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The correlation between Body Mass Index and Body Image Dissatisfaction and Body Image Perception in young Saudi women

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Summary. *Background/ aims:* Staying healthy may become a challenge, especially for young women, who are at greater risk of Body Image Dissatisfaction (BID) and weight gain compared with other age groups. Greater body size links to BID, among young women. The prevalence of BID iis also influenced by many factors including culture. Therefore, this research aimed to; (1) explore the existence of BID, and body image perception across Body Mass Index (BMI) categories; and (2) explore the correlation between BMI and BID among a sample of Young Saudi women (n=226) who live in Makkah region. *Methodology:* A self-administrative questionnaire was used for data collection on social-demographic and anthropometric measurements, and a figure rating scale of 9 graphics of body shape by Stunkard et al. (1983) was used to measure the BID and body image perception. The BID score was calculated as the differences between the perceived current image and ideal image. Body image perception was calculated as the differences between perceive body image and actual BMI. BMI for each participant was calculated from self-reported weight and height. *Results:* The participants were 226 young women with an age range from 18 to 35 years. The findings indicated that BMI positively correlated with BID, but this correlation was small with r=0.135, P value > 0.01. Even though the prevalence of overweight and obesity was low (23%), the prevalence of BID was high (80.5%). Of those who classified as healthy weight, 57.6% wanted to lose weight, while 17.3% wanted to add weight. The majority of participants (61.5%) adequately estimated their BMI, while 28.3% underestimated their weight and 10% overestimated it. All the obese and 32% of the overweight underestimated their BMI, while 20% of underweight participants overestimated their BMI. *Conclusion:* The findings indicated that most of the young women were dissatisfied with their weight, even if it is within normal BMI, and had a misconception about their current weight.

Key words: BMI, body image dissatisfaction, body image perception, women, Saudi, perceive body image

Introduction

Maintaining a healthy weight is crucial, as it lowers future risks of diabetes, cardiovascular diseases, various cancers, and other chronic illnesses (1, 2). In communities like Saudi Arabia where there is a high prevalence of obesity and a burden of type 2 diabetes, aspects of Body Mass Index (BMI) and body image are critical to ensure that the young women adopt healthy alternatives to maintain a healthy weight (3-7). BMI is often used as an assessment tool in estimating a person's weight status. The BMI refers to the ratio of one's weight to his or her height (8). It can be a predictor of body image dissatisfaction (BID) in some cases. Moreover, young women are at greater risk of body image concerns and eating disorders compared to other age group. A negative body image concern links to an adverse effect on an

individual's physical and mental health and on public health as well (9-12).

Body image is a biased concept of an individual's physical look that is based on both self-perception and the perception of peers (10). In addition to perception, body image encompasses behavioural, cognitive, and affective body aspects (9). The concept of body image involves multiple dimensions like psychological, neurological, and sociocultural elements (13-17). BID occurs when an individual has negative feelings, thoughts about their own body and can't appreciate, respect, and accept their body as it is (11, 18). BID has an impact on individuals' self-esteem and confidence as one may not be comfortable among their peers. Body image since is a factor that can make an individual more to eating disorders (9).

While BID can cause eating disorders and other adverse health outcomes on individual or public health levels (9-11, 19). Those who are experiencing BID may become fixated on changing the shape and size of the body, which may trigger unhealthy practices with nutrition and physical exercise, that can damage physical and psychological wellbeing (12, 19, 20). However, BID is an internal process and can be impacted by several external factors. Preference for given body weight as well as attitude towards one's body image can be influenced by physical, cultural, emotional, media, and interpersonal factors (21-25). Culture may encourage various body shapes and composition. Since culture and social factors impact BID, it is important to explore BID and body image perception among populations in different areas. Few Saudi studies have been carried out to measure BID or body image perception in Taibah (26) Riyadh (27) and Hofuf (28).

However, the current study explored the correction between BMI and BID; and to investigate the prevalence of BID and body image perception across BMI categories among a sample of Young Saudi women in Makkah region. Unlike the three studies referenced above, the current study incorporated both the prevalence of BID and the correlation between BMI and BID among young Saudi women, with the age of 18 to 35, who live in Makkah Region.

