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Association of Body Mass Index with Self-Esteem and Social Appearance Anxiety among University Students: A Cross-Sectional Study

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ABSTRACT

Background: Many studies reported that obesity not only influences self-esteem but social appearance anxiety as well. Distortions of self-perceived body image can be seen in teenagers starting from the age of 15 and are often carried into their university years. Therefore, this study was aimed to determine the relationship between body mass index with self-esteem and social appearance anxiety among the university students. **Methods:** A total of 183 university students (mean age ± SD = 21. 02 ± 1.37 years) participated in this cross-sectional study. An online questionnaire consisting of demographic questions, questions on self-esteem, and the social appearance anxiety scale was used to collect the data. All the data were analysed descriptively and using Chi Square test. **Results:** The results demonstrated no significant association between body mass index and self-esteem ($p>0.05$), and body mass index and social appearance anxiety ($p>0.05$). However, there is a significant association between self-esteem and social appearance anxiety among the respondents, based on Chi Square test analysis ($p < 0.05$). The results also showed an inverse relationship between self-esteem and social appearance anxiety such that students with low self-esteem could have high social appearance anxiety and vice versa. **Conclusion:** This study found that self-esteem is significantly associated with social appearance anxiety among university students. Therefore, it is important for the university management to address the psychological health issues of students, such as low self-esteem and social appearance anxiety, as these may not only affect academic adjustment but may be a risk factor of other psychosocial problems.

Keywords: Body mass index, self-esteem, social appearance anxiety, university students

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INTRODUCTION

The increasing prevalence of obesity in Malaysia can be attributed to the progressively increasing availability of food calorie intake per capita in Malaysia and the decrease of physical activity per capita in the wake of urbanisation (Lee & Wan Muda 2019). The Malaysian government's response to address this issue was to implement awareness programmes and emphasise the role of every individual to bear the responsibility in maintaining their own health. However, there has not been a single systematic evaluation of the success of these implemented strategies and therefore no evidence of success was reported (Davey et al. 2013).

Apart from the association of obesity with increased risk of mortality and comorbidities such as diabetes mellitus, hypertension, coronary heart disease and other conditions (Wilborn et al. 2005); mental illness has also been associated with obesity in which case obese individuals have a 30-70% increased risk of developing a mental illness (De Hert et al. 2011). It is unquestionable that university students are exposed to increased levels of stress throughout their study and long-term stress levels contribute to increased cortisol levels. Long term cortisol levels have been associated with almost 10 times increased risk of developing obesity (van der Valk, Savas & van Rossum 2018).

Obese college students report a range of social and emotional problems including stigmatisation, depression, and altered academic achievements (Desai et al. 2008). Obesity is associated with marked lower overall academic achievement, higher depressive symptoms and use of diet pills (Odlaug et al. 2015). The researchers reported that obese university male students had significantly high rates of Trichotillomania while obese female students reported high rates of panic disorders.

There is a significant relationship between obesity and depression and many studies have found that obesity has an effect on lowering self-esteem as well as social appearance anxiety which is mainly attributed to the

distorted self-perceived body image among adolescents. This distortion of self-perceived body image can be seen to start from the age of 15 and as teenagers begin tertiary education in universities this self-perceived distortion may be carried into their university years with an increased amount of pressure from peer evaluation. There is also a significant link between obesity and sex differences as females have a higher prevalence of obesity than males. University students particularly are prone to increased levels of stress which has been associated with an increased risk of developing obesity and this has been proven to be correlated with a decline in self-esteem and social appearance anxiety which results in decreased psychological adjustment and decline in academic performance. There is currently limited research among young people in metropolitan areas to give a wider grasp of the association of obesity with self-esteem and social appearance anxiety among university students. Perhaps the outcomes of this study will provide valuable insight in the development of treatment plans tailored for university students in terms of weight management, stress coping and counselling strategies.

MATERIAL AND METHODS

Study Design

A cross-sectional study was conducted to determine the association between Body Mass Index (BMI) with self-esteem and social appearance anxiety among university students.

Participants

This study involved students from Universiti Tunku Abdul Rahman (UTAR). The respondents for this study were limited to students from the Sungai Long campus only. The sample size was calculated by using Krejcie-Morgan formula (1970). The convenience sampling method was used. Inclusion criteria included students of Universiti Tunku Abdul Rahman (UTAR), Sungai Long Campus pursuing a full-time or part-time course. Male and female students were recruited.

