Exp Biomed Res 2024; 7(2): 94-102 **https://doi.org/ 10.30714/j-ebr.2024.212**

Experimental Biomedical Research *Original article*

Psychological inflexibility and obesity: Mediating factors in psychological health

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ABSTRACT

Aim: To explore the relationships between psychological factors, especially experiential avoidance (EA) and psychological inflexibility, and obesity, and to assess their mediating roles in the association between general psychological symptoms and obesity.

Methods: The study employed Pearson correlation analysis and mediation analysis to examine relationships among Body Mass Index (BMI), the Acceptance and Action Questionnaire for Weight-Related Difficulties-Revised (AAQW-R), its subscales, and the General Health Questionnaire (GHQ12). Participants predominantly consisted of females, with a mean age of 39.3 years and an average BMI of 38.5.

Results: Significant correlations were found between BMI, AAQW-R, and GHQ12 ($p < 0.05$). However, the correlation between BMI and AAQW-R-fc was not significant ($p = 0.142$). Mediation analysis revealed that AAQW-R fully mediated the relationship between GHQ12 and BMI, indicating a significant role of psychological factors in obesity.

Conclusions: The findings highlight the importance of incorporating psychological elements, such as psychological inflexibility and EA, into obesity interventions. Addressing these factors may enhance the effectiveness of weight control strategies. Future research is encouraged to explore potential biological pathways linking obesity and psychological variables.

Key words: Body mass index, obesity, acceptance and commitment therapy, mental health.

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Received: 2024-01-20 / Revisisons: 2024-02-13

Accepted: 2024-02-21 / Published: 2024-03-15

Introduction

In the adult population, the World Health Organization (WHO) categorizes obesity as having a Body Mass Index (BMI) of 30 or above. A staggering number of over 650 million adults globally were reported as obese in 2016 [1]. Specifically focusing on Turkey, a 2010 study highlighted that obesity prevalence stood at 31.2%, with a higher incidence in women (44.2%) than in men (27.3%) [2]. Obesity emerges as a critical public health issue due to its association with increased mortality and morbidity rates, elevated healthcare costs, and a reduction in workforce productivity [3]. Research indicates that between 5.5% and 7.8% of total healthcare expenditures are attributed to obesity-related healthcare [4]. This condition not only leads to social isolation and a reduction in life expectancy [2, 5–7] but also is linked with a range of health issues including diabetes, coronary heart disease, hypertension, various forms of cancer, musculoskeletal disorders, polycystic ovary syndrome, obstructive sleep apnea, depression, non-alcoholic steatohepatitis, and chronic venous insufficiency [3,8–10].

Moreover, obesity is intricately connected with psychological issues such as depression and anxiety [11–14]. It adversely affects psychosocial functioning across various domains in individuals with elevated BMI [15]. Studies demonstrate an increased risk for depression and other psychological disorders among overweight and obese individuals, often leading to a negative self-perception. Notably, overweight individuals show a 7% higher lifetime prevalence of depression compared to those of normal weight, and this figure rises to 32% in obese individuals [16]. A significant correlation exists between increased body weight and symptoms of anxiety in obese individuals. Such psychiatric issues are frequently associated with diminished quality of life and low self-esteem [13]. Higher psychological distress has been observed in individuals with higher BMIs (17). A cohort study involving 6820 men and 3346 women revealed that people with common mental disorders are at an increased risk of obesity [18]. In Turkey, mood and anxiety disorders were more prevalent in obese women compared to a control group [19].

