

How to Cite:

Adam, M. Y., & Wani, M. A. (2022). Self-esteem and mental health among obese and non-obese people. *International Journal of Health Sciences*, 6(S8), 1689–1705.

<https://doi.org/10.53730/ijhs.v6nS8.11511>

Self-esteem and mental health among obese and non-obese people

M. Yousuf Adam

Ph.D. Scholar in Psychology, Lovely Professional University – Punjab

Corresponding author email: dryousufadam@gmail.com

Dr. Mohammad Amin Wani

Assistant Professor Psychology, Lovely Professional University – Punjab

Email: amin.23914@lpu.co.in

Abstract---Obesity and mental health problems are becoming as major health related issues in 21st century due to improper and unhealthy lifestyles. In other hand the term self-esteem is derived word “esteem” (in Latin aestimare means to value), it denotes how we value ourselves. It plays important role in body mass index and mental health. Aim and objectives of present study to explore various research input in obesity research through multiple linear analysis and non-parametric test such as Mann-Whitney test and Kruskal Wallis test among 560 obese and non-obese participants from Cuddalore district in Tamil Nadu, India using Rosenberg’s Self-esteem Scale (RSES) and the Mental Health Inventory-38 (MHI-38) along with body mass index (BMI) measurement. The results stated self-esteem have significant mean difference at the level of .001 with respect to age, and at level of .000 with respect to body mass index, whereas gender have showed statistical insignificant mean difference at .181. Whereas mental health have significant mean difference only in body mass index at the level of .000 and showed no significant mean difference in age and gender with p-value .504 and .421 respectively. Regression equation showed significant negative impact of self-esteem over mental health, $p = .000$, $R = .378$, $R^2 = .143$, *adjusted* $R^2 = .142$, *Regression co-efficient* $\beta = -2.09$, and also showed significant negative impact of self-esteem over body mass index $p = .000$, $R = .189$, $R^2 = .036$, *adjusted* $R^2 = .034$, *Regression co-efficient* $\beta = -.294$. It showed shocking research output and gave creative research input to explore further insight related to self-esteem and mental health among obese and non-obese people.

Keywords---mental health, obesity, self-esteem, regression analysis, Mann-Whitney test, Kruskal Wallis test, body mass index.

Introduction

Each person have their own valuation about themselves based on their personality, attitude, social interaction and physical appearance. Appropriate and realistic perception about themselves provide healthy self-esteem. The term self-esteem is derived word “esteem” (in Latin aestimare means to value), it denotes how we value ourselves. It plays important role in body mass index (BMI) and mental health. Body mass index are calculated based on weight and height of an individual. World Health Organisation (WHO) categorized body mass index as underweight with body mass index less than 18.5 kg/cm^2 , normal weight with 18.5 to 24.9 kg/cm^2 , overweight with 25 to 29.9 kg/cm^2 , and obesity with body mass index greater than 30 kg/cm^2 (World Health Organization, 2001). Apart from biological and hereditary nature of obesity, obese person have greater possibilities for mental health disorder (Milano et al., 2020). Obesity acts as risk factor for many disease like as high blood pressure, heart disease, stroke, type 2 diabetes, joint problems, high cholesterol, and sleep apnea (National Institute of Diabetes and Digestive and Kidney Diseases, 2019). Obesity have associated with many psychosocial problems related to social life, mood, life satisfaction, physical appearance, weight stigma and quality of life (Sarwer and Polonsky, 2019). Nowadays most of obese people have been facing inequalities in healthcare sectors and stigma in health stigma in addition with weight discrimination in social environment such as restaurants, schools, colleges and other public places (Puhl & Heuer, 2010). Past study in obesity stated that people with obesity have low exercise self-efficacy, high stigma induced stress, high depression, high anxiety, high external shame, feelings of social rejection, and poor psychological adjustment than non-obese people which create harmful circumferences in health promotion (Graham & Edwards, 2013). Aim of present study to find out impact of self-esteem over mental health and body mass index among obese and non-obese people. Usually people with obesity have unhealthy self-esteem which means they have overestimation about their own body appearance or under estimation about their own weight (Weinberger et al., 2016). Obese people have 55% of chance of getting mental health problem than people without obesity (Luppino et al., 2010). Thus, mental health in obese person is very important to strengthen themselves against psychological issues and medical complications through appropriate weight reduction strategies.

