health Psychology Open*, *5*(1), 2055102918774251. https://doi.org/10.1177/2055102918774251

Aljadani, H. M. (2019). The correlation between Body Mass Index and Body Image Dissatisfaction and Body Image Perception in young Saudi women. *Progress in Nutrition*, *21*(4), 984–991. https://doi.org/10.23751/pn.v21i4.8913

Baker, C., & Wertheim, E. H. (2003). Body Image: A Handbook of Theory, Research, and Clinical Practice, edited by Thomas F. Cash and Thomas Pruzinsky, New York: Guilford Press, 2002, 530 pages, $60.00. *Eating Disorders*, *11*(3), 247–248. https://doi.org/10.1080/10640260390218738

Cardinal, T. M., Kaciroti, N., & Lumeng, J. C. (2006). The figure rating scale as an index of weight status of women on videotape. *Obesity (Silver Spring, Md.)*, *14*(12), 2132–2135. https://doi.org/10.1038/oby.2006.249

Cash, T. F. (2004). Body image: Past, present, and future. *Body Image*, *1*(1), 1–5. https://doi.org/10.1016/S1740-1445(03)00011-1

Gardner, R. M. (2014). Weight status and the perception of body image in men. *Psychology Research and Behavior Management*, *7*, 175–184. https://doi.org/10.2147/PRBM.S49053

Kantanista, A., Król-Zielińska, M., Borowiec, J., & Osiński, W. (2017). Is Underweight Associated with more Positive Body Image? Results of a Cross-Sectional Study in Adolescent Girls and Boys. *The Spanish Journal of Psychology*, *20*, E8. https://doi.org/10.1017/sjp.2017.4

Kim, Y., Austin, S. B., Subramanian, S. V., & Kawachi, I. (2018). Body weight perception, disordered weight control behaviors, and depressive symptoms among Korean adults: The Korea National Health and Nutrition Examination Survey 2014. *PLOS ONE*, *13*(6), e0198841. https://doi.org/10.1371/journal.pone.0198841

Ministry of Health. (2018). *Hasil Utama RISKESDAS 2018* (p. 95). Kementerian Kesehatan Republik Indonesia. https://kesmas.kemkes.go.id/assets/upload/dir_519d41d8cd98f00/files/Hasil-riskesdas-2018_1274.pdf

Monthuy-Blanc, J., Corno, G., Ouellet, M., Touré, F., Bourbeau, F., Rousseau, M., Charette, A., Moreau, N., Roy, N., Drapeau, V., Mathieu, M.-E., & Bouchard, S. (2022). eLoriCorps Immersive Body Rating Scale and eLoriCorps Mobile Versions: Validation to Assess Body Image Disturbances from Allocentric and Egocentric Perspectives in a Nonclinical Sample of Adolescents. *Journal of Clinical Medicine*, *11*(5), 1156. https://doi.org/10.3390/jcm11051156

Paans, N. P. G., Bot, M., Brouwer, I. A., Visser, M., & Penninx, B. W. J. H. (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

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *PLOS Medicine*, *18*(3), e1003583. https://doi.org/10.1371/journal.pmed.1003583

Radwan, H., Hasan, H. A., Ismat, H., Hakim, H., Khalid, H., Al-Fityani, L., Mohammed, R., & Ayman, A. (2019). Body Mass Index Perception, Body Image Dissatisfaction and Their Relations with Weight-Related Behaviors among University Students. *International Journal of Environmental Research and Public Health*, *16*(9), 1541. https://doi.org/10.3390/ijerph16091541

Schuck, K., Munsch, S., & Schneider, S. (2018). Body image perceptions and symptoms of disturbed eating behavior among children and adolescents in Germany. *Child and Adolescent Psychiatry and Mental Health*, *12*, 10. https://doi.org/10.1186/s13034-018-0216-5

Silva, D., Ferriani, L., & Viana, M. C. (2019). Depression, anthropometric parameters, and body image in adults: A systematic review. *Revista Da Associacao Medica Brasileira (1992)*, *65*(5), 731–738. https://doi.org/10.1590/1806-9282.65.5.731

Sonneville, K. R., Thurston, I. B., Milliren, C. E., Gooding, H. C., & Richmond, T. K. (2016). Weight misperception among young adults with overweight/obesity associated with disordered eating behaviors. *The International Journal of Eating Disorders*, *49*(10), 937–946. https://doi.org/10.1002/eat.22565

Stunkard, A. J., Sørensen, T., & Schulsinger, F. (1983). Use of the Danish Adoption Register for the study of obesity and thinness. *Research Publications - Association for Research in Nervous and Mental Disease*, *60*, 115–120.

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