

Resilience And Mental Health Among Obese And Non-Obese People

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Abstract:

Obesity and mental health issues act as two side of coin in respect to chronic condition among most of countries due to so called modernization. In other hand the term resilience is derived from the Latin term “resilio” (back behind, back from a jump, or bounce), nature of it is present within each of us which acts as preventing role in obesity and mental health issues. Aim and objectives of this 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 500 obese and non-obese participants from Tamil Nadu, India using Psychological Resilience Scale (PRS) and the Mental Health Inventory-38 (MHI-38) along with body mass index (BMI) measurement. The findings revealed psychological resilience have significant mean difference at the level of .000 with respect to age, location, income, and body mass index, whereas gender and family type have statistical insignificant mean difference at .154 and .262 respectively. Similarly mental health have significant mean difference at the level of .040 for family type, at .042 for and at .000 for body mass index, whereas rest demographic variables such as age, gender and income status were in statistical insignificant mean difference. Body mass index showed U-shaped relationship with mental health. Regression line showed significant positive influence of resilience over mental health have statistically significant positive influence over mental health, $p = .000$, $R = .357$, $R^2 = .127$, adjusted $R^2 = .126$, and also showed significant positive influence of resilience over body mass index $p = .000$, $R = .367$, $R^2 = .135$, adjusted $R^2 = .133$.

Keywords: Mental health, obesity, Resilience, Body mass index, Mann-Whitney test and Kruskal Wallis test.

Introduction:

Obesity is trending disease in modern society due to global prevalence and develops as result of consumption of more foods (calories) than its body utilization through exercise and routine daily activities. Overweight occurs in an individual when his or her body mass index (BMI) is 25 or greater till 29.99. After body mass index above 30 is termed as obesity. This increase in body weight is due to excessive deposition of body fat which acts as risk factor for several health problems. Mainstream causative factor for overweight and obesity is lifestyle changes beyond medical and genetic factors. Similarly the

mainstream in management or treatment of overweight and obesity are lifestyle changes like change in diet pattern and physical activities. World Health Organisation (WHO) Data sheet revealed around two billion adults were with overweight, and one third of them in obese. Overweight and obesity is becoming as killer disease than malnutrition as seen statistical report from many countries (World Health Organization, 2021). Many people in world's population dies due to overweight and obesity than underweight or malnutrition. Obesity is becoming very trending topic among many researchers due to its impact on medical and psychological health. In general, overweight

status which is a part of non-obese condition acts as step to obesity and it is around 40% of world population. NCI dictionaries from National Institutes of Health stated the definition for energy balance as “the state at which the number of calories eaten equals the number of calories used”. Body size, amount of body fat and muscle, physical activity, exercise, and genetics affects energy balance of an individual (National Cancer Institute, 2011). When there is disturbance in energy balance will change our body weight, a positive energy balance which means there is increase energy intake than energy expenditure will lead to fat deposition. Similarly a negative energy balance in which there is decreased energy intake than energy expenditure will favour body weight loss (Hill et al., 2010). The disturbance in energy balance in beginning as low birth weight, later during lifespan developing into obesity, disruption in glucose homeostasis and increase blood pressure due to altered in fat metabolism have recorded in epidemiological as well as experimental studies (Cottrell & Ozanne, 2007). An increased in body weight due to positive energy balance have been caused by linking between genetic and environmental factors, of which excessive food intake, sedentary lifestyle, behavioural factors, parental obesity, individual metabolism and genetic predisposition are acted as predominant role in it (Bethesda et al., 2007). Obesity acted as risk factor for many metabolic diseases such as cardiac disease, stroke, high blood pressure, diabetes, gallstones, sleep apnea, back pain, joint disease, and few cancers like breast cancer and colon cancer (Rockville et al., 2001). Mental health problems and chronic stress may disturb energy balance through dietary over-consumption mainly palatable foods and increased visceral adiposity which leads to obesity (Rabasa & Dickson, 2016).