Self-esteem

Opinion about ourselves gives either positive or negative respect to ourselves which is termed as self-esteem. Positive feelings bring our self-esteem towards higher level while negative feelings creates our self-esteem to low. People from psychology, social science and anthropology defined self-esteem in different views like competence or ability to handle achievement in meaningful way, feeling or attitude of self-worth, and overall opinion about ourselves (Mruk, 2013). People with high self-esteem have high positive perception about themselves, but people from low self-esteem have poor evaluation and negative feelings with their own (Smith et al., 2020). Self-esteem starts to develop itself as early in childhood periods, then slowly increases over lifespan (Robins & Trzesniewski, 2005). Many research studies were documented as that self-esteem had strong negative

association with body image (ALAhmari et al., 2017; Almenara et al., 2017; (Ercan & Özcebe, 2020).

Mental Health

Mental health includes various dimensions such as cognitive, emotional, psychological and social. Our thoughts, feelings and behaviours determine nature and consequence of status of our mental health. Mental health acts as important element in everyday life and in each stages of development begin from birth to childhood, adolescence and adulthood. People with obesity perceives weak mental health due to social stigma, teasing, bullying, low social support, weight stigma, low self-esteem and body dissatisfaction (Puhl & Heuer, 2010) A review study revealed that about 80% of research related to obese and non-obese stated presence of depression in it, but around 53% of research in depression showed obesity (Faith et al., 2011). Thus, obesity plays an important causative factor for mental health problem. There was strong significant relationship between obesity and emotional disorder especially among women (Scott et al., 2007; Simon et al., 2006). Database from National Health Insurance in Korea stated there was significant relationship between unhealthy obese people and healthy obese female with metabolic disease with depression (Seo et al., 2020).

Objective of present study

1. To identify the influence of self-esteem on mental health among obese and non-obese people.
2. To examine age difference in self-esteem and mental health among obese and non-obese people.
3. To examine gender difference in self-esteem and mental health among obese and non-obese people.
4. To examine family difference in self-esteem and mental health among obese and non-obese people.
5. To examine location difference in self-esteem and mental health among obese and non-obese people.
6. To examine income difference in self-esteem and mental health among obese and non-obese people.
7. To examine BMI difference in self-esteem and mental health among obese and non-obese people.
8. To investigate the level of self-esteem and mental health among obese non-obese people

Methodology

Present study is a non-experimental, exploratory, survey type study with quantitative in nature.

Variable

Self-esteem and mental health are psychological variables used in this study in which mental health is criterion variable while self-esteem as predictor variables. Demographic variables used in this study are age, gender, family type, location,

and income status. Body mass index is used as categorical variable which includes underweight, normal weight, overweight in non-obese spectrum while in obese spectrum it has class I, class II and class III obesity.

Sampling

Present study were investigated as public study so that prime focus of datasets were from public population based on body mass index calculation from weight and height of participants. The researchers have collected around 560 obese and non-obese samples from this study from Tamil Nadu, India. Sample design used in this study were purposive sampling technique and the criteria includes participant above 15 years old, from Cuddalore district, and belonging to rural and urban areas only.

Table 1, Descriptive statistical details with respect to age, gender, social support, self-esteem and mental health among non-obese (295)

	Obese		Non-obese	
	Frequency	Percentage	Frequency	Percentage
Age Group				
15 to 25	49	17.5	109	38.9
26 to 35	88	31.4	77	27.5
Above 35 years	143	51.1	94	33.6
Gender				
Male	80	28.6	125	44.6
Female	200	71.4	155	55.4
Total	280	100.0	280	100.0

Table 1 described frequency of datasets in each demographic categories with respect to as age, gender, family type, location, and income status among obese and non-obese. Obesity was much more among people above 35 years old. This prevalence was in line with previous study especially carried by Control of Diabetes in India, (2017) revealed obesity risk was high among people above 40 years old (Venkatrao et al., 2020). Present study also stated female obesity was more common than male obese which were supported by many past studies as seen in Al-Raddadi et al., 2019; Dwivedi et al., 2019; Andoy-Galvan et al., 2020; and Adeloye et al., 2021.