Ethical Consideration:

The ethical approval for this study was obtained from the Scientific and Ethical Review Committee (SERC) of UTAR (U/SERC/232/2021). Informed consent was obtained from all the respondents in the online questionnaire before they could proceed to the rest of the questionnaire. Furthermore, all respondents were informed regarding their right to withdraw from the study at any moment should they decide to. Apart from this, each respondent was required to sign the Personal Data Protection Statement in the questionnaire. The confidentiality of all the personal data provided by the respondents was assured.

Data Collection

An online questionnaire was used for the data collection. The questionnaire consisted of five sections. The first section comprised of an introduction to the study as well as explanations on the participation criteria, and a section for the informed consent of the respondent. The second section consisted of the personal data protection statement as well as the electronic signature of the respondents. The third section was solely dedicated to the demographic data of the respondents. The demographic data section requested data such as the respondents' student ID, age, gender, race, level of education and year of study. The weight (in kilograms) and height (in meters) of the respondents were also requested.

Next section of the questionnaire comprised of the Rosenberg Self-Esteem Scale. The Rosenberg Self Esteem Scale is a widely used self-reported 10-item scale used to assess the level of self-esteem in an individual. The scale is scored using a 4-point Likert scale ranging from "strongly agree" to "strongly disagree". The first, second, fourth, sixth and seventh items on the scale are scored in the manner of which 3 represents "Strongly Agree" and 0 represents "Strongly Disagree". Meanwhile the third, fifth, eighth, ninth and tenth items are reverse scored in which 0 represents "Strongly Agree" and 3 represents "Strongly Disagree". The range of scores goes from 0 which is the lowest to the highest of 30 in which any score between 15 and 25 indicate the normal range while scores below 15 indicate low self-esteem. As such, scores above 25 indicate high self-esteem.

The fifth section includes the Social Appearance Anxiety Scale. The Social Appearance Anxiety Scale developed by Hart et al. in 2008 is a 16-item scale used to assess the level of fear of overall appearance evaluation, scored using a five-point Likert scale ranging from 1 representing "Strongly Disagree" to 5 representing "Strongly Agree". While the first item is reverse scored, the other items are scored as is and the range of scores go from the lowest of 16 to the highest of 80. The higher scores indicate a higher level of social appearance anxiety among individuals.

The researchers distributed the link to the online questionnaire along with a message and a small introduction of the research to all the respondents via WhatsApp, Instagram, Microsoft Teams and Facebook Messenger.

After collecting the data, all the data was converted systematically into a Microsoft Excel document and the data were analysed using SPSS. All data collected for this study were compiled into and summarised using Microsoft Excel. The data was analysed using IBM Statistical Package for Social Sciences (SPSS) version 26.0 software. Chi square analysis and multiple regression were used to analyse the data. A p-value of < 0.05 was considered as statistically significant at 95% confidence interval for every statistical test conducted in this study.

RESULTS

A total of one hundred and eighty-three university students participated in this study. Majority of the respondents were females with a 69.9% (n = 128). while 30.1% (n = 55) were males. The mean age of the respondents was 21.02 (1.37) years. The age of the respondents ranged from 18 years old to 24 years.

Majority of the respondents were Chinese (97.3%) followed by Indians with 1.6% (n = 3), Malay (n = 1) and Eurasian (n = 1) with 0.5%. Majority of the respondents came from bachelor's degree level of education with 93.4% (n = 171) followed by foundation level of education with 6.6% (n = 12). There we no respondents from the postgraduate level of education. Majority of the respondents of this study are in their Second year of study with a percentage of 26.8% (n = 49), followed by Year 3 with 26.2% (n = 48), Year 4 with 25.7% (n = 47), Year 1 with 18% (n = 33) and lastly the minority of the respondents were in their Fifth year of study with 3.3% (n = 6). Most of the respondents had a normal body mass index (BMI) with a percentage of 55.7% (n = 102), followed by underweight with 26.2% (n = 48), overweight with 11.5% (n = 21) and lastly, obese with 6.6% (n = 12). The mean score of the Rosenberg Self-Esteem Scale scores was 16.47 (3.65). The scores ranged from 7 to 26.