An individual behaviour patterns such as smart phone addictions, consumption of sugar-sweetened beverages and excess snacking have positive correlation with obesity (Landsberg et al., 2010). Regular exercise, optimal sleep, proper nutrition, avoid alcohol, no smoking and mindfulness are top lifestyle factor in preventing and treating obesity (Mihaela Hâncu, 2021). Our lifestyle includes both enhancing and preventing factors for obesity as the researchers mentioned last two statement. Energy balance is prime

metabolic center in managing body weight through maintenance of body fat. Our body survival under critical conditions is well understood and mechanism of energy balance are likely predicted or controlled in light of resilience generated within us

Human physical survival under harsh environmental conditions is fairly well understood and somewhat predictable as a function of known physiological mechanisms (Lukey & Tepe, 2008). Kevin Cashman (2022) from the Global Co-Leader of CEO and Enterprise Leader Development at Korn Ferry stated under title “The Resilience Principle: Restore and Multiply Energy Across” as to energize ourselves which help us energy balance system in equilibrium and can prevent or reduce obesity, which provides key contents as ‘be on-purpose, but be aware’, ‘fostering your energy vs. managing time’, ‘learn to exercise with ease’, ‘deal with life-damaging habits’, ‘avoid taking yourself so seriously’, ‘develop mind-body awareness’, ‘managing stress more effectively’, ‘nurture your close relationships, and ‘integrate more reflection and introspection into your lifestyle’ (Cashman, 2021). Thus resilience acted as key component in maintaining our body weight as well as mental health. In other hand, mental health and emotional regulation have positive influence over health people through psycho-neuro-endocrine-immune homeostasis as well as in association with epigenetic relationships (Gómez-Acosta & Londoño Pérez, 2020). Energy balance can controlled through behaviour in association with resilience and mental health. The researchers were aimed to nature, difference and level of resilience and mental health among obese and non-obese people with respect to demographic variables such as age, gender, family type, and income status.

Resilience:

The sentence “Bounce back from adversity” is not a proverb, but it defines the meaning for resilience. In short, it is meant for the process of adaptation. The person with high resilience have three characteristic features like accepting truth, have strong faith on life, and has talent to adjust with situations (Goleman et al., 2017). Resilience in association with social support have strong buffering effect on stress (Celik et al., 2021). It

has positive effect on quality of life (Mohlin et al., 2021), with physical activity (Seçer & Çakmak yildizhan, 2020), in food behaviour (Spinosa et al., 2019), and as preventive role in obesity (Williamson et al., 2021). The American Psychological Association (2012) outlined few strategies to improve one's resilience as smart action plan, social network, ignoring negativity, accepting changes in life, have positive hope and self-orientation.

Mental Health:

Every day within each fractions of minute or second our neural system programmed to act in such a way as thinking, feeling or behaving in different dimensions either internally as attitudes or externally as behaviours. These programmed patterns of thinking, feeling and behaving give status to our temperament either in positive mood or negative mood which determines our mental health. Thus, mental health of an individual varies in accordance with our thinking, feeling and behaving, and it also varies from person to person. Mental health with body weight have U-shaped relationship in which mental health increases with body weight from underweight category till a level and then it gets decreases with an increase in body weight beyond overweight or obese category (de Wit et al., 2009; Linna et al., 2013; Heidari-Beni et al, 2021; Magallares & Pais-Ribeiro, 2013; Knoesen et al., 2012). Mental health relation and body weight also correlated with resilience (Wu et al., 2020). Similarly, body weight also associated with emotional disorder especially in women populations (Scott et al., 2007; Simon et al., 2006; Seo et al., 2020).

Objectives of this study:

1. To find out influence of resilience on mental health among obese and non-obese people.
2. To find out influence of resilience on body mass index among obese and non-obese people.
3. To examine age difference in resilience and mental health among obese and non-obese people.
4. To examine gender difference in resilience and mental health among obese and non-obese people.
5. To examine family difference in resilience and mental health among obese and non-obese people.
6. To examine location difference in resilience and mental health among obese and non-obese people.
7. To examine income difference in resilience and mental health among obese and non-obese people.
8. To examine body mass index difference in resilience and mental health among obese non-obese people.
9. To identify the level of resilience, and mental health among obese and non-obese people.

Methodology:

Present study is quantitative, descriptive and survey type with non-experimental in nature. The study considered psychological resilience and mental health as interdependent psychological variables with age, gender and body mass index as demographic variables. Present study carried as community based survey with 295 non-obese participants from Cuddalore district in Tamil Nadu, India.