Measuring Tools

In present study, the following measuring scales were in research design,

1. Demographic Sheet: Respondents' personal demographic information were asked through appropriate open type questionnaires.
2. Body Mass Index (BMI): it is a measure fat deposition and calculated from weight and height of respondents. WHO classified it as underweight with BMI below 18.5 kg/cm², normal weight with BMI from 18.5 to 24.9 kg/cm², overweight with BMI from 25 to 29.9 kg/cm² and obese with BMI above

30kg/cm². In obese spectrum class I obesity have BMI in between 30 to 34.9 kg/cm², class II obesity with BMI 35 to 39.9 kg/cm², and class III obesity with BMI above 40 kg/cm².

3. Rosenberg's Self-Esteem Scale (RSES): It is used for measuring the level of self-esteem, and this scale was developed by Rosenberg (1965) which consist of ten items in 4-point likert scale with response as strongly agree, agree, disagree and strongly disagree. The scale as 0.82 to 0.88 test-retest correlation, and 0.77 to 0.88 as Cronbach's alpha Co-Efficient values in different studies.
4. The Mental Health Inventory (MHI-38): Veit & Ware (1983) developed this scale to measure mental health with 38 items in six point likert type responses and includes questionnaires related to anxiety, depression, behavioural control, positive affect, emotional ties and Life satisfaction. This scale states both positive and negative aspects of mental temperaments.

Results and Discussions

The present study aimed to predict the influence of self-esteem on mental health among obese and non-obese people. Further to investigate age, gender and BMI difference in said variables. The level of self-esteem and mental health among obese and non-obese people was also investigated. The findings of the above cited objectives are given in following tables.

Self-esteem

Positive Opinion about ourselves gives positive impact, likewise negative opinion gives negative impact. Appropriate opinion whether positive or negative towards themselves will provide healthy self-esteem. Healthy self-esteem should be in moderate one and it should not either high or low. Here, the researchers aimed to measure the level of self-esteem among obese and non-obese people and also to find out age, gender and BMI difference among obese and non-obese.

Table 2., Descriptive details in level of self-esteem among Non-obese (300) and obese (300)

Self-esteem	Range	Obese		Non-obese	
		Frequency	Percentage	Frequency	Percentage
Very Low	0 - 15	5	1.8	22	7.8
Low	16 - 25	248	88.6	197	70.3
Average	26 - 35	27	9.6	61	21.7
High	36 - 40	0	0	0	0
Total		280	100	280	100

Table 2 described frequency of observation in level of self-esteem as very low, low average and high in which 88.6% of obese people have scored low self-esteem while non-obese it was 70.3%. 21.6% of non-obese have scored average self-esteem while in obese it was 9.6%. These findings in line by line with previous studies as obese people have lower body esteem than normal weight people (French et al., 1995), body dissatisfaction correlated with childhood obesity which

leads to low self-esteem (Shin & Shin, 2008), low self-esteem and depression have positive association with bodu dissatisfaction among overweight people (Ozmen et al., 2007), obese children have low self-esteem, low perceived competence in exercise and sports (Franklin et al., 2006) and stigmatization helps obese to cope with stigma through healthy self-esteem (Myers & Rosen, 1999).

Table 3, Age difference in self-esteem among obese and non-obese by using Kruskal-Wallis Test

<i>Age</i>	<i>N</i>	<i>Mean Rank</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Kruskal-Wallis H</i>	<i>Asymp. Sig. (2-tailed)</i>
15 to 25 years	158	310.51				
26 to 35 years	165	293.07	21.65	3.75	14.045	.001
Above 35 years	237	251.74				
Total	560					

Table 3 represented that age difference in self-esteem among obese and non-obese people using Kruskal-Wallis test which revealed there was statistically significant mean difference in self-esteem among different age groups with higher self-esteem among age group 15 to 25 years old with mean rank as 310.51 than age group 26 to 35 years old with mean rank 293.07 and age group above 35 years old with mean rank 251.74, Kruskal Wallis H = 14.045, $p = .001$. These findings goes in line with previous studies as self-esteem increases with age as from adolescence to adulthood (Erol & Orth, 2011; McMullina & Cairney, 2004), and there was significant age difference in self-esteem (Dias et al., 2002).