The concepts of psychological flexibility and experiential avoidance (EA), a component of psychological flexibility, are vital in understanding obesity. EA has been positively correlated with eating pathology, BMI, and feelings of shame [12,14,20]. Higher psychological inflexibility is linked to increased BMI and tendencies towards binge eating and consumption of energy-dense foods [21]. Binge eating, in this context, is often a maladaptive coping response to depression and anxiety [19]. One strategy to circumvent the embarrassment linked to overeating is the avoidance of dieting [22]. In obese individuals, avoidance behaviors such as shunning physical activity due to fear of physical discomfort, negative self-thoughts, or fear of judgment, and eating to suppress unpleasant emotions are manifestations of EA [23]. Emotional eating, characterized as eating in response to negative emotions for relaxation or mood regulation, is closely associated with experiential avoidance. Studies have found that individuals who regain weight post-loss often report lower self-esteem, higher levels of emotional eating, and avoidance-based motivations for weight loss [12]. Additionally, self-stigma and self-devaluation, prevalent among obese individuals, are also linked to EA [20,24]. The negative effects of stigma are implicated in the development of depressive symptoms, poor psychological functioning, and exacerbated medical conditions [25].

The presence of depressive symptoms in obese individuals may negatively impact the effectiveness of behavioral weight loss interventions, evidenced by higher dropout rates and increased likelihood of weight regain [26]. A recent study has shown the relationship between general psychological health and psychological flexibility with both BMI and general psychological health in obese and overweight people [27]. This study aims to explore the potential relationship between BMI, general psychological health, and experiential avoidance in the context of psychological flexibility among obese individuals. The primary hypothesis posits that higher BMI scores correlate with lower general psychological health in obese individuals. The secondary hypothesis explores the influence of experiential avoidance on the relationship between BMI and general psychological health in obesity

Materials and metods

Sample: A total of 100 volunteers, informed about the study, participated in this research. Out of these, 98 participants provided sufficient data for analysis. A non-random convenience

sampling approach was employed for its time efficiency. The study included individuals aged 18 to 65 years with a BMI over 30, who provided consent and were literate. These participants were recruited during outpatient clinic visits at a hospital in Turkey.

Measurements: Demographic Data Form: Specifically designed for this study, this form collected information on participants' age, gender, and educational status.

Acceptance and Action Questionnaire for Weight-Related Difficulties Revised (AAQW-R): Developed by Palmeira et al., this scale assesses weight-specific experiential avoidance (EA). It comprises ten items across three subscales: food as control (AAQW-R-fc), weight as barrier to living (AAQW-R-wb), and weight-stigma (AAQW-R-ws). The AAQW-R-fc evaluates the tendency to use food as a coping mechanism for negative emotions, AAQW-R-wb assesses avoidance of valued life activities due to weight or body shape, and AAQW-R-ws measures experiences of self-stigma related to weight. Higher scores signify greater experiential avoidance (20). The AAQW-R was adapted into Turkish by Burhan and Kuru [27].

General Health Questionnaire (GHQ-12): Created by Goldberg et al., this scale measures general psychological health. It includes 12 items, with higher scores indicating increased psychological distress [28,29]. The GHQ-12 has been adapted for Turkish use by Kılıç [30].

Procedure: The study adhered to the Helsinki Declaration guidelines. The Başakşehir City Hospital Ethical Committee granted approval for the study protocol (Dec 28, 2022; No:10-15). Interviews were conducted with participants to inform them about the study's nature, following which informed consent was obtained. Participants completed self-report forms, including demographic data, BMI, AAQW-R, and GHQ12, after the interviews. Data collection occurred in January 2023. While the initial target was 100 individuals, the analysis included data from 98 participants who provided comprehensive responses. No financial compensation was offered to the participants.

Statistical analysis: Data analysis was conducted using Jamovi version 2.3.19.0. Demographic and clinical data were described using means, standard deviations, frequencies, and percentages. Normal distribution was assessed through histograms, kurtosis, and skewness. The study utilized Pearson correlation analysis and mediation analysis. Pearson correlation explored the relationships between Body Mass Index (BMI), the Acceptance and Action Questionnaire for Weight-Related Difficulties-Revised (AAQW-R), its subscales, and the General Health Questionnaire (GHQ12), with significance levels marked at $*p < 0.05$, $**p < 0.01$, and $***p < 0.001$. Mediation analysis focused on the indirect and direct effects between AAQW-R and BMI. Bootstrapped confidence intervals were used for a more robust estimation of these effects, with standard errors (SE), confidence intervals, estimates, β coefficients, z-scores, and *p*-values reported to demonstrate the significance of each pathway in the model.