Table 1: Self-esteem and Social Appearance Anxiety Scale categories of the respondents

Self-esteem	**Frequency**	**Percent**
Low self esteem	69	37.7
Normal	113	61.7
High self esteem	1	0.5
Social Appearance Anxiety Scale	**Frequency**	**Percent**
Low social appearance anxiety	3	1.6
Average social appearance anxiety	138	75.4
High social appearance anxiety	42	23.0

The total scores of the respondents were categorized into low, normal, and high self-esteem categories based on the cut off scores of the Rosenberg Self-Esteem Scale where scores less than 15 represent low self-esteem, scores between 15 and 25 show normal range and scores above 25 represent high self-esteem. Based on Table 1, most of the respondents were within the normal range with 61.7% respondents (n = 113), followed by respondents with low self-esteem with a percentage of 37.7% (n = 69) and lastly the minority is those with high self-esteem with 0.5% (n = 1).

The mean score of Social Appearance Anxiety Scale is 47.07 (11.51). The respondents' scores ranged from 16 to 77. Table 1 shows the categories of the respondents based on the Social Appearance Anxiety Scale where scores lesser than 21 were categorised as low social appearance anxiety, scores between 21 and 55 were categorised as having average social appearance anxiety, and scores higher than 55 were categorised as having high social appearance anxiety.

As seen in Table 2 most of the respondents had average scores of social appearance anxiety with a percentage of 75.4% (n = 138), followed by those with high scores of social appearance anxiety with 23% (n = 42). The minority of the respondents had low scores of social appearance anxiety with only 1.6% (n = 3).

Table 2: The Association between BMI and Self-esteem using Chi-Square Test

	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	10.084[a]	6	0.121
Likelihood Ratio	6.610	6	0.358
Linear-by-Linear Association	.338	1	0.561
N of Valid Cases	183		

Note: df = degree of freedom, level of significance = $p < 0.05$

Chi Square analysis was performed to determine the association between BMI and self-esteem of the respondents. Table 2 shows that the relationship between Body Mass Index and Self-Esteem is not statistically significant where $p > 0.05$. Therefore, there was no association between BMI and self-esteem.

Table 3: The Association between BMI and Social Appearance Anxiety using Chi-Square Test

	Value	**df**	**Asymptotic Significance (2-sided)**
Pearson Chi-Square	5.93[a]	6	0.43
Likelihood Ratio	6.91	6	0.32
Linear-by-Linear Association	.00	1	0.94
N of Valid Cases	18		

Note: df = degree of freedom, level of significance = $p < 0.05$

Chi Square analysis was performed to determine the association between BMI and social appearance anxiety of the respondents. Table 3 shows that the relationship between Body Mass Index and Social Appearance Anxiety is not statistically significant where $p > 0.05$. Therefore, there was no statistically significant association between BMI and social appearance anxiety.

Chi Square analysis was performed to determine the association between self-esteem and social appearance anxiety of the respondents. Table 4 shows that the relationship between Self-Esteem and Social Appearance Anxiety is statistically significant where $p < 0.05$. Therefore, there was a statistically significant association between self-esteem and social appearance anxiety.

Table 4: The Association between Self-esteem and Social Appearance Anxiety using Chi-Square Test

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	79.70[a]	4	0.00
Likelihood Ratio	29.25	4	0.00
Linear-by-Linear Association	14.68	1	0.00
N of Valid Cases	183		

Note: df = degree of freedom, level of significance = $p < 0.05$

Table 5: The Association between BMI with Self-esteem and Social Appearance Anxiety using Multiple Regression Analysis

Coefficients					
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Sig
(Constant)	51.78	1.63		31.77	0.00
BMI Categories	0.86	0.98	0.06	0.87	0.38
SES Categories	-8.84	1.59	-0.38	-5.53	0.00

a. Dependent Variable: Social Appearance Anxiety Scores, level of significance = $p < 0.05$

A multiple regression analysis was conducted to determine the association between BMI with self-esteem and social appearance anxiety. Table 5 shows that Self-Esteem (-0.381) was the biggest contributor to social appearance anxiety as compared to BMI (0.06). There is a significant association between self-esteem and social appearance anxiety where $p < 0.05$. Whereas the association between BMI and social appearance anxiety is not statistically significant where $p > 0.05$.