Table 4, Gender difference in self-esteem among obese and non-obese by using Mann-Whitney Test

	<i>N</i>	<i>Mean Rank</i>	<i>Sum of Ranks</i>	<i>Test</i>	<i>Social Support</i>	<i>Asymp. Sig. (2-tailed)</i>
Male	205	292.49	59961.00	Mann-Whitney U	33929.000	
Female	355	273.57	97119.00	Wilcoxon W	97119.000	.181
Total	560			Z	-1.339	

Table 4 revealed that gender difference in self-esteem among obese and non-obese people using Mann-Whitney test which stated that there was no statistically significant gender difference found between male with mean rank as 292.49 and female with mean rank as 273.57, Mann-Whitney U = 33929.000, Wilcoxon W = 97119.000, $Z = -1.339$, $p = .181$. This finding is supported in line with previous studies as there was no mean difference in self-esteem with respect to (Erol & Orth, 2011). But few studies revealed women have slight lower self-esteem than men (McMullina & Cairney, 2004; Magee and Upenieks, 2019). Usually, in gender difference lower self-esteem have present in women only during young adulthood,

not in late adults and old ages (Orth et al., 2010), male obese have slightly higher self-esteem than female during adulthood (Bleidorn et al., 2016).

Table 5, BMI difference in self-esteem among obese and non-obese by using Kruskal-Wallis Test

<i>Age</i>	<i>N</i>	<i>Mean Rank</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Kruskal-Wallis H</i>	<i>Asymp. Sig. (2-tailed)</i>
Obese	280	267.89	21.65	3.75	18.610	.000
Overweight	103	247.58				
Normal weight	150	312.04				
Underweight	27	361.57				
Total	560					

Table 5 revealed that BMI difference in self-esteem among obese and non-obese people using Kruskal Wallis test in which there was statistically significant BMI difference found between various BMI categories as underweight people have very high mean rank with 361.57 than normal weight with 312.04, obese with 267.89 and overweight with 247.58, Kruskal Wallis $H = 18.610$, $p = .000$. This finding is supported in line with previous studies as prevalence of obese people with low self-esteem (Ercan & Özcebe 2020; Franklin et al. 2006; Wang & Beydoun, 2007; Unlu et al. 2019; Aggarwal 2019; Al-Ahmari et al. 2017; Almenara et al. 2017; and Griffiths et al. 2010). Low self-esteem in association with fear of failure, shame and negative appearance evaluation brought them to the feeling of weight stigma and disordered eating especially with obese women (Almenara et al.2017). Beyond physical or emotional bullying, obese people have highly associated with low self-esteem (Ercan & Özcebe 2020).

Mental Health

Mental health have both positive dimension such as positive affect, emotional control and life satisfaction, similarly have anxiety, depression and loss of behavioural control. Mental health also includes emotional, cognitive and psychological components of our temperament. The researchers aimed to measure the level of mental health among obese and non-obese people and also to find out age, gender and BMI difference among obese and non-obese.

Table 6, Descriptive statistical details of mental health among Obese and Non-obese

<i>Resilience</i>	<i>Raw</i>		<i>Obese</i>		<i>Non-obese</i>	
	<i>Score</i>	<i>Z-Score</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Frequency</i>	<i>Percentage</i>
Extr. Low	38	-2.01&	7	2.5	8	2.9
	98	below				
Low	99	-2.00 to -	15	5.4	17	6.1
	113	1.26				
Below.Ave	114	-1.25 to -	45	16.1	42	15

	129	0.51					
Average	130 -	-.050	to	182	65	108	38.6
	150	0.50					
Above	151 -	0.51	to	27	9.6	51	18.2
Ave	165	1.25					
High	166 -	1.26	to	4	1.4	34	12.1
	181	2.00					
	182	2.00	&	7	2.5	8	2.9
Extr.High	&	above					
	above						
Total				280	100	280	100

Table 6 stated descriptive statistical details of mental health among obese and non-obese people. It revealed greater frequency of them in obese have average and below average level of mental health, while non-obese have more frequency in average and above average level of mental health. This finding is supported in line with previous studies as mental health issues such as anxiety, depression and stress have positive relationship with obesity (AlQahtani et al. 2015), obese patient have greater chances for depression (Reynolds et al. 2018), mental health of obese people acted as strongest predictor for perceived physical health (Knoesen et al. 2010), and obesity was highly associated with depressive disorder especially in women (Ahuja et al. 2020).

