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Self-esteem and weight status of young adults: Findings from a pilot study

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Abstract:

BACKGROUND: Researchers have examined the association between self-esteem and obesity in past studies. However, most studies have focused on pediatric or adolescent populations. In this pilot study, we aim to explore the association of self-esteem with weight status in young adults, a group of individuals in a significant and pivotal period of their lives whose needs and challenges have received little attention in previous studies.

MATERIALS AND METHODS: Exactly 127 college juniors and seniors in the Midwest participated in late 2017. For our survey, we collected the following information: body weight, height, self-esteem score from the state self-esteem scale, grade point average, risk of eating disorders, sleep quality, nutritional behavior, lifestyle (smoking, frequency of exercise, alcohol drinking, average daily time watching television, playing video games, and social media use), and demographic and socioeconomic background. We used logistic regression for our analysis.

RESULTS: The logistic regression indicates that a one-point increase in the self-esteem score was negatively associated with a young adult's odds of having an unhealthy weight (being overweight or obese) by approximately 3%. Furthermore, soda drinking is a statistically significant factor associated with weight status.

CONCLUSIONS: This finding suggests self-esteem is positively associated with a healthy weight in young adults. A larger-scale study should be conducted in the future to validate this relationship and better understand young adults' needs.

Keywords:

Humans, pilot projects, self-concept, young adult

Introduction

The association between self-esteem and body weight has drawn the attention of researchers in the health, psychological, and psychiatric fields. We can explain the association in two ways. First, an individual with unhealthy weight generally prompts stereotyped and stigmatizing beliefs from others, leading them to act in prejudicial and discriminatory practices.^[1,2] Such discriminatory behaviors affect how individuals feel about themselves and negatively impact self-esteem. Second, people with low self-esteem commonly

experience self-awareness as painful.^[3] If eating becomes their channel for reducing painful self-awareness, it may negatively impact their weight status. Some studies have shown that self-esteem is an excellent predictor of eating disorders;^[4] therefore, it is reasonable to hypothesize that self-esteem is an essential predictor of an individual's likelihood of having an unhealthy weight.

Most studies on self-esteem and body weight have focused on pediatric populations, and their findings are mixed. Some reported lower self-esteem among obese children.^[5] However, others found no significant association between self-esteem and childhood obesity.^[6] Some studies

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have shown that obesity is independent of self-esteem in adolescents.^[7] Nevertheless, other studies have revealed that obesity negatively impacts adolescents' self-esteem.^[8,9]

The association between self-esteem with weight status in the young adult population is understudied. Young adulthood, which generally refers to 18–26, is a period of heightened psychological vulnerability, potentially due to challenges associated with the new responsibilities and obligations that young adults are expected to take on and fulfill.^[10] However, researchers have seldom treated young adults as a distinct population.^[10] Moreover, young adults are more likely to develop preventable illnesses, including obesity, than older adults and adolescents.^[10] Therefore, the psychological dimensions, such as self-esteem, related to young adults' weight status is worth exploring.

Among the minimal studies targeting this population, Singleton *et al.* surveyed 49 college students between the ages of 20 and 39 at a historically Black southern university in the United States. They found no association between self-esteem and body mass index (BMI).^[11] Sanlier *et al.* analyzed data from a survey of 503 college students aged 18–23 in Turkey, finding no association between self-esteem and BMI.^[12] This finding is consistent with the study Herbozo *et al.* conducted.^[13] They analyzed data from 194 overweight or obese female undergraduate students between 18 and 30 years old in the United States.

The results of these studies were subject to one of the following two methodological limitations. First, the researchers used only correlation analysis,^[11,13] or unadjusted analyses to examine differences in self-esteem across BMIs.^[12] Second, they focused on only one gender.^[13] Therefore, the association between self-esteem and weight status among young adults requires better elucidation because of these limitations in the literature. We conducted a pilot study to survey juniors and seniors at a university in the Midwest urban area of the United States to fill this gap. In this study, we aim to analyze more comprehensive data collected from this survey and examine empirical evidence of the association between self-esteem and unhealthy weight among young adults using a more robust method.