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
<u>Age Group</u>				
15 to 25	38	15.2	83	33.2
26 to 35	73	29.2	82	32.8
Above 35 years	139	55.6	85	34.0
<u>Gender</u>				
Male	72	28.8	114	45.6
Female	178	71.2	136	54.4

<u>Family Type</u>				
Joint	79	31.6	76	30.4
Nuclear	171	68.4	174	69.6
<u>Location</u>				
Urban	75	30.0	113	45.2
Rural	175	70.0	137	54.8
<u>Income status</u>				
Low income	209	83.6	153	61.2
Middle income	31	12.4	62	24.8
High income	10	4.0	35	14.0
Total				

Table 1 described number of observations in each category with demographic variables such as age, gender, family type, location, and income status among obese and non-obese. Since the collection samples were based on purposive sampling technique, the data related obesity might not accurate due to availability of non-obese is greater than obese. The prevalence of obesity is restricted and it vary with respect to demographic variables. The study on Control of Diabetes in India (2017) revealed that the obesity rate was high among adult people with age above 40 years old (Venkatrao et al., 2020). Further past researches like Al-Raddadi et al., 2019; Dwivedi et al., 2019; Djalalinia et al., 2020; and Adeloje et al., 2021 stated that female obesity was more prevalence than male. When looked to non-obese people, data obtained in present study revealed as 40% of them were in overweight which was in line with previous studies as in World Health Organization, (2020); Chen et al., (2019). Irrespective of obesity, most of the samples were from nuclear family. Many previous obesity research showed obesity rate was high among nuclear family than joint family (Singh et al., 2014; Laxmaiah et al., 2006; Kumar et al., 2011; and Gupta et al., 2013). Obesity statistics with respect to location stated that prevalence rate was high in the most rural areas, but it was opposite among older adults in which urban population had higher obesity than rural background (Cohen et al., 2018). Analytical studies conducted from 147 countries revealed developed countries have

high adult obesity rate, male obesity was more common in developed countries while female obesity was high in low economic countries such as Sub-Saharan Africa, South Asia, Latin America & Caribbean and Middle East & North Africa (Talukdar et al., 2020).

Measuring Tools:

In this study, the researchers used the following measuring scales,

1. **Demographic Sheet:** It includes demographic detail such as age, gender, family type and income status which was collected with semi-structured questionnaires.
2. **Body Mass Index:** It is a measurement to calculate fat deposition with respect to weight and height of participants. Non-obese people consist of body mass index categories as overweight, normal weight and underweight.
3. **The Psychological Resilience Scale (PRS):** This tool was generated by Rizwan Hasaan Bhat and Shah Mohamed Khan (2018) from work done by Wagnild and Young (1993). The original tool by Wagnild and Young (1993) have 25 items in seven point likert scale. But, Bhat and Khan (2018) developed it with 21 items in 5-point likert type responses such as 'strongly disagree', 'Disagree', 'Uncertain', 'Agree', and 'strongly Agree', as five dimensions such as self-perception, single Mindedness, Task Orientation, Organised and self-Restraint.

4. **The Mental Health Inventory (MHI-38):**

This scale was developed by Veit & Ware (1983) for the purpose of health insurance with 38 items in six point Likert scale. Asked the respondents to fill this inventory with respect their mental status or mood related to last four week. This inventory reveals positive aspects of mental health like interest, cheerfulness, and enjoyment in life, and negative aspects as emotional instability, depression and anxiety.

distributed in normal distribution pattern. Hence the researchers used non-parametric test such as Man-Whitney test and Kruskal Wallis test for mean difference among demographic variables namely age, gender, family type, location, income status and body mass index.

Psychological Resilience:

As discussed earlier psychological resilience acted as prime protective action in terms of mental health and body weight. Prior to analysis result and interpretations related to prediction of resilience over mental health and body mass index, let us discuss various research output based on the framed objectives of present study.

Results and Discussions

The normality test which have carried in this study revealed that the datasets were not

Table 2, Descriptive statistical details of Resilience among Obese and Non-obese.