Materials and Methodology

Sample Size and Procedure

The study was descriptive, and carried out in Makkah region at 2019. The size of the sample was 200 people based on the argument that the number of participants should be about 10-20 times the items in the study questionnaire (29). The exclusion criteria of participants were pregnant women or those with age 36 or older, and if had missing data on weight, or height, or the BID or body image perception. The criteria for inclusions in the study were females, aged 18 to 35 years with Saudi nationality and completed data on the BMI and BID. 247 women completed the survey, but only 226 women were included in the study. Four participants were excluded from the study due to the extreme values of weight and height. The number of participants who were excluded for missing data on weight and height was 15. Two others were excluded due to the age one were 51 years old and the other was 49 years old. This study followed the research policies of the King Abdulaziz University Research Centre. The survey included a written consent for the participants to participate in the study voluntarily. The researchers assured the participants that the information provided would only be exclusive to the scientific purposes, and be kept confidential.

The Tool and Anthropometric Data

A self-administrative questionnaire containing social-demographic, anthropometric data and a figure rating scale of 9 graphics of body shape, was used for data collection. The survey asked participants about gender, age, health status, marital status, weight in kg, and height in cm. Body weight and height were self-reported. A study conducted on young adults shows good agreement between self-reported data on BMI and measured BMI with r=0.99; P<.001(29). Other studies also came up with same conclusion, that self-reported data on weight and height are sufficient to obtained BMI values in public health studies (30, 31). The BMI for all the participants was calculated from the self-reported weight and height data. Participants classified into one of the four categories of the BMI values by the World Health Organization as following; (a) underweight (BMI <18.5), (b) healthy weight

(BMI 18-24.9), (c) overweight (BMI 25.0-29.9), and (d) obesity (BMI 30.0 or more) (8).

Body Image Dissatisfaction and Body Image Perception

The Figure Rating Scale (FRS) were used for the assessment of BID and body image perception. Stunkard *et al.* (1983) (32) developed the FRS tool as a simple and visual tool to help in assessing individuals' dissatisfaction with body image and perceived body size. The tool comprises nine body image drawings depicting different sizes as indicated in figure 1 below. The drawings range from slim (1) to very big or plus size (9). The assessment was done by asking the participants to select their body size they resembled (perceived body size) and the one they liked to look like (ideal body size). The subjects' BID was assessed by determining the difference between their perceived and ideal body types. Those who scored zero would be satisfied with their body sizes while negative and positive scores indicated that the subjects were dissatisfied. While negative scores depicted that the subjects desired to gain weight, the positive scores would indicate the desire to lose weight. Body Image percrption was assessed by comparing the perceived body size with the actual body size according to the subjects' BMI levels. In this case, zero scores would indicate a correct estimation with current body image, while negative or positive scores would depict underestimation or overestimation. The numbers on the FRS were classified based on BMI categories as follows; underweight (1 and 20), healthy weight (3 and 4), overweight (5-7), and obese (8 and 9). This tool approved to be validity and reliability in different populations (30).

Statistical Analysis Procedure

The data were analysed using SPSS version 21, the frequencies for category variables presented as percentages (%), means ± standard deviation presented for continuous variables. Also, participants were grouped according to their actual BMI to present the percentages of BID for each group. To test the relationship between the BMI and BID, we used Spearman Rank Correlation. The normality was tested using the Kolmogorov-Smirnov test, and the data were normally distributed ($p \geq 0.05$).

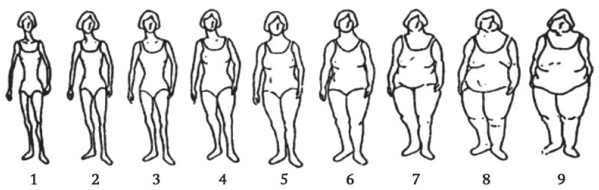

Fig. 1: Body image figures.
FRS tool for the assessment of body image perception among the subjects. Adapted from Stunkard et al. (1983).