Materials and Methods

Study design and setting

As mentioned previously, a survey was conducted on a university campus in the urban Midwest of the United States to collect data for this study. Before the survey was conducted, it was approved by this university's institutional review board (IRB). All survey responses are anonymous.

Study participants and sampling

Our survey participants were juniors and seniors studying at this university in a Midwest urban area of the United States. The survey has a two-step process. A short web-based survey was sent to all juniors and seniors to solicit their willingness to participate in the study on November 27, 2017. By the end of November 29, 2017, 762 students consented to participate in the study. Due to the funding limit, we sent a full version of the web-based survey consisting of 102 questions to 127 randomly selected students from these 762 consenting students on November 30, 2017. All these 127 selected students completed the survey on December 9, 2017, and each was aware that they would receive a \$10 Amazon gift card in advance of completing the study.

Data collection tool and technique

The survey was distributed through Qualtrics, a simple but powerful web-based survey tool to conduct research, evaluations, and other data collection activities. Our survey contained questions intended to collect data on self-esteem scores as measured by the state self-esteem scale (SSES),^[14] body height and weight, and individual characteristics [Table 1], including age, grade point average (GPA), risk of an eating disorder (measured by eating attitudes test (EAT-26) scores), sleep quality (measured with the Pittsburgh sleep quality index), gender, race/ethnicity (nonHispanic Caucasian, African American, Hispanic or Spanish/Latino, and Asian), employment status, marital status, nutritional behavior (frequency of skipping meals, consumption of fast food, rate of drinking soda, amount of fruits and vegetables consumed, and amount of bread or grains consumed), frequency of exercise, frequency of drinking alcohol, number of cigarettes smoked, average time watching television every day, average time playing video games every day, average time on social media every day, parent's educational attainment, and household income.

After every participant completed the survey, their BMIs are calculated as self-reported weight in pounds divided by height in inches for each survey participant. Afterward, we categorized their BMIs as underweight (BMI <18.5), healthy weight (BMI 18.5–24.9), overweight (BMI 25–29.9), or obese (BMI ≥30) based on the standards of the World Health Organization.^[15] We then defined the outcome variable as a dichotomous variable indicating unhealthy weight (overweight or obese). In addition, participants' self-esteem was measured using the score from the SSES, a multidimensional scale that includes three facets of an individual's self-esteem: performance, social comfort, and appearance.^[14] Since the SSES questionnaire consists of 20 items with scores ranging from 1 to 5, the scale score ranges from 5 to 100. This approach was proposed and validated by Heatherston and Polivy.^[14]

Table 1: Demographics and characteristics of the survey participants

Variables	n (%)
Weight status	
Healthy weight	95 (74.80)
Unhealthy weight (overweight or obese)	32 (25.20)
Self-esteem score, mean (SD)	67.77 (15.28)
Age, years	
19	5 (3.94)
20	42 (33.07)
21	53 (41.73)
22	18 (14.17)
23	6 (4.72)
24	1 (0.79)
26	1 (0.79)
30	1 (0.79)
GPA	
<3.0	10 (7.87)
Between 3.0 and 3.5	41 (32.28)
>3.5	76 (59.84)
Gender	
Male	28 (22.05)
Female	96 (75.59)
Other	3 (2.36)
Race	
Non-Hispanic White	97 (76.38)
Black or African American	1 (0.79)
Hispanic or Spanish/Latino	3 (2.36)
Asian	26 (20.47)
Marital status	
Single, never married	125 (98.43)
Married	1 (0.79)
Other	1 (0.79)
Employment status	
Employed full-time	4 (3.15)
Employed part-time	83 (65.35)
Not employed but looking for work or awaiting recall	7 (5.51)
Not employed and not looking for work or awaiting recall	21 (16.54)
Other	12 (9.45)
Household income (\$)	
<10,000	2 (1.57)
10,000-19,999	0 (0.00)
20,000-29,999	2 (1.57)
30,000-39,999	7 (5.51)
40,000-49,999	6 (4.72)
50,000-59,999	7 (5.51)
60,000-69,999	6 (4.72)
70,000-79,999	4 (3.15)
80,000-89,999	11 (8.66)
90,000-99,999	6 (4.72)
100,000-149,999	37 (29.13)
>150,000	39 (30.17)
Father's educational attainment	
High school graduate or the equivalent	11 (8.66)
Some college credit, no degree	15 (11.81)
Trade/technical/vocational training	9 (7.09)

Table 1: Contd...