Resilience	Raw Score Range	Z-Score Range	Obese		Non-obese	
			Frequency	Percentage	Frequency	Percentage
Extr. Low	21 - 50	-2.01 & below	3	1.2	18	7.2
Low	51 - 61	-2.00 to -1.26	13	5.2	37	14.8
Below.Ave	62 - 71	-1.25 to -0.51	24	9.6	35	14
Average	72 – 85	-.050 to 0.50	169	67.6	116	46.4
Above Ave	86 – 95	0.51 to 1.25	20	8	27	10.8
High	96 – 105	1.26 to 2.00	21	8.4	17	6.8
Extr.High	106 & above	2.00 & above	0	0	0	0
Total			250	100	250	100

Table 2 represented descriptive statistical details related to psychological resilience and the calculations to assess level of resilience were made using z-score with respect to study population. Obese population showed higher mean when compared to non-obese population. This finding goes in line side by side with previous studies as resilience played as protective statergies among high BMI peoples in association

with adjustment from environmental hazards (Luthar et al., 2000). Student with comparatively high BMI than with student with low BMI have significantly higher psychological resilience (Secer and Yildizhan., 2020), Healthy older people have better resilience (Lutz et al., 2016), and weight-resilience factor played as preventive role for psychological distress among obese (Brogan et al., 2012).

Table 3, Age difference in resilience 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	121	188.45				
26 to 35 years	155	253.41	78.38	13.76	35.482	.000
Above 35 years	224	282.00				
Total	500					

Table 3 represented age difference in psychological resilience using Kruskal-Wallis test among obese and non-obese people. It showed there was statistical significant age difference between different age group, and resilience increases with an increase in age. Kruskal-Wallis Test stated that age group 15 to 25 years have very low resilience with mean rank as 188.45, than age group 26 to 35 years with mean rank as 253.41, while age group above 35 years took very high resilience with mean rank

282.00 out of total study population, N= 500, Kruskal Wallis H = 35.482, p = .000. This finding goes in line with previous studies as older people have showed significantly high resilience than younger one (Cohen et al., 2014), age with adequate resilience predict good quality of life (Yazdi-Ravandi et al., 2012), in general psychological well-being was not in correlated with age, but it was related with purposefulness, perception and transcendence which were dimensions of resilience (Svence & Majors, 2015), and life experience with an increase in age

provided real resilience (Lamb 2020).

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

	N	Mean Rank	Sum of Ranks	Test	Social Support	Asymp. Sig. (2-tailed)
Male	186	238.94	44443.00	Mann-Whitney U	27052.000	
Female	314	257.35	80807.00	Wilcoxon W	44443.000	.154
Total	500			Z	-1.427	

Table 4 represented gender difference of resilience using Mann-Whitney test among obese and non-obese people. It showed there was no statistical significance between male and female. But female took higher mean rank than male. The mean rank for female is 257.35, the mean rank for male is 238.94, N=500, Mann-Whitney U is 27052.000, Wilcoxon W is 44443.000, Z = -

1.427, p = .154. This finding goes towards significance gender difference with previous studies as socio-cultural conditions in 21st century provides women to handle challenging vulnerabilities (Jordan 2018), women have significantly high resilience than men (Zhang et al., 2018), women have better disaster resilience than male (Chisty et al., 2022), while men have higher resilience in trauma (Portnoy et al., 2018).

Table 5, Family difference in resilience among obese and non-obese by using Mann-Whitney Test

	N	Mean Rank	Sum of Ranks	Test	Social Support	Asymp. Sig. (2-tailed)
Joint	155	240.06	37210.00	Mann-Whitney U	25120.000	
Nuclear	345	255.19	88040.00	Wilcoxon W	37210.000	.262
Total	500			Z	-1.122	

Table 5 represented family difference of resilience using Mann-Whitney test among obese and non-obese people. It showed there was no statistical significance between joint and nuclear family type. But nuclear family type have slightly insignificant high mean rank than joint family type. The mean rank for nuclear family type is 255.19, the mean rank for joint is 240.06, N=500, Mann-Whitney U is 25120.000, Wilcoxon W is 37210.000, Z = -1.122, p = .262. This finding

goes towards significance family difference with previous studies as resilience was correlated with many familial factors and family situations which includes developmental factors, risk and protective factors, (Hawley & DeHaan, 1996), psychological resilience of an individual decided from also childhood trauma and family resilience (Dong et al., 2020), psychological resilience in family type also depends on financial resources, coping skills, cultural values, ,

Table 6, Location difference in resilience among obese and non-obese by using Mann-Whitney Test

	N	Mean Rank	Sum of Ranks	Test	Social Support	Asymp. Sig. (2-tailed)
Urban	188	222.18	41769.00	Mann-Whitney U	24003.000	
Rural	312	267.57	83481.00	Wilcoxon W	41769.000	.000
Total	500			Z	-3.527	

parental support, stable home life, , supportive members and perseverance (Graber et al., 2015).