Results

Participant Measurements and Participants

Table 1 below outlines the characteristics of the 226 participants. Mean age of participants was 21.8 years ± 3.2 SD. The mean weight for participants was 55.28 kg with SD=5.5, and the BMI means was 22.57kg/m^2. The majority of participants were single with 88.5 % (n=200), married was only 10.6% (n=24) of the whole sample. Most of the participants had an income of 5000 SAR-12999 SAR with 38.1% (n=86); the rest income category ranged between 17.3% and 24%. Almost all the participants (99.1%; n=224) reported healthy status with no diseases, and only 2 had type 1 diabetes. The majority of participant (61.5%, n= 139) classified with a healthy weight (BMI 18 to 24.9 kg/m^2), 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%), while 47 (20.8%) desired to gain weight. Only 19.5% (44) of total participants were satisfied with body image.

Fig. 2 below presents the percentage between BMI with its four categories and body image dissatisfaction. Of those who were with a healthy weight only 19.7% were satisfied with their current body size. 57.5% of healthy weight women wished to lose weight, while 17.3% of healthy weight want to gain weight and wished for larger body size. The underweight category has 14.3 % (n=35) dissatisfied participants, and want to lose weight. 2.5% and 8.3% of those who category as overweight and obese, respectively, wished for larger body size.

Table 2: The distribution of body image perception was as illustrated in Table 2. Overall, 64.6% of

Table 1: Participant's characteristics (N=226)

Variables	Mean	SD
Age (years)	21.8	3.2
Height (cm)	157.23	5.66
Weight (kg)	55.28	5.05
BMI (kg/m^2)	22.57	4.41
Dissatisfaction with body Image	**Frequency**	**Percent**
Satisfied with Body image	44	19.5
Dissatisfied with body image	182	80.5
desired to lose weight	135	59.7
desired for gain weight	47	20.8
BMI categories		
Underweight	35	15.5
Healthy weight	139	61.5
Overweight	40	17.7
Obese	12	5.3
Marital status		
Single	200	88.5%
Married	24	10.6%
Divorce	2	0.9%
Income		
Below 5000 SAR	53	23.5%
5000 SAR - 12999 SAR	86	38.1%
13000 SAR - 17000 SAR	39	17.3%
More than 17000 SAR	48	21.2%
Health status		
No diseases	224	99.1%
Diabetes	2	0.9%

participants perceived their body adequately, while 35.4% estimated their weight either under or over than their actual body size. All obese and almost one third (32.3%) of the overweight participants underestimate their body size. 11.5% and 20% of those with underweight and healthy weight respectively overestimate

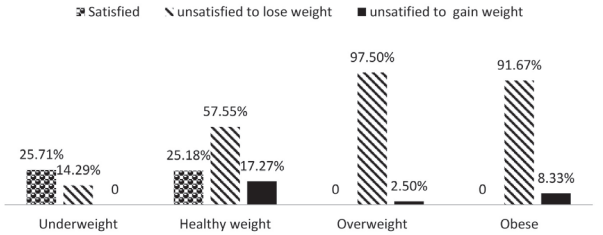

Fig. 2: The distribution of participants in different BMI by BID (N=226)

their actual BMI.

Correlation between BMI and Body Image Dissatisfaction

The BMI and BID correlated positively (r=0.135, p<0.05). Those with greater BMI were less satisfied with their current body image. While there was no correlation between the BMI and body image perception.

Discussion

This study investigated the existence of BID and the perception of body image across BMI categories among young Saudi women age 18 to 35 years in Makkah region, and it explored the relationship between actual BMI and BID in these women (n=226). Overall, the prevalence of BID was high (80.5%), while only 19.5% of these women were satisfied with their body image. Similar to our results, an Emirate study that recruited both men and women with age 18 to 25 years old, found that 80.9% were dissatisfied with body image (33). In comparison to a Saudi study that used the same methodology but conducted in a different area in Saudi Arabia, it was found that the prevalence of BID was 73.6% amongst Saudi women who lived in Taibah (26), which is lower than our finding.