Variables	n (%)
Associate degree	6 (4.72)
Four-year college graduate	37 (29.13)
Master's degree	31 (24.41)
Professional degree (for example, MD, DDS, DVM, LLB, JD)	15 (11.81)
Doctorate degree (for example, PhD, EdD)	3 (2.36)
Mother's educational attainment	
Eighth grade or less	1 (0.79)
High school graduate, diploma, or the equivalent	10 (7.87)
Some college credit, no degree	13 (10.24)
Trade/technical/vocational training	3 (2.36)
Associate degree	10 (7.87)
Four years college graduate	46 (36.22)
Master's degree	33 (25.98)
Professional degree (for example, MD, DDS, DVM, LLB, JD)	7 (5.51)
Doctorate degree (for example, PhD, EdD)	4 (3.15)
EAT-26 score, mean (SD)	9.51 (7.32)
Having a low-quality sleep in the past month (PSQI score \geq 5)	88 (69.29)
Number of times skipping breakfast last week	
0	51 (40.16)
1	12 (9.45)
2	15 (11.81)
3	12 (9.45)
>3	37 (29.13)
Number of times skipping lunch last week	
0	60 (47.24)
1	27 (21.26)
2	22 (17.32)
3	11 (8.66)
>3	7 (5.51)
Number of times skipping dinner last week	
0	93 (73.23)
1	16 (12.60)
2	10 (7.87)
3	3 (2.36)
>3	5 (3.94)
Number of times eating fast food last week	
0	42 (33.07)
1	42 (33.07)
2	20 (15.75)
3	13 (10.24)
>3	10 (7.87)
Number of sodas consumed last week	
0	79 (62.20)
1	26 (20.47)
2	7 (5.51)
3	8 (6.30)
>3	7 (5.51)
Number of cigarettes smoked last week	
0	122 (96.06)
1-10	3 (2.36)
11-20	1 (0.79)
\geq 21	1 (0.79)

Contd...

Contd...

Table 1: Contd...

Variables	n (%)
On average, I ate at least five portions of fruits and vegetables a day in the past week	46 (36.22)
Number of days eating bread or grains in the past week	
0	4 (3.15)
1	4 (3.15)
2	13 (10.24)
3	23 (18.11)
>3	83 (65.35)
Number of days doing exercise for at least 30 min in the past week	
0	32 (25.20)
1	22 (17.32)
2	17 (13.39)
3	14 (11.02)
>3	42 (33.07)
Number of times having alcoholic drinks in the past week	
0	55 (43.31)
1	31 (24.41)
2	22 (17.32)
3	6 (4.72)
>3	13 (10.24)
The average amount of time spent watching television every day (h)	
0	21 (16.54)
<1	43 (33.86)
1-<2	38 (29.92)
2-<3	14 (11.02)
≥3	11 (8.66)
The average amount of time spent on video games every day (h)	
0	95 (74.80)
<1	13 (10.24)
1-2	13 (10.24)
>2	6 (4.72)
The average amount of time spent on social media, such as Facebook or Twitter, every day (h)	
0	9 (7.09)
<1	27 (21.26)
1-2	38 (29.92)
2-3	31 (24.41)
≥3	22 (17.32)

GPA=Grade point average, SD=Standard deviation, EAT=Eating Attitudes Test, PSQI=Pittsburgh Sleep Quality Index

We performed a logistic regression to find the association between self-esteem and weight status among our study participants. Following the suggestion of Garrett,^[16] we used a bootstrap stepwise (SWBOOT) method to select the independent variables, which we defined based on the demographic and personal characteristics variables reported in Table 1 for inclusion in the logistic regression model. In the end, independent variables we considered appropriate for inclusion using the SWBOOT method were the EAT-26 score, the self-esteem score, whether the student had skipped dinner in the past week, whether

the student had fast food in the past week, whether the student had soda in the past week, whether the student ate at least five portions of fruit and vegetables on average every day during the past week, whether the student performed exercise for at least 30 min and at least three times in the past week, whether the student used social media on average at least 2 h every day during the past week, and whether the student’s father has a college degree or higher. All tests were two-sided, and we considered a $P < 5\%$ statistically significant. We performed all statistical analyses using STATA 15.