Table 6 represented location difference of resilience using Mann-Whitney test among obese and non-obese people. It showed there was statistical significance between urban and rural background. But rural have significantly higher mean rank than urban people. The mean rank for rural is 267.57, the mean rank for urban is 222.18, N=500, Mann-Whitney U is 24003.000, Wilcoxon W is 41769.000, Z = -3.527, p = .000. This finding is supported in line with

previous studies as psychological resilience was associated with strong social ties with respect to location (Wells 2010), risk perception, perceived hazard knowledge, and evacuation mode efficacy were the dimensions of psychological resilience have correlation with demographic location (Chen et al., 2021), and demographic variables such as gender, community size, income status and sense of danger have significant association with resilience (Kimhi et al.,2020).

Table 7, Income difference in resilience among obese and non-obese by using Kruskal-Wallis Test.

Age	N	Mean Rank	Mean	Standard Deviation	Kruskal-Wallis H	Asymp. Sig. (2-tailed)
Low income	362	279.89				
Middle income	93	169.41	78.38	13.76	58.527	.000
High income	45	181.66				
Total	500					

Table 7 described income difference of resilience using Mann-Whitney test among obese and non-obese people. It showed there was statistical significance between different income statuses. Here, people with low income have significantly higher mean rank which is 279.89, than high income with rank 181.66 and middle income with rank 169.41, N=500, Kruskal-Wallis

H = 58,527, p = .000. This finding is supported in line by line with previous studies as demographic variable income status acted as one of primary decider of resilience (Bonanno et al., 2007), income status has positive relationships with resilience (Kimhi et al., 2020), and being earning person and married were significant factors in psychological

Table 8, BMI difference in resilience among obese and non-obese by using Kruskal-Wallis Test.

Age	N	Mean Rank	Mean	Standard Deviation	Kruskal-Wallis H	Asymp. Sig. (2-tailed)
Obese	250	287.96				
Overweight	102	267.03	78.38	13.76	62.038	.000
Normal weight	128	174.38				
Underweight	20	185.20				
Total	500					

resilience (Gruebner et al., 2015).

Table 8 stated BMI difference of resilience using Kruskal-Wallis test. It showed there was statistically significant BMI difference in resilience between various body mass index categories in which obese had very high mean rank around 287.96, than overweight had mean rank as 267.03, normal weight took low mean rank as 174.38 and underweight were in very low mean rank as 185.20, Kruskal Wallis H = 62.038, p = .000. These findings goes in line with previous studies as high BMI people have

significantly higher resilience than low BMI (Secer & Yildizhan., 2020), people with better cardio-metabolic resilience can lead to overweight and obesity (Johnson., 2018), and old age peoples with better healthy index have high resilience (Lutz et al., 2016).

Mental Health:

Mental health is key factor in the definition of health by world health organisation as "Health is a state of complete physical, mental and social well-being and not merely the absence of disease

or infirmity” (World Health Organization, 1948). Thus, mental health is highly important to discuss due to its importance on health. The researcher also framed objectives to find out mean difference of mental health among various demographic variables such as age, gender,

family type, location, income status and body mass index. Let us discuss various research output with respect to mental health based on the framed objectives of present study as follows.

Table 9, Descriptive statistical details of mental health among Obese and Non-obese.

Resilience	Raw Score Range	Z-Score Range	Obese		Non-obese	
			Frequency	Percentage	Frequency	Percentage
Extr. Low	38 – 100	-2.01 & below	5	2	12	4.8
Low	101 - 114	-2.00 to -1.26	6	2.4	13	5.2
Below.Ave	115 – 129	-1.25 to -0.51	40	16	38	15.2
Average	130 - 148	-.050 to 0.50	167	66.8	106	42.4
Above Ave	149 - 161	0.51 to 1.25	24	9.6	35	14
High	162 – 176	1.26 to 2.00	8	3.2	27	10.8
Extr.High	177 & above	2.00 & above	0	0	19	7.6
Total			250	100	250	100

Table 9 represented descriptive statistical details related to mental health and the calculations to assess level of mental health were made using z-score with respect to study population. People with high mental health were more in non-obese population than obese population. But, obese people showed more number of average mental health than non-obese people. These findings were in line with previous

studies as an increase in body weight acted as risk factor for mental health issues (AlQahtani et al. 2018). Patient with high body weight above obesity limit have more chances for depression (Reynolds et al. 2015). Among people in high body weight, better mental health acted as strong indicator for better perceived physical health (Knoesen et al. 2010). High body weight have positive correlation with depressive disorder

Table 10, 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	121	239.47				
26 to 35 years	155	238.90	138.34	18.82	3.807	.149
Above 35 years	224	264.49				
Total	500					

especially among women (Ahuja et al. 2020).