Table 2: Distribution of body image perception across actual BMI among young women (n=226)

Body image perception		BMI categories Frequency (percent)				Total	X^2
		Underweight	Healthy weight	Overweight	Obese		
Adequate		28 (80)	93(66.9)	25(62.1)	0	146(64.6%)	0.04
Misconception	Underestimate	0(0)	30(21.6)	13(32.5)	12 (100)	55(24.3%)	
	Overestimate	7(20)	16(11.5)	2(5.0)	0	25(11.1%)	
Total		35(15.5)	139(61.5)	40(17.7)	12(5.3)	226	

In a different Saudi study that used a different methodology in assessing the BID by Body shape Questionnaires, it found that around 33% of young women were dissatisfied with their body shape (28), while in Pakistani almost 100% of the sample were dissatisfied with body image (34). Studies conducted in Brazil (35) and Poland (36) showed a lower prevalence of BID with 47.3% and 65.6% respectively.

Regarding the relationship between actual BMI and BID, the study established that BMI was positively correlated with BID amongst these young Saudi women (n=226). However, the degree of the positive correlation between BMI and BID was shown to be small for young Saudi women. A straightforward explanation of why the association was small (r=0.135) was because even the young women who had healthy weight were not pleased with their body appearance. The findings indicated that the percentage of participants with a healthy weight and satisfied with their current body image was low (19.7%), taking into consideration that the prevalence of healthy weight was high (61.5%). Despite the prevalence of overweight and obesity being low (23%), it was found that more than half of the participants (59.7%) were eager to lose their weight. The finding could be attributable to the Western media effect (25, 37), advocating for certain body images as beautiful and good looking, since 57.6% of those with a healthy weight wished to lose weight. This aspect of the need to lose weight even when some has ideal weight may be as a result of dissatisfaction with some aspects of their body, such as shape, size, and figure.

The BID could also be associated with peer contact influence and media portrayal of the ideal female body image as very thin. 14.3% of those who desired to lose weight was underweight, and such percentage is considered to be too high posing a significant problem. This finding shows that even those who are underweight have body image dissatisfaction and that they wish to lose more weight rather than gain weight to attain a healthy weight mark. Even though a young female may be underweight, she may wish to lose more weight to achieve the body shapes and sizes that are considered ideal in the current society or by their peers. For this group, the traditional cultural influence on body shape may have been outdone by the media influences, when it comes to ideal body image and body image dissatisfaction. This aspect indicated that body image distortion might lead to poorer psychological outcomes, unhealthy eating habits, and over exercising to achieve the body image that they consider ideal (11, 12, 19, 38).

Another explanation for this group of participants who wished to lose weight especially those who were at a healthy weight and being unsatisfied with their body image, maybe because they are unhappy with specific parts of their body which may have high fat, and low muscle mass even if they classified with the healthy weight based on the BMI measured. BMI is a simple measure of height and weight and does not include a fat percentage or other anthropometrics in consideration (8). Additionally, a study showed that most of the women in Saudi Arabia are physically inactive (39). A sedentary lifestyle may result in high accumulation of fat and low muscle mass in physically inactive people, causing BID in this participant group. However, the study shows that there is a misconception of the ideal body image and the healthy weight amongst the young Saudi women.

On the contrary, the percentage of those at a healthy weight and wish to gain weight is also alarming at 17.3%. Other results that were worth reporting were that 2.5% and 8.3% of those who were classified as overweight and obese respectively, desired to gain weight despite having an unhealthy weight. However, it is essential to indicate that if the same women go ahead and manage to gain weight, they become overweight and/or obese, exposing themselves to the risks associated with weight-related chronic illnesses like diabetes. Obese and overweight young women who prefer to gain more weight to conform to the community expectations may risk overweight issues at some point in their lives (2, 40). Overall, the study underscores the need for advice and sensitisation of people about the need to appreciate their body image, size, and shape, as well as the benefits of maintaining a healthy weight. Such programs may touch on the negative impacts of unhealthy eating habits, being overweight, or underweight (40).