Ethical consideration

As mentioned earlier, this study received approval from the university’s IRB. At the time of recruitment, this study’s protocols, procedures, duration, and benefits were explained to all potential survey participants. The approval document was available upon request.

Results

Of the 127 randomly selected participants [Table 1], the majority were female (75.59%), nonHispanic whites (76.38%), single (98.43%), reportedly between 20 and 22 years old (20 years: 33.07%; 21 years: 41.73%; 22 years: 14.17%), reported a GPA >3.5 (59.84%) and had part-time jobs (65.35%). In addition, approximately 69% of respondents reported problems with sleep quality. Moreover, only about 36% of the participants ate, on average, at least five portions of fruits and vegetables per day in a week, and about 42% reported spending on average at least 2 h on social media every day in a week. Most of the participants were nonsmokers (96.06%) and exercised for at least 30 min at least one day a week (1 day: 17.32%, 2 days: 13.39%, 3 days: 11.02%, >3 days: 33.07%). Approximately 50% of the participants spent more than one-hour watching television on average every day. A high percentage of participants ate fast food and consumed alcoholic drinks at least once a week. The participants’ average self-esteem score was 67.77 (standard deviation [SD] = 15.28), and the average EAT-26 score was 9.51 (SD = 7.32). Approximately 25% of the participants had an unhealthy weight (were overweight or obese).

As Table 2 shows, self-esteem was negatively associated with unhealthy weight. With a one-point increase in the self-esteem score, the odds of having an unhealthy weight decreased by roughly 3%, holding other factors constant (odds ratio [OR] = 0.97, 95% confidence interval [CI]: 0.94–1.00). Moreover, skipping dinner (OR = 2.86, 95% CI: 1.12–7.31), having five or more portions of fruits and vegetables daily (OR = 2.46, 95% CI: 0.96–6.31), and doing exercise for at least 30 min at least three times in the past week (OR = 2.15, 95% CI: 0.82–5.63) increased the participants’ odds of having

Table 2: Estimated odds ratios and 95% confidence intervals from the logistic regression

Variables	OR	95% CI
EAT-26 score	1.01	0.95-1.07
Self-esteem score	0.97	0.94-1.00
Skipping dinner in the past week (= 1 if yes; = 0 otherwise)	2.74	0.95-7.89
Eating fast food in the past week (=1 if yes; =0 otherwise)	1.07	0.38-3.00
Drinking soda in the past week (=1 if yes; =0 if no)	4.05	1.41-11.67
On average, I ate at least five portions of fruits and vegetables every day during the past week (=1 if yes; =0 otherwise)	2.46	0.96-6.31
Doing exercise for at least 30 minutes at least three times in the past week (=1 if yes; =0 if no)	2.15	0.82-5.63
On average, I used social media for at least two hours every day in the past week (=1 if yes; =0 if no)	1.20	0.47-3.07
Father has a college degree or higher (=1 if yes; =0 if no)	1.02	0.35-2.94
Constant	1.56	0.16-15.03

EAT=Eating Attitudes Test, OR=Odds ratio, CI=Confidence interval

an unhealthy weight when all other variables were equal. However, the OR estimates of these variables are statistically insignificant. Table 2 also shows that [insert Table 2 here] the EAT-26 score (OR = 1.01, 95% CI: 0.95–1.07) and whether a respondent’s father has a college degree or higher (OR = 1.02, 95% CI: 0.35–2.94) are not significant predictors of our sample’s weight status although SWBOOT indicated that we should include these two variables in the logistic regression. The OR estimate on the variable “using social media for, on average, at least two hours per day in the past week” in Table 2 demonstrates that comparatively heavy users of social media are 20% more likely to have an unhealthy weight (OR = 1.20, 95% CI: 0.47–3.07) on average, holding all else constant. However, this OR estimate is statistically insignificant. We found drinking soda, on average, to be significantly associated with our participants’ odds of having an unhealthy weight (OR = 4.05, 95% CI: 1.41–11.67), holding all else constant.