Results

Demographic and clinical data: The study sample comprised predominantly female participants (70.4%) and a majority were married (71.6%). A notable proportion had a psychiatric history (22.9%) and chronic medical conditions (43.3%), with 35.1% identified as smokers. The average age of participants was 39.3 years (SD = 11.7), and the mean Body Mass Index (BMI) was 38.5 (SD = 7.27). Scores on the Acceptance and Action Questionnaire for Weight-Related Difficulties Revised (AAQW-R) averaged at 38.5 (SD = 15.9), with its subscales AAQW-R-

fc, AAQW-R-wb, and AAQW-R-ws scoring 12.9 (SD = 5.51), 12.9 (SD = 5.22), and 13.3 (SD = 7.37) respectively. The General Health Questionnaire (GHQ12) scores averaged at 12.8 (SD = 7.21). Descriptive statistics for demographic and clinical data are shown in Table 1.

Relations among scales: Histogram graphs, Skewness and Kurtosis, stated normal distributions for continuous variables measured BMI, AAQW-R, subscales of AAQW-R, and GHQ12. Descriptive statistics for the scales are shown in Table 1.

Table 1. Demographic data and clinical variables.

Parameters	**n**	**%**
Female	69	70.4 %
Married	69	71.6%
Psychiatric history	22	(22.9%)
Chronic medical condition	42	(43.3%)
Smokers	34	(35.1%)
Parameters	**M**	**SD**
Age (years)	39.3	11.7
BMI	38.5	7.27
AAQW-R	38.5	15.9
AAQW-R-fc	12.9	5.51
AAQW-R-wb	12.9	5.22
AAQW-R-ws	13.3	7.37
GHQ12	12.8	7.21

M= Mean; SD = standard deviation; BMI = Body Mass Index; AAQW-R = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised; AAQW-R-fc = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised-food as control; AAQW-R-wb = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised-weight as barrier; AAQW-R-ws = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised- weight-stigma; GHQ12 = General Health Questionnaire.

Pearson correlation analysis revealed significant relationships among the study variables. BMI showed a positive correlation with AAQW-R (r = 0.321, $^{**}p < .01$), AAQW-R-wb (r = 0.303, $^{**}p < .01$), and GHQ12 (r = 0.265, $^{**}p < .01$). Strong correlations were observed between AAQW-R and its subscales, particularly AAQW-R-fc (r = 0.814, $^{***}p < .001$), AAQW-R-wb (r = 0.815, $^{***}p < .001$), and AAQW-R-ws (r = 0.831, $^{***}p < .001$), suggesting significant associations within weight-related difficulties and their perceived impacts. The results of the Pearson correlation analyses are shown in Table 2.

The mediation analysis examined the indirect and direct effects between GHQ12, AAQW-R, and BMI. There was a significant indirect effect of GHQ12 on BMI through AAQW-R (β = 0.119, $p = 0.049$). The path from GHQ12 to AAQW-R was significant (β = 1.036, $p < .001$), as was the path from AAQW-R to BMI (β = 0.115, p = 0.030). The direct effect of GHQ12 on BMI was not statistically significant (β = 0.148, $p = 0.253$), suggesting the importance of AAQW-R as a mediator in this relationship. The results of the mediation analysis are shown in Figure 1 and Table 3.

Table 2. Relation among scales by Pearson correlation analysis.