The reason behind yearning to gain more weight is their unhappy mood with their body composition, especially their figure. Also, for those at healthy weight

and desiring to add more weight could be due to culture and society effect as they think that plump women are more beautiful and attractive (37). Another explanation would be the misconception of a healthy weight. The findings revealed that the majority of participants (61.5%) correctly perceived their weight while all obese, 32% of overweight and 21.3% of healthy weight underestimated their BMI. This finding is coherent with the conclusion by Albeeybe *et al.* (26), whereby, a notable proportion of young females in college, especially the obese or overweight, tend to underestimate their perceived body weight. The trend indicates the prevalence of body image distortion among young females. Generally, most of the participants in the current study saw their BMI adequately. The finding of our study can also imply that a section of the Saudi women has failed to subscribe to the portrayal of the thin body as the ideal body image but are also in danger of becoming overweight. The finding also appears to contradict with results of studies that a higher BMI leads to a panic of being negatively judged by others (26). The outcome is contradictory, due to the pervasiveness of overweight and obesity in Saudi Arabian population. According to (26), underestimation of body weight amongst young Saudi females with overweight or obesity are alarming.

Taking into consideration the cultural, societal, and media impact on the satisfaction of body size may help avoid future problematic issues such as eating disorders and public health concerns regarding an increase in chronic illnesses. According to (20, 41), culture, ethnicity, and socioeconomic factors have been shown to have protective impacts against body image dissatisfaction and worrying disorders in women. The BMI is an essential destructive factor regarding the increment of negativity about body image. In line with Albeeybe, *et al.* (27) study, obese and overweight participants showed considerably advanced intensities of body image dissatisfaction, more shape, and weight worries than underweight and normal participants did. Young women with obesity and overweight issues reported disconsolate feelings about the shape and appearance of their bodies (42). For female students in colleges, higher BMI is linked with BID (33) and poorer psychosocial outcomes (43). Two studies conducted amongst young women in Saudi Arabia who had greater weight showed that they had a high frequency of depressive disorders (43) and were highly concerned about their body image (26, 27).

Obesity and BID has been associated with a decline in self-esteem levels (44). Also, the preference for thinner bodies amongst young women in Saudi Arabia may be associated with exposure to the Western way of life through social media and online magazines that promote a certain body type as the most acceptable and beautiful. Similar to the finding by Muasiger (37), more underweight and overweight women tend to express dissatisfaction with their current body weight compared to normal-weight females (26, 27). Amongst females, overweight status was linked with eating disorders, unhealthy eating behaviours, emotional problems, and hopelessness (9, 38).

A major limitation of this study that should be addressed is that data on anthropometric measurements were self-reported, few studies concluded that data of self-reported weight and height can be used to obtained BMI values in public health studies (29-31, 45). However, a review concluded that the calculation of BMI from self- reported weight and height data may lead to misestimating of the BMI categories (46). Therefore, results of this study should be interpreted with caution.

Conclusion and Recommendations

This study showed that BMI is negatively correlated with body image satisfaction. Besides, BID was proven to be a great challenge that may lead to adverse health problems, psychological issues, and public health concerns amongst young Saudi women. As such, the need for a systematic approach towards the problem of BID is an essential element in the prevention of public health problems, such as increases chronic illnesses. Self-esteem can help protect people, especially the obese and the overweight, from the harmful effects of high BMI on the body image. The misconception of the ideal or healthy body image among a section of these young women was also associated with BID. It is important to note that cultural factors may also play an important role in body image satisfaction and body image misconception of the ideal body image. However, this study did not explore the cultural impact or the reasons behind this.

The recommendations focused on the need for fur-

ther studies to validate self-reported weight in young Saudi women. Further public health interventions to address the problem of the BID. Future studies are needed to explore the underneath reasons behind BID and the cultural roles. Also, future studies to address lifestyle and psychological factors that may cause misconceptions about body weight and size should be considered. As a public health issue, it would be essential to focus on the factors that influence BID as a result of high or low BMI. In addition, the call to educate people about the importance of keeping fit and maintaining a healthy weight is an essential aspect. Boosting women's self-esteem and minimize the chance of being negatively impacted by the media should be considered.