DISCUSSION

Obesity is one of the most important public health problems in the world (Abdelaal et al. 2017). Disruptions in the way individuals perceive their body may cause eating disorders and/or obesity (Pellizzer et al. 2018). Elevated BMI negatively affects the quality of life and the emotional well-being of individuals either directly by way of causing various health problems (Herhaus et al. 2020).

A total of 183 students from UTAR, Sungai Long Campus participated in this study. Among the 183 respondents, the weight and height of the respondents were collected in kilograms and metres respectively. The individual BMI of the respondents was then calculated using the formula kg/m^2 using Microsoft Excel. The respondents' BMI was then categorized into four groups according to the Asian BMI classification where BMI values of <18.5 were categorized as underweight, values between 18.5 and 22.9 were categorized as normal, values between 23 and 27.5 were categorized as overweight and values > 27.5 were categorised as obese. Among the 183 participants in this study, 102 of the respondents were within the normal range, 48 respondents were under the underweight category, 21 respondents were categorized as overweight, and 12 respondents were categorized as obese. A previous study conducted in Malaysia reported that 16.7% male students and 20.9% female students were underweight while 17.8% of male student and 10% of female students were overweight (Abdull Hakim 2012).

In the present study, the Rosenberg Self-Esteem Scale was used to evaluate the self-esteem of the participants. The Rosenberg Self-Esteem Scale has been reported to be highly reliable and valid. It has been reported that the Rosenberg Self-Esteem Scale has a Cronbach's alpha internal consistency coefficient ranging from 0.77 to 0.88 and a test-retest reliability ranging from 0.82 to 0.85 (Blascovich & Tomaka 1993). Most of the participants had self-esteem scores within the normal range. However, 69 respondents reported scores within the low self-esteem range and only one respondent was reported to fall within the high self-esteem category. University students often experience chronic stress. Self-esteem is one of the most important factors in the process of psychosocial growth and has remarkable effect on thoughts, feelings, values, and goals. Self-esteem is defined as the person's overall subjective view of one's own worth, which is related to a feeling of personal aptitude, success and pride, or to a feeling of despair and shame (Baumeister et al, 2003). Self-esteem is considered very important for mental health; which influences the emotional states, general adaptability to life-challenges and resilience to stress during lifetime (Dishman et al. 2006). Undergraduate students are more prone to mental illness as they are going through physiologic and social changes that happen in late adolescence and early adulthood (Radeef & Faisal 2019).

In this study, the Social Appearance Anxiety Scale was used to determine the level of social appearance anxiety of the participants. The Social Appearance Anxiety Scale has been reported to have a convergent validity of 0.95 (Levinson & Rodebaugh 2011). Most of the respondents reported scores within the average range with 138 respondents, followed by 42 respondents that reported scores indicating high levels of social appearance anxiety, and 3 respondents who reported scores categorized as having low levels of social appearance anxiety.

Social appearance anxiety is a term related to the individual's concerns about their outer appearance so it is described as the worry and tension they experience if their outer appearance is assessed and criticized by the society. Social appearance anxiety in individuals who belongs to the adolescent category and the youth category might experience serious problems in their future. It is stated that appearance anxiety includes all the features such as height, weight, complexion, skin colour, eye colour, facial structure, nose, lips, hair, etc.

The issues of body image and perceptions of fat and thin structures have become main point of focus as people were conscious about being attracted by others. Sociocultural factors play an important role in determining the level of body dissatisfaction. Body dissatisfaction can be changed according to different cultures and different places. This helps the individuals to develop different types of coping attitudes among them (Reshma et al. 2020). Parental educational level may be a protective factor in the development of social appearance anxiety (Sahin et al. 2013).

Statistical analyses show a significant relationship between self-esteem and social appearance anxiety however no significant association was found between BMI with either self-esteem or social appearance anxiety. The findings show a negative relationship between self-esteem and social appearance anxiety. This means that exists an inverse relationship between self-esteem and social appearance anxiety where individuals with low self-esteem have higher social appearance anxiety scores. This is consistent with a previous study which stated that adolescents with low self-esteem can have high scores of social appearance anxiety and vice versa. According to the findings of this study, there was also a statistically significant negative relationship between self-esteem and negative body image. This could also be explained by the increased awareness and capability to perceive their own level of attractiveness and their increased interest to their physical appearance as perceived by others (Sahin et al. 2014).