Table 7, Age difference in mental health among obese and non-obese by using Kruskal-Wallis Test

Age	N	Mean Rank	Mean	Standard Deviation	Kruskal-Wallis H	Asymp. Sig.(2-tailed)
15 to 25 years	158	281.35				
26 to 35 years	165	268.88	139.67	20.72	1.369	.504
Above 35 years	237	288.03				
Total	560					

Table 7 revealed age difference in mental health using Kruskal-Wallis test among obese and non-obese. It showed that there was no statistically significant age difference in mental health among obese and non-obese, Kruskal Wallis H = 1.369, p = .504, with lower mean rank in age group 26 to 35 years as 268.88 than age group 15 to 25 years with mean rank 281.35 and above 35 years with mean rank 288.03. Comparatively it was very low among age group 26 to 35 years, and very high among age group above 35 years. This finding goes towards significant age difference previous studies there was no significant age difference in mental health but beliefs about the life will vary based on age (Farrer et al., 2008), mental health illness begins as early as in childhood or adolescents (Kessler et al., 2007), Factors such as social and familial restrictions impact mental health especially more in young adults than old ages (Sojli et al.,2021), there was existence of

increased mental health problems diagnosis especially with young female (Rossell et al., 2021).

Table 8, Gender difference in mental health among obese and non-obese by using Mann-Whitney Test

	<i>N</i>	<i>Mean Rank</i>	<i>Sum of Ranks</i>	<i>Test</i>	<i>Social Support</i>	<i>Asymp. Sig. (2-tailed)</i>
Male	205	287.74	58987.00	Mann-Whitney U	34903.000	
Female	355	276.32	98093.00	Wilcoxon W	98093.000	.421
Total	560			Z	-.805	

Table 8 stated gender difference in mental health using Mann-Whitney test among obese and non-obese people. It showed that mental health have no statistical significant mean difference between male with mean rank as 287.74 and female with mean rank as 276.32, Mann-Whitney U is 34903.000, Wilcoxon W is 98093.000, $Z = -.805$, $p = .421$. This finding have showed no statistical significance but goes in line to support it through significant gender differences in mental health in past studies as mental health status relied on social context better than by gender (Kiely et al., 2019), there was no significant differences between male and female (Liu et al., 2020), gender based differences in mental health of population have showed conflicting identity due to psychopathology seen in women (Dhejne et al., 2016), and among young men have greater chance for withdrawal mental health care (Seidler et al., 2020).

Table 9, BMI difference in mental health among obese and non-obese by using Kruskal-Wallis Test

<i>Age</i>	<i>N</i>	<i>Mean Rank</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Kruskal-Wallis H</i>	<i>Asymp. Sig.(2-tailed)</i>
Obese	280	249.72				
Overweight	103	348.50				
Normal weight	150	302.05	139.67	20.72	34.701	.000
Underweight	27	220.63				
Total	560					

Table 9 stated BMI difference of mental health using Kruskal-Wallis test among obese and non-obese people. It showed there was strong statistically significant BMI difference in mental health between various body mass index categories in which BMI difference were as U-shaped relationship with obese people had comparatively low mean rank as 234.20, than overweight very high mean rank as 304.79, and normal weight 251.50. But underweight people have very low mean rank as 170.90, $N=500$, Kruskal Wallis $H = 23.675$, $p = .000$. These findings goes in line with previous studies as in obese peoples the mental health played as strong predictor for optimum perceived physical health (Knoesen et al. 2010), women with high BMI have greater mental health problems than Boys (Xie et al. 2005), mental health illness had positive correlation with BMI till a point after which it showed negative correlation with BMI (McCrea et al., 2012), mood or

mental disorders were common issues in overweight and obese people than normal weight people (Bruffaerts et al., 2008).