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References

1. World Health Orgianziation, Global Status Reoprt on Non Communicable Diseases (NCD). 2014.
2. Bray, G.A., Medical Consequences of Obesity. The Journal of Clinical Endocrinology & Metabolism, 2004. 89(6): p. 2583-2589.
3. Al Dawish, M.A., et al., Diabetes Mellitus in Saudi Arabia: A Review of the Recent Literature. Curr Diabetes Rev, 2016. 12(4): p. 359-368.
4. Al-Nozha, M.M., et al., Obesity in Saudi Arabia. Saudi Med J, 2005. 26(5): p. 824-9.
5. Alqurashi, K.A., K.S. Aljabri, and S.A. Bokhari, Prevalence of diabetes mellitus in a Saudi community. Annals of Saudi Medicine, 2011. 31(1): p. 19-23.
6. Daoud, F., et al., The health status of Saudi women: findings from a national survey. Journal of Public Health, 2016. 38(4): p. 660-672.
7. DeNicola, E., et al., Obesity and public health in Kingdom of Saudi Arabia. Vol. 30. 2015. 191-205.
8. World Health Orgianziation. Body Mass Index_BMI. 2019.
9. Levine, M.P. and N. Piran, The role of body image in the prevention of eating disorders. Body Image, 2004. 1(1): p. 57-70.
10. Liechty, J.M., Body Image Distortion and Three Types of Weight Loss Behaviors Among Nonoverweight Girls in the United States. Journal of Adolescent Health, 2010. 47(2): p. 176-182.
11. Baker, C. and E. Wertheim, 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, 2003. 11: p. 247-248.
12. Michaela, M.B., Body dissatisfaction: an overlooked public health concern. Journal of Public Mental Health, 2014. 13(2): p. 64-69.
13. Harter, S., Self and identity development, in At the threshold: The developing adolescent. 1990, Harvard University Press: Cambridge, MA, US. p. 352-387.
14. Tiggemann, M., Body image across the adult life span: stability and change. Body Image, 2004. 1(1): p. 29-41.
15. Holsen, I., D.C. Jones, and M.S. Birkeland, Body image satisfaction among Norwegian adolescents and young adults: A longitudinal study of the influence of interpersonal relationships and BMI. Body Image, 2012. 9(2): p. 201-208.
16. Thompson, J.K., et al., Exacting beauty: Theory, assessment, and treatment of body image disturbance. Exacting beauty: Theory, assessment, and treatment of body image disturbance. 1999, Washington, DC, US: American Psychological Association. xii, 396-xii, 396.
17. Geller, J., et al., Assessment of shape- and weight-based self-esteem in adolescents. International Journal of Eating Disorders, 2000. 28(3): p. 339-345.
18. McGuinness, S. and J.E. Taylor, Understanding body image dissatisfaction and disordered eating in midlife adults. 2016. 45: p. 4-12.
19. Stice, E., Risk and maintenance factors for eating pathology: A meta-analytic review. Psychological Bulletin, 2002. 128(5): p. 825-848.
20. Wardle, J., A.M. Haase, and A. Steptoe, Body image and weight control in young adults: international comparisons in university students from 22 countries. International Journal of Obesity, 2006. 30(4): p. 644-651.
21. Chin Evans, P. and A.R. McConnell, Do Racial Minorities Respond in the Same Way to Mainstream Beauty Standards? Social Comparison Processes in Asian, Black, and White Women. Self and Identity, 2003. 2(2): p. 153-167.
22. Gluck, M.E. and A. Geliebter, Racial/ethnic differences in body image and eating behaviors. Eating Behaviors, 2002. 3(2): p. 143-151.
23. Cafri, G., The Influence of Sociocultural Factors on Body Image: A Meta-Analysis. Clinical Psychology: Science and Practice, 2005. 12: p. 421-433.
24. Tiggemann, M. and M. Zaccardo, "Exercise to be fit, not skinny": The effect of fitspiration imagery on women's body image. Body Image, 2015. 15: p. 61-67.
25. Khaled, S., et al., Testing Western Media Icons Influence on Arab Women's Body Size and Shape Ideals: An Experimental Approach. Social Sciences, 2018. 7.
26. As-Sa'edi, E., et al., Body image dissatisfaction: Prevalence and relation to body mass index among female medical students in Taibah University, 2011. Journal of Taibah University Medical Sciences, 2013. 8(2): p. 126-133.