Discussion

Young adulthood is a critical development period, as it bridges adolescence and independent adulthood.^[10] An individual’s experiences and accomplishments in this period play a crucial role in determining the route of their adult life. Compared to previous generations, today’s young adults face more challenges stemming from diverse and dynamically changing environments. Their physical and mental health should be areas of concern, as they are under increased social pressure. However, researchers have rarely studied young adults as a separate population. Instead, they are often grouped with adolescents or with all adults.^[10]

To better understand the psychological dimension of health for young adults, we conducted a pilot study to collect data and examine the relationship between young adults’ self-esteem and weight status. Our results indicate that higher self-esteem is associated with lower odds of an unhealthy weight. This finding is very different from the null findings in the limited literature,^[11-13] in which the researchers found no association between self-esteem and BMI. As we discussed previously, in these past studies, researchers used correlation or unadjusted analysis only, and our sample’s composition differs from theirs. Moreover, outcome measures in the literature are BMI, not weight status.

We also found that the risk of an eating disorder, which we measured as the EAT-26 score, is positively but insignificantly associated with young adults’ odds of having an abnormal weight status. This insignificance seems counterintuitive and differs from findings in the literature.^[17] This lack of significant association between the risk of an eating disorder and weight status is potentially due to the smaller survey size. Yamamoto *et al.* found that skipping dinner is the most potent predictor of weight gain and subsequent development of obesity because it may increase calorie intake the next day.^[18] This conclusion is somewhat consistent with what we found in this study: skipping dinner is associated with the odds of having unhealthy weight for the students we surveyed but in a statistically insignificant way. Past studies have shown that drinking soda increases the likelihood of becoming overweight or obese because of soda’s high added-sugar content.^[19] The significant and positive association between drinking soda and the odds of having an unhealthy weight in this study is consistent with evidence from the literature.

Our study shows a positive but insignificant association between eating fast food and the odds of having an unhealthy weight. This insignificance may also be due to our survey’s smaller scale. Past studies also showed that a generous intake of vegetables and fruits might help weight management because they are low in calories but high in fiber and water to generate a satiating effect.^[20] However, the impact of increasing fruit and vegetable consumption on weight control may become small and insignificant if the energy from other food is not well-controlled.^[21] Adherence to a healthy diet is also significantly related to social-economic factors, such as family income,^[22] and personal characteristics, such as degree of control over decisions and actions affecting health.^[23] Among our 46 survey respondents who reported eating at least five portions of vegetables and fruits on an average a day, most of them (29; 63.04%) ate fast food at least once a week. This high percentage may undermine the benefits of a healthy diet and explain the counterintuitive positive but insignificant association

between having at least five portions of vegetables and fruits a day and the odds of having unhealthy weight reported in Table 2. It is common knowledge that doing regular exercise helps maintain healthy weight status. However, vigorous exercise can also increase a person's appetite.^[24] Therefore, the benefit of exercising in maintaining or enhancing weight status can be highly individual.^[25] The positive but statistically insignificant association between exercising for at least 30 min three times per week and unhealthy weight status reported in this study needs more research.

Naess *et al.* found that mothers, not fathers, play a critical role in children's BMI.^[26] This finding is possibly due to an important fact: mothers are still considered children's primary caregivers, although children are largely more independent and involved in modern society. Therefore, a mother's influence on children's physical health development is more significant than her spouse's. As a result, it is not highly surprising to see only a marginal association between a father's education and a student's odds of having an unhealthy weight from our analysis even though SWBOOT suggested the inclusion of this variable in the logistic regression. A cross-sectional study by Alley *et al.* showed social media was not associated with BMI.^[27] This finding is consistent with our analysis reports: using more social media may be positively related to the odds of having an unhealthy weight, but this association is not statistically significant. A possible explanation for this lack of association is that although social media increases sitting time, it may educate people on the importance of a healthy diet and exercise.^[27] Therefore, the connection between social media use and weight cannot develop in the literature or this study.