The statistical analyses also showed that there was no significant association between BMI with self-esteem or social appearance anxiety. Using the multiple regression model, the standardized Beta value explains the level of contribution of the independent variable to changes in the dependent variable. It was seen that BMI only has a value of (0.60) which shows that there is some level of contribution of BMI to social appearance anxiety, but it is not statistically significant enough to matter. The results also show that there is no significant relationship between BMI and self-esteem. A previous study conducted among medical students in India reported that there was no association between BMI and physical self-concept (Shivani et al. 2013). The findings of the present study are in accord with the reports of a previous study conducted among children and adolescents which states that although the results supported the inverse relationship between obesity and self-esteem, there was no strong relationship as the self-esteem scores of children and adolescents with and without obesity fell within the normal range (French et al. 1995). This could be explained by the recent lockdowns implemented during the COVID-19 pandemic. As more individuals have been cooped up at home, the lack of physical gatherings and in-person meetings could lead to a decrease in social appearance anxiety regardless of BMI. The present results suggest that negative consequences of high body mass index on self-esteem and social appearance anxiety are not seen in university students. It may be that academic achievement nullifies the effect on BMI and as the age progresses, appears later in life.

The findings of this study have shown that there is an association between self-esteem and social appearance anxiety among university students. The results also show that there was no significant association with either BMI and self-esteem or body mass index and social appearance anxiety. It is important for universities to address the psychological health issues of students such as low self-esteem and social appearance anxiety as these may not only affect academic adjustment but may be risk factors to other mental health problems as well. It would also be beneficial for counsellors to investigate the implications of bullying on self-esteem and social appearance anxiety as this could also potentially lead to a plethora of mental health problems and psychological adjustment of the students. Further research is needed in large number of subjects of different age groups (preadolescents, adolescents and adults) and economic/professional groups to evaluate the generalizability of present results.

Although this study was conducted using validated and highly reliable scales, there are still several limitations to the study. The main limitation is the relatively small sample size of the study. Since the study design adopted for this study is cross-sectional, it cannot establish a cause-and-effect relationship or analyse behaviour over a period of time. Besides this, the results cannot be generalized to other populations due to the small sample size. Furthermore, the sampling method of this study was convenience sampling which makes the study prone to bias.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

1. Abdull Hakim, N., H., Muniandy, N., D., Ajau, D. (2012). Nutritional Status and Eating Practices among University Students in Selected Universities in Selangor, Malaysia. *Asian Journal of Clinical Nutrition 4*(3):77-87 DOI: 10.3923/ajcn.2012.77.87
2. Abdelaal, M., le Roux, C.W., & Docherty, N.G. (2017). Morbidity and mortality associated with obesity. *Annals of* Translational *Medicine, 5*(7), 161. doi: 10.21037/atm.2017.03.107
3. Baumeister, R., F., Campbell, J., D., Krueger, J., I., Vohs, K., D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or