Impact of self-esteem over Mental Health

The impact of self-esteem over mental health was analysed statistically using linear regression equation among obese and non-obese. The predicted values of the criterion variables (mental health) can be made from the observed values of the predictor variables (self-esteem).

Table 10, Regression analysis shows the impact of self-esteem over mental health among obese and non-obese people.

<i>BMI Groups</i>	<i>R</i>	<i>R²</i>	<i>Adjusted R²</i>	<i>Std Error of Estimate</i>	<i>B</i>	<i>Std. Error</i>	<i>β</i>	<i>t-value</i>	<i>p-value</i>
Overall*	.378	.143	.142	19.200	-2.09	.216	-.378	-9.660	.000
Obese*	.279	.078	.074	15.316	-1.491	.308	-.279	-4.838	.000
Non-obese*	.460	.211	.209	21.229	-2.504	.290	-.460	-8.634	.000

**Predictor Variable: Self-esteem; Criterion Variable: Mental Health*

Table 10 described regression analysis to identify impact of self-esteem over mental health among obese and non-obese people. It revealed that self-esteem have statistically significant negative impact over mental health, $p = .000$, $R = .378$, $R^2 = .143$, *adjusted R²* = .142. The regression co-efficient (*B*) of self-esteem was -2.09, stated that an increase in one part of self-esteem will decrease the mental health with 2.09 points and self-esteem played 14.2% determination role over mental health. Regression analysis among obese and non-obese people also stated that self-esteem have high negative impact and better determination over mental health among non-obese, $p = .000$, $R = .460$, $R^2 = .211$, *adjusted R²* = .209 than obese people, $p = .000$, $R = .279$, $R^2 = .078$, *adjusted R²* = .074. Which means an increase in one part of self-esteem will decrease the mental health with 2.504 points in non-obese and 1.491 in obese, similarly self-esteem played 20.9% determination role over mental health in non-obese and only 7.4% determination role over mental health in obese people. These findings goes side by side with previous studies as self-esteem have negative relationships with mental health (Moksnes & Reidunsdatter, 2019), self-esteem played as intermediate role with eating disorder and self-devaluation (Almenara et al., 2017), self-esteem have impaction over self-compassion with mental health among obese people irrespective of any age (Hwang et al., 2016), and body mass index were negatively correlated with self-esteem and mental health (Prabhu & D'Cunha, 2018).

Impact of self-esteem over Body Mass Index

The impact of self-esteem over body mass index was analysed statistically using multiple linear regression among obese and non-obese people. The predicted values of the criterion variables (body mass index) can be made from the observed values of the predictor variables (self-esteem).

Table 11, Regression analysis shows the influence of psychological resilience on body mass index among Obese and Non-obese people

<i>BMI Groups</i>	<i>R</i>	<i>R²</i>	<i>Adjusted R²</i>	<i>Std Error of Estimate</i>	<i>B</i>	<i>Std. Error</i>	β	<i>t-value</i>	<i>p-value</i>
Overall*	.189	.036	.034	5.75	-.294	.065	-.189	-4.535	.000
Obese*	.203	.041	.038	2.70	-.187	.054	-.203	-3.449	.001
Non-obese*	.249	.062	.059	3.57	-.209	.049	-.249	-4.295	.000