Table 10 revealed age difference in mental health using Kruskal-Wallis test. It showed that there was a statistically no significant age difference in mental health among obese and non-obese, Kruskal Wallis $H = 3.807$, $p = .149$, with 239.47 mean rank for age group 15 to 25 years, 238.90 mean rank for 26 to 35 years and 264.49 mean rank for above 35 years. Comparatively mental health is very low among age group 26 to 35 years, while it is very high

among age group above 35 years. This finding goes towards significant age difference previous studies as differences with age depended on beliefs about the life, usually older people have higher belief (Farrer et al., 2008), mental health problems starts as early in childhood or adolescents (Kessler et al., 2007), there was an age difference in mental health (Li et al., 2021), social and familial restrictions often affect mental health among young adults than older adults (Sojli et

al.,2021), increased mental health illness diagnosis among young especially female (Rossell et al.,

Table 11, Gender difference in mental health among obese and non-obese by using Mann-Whitney Test

	N	Mean Rank	Sum of Ranks	Test	Social Support	Asymp. Sig. (2-tailed)
Male	186	258.39	48061.00	Mann-Whitney U	27734.000	
Female	314	245.82	77189.00	Wilcoxon W	77189.000	.347
Total	500			Z	-.940	

2021).

Table 11 stated gender difference in mental health using Mann-Whitney test among obese and non -obese. It showed mental health have no statistical significant mean difference in which non -obese women have higher mental health than men. Thus, a Mann-Whitney test indicated that gender difference in mental health have more or less same mean rank in female with 245.82, and Mean rank in male as 258.39, Mann-Whitney U is 27734.000, Wilcoxon W is 77189.000, $Z = -.940$, $p = .347$. This finding have

to support it through significant gender differences in mental health in previous studies as it depended based on social context than by gender (Kiely et al., 2019), have no significant differences not only in gender, but also in grade and location for depression and anxiety among students (Liu et al., 2020), gender differences in mental health was so conflicting because of its psychopathology in women (Dhejne et al., 2016), among young men risk of discontinuation in mental health care were high (Seidler et al., 2020)

Table 12, Family difference in mental health among obese and non-obese by using Mann-Whitney Test

	N	Mean Rank	Sum of Ranks	Test	Social Support	Asymp. Sig. (2-tailed)
Joint	155	270.27	41891.50	Mann-Whitney U	23673.500	
Nuclear	345	241.62	83358.50	Wilcoxon W	83358.500	.040
Total	500			Z	-2.051	

showed no statistical significance but goes in line

Table 12 revealed family difference in mental health using Kruskal-Wallis test. It

showed that there was no statistical significant family difference in mental health among obese and non-obese. Mann-Whitney test indicated that

family difference in mental health have high mean rank in joint with 270.27, than nuclear family type with mean rank as 241.62, Mann-Whitney U is 23673.500, Wilcoxon W is 83358.500, Z = -2.051, p = .040. This finding goes in line by line with previous studies as security in attachment type were highly

correlated to mental health (Riggs & Jacobvitz, 2002), family structures with different family members have different nature of significant differences in mental health (Sonuga-Barke & Mistry, 2000), and well-being of offspring were impacted more among single mother parent than normal families (Kellam et al., 1977).

Table 13, Location difference in mental health among obese and non-obese by using Mann-Whitney Test

	N	Mean Rank	Sum of Ranks	Test	Social Support	Asymp. Sig. (2-tailed)
Urban	188	267.43	50276.50	Mann-Whitney U	26145.500	
Rural	312	240.30	74973.50	Wilcoxon W	74973.500	.042
Total	500			Z	-2.034	

Table 13 stated location difference in mental health using Kruskal-Wallis test. It showed that there was statistical significant location difference in mental health among obese and non-obese. Mann-Whitney test indicated that location difference in mental health as high mean rank around 267.43 within urban people joint than rural with 240.30, N=500, Mann-Whitney U is 26145.500, Wilcoxon W is 74973.500, Z = -2.034, p = .042. This finding goes in line by line

with previous studies as depression were correlated with people in less connectedness to social gatherings (Lin et al., 2008), depression rate was very high among urban married people than urban old aged people (Masoumeh et al.,2021), minority tribes people were reported more anxiety than people from majority tribes (Osborn et al.,2019), and difference in mean of mental health with respect to location were because of variety of social and cultural diversity (Gaither

Table 14, Income difference in mental health among obese and non-obese by using Kruskal-Wallis Test.