healthier lifestyles? *Psychological Science, 4*:1–44.
4. Blascovich, J., & Tomaka, J. (1993). Measures of Self-Esteem. In J. P. Robinson, P. R. Shaver, & L. S. Wrightsman (Eds.), Measures of Personality and Social Psychological Attitudes (3rd ed., pp. 115-160). Ann Arbor: Institute for Social Research. https://doi.org/10.1016/B978-0-12-590241-0.50008-3
5. Davey, T. M., Allotey, P., & Reidpath, D. D. (2013). Is obesity an ineluctable consequence of development? A case study of Malaysia. *Public health*, *127*(12), 1057–1062. https://doi.org/10.1016/j.puhe.2013.09.008
6. De Hert, M., Correll, C. U., Bobes, J., Cetkovich-Bakmas, M., Cohen, D., Asai, I., Detraux, J., Gautam, S., Möller, H.J., Ndetei, D. M., Newcomer, J. W., Uwakwe, R., & Leucht, S. (2011). Physical illness in patients with severe mental disorders. I. Prevalence, impact of medications and disparities in health care. *World Psychiatry: Official Journal of the World Psychiatric Association (WPA)*, *10*(1), 52–77. https://doi.org/10.1002/j.2051-5545.2011.tb00014.x
7. Desai, M., Miller, W., Staples, B., & Bravender, T. (2008). Risk Factors Associated with Overweight and Obesity in College Students. *Journal of American College Health*, *57*(1), 109-114. doi: 10.3200/jach.57.1.109-114
8. Dishman, R., K., Hales, D., P., Pfeiffer, K., A., Felton, G., A., Saunders, R., Ward, D., S., et al. (2006). Physical self-concept and self-esteem mediate cross-sectional relations of physical activity and sport participation with depression symptoms among adolescent girls. *Health Psychology, 25*:396.
9. French, S. A., Story, M., & Perry, C. L. (1995). Self-esteem and obesity in children and adolescents: a literature review. *Obesity Research*, *3*(5), 479–490. https://doi.org/10.1002/j.1550-8528.1995.tb00179.x
10. Herhaus, B., Kersting, A., Brähler, E., & Petrowski, K. (2020). Depression, anxiety and health status across different BMI classes: A representative study in Germany. *Journal of Affective Disorders,* 276, 45-52. doi: 10.1016/j.jad.2020.07.020
11. Lee, Y. Y., & Wan Muda, W. (2019). Dietary intakes and obesity of Malaysian adults. Nutrition Research and Practice, 13(2), 159–168. https://doi.org/10.4162/nrp.2019.13.2.159
12. Levinson, C. A., & Rodebaugh, T. L. (2011). Validation of the Social Appearance Anxiety Scale: factor, convergent, and divergent validity. Assessment, 18(3), 350–356. https://doi.org/10.1177/1073191111404808
13. Odlaug, B. L., Lust, K., Wimmelmann, C. L., Chamberlain, S. R., Mortensen, E. L., Derbyshire, K., Christenson, G., & Grant, J. E. (2015). Prevalence and correlates of being overweight or obese in college. Psychiatry Research, 227(1), 58–64. https://doi.org/10.1016/j.psychres.2015.01.029
14. Pellizzer, M. L., Tiggemann, M., Waller, G., & Wade, T. D. (2018). Measures of body image: Confirmatory factor analysis and association with disordered eating. Psychological Assessment, 30 (2), 143-153. doi: 10.1037/pas0000461
15. Radeef, A., S., Faisal, G., G. (2019). Low Self-esteem and its Relation with Psychological Distress among Dental Students. European Journal of Medical and Health Sciences, 1(1) 1-4. DOI: http://dx.doi.org/10.24018/ejmed.2019.1.1.21
16. Reshma, U., Adithi, R., Vignesh, K., Prem Kumar, S. (2020). A Study on Social Appearance Anxiety and Coping among College Students. BSSS Journal of Social Work, 12(1), 1-10.
17. Şahin, E., Barut, Y., & Ersanlı, E. (2013). Parental Education Level Positively Affects Self-Esteem of Turkish Adolescents. Journal of Education and Practice, 4(20), 87–97.
18. Sahin, E., Yasar, Barut, Y., Ersanlı, E., Kumcağız, H. (2014). Self-Esteem and Social Appearance Anxiety: An Investigation of Secondary School Students. Journal of Basic and Applied Scientific Research. 4(3): 152-159.
19. Shivani, A., Payal, B., Simran, K., Rashmi, B. (2013). Effect of body mass index on physical self-concept, cognition & academic performance of first year medical students, Indian Journal of Medical Research,138(4), 515–522.
20. van der Valk, E. S., Savas, M., & van Rossum, E. (2018). Stress and Obesity: Are There More Susceptible Individuals? Current Obesity Reports, 7(2), 193–203. https://doi.org/10.1007/s13679-018-0306-y
21. Wilborn, C., Beckham, J., Campbell, B., Harvey, T., Galbreath, M., La Bounty, P., Nassar, E., Wismann, J., & Kreider, R. (2005). Obesity: prevalence, theories, medical consequences, management, and research directions. Journal of the International Society of Sports Nutrition, 2(2), 4–31. https://doi.org/10.1186/1550-2783-2-2-4