**Predictor Variable:* Psychological Resilience; *Criterion Variable:* body mass index

Table 11 represented regression analysis to identify impact of self-esteem over body mass index among obese and non-obese people. It stated that self-esteem have statistically significant negative impact over body mass index, $p = .000$, $R = .189$, $R^2 = .036$, *adjusted R²* = .034. The regression co-efficient (*B*) of self-esteem was -.294, stated that an increase in one part of self-esteem will decrease the body mass index with .294 points and self-esteem played 3.4% determination role over body mass index. Regression analysis among obese and non-obese people also stated that self-esteem have high negative impact and better determination over body mass index among non-obese, $p = .000$, $R = .249$, $R^2 = .062$, *adjusted R²* = .059 than obese people, $p = .000$, $R = .203$, $R^2 = .041$, *adjusted R²* = .038. Which means an increase in one part of self-esteem will decrease the mental health with .209 points in non-obese and .187 in obese, similarly self-esteem played 5.9% determination role over body mass index in non-obese and 3.8% determination role over body mass index in obese people. These findings goes side by side with previous studies as obese people have lower body esteem than normal weight people (French et al., 1995), body dissatisfaction correlated with childhood obesity which leads to low self-esteem (Shin & Shin, 2008), low self-esteem and depression have positive association with body dissatisfaction among overweight people (Ozmen et al., 2007), obese children have low self-esteem, low perceived competence in exercise and sports (Franklin et al., 2006) and stigmatization helps obese to cope with stigma through healthy self-esteem (Myers & Rosen, 1999).

Conclusion

Mental health and Body mass index have bidirectional association with each other. Behaviours related to food habits and physical activities might disturb energy balance through energy intake and energy expenditure. Present study used self-esteem as interaction factor in mediating or preventing mental health issues and obesity. Present study stated prevalence of mental health problems were high among obese than non-obese. Similarly the self-esteem in non-obese people have statistically significant lesser negative impact on mental health and on body mass index than obese people. When analyzing the data sets in term of self-esteem with respect to demographic variables and body mass index revealed various significant statistical research outputs as significant age difference ($p = .001$) and BMI difference ($p = .000$) while gender showed no significant mean difference ($p = .181$). Meanwhile mental health have showed significant difference

only in body mass index ($p = .000$) and insignificant in age ($p = .504$) and gender ($p = .421$). in which as age increases the psychological resilience also significantly increased, significant location difference ($p = .000$) in which rural people have significantly higher resilience than urban people, significant income difference ($p = .000$) where low income people have high resilience than others, and significant BMI difference ($p = .000$) where an increase in body mass index increases resilience which mean overweight and obese people have higher resilience than normal weight and underweight people.

Regression line in this study revealed self-esteem have significant negative impact on mental health and also showed significant negative impact on body mass index. As the researchers found in this study as underweight people have very high mean rank with 361.57 than normal weight with 312.04, obese with 267.89 and overweight with 247.58. It denotes obese and overweight people have low self-esteem than normal weight people, while underweight people have very high self-esteem than all other. Similar findings stated in many past researches as prevalence of obese people with low self-esteem (Ercan & Özcebe 2020; Franklin et al. 2006; Wang & Beydoun, 2007; Unlu et al. 2019; Aggarwal 2019; Al-Ahmari et al. 2017; Almenara et al. 2017; and Griffiths et al. 2010). Low self-esteem in association with fear of failure, shame and negative appearance evaluation brought them to the feeling of weight stigma and disordered eating especially with obese women (Almenara et al. 2017). Beyond physical or emotional bullying, obese people have highly associated with low self-esteem (Ercan & Özcebe 2020). This denotes obesity have low self-esteem. So an increase in self-esteem will decrease body mass index and bring them to normal weight or reduce their body mass index. Present study also revealed it as statistically significant negative impact over body mass index, $p = .000$, $R = .189$, $R^2 = .036$, *adjusted* $R^2 = .034$. The regression co-efficient (B) of self-esteem was $-.294$, stated that an increase in one part of self-esteem will decrease the body mass index with $.294$ points and self-esteem played very less role of prediction on body mass index as 3.4% determination role. But, the regression analysis in present study revealed that impact of self-esteem over mental health have showed shocking research output as there was significant negative impact of self-esteem over mental health, $p = .000$, $R = .378$, $R^2 = .143$, *adjusted* $R^2 = .142$. The regression co-efficient (B) of self-esteem was -2.09 , stated that an increase in one part of self-esteem will decrease the mental health with 2.09 points and self-esteem played 14.2% determination role over mental health. Although obese people have significantly low self-esteem, if any behavioural intervention on self-esteem enhancement carried, will automatically decrease mental health which can lead to mental health illness such as depression, anxiety, or emotional disorder. This research input made an insight to explore further insight related to self-esteem and mental health among obese and non-obese people.

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