Income status	N	Mean Rank	Mean	Standard Deviation	Kruskal-Wallis H	Asymp. Sig. (2-tailed)
Low	362	247.55				
Middle	93	251.48	138.34	18.82	1.171	.557
High	45	272.20				
Total	500					

2020).

Table 14 stated income difference in mental health using Kruskal-Wallis test. It showed that there was no statistical significant location difference in mental health among obese and non-obese. Mann-Whitney test indicated that

income difference in mental health were high in high income people with mean rank around 272.20, than low with 247.55 and middle with 251.48 respective mean ranks, N=500, Kruskal-Wallis H is 1.171, p = .557. This finding goes towards statistical significant with previous

studies as prevalence of depression were high among low family income status (Lin et al., 2008), mental health problems were very common among female students with low income groups (Farrer et al., 2016), adolescents especially with lower Socio-economic status have greater chance

for psychological distress (Rivenbark et al., 2019), there was significant differences in mental health among different socioeconomic status (Reiss et al., 2019), and the depression and anxiety rate depended on household income (Donnelly

Table 15, BMI difference in resilience among obese and non-obese by using Kruskal-Wallis Test.

Age	N	Mean Rank	Mean	Standard Deviation	Kruskal-Wallis H	Asymp. Sig. (2-tailed)
Obese	250	234.20				
Overweight	102	304.79				
Normal weight	128	251.50	138.34	18.82	23.675	.000
Underweight	20	170.90				
Total	500					

& Farina, 2020).

Table 15 stated BMI difference of mental health using Kruskal-Wallis test. 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 the strongest predictor of mental health among high BMI peoples were perceived physical health (Knoesen et al. 2010). Girls with high BMI have more mental health issues than Boys (Xie et al. 2005). Among young female mental health illness increased with an increase in BMI, but it was U-shaped relation with young male (McCrea et al., 2012). Overweight and obese people have higher chance of getting mood or mental

disorders than normal weight people (Bruffaerts et al., 2008). Depression have positive relation with BMI in school children (Tashakori et al., 2016). Body mass index have negative association with suicide mortality, while it has positive relationships with depression and no relationships with anxiety (Bjørngaard et al., 2015).

Influence of psychological resilience on Mental Health:

The influence of the, resilience on mental health was statistically analysed using regression analysis among obese and non-obese. The predicted values of the mental health (criterion variables) can be calculated from the observed values of the psychological resilience (predictor variables). Similarly, the factors which influence the result or outcome can be determined which will be very helpful for individual prognosis with respect to body mass index and mental health.

Table 16, Regression analysis shows the influence of psychological resilience on Mental Health among Obese and Non-obese people.

BMI Groups	R	R ²	Adjusted R ²	Std Error of Estimate	B	Std. Error	β	t-value	p-value
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Overall*	.357	.127	.126	17.597	.488	.057	.357	8.530	.000
Obese*	.354	.125	.122	12.911	.451	.076	.354	5.955	.000
Non-obese*	.439	.193	.190	20.290	.647	.084	.439	7.697	.000

*Predictor Variable: Psychological Resilience; Criterion Variable: Mental Health

Table 16 described regression analysis to find influence of psychological resilience over mental health among obese and non-obese population. In general, psychological resilience have statistically significant positive influence over mental health, $p = .000$, $R = .357$, $R^2 = .127$, adjusted $R^2 = .126$. The regression co-efficient (B) for predictor variable resilience was .488, revealed an increase in one part of resilience will increase the criterion variable mental health with .488 points and resilience played 12.7 % prediction role over mental health. Regression analysis among obese and non-obese revealed psychological resilience have higher positive influence and high prediction over mental health among non-obese, $p = .000$, $R = .439$, $R^2 = .193$,

adjusted $R^2 = .190$ than obese people, $p = .000$, $R = .354$, $R^2 = .125$, adjusted $R^2 = .122$. It also revealed that overall study population and obese population have almost same level of impact over mental health. These findings goes side by side with psychological resilience in previous studies as resilience was significantly high level among student with normal BMI than thin student (Secer & Yildizhan, 2020), high weight-resilience factor played as preventive role among obese people (Brogan et al., 2012), among women people "resilient to obesity" were belonging to young, unmarried, highly educated have smart lifestyle strategies as minimum physical activity with less junk food & soft drinks than obese women (Ball et al., 2011).