27. Albeeybe, J., et al., Body Size Misperception and Overweight or Obesity among Saudi College-Aged Females. Journal of Obesity, 2018. 2018: p. 9.
28. Al-Otaibi, H., S. Nassef, and T. A. Raouf, Body Shape Dissatisfaction, Weight Status and Physical Activity among a Sample University Students in Saudi Arabia. Food and Nutrition Sciences, 2013. 04: p. 616-625.
29. Pursey, K., et al., How accurate is web-based self-reported height, weight, and body mass index in young adults? J Med Internet Res, 2014. 16(1): p. e4.
30. Olfert, M.D., et al., Self-Reported vs. Measured Height, Weight, and BMI in Young Adults. International journal of environmental research and public health, 2018. 15(10): p. 2216.
31. McAdams, M.A., R.M. Van Dam, and F.B. Hu, Comparison of Self-reported and Measured BMI as Correlates of Disease Markers in U.S. Adults. Obesity, 2007. 15(1): p. 188-188.
32. Stunkard, A.J., Use of the Danish Adoption Register for the study of obesity and thinness. Res. Publ. Assoc. Res. Nerv. Ment. Dis., 1983. 60: p. 115-120.
33. Radwan, H., et al., 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, 2019. 16(9): p. 1541.
34. Khan, A.N., et al., Impact of today's media on university student's body image in Pakistan: a conservative, developing country's perspective. BMC Public Health, 2011. 11(1): p. 379.
35. Costa, L.d.C.F. and F.d.A.G.d. Vasconcelos, Influence of socioeconomic, behavioral and nutritional factors on dissatisfaction with body image among female university students in Florianopolis, SC. Revista Brasileira de Epidemiologia, 2010. 13: p. 665-676.
36. Jaworowska, A. and G. Bazylak, An outbreak of body weight dissatisfaction associated with self-perceived BMI and dieting among female pharmacy students. Biomedicine & Pharmacotherapy, 2009. 63(9): p. 679-692.
37. Musaiger, A., Body weight concern among female university students in five Arab countries – a preliminary cross-cultural study. Annals of Agricultural and Environmental Medicine, 2015. 22(2): p. 349-352.
38. Tiwari, G. and S. Kumar, Psychology and Body Image : A Review. SHODH PRERAK, 2015. 5: p. 1-9.
39. Al-Hazzaa, H.M., Physical inactivity in Saudi Arabia revisited: A systematic review of inactivity prevalence and perceived barriers to active living. International journal of health sciences, 2018. 12(6): p. 50-64.
40. Hruby, A., et al., Determinants and Consequences of Obesity. American journal of public health, 2016. 106(9): p. 1656-1662.
41. Dinsa, G., et al., Obesity and socioeconomic status in developing countries: A systematic review. Obesity reviews : an official journal of the International Association for the Study of Obesity, 2012. 13: p. 1067-79.
42. Kabir, Y., T.A. Zafar, and C. Waslien, Relationship Between Perceived Body Image and Recorded Body Mass Index Among Kuwaiti Female University Students. Women & Health, 2013. 53(7): p. 693-705.
43. AlQahtani, A.A., et al., Association between obesity and mental disorders among male students of King Khalid University, Abha, Saudi Arabia. Saudi Journal of Obesity, 2015. 3(2): p. 48-54.
44. Stice, E. and H.E. Shaw, Role of body dissatisfaction in the onset and maintenance of eating pathology: A synthesis of research findings. Journal of Psychosomatic Research, 2002. 53(5): p. 985-993.
45. Nikolaou, C.K., C.R. Hankey, and M.E.J. Lean, Accuracy of on-line self-reported weights and heights by young adults. European Journal of Public Health, 2017. 27(5): p. 898-903.
46. Seijo, M., et al., Comparison of self-reported and directly measured weight and height among women of reproductive age: a systematic review and meta-analysis. Acta Obstetricia et Gynecologica Scandinavica, 2018. 97(4): p. 429-439.

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