Limitation and recommendation

This study had several limitations. First, due to the lack of information on our study population's likely proportion of unhealthy weight, we did not estimate the appropriate sample size following a conventional approach in the literature before the survey started.^[28] Consequently, we only surveyed the number of students for which our funding budget allowed. Therefore, the power of our analysis may not be as strong as that of any larger-scale study, given the nature of a pilot study with a relatively small sample size. Second, participants self-reported weight and height in this study, which may have been subject to some bias. Third, low self-esteem is often associated with depression, and depression potentially affects weight status.^[29,30] Therefore, depression seems an important confounding factor that must be controlled when estimating the association between self-esteem and weight status. Genetic factors, environmental factors, and diseases are also critical determinants of weight status. However, due to concerns regarding the survey's length (102 items in total without questions related to

these dimensions) and participants' privacy, we did not include inquiries related to depression, genetics, illness, or environment in the questionnaire. The exclusion of variables related to these dimensions may limit the power of our analysis. Still, our findings can serve as a basis for implementing a more comprehensive, larger-scale study in the future and help policymakers design effective interventions to alleviate low self-esteem in younger adults and improve their health. Finally, this is a smaller scale and cross-sectional study of college students. Although it is based on a survey that includes many lifestyles and critical predictors of young adult's weight status that relevant literature did not consider, it would be interesting to conduct a similar but larger-scale panel study that includes more age cohorts, such as those who are between 22 and 26, to allow for more variations in data and the control of individuals' unobservable characteristics to examine the causation between self-esteem and weight status.

Conclusions

This study demonstrates that low self-esteem is associated with increased odds of having an unhealthy weight among young adults, highlighting the strong relationship between self-esteem and health in this population. Prospective studies are necessary to determine whether this relationship is causal to inform future interventions and improve this population's mental and physical health.

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Conflicts of interest

There are no conflicts of interest.

References

1. Stunkard AJ, Wadden TA. Psychological aspects of severe obesity. *Am J Clin Nutr* 1990;55:524S-32S.
2. Wadden TA, Stunkard AJ. Social and psychological consequences of obesity. *Ann Intern Med* 1985;103:1062-7.
3. Heatherton TF, Baumeister RF. Binge eating as escape from self-awareness. *Psychol Bull* 1991;110:86-108.
4. Kelly AC, Vimalakanthan K, Carter JC. Understanding the roles of self-esteem, self-compassion, and fear of self-compassion in eating disorder pathology: An examination of female students and eating disorder patients. *Eat Behav* 2014;15:388-91.
5. Griffiths LJ, Parsons TJ, Hill AJ. Self-esteem and quality of life in