Influence of psychological resilience on Body Mass Index:

Table 17, Regression analysis shows the influence of psychological resilience on body mass index among Obese and Non-obese people.

BMI Groups	R	R ²	Adjusted R ²	Std Error of Estimate	B	Std. Error	β	t-value	p-value
Overall*	.367	.135	.133	5.548	.159	.018	.367	8.810	.000
Obese*	.204	.042	.038	2.755	.053	.016	.204	3.282	.001
Non-obese*	.287	.083	.079	3.567	.070	.015	.287	4.725	.000

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

Table 17 represented regression analysis to find influence of psychological resilience over body mass index among obese and non-obese population. In general, psychological resilience have statistically significant positive influence over body mass index, $p = .000$, $R = .367$, $R^2 = .135$, adjusted $R^2 = .133$. The regression coefficient (B) for predictor variable resilience was .159, revealed an increase in one part of resilience will increase the criterion variable body mass index with .159 points and resilience played 13.3 % prediction role over body mass index. Regression analysis among obese and non-obese revealed psychological resilience have higher positive influence and high prediction over body mass index among non-obese, $p = .000$, $R = .287$, $R^2 = .083$, adjusted $R^2 = .079$ than obese people, $p = .000$, $R = .204$, $R^2 = .042$, adjusted $R^2 = .038$. It also revealed that overall study population have showed significantly higher influence on body mass index than obese and non-obese population. These findings goes side by side with psychological resilience in previous studies as low BMI people better physical activity than high BMI people (Seçer & Yildizhan, 2020), diet quality is correlated with psychological resilience (Lutz et al., 2017), innovative strategies such as changing food habits and exercise have modest efficacy on BMI (Siwik et al., 2013), and strategies for improving resilience such as meditation and exercise will manage health condition and reducing BMI (Sun & Buys, 2014).

Conclusion:

Mental health issue and obesity are two important challenges in era of 21st century. Everyone in world population are either affected with mental issue, obesity or both. Mental health and obesity have bidirectional relationships with each other. When people gets obese due to behavioural or medical factors, he or she have more possibility to get mental health issue. Similarly any mental health issue such as depression, anxiety or emotional disorder might change behavioural pattern related to food habits and physical activities which lead to increase in body weight and obesity. Present study used psychological resilience as key factor and mediating or preventing factor between mental health and obesity. Since the present study is exploratory in

nature, it showed many significant research output as seen earlier. Among obese and non-obese, the present study revealed prevalence of mental health issues were more among obese people than non-obese people. Similarly the nature of obese people revealed through statistical evidence as statistical significant high psychological resilience among obese than non-obese. When analyzing the data sets in term of psychological resilience with respect to demographic variables and body mass index revealed various significant statistical research outputs as significant age difference ($p = .000$) 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.

When looking into the data sets in relation to mental health with respect to demographic variables and body mass index revealed various significant statistical research outputs as significant family difference ($p = .040$) in which joint family people have better mental health than nuclear family people, significant location difference ($p = .042$) in which urban people have significantly higher mental health than rural people, and significant BMI difference ($p = .000$) where mental health have showed U-shaped relationship body mass index in which obese people have low mental health than overweight and normal weight people, and in other end underweight people also showed low mental health than normal weight, overweight and obese people. Regression analysis in finding the influence of psychological resilience on mental health stated that resilience have greater influence over mental health only among non-obese people. Even though obese people have significant higher resilience than non-obese people, they have comparatively low mental health than non-obese. In other side psychological resilience have significantly positive influence over body mass index.

Comparatively obese and non-obese people have showed very little change in prediction of the influence of psychological resilience over body mass index. Further researches are highly recommended in obesity research in order to identify the dimensions of resilience with their prediction over mental health and body mass index.

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