- obese children and adolescents: A systematic review. *Int J Pediatr Obes* 2010;5:282-304.
6. Hill AJ. Obesity in children and the 'myth of psychological maladjustment': Self-esteem in the spotlight. *Curr Obes Rep* 2017;6:63-70.
 7. Meland E, Breidablik HJ, Thuen F, Samdel GB. How body concerns, body mass, self-rated health, and self-esteem are mutually impacted in early adolescence: A longitudinal cohort study. *BMC Public Health* 2021;21:496.
 8. McClure AC, Tanski SE, Kingsbury J, Gerrard M, Sargent JD. Characteristics associated with low self-esteem among US adolescents. *Acad Pediatr* 2010;10:238-44.e2.
 9. Radziwillowicz W, Macias M. Self-esteem, and achievement motivation level in overweight and obese adolescents. *Health Psychol Rep* 2014;2:132-43.
 10. Committee on Improving the Health, Safety, and Well-Being of Young Adults; Board on Children, Youth, and Families; Institute of Medicine; National Research Council. Investing in the health and well-being of young adults. In Bonnie RJ, Stroud C, Breiner H, editors. *Investing in the Health and Well-Being of Young Adults*. Washington (DC): National Academies Press (US); 2015. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK284787/>. [doi: 10.17226/18869] [Last accessed on 2021 Dec 01].
 11. Singleton EK, Bienemy C, Hutchinson SW, Dellinger A, Rami JS. A pilot study: A descriptive correlational study of factors associated with weight in college nursing students. *ABNF J* 2011;22:89-95.
 12. Sanlier N, Biyikli AE, Biyikli ET. Evaluating the relationship of eating behaviors of university students with body mass index and self-esteem. *Ecol Food Nutr* 2015;54:175-85.
 13. Herbozo S, Schaefer LM, Thompson JK. A comparison of eating disorder psychopathology, appearance satisfaction, and self-esteem in overweight and obese women with and without binge eating. *Eat Behav* 2015;17:86-9.
 14. Heatherton TF, Polivy J. Development and validation of a scale for measuring state self-esteem. *J Per Soc Psychol* 1991;60:895-910.
 15. World Health Organization. Obesity: Preventing and Managing the Global Epidemic: Report of a WHO Consultation. World Health Organization; 2000. Available from: <https://apps.who.int/iris/handle/10665/42330>. [Last accessed on 2022 Feb 24].
 16. Garrett JM. SWBOOT: Stata Module to Bootstrap Stepwise Linear or Logistic Regression Models. Statistical Software Components S415601, Boston College Department of Economics; 2000. Available from: <https://ideas.repec.org/c/boc/bocode/s415601.html>. [Last accessed on 2021 Nov 15].
 17. Abdalla MM, Alsadi NA, Azman AH, Thivakaran, AQ, Vin HS, Karunakaran K, *et al*. The association between abnormal eating behaviors, body mass index, and waist-to-height ratio among university students in Malaysia. *US Endocrinol* 2020;16:69-73.
 18. Yamamoto R, Tomi R, Shinzawa M, Yoshimura R, Ozaki S, Nakanishi K, *et al*. Associations of skipping breakfast, lunch, and dinner with weight gain and overweight/obesity in university students: A retrospective cohort study. *Nutrients* 2021;13:271.
 19. Malik VS, Schulze MB, Hu, FB. Intake of sugar-sweetened beverages and weight gain: A systematic review. *Am J Clin Nutr* 2006;84:274-88.
 20. Nour M, Lutze SA, Grech A, Allman-Farinelli M. The relationship between vegetable intake and weight outcomes: A systematic review of cohort studies. *Nutrients* 2018;10:1626.
 21. Kaiser KA, Brown AW, Bohan Brown MM, Shikany JM, Mattes RD, Allison DB. Increased fruit and vegetable intake has no discernible effect on weight loss: A systematic review and meta-analysis. *Am J Clin Nutr* 2014;100:567-76.
 22. Mohebibi B, Tafaghodi B, Sadeghi R, Tol A, Yekanenejad MS. Factors predicting nutritional knowledge, illness perceptions, and dietary adherence among hypertensive middle-aged women: Application of transtheoretical model. *J Educ Health Promot* 2021;10:212.
 23. Sabouri M, Shakibazadeh E, Mohebibi B, Tol A, Yaseri M, Babae S. Effectiveness of an educational intervention using theory of planned behavior on health care empowerment among married reproductive-age women: A randomized controlled trial. *J Educ Health Promot* 2020;9:293.
 24. Barutcu A, Taylor S, McLeod CJ, Witcomb GL, James, LJ. Planned aerobic exercise increases energy intake at the preceding meal. *Med Sci Sports Exerc* 2018;52:968-75.
 25. West, H. Does Exercise Help You Lose Weight? The Surprising Truth; 2021. Available from: <https://www.healthline.com/nutrition/does-exercise-cause-weight-loss>. [Last accessed on 2021 Nov 15].
 26. Naess M, Sund ER, Holman TL, Kvaløy K. Implications of parental lifestyle changes and education level on adolescent offspring weight: A population-based cohort study-The HUNT study, Norway. *BMJ Open* 2018;8:E023406.
 27. Alley S, Wellens P, Schoeppe S, de Vries H, Rebar AL, Short CE, *et al*. Impact of increasing social media uses on sitting time and body mass index. *Health Promot J Austr* 2017;28:91-5.
 28. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? *Indian J Psychol Med* 2013;35:121-6.
 29. Sowislo JF, Orth U. Does low self-esteem predict depression and anxiety? A meta-analysis of longitudinal studies. *Psychol Bull* 2013;139:213-40.
 30. Luppino FS, de Wit LM, Bouvy PF, Stijnen T, Cuijpers P, Penninx BW, *et al*. Overweight, obesity, and depression: A systematic review and meta-analysis of longitudinal studies. *Arch Gen Psychiatry* 2010;67:220-9.