Parameters	BMI	AAQW-R	AAQW-R-fc	AAQW-R-wb	AAQW-R-ws
BMI	-				
AAQW-R	0.321**	-			
AAQW-R-fc	0.149	0.814***	-		
AAQW-R-wb	0.303**	0.815***	0.677***	-	
AAQW-R-ws	0.248*	0.831***	0.679***	0.665***	-
GHQ12	0.265**	0.469***	0.434***	0.369***	0.432***

*BMI = Body Mass Index; AAQW-R = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised; AAQW-R-fc = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised-food as control; AAQW-R-wb = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised- weight as barrier; AAQW-R-ws = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised- weight-stigma, GHQ12 = General Health Questionnaire; * p < .05, ** p < .01, *** p < .001.*

Table 3. Effects in mediation analysis.

Parameters		95% Confidence Intervals						
Type	**Effect**	**Estimate**	**SE**	**Lower**	**Upper**	**β**	**z**	**p**
Indirect	GHQ12 ⇒ AAQW-R ⇒ BMİ	0.119	0.0605	0.00352	0.241	0.118	1.97	0.049
Components	GHQ12 ⇒ AAQW-R	1.036	0.1993	0.64792	1.429	0.469	5.20	< .001
	AAQW-R ⇒ BMİ	0.115	0.0531	0.01355	0.222	0.252	2.16	0.030
Direct	GHQ12 ⇒ BMİ	0.148	0.1299	-0.10858	0.401	0.147	1.14	0.253
Total	GHQ12 ⇒ BMİ	0.267	0.0986	0.07408	0.461	0.265	2.71	0.007

BMI = Body Mass Index; AAQW-R = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised; AAQW-R-fc = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised-food as control; AAQW-R-wb = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised- weight as barrier; AAQW-R-ws = Acceptance and Action Questionnaire for Weight-Related Difficulties Revised- weight-stigma; GHQ12 = General Health Questionnaire. Confidence intervals computed bootstrap; Betas are completely standardized effect sizes.

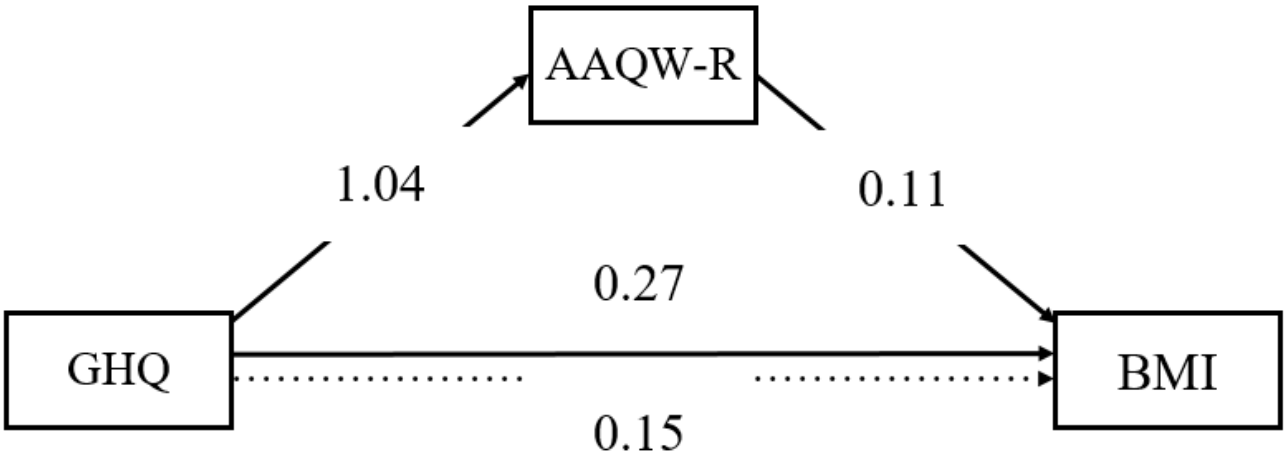

Figure 1. Mediation analysis diagram.

Discussion

This study revealed statistically significant correlations between Body Mass Index (BMI), the Acceptance and Action Questionnaire for Weight-Related Difficulties-Revised (AAQW-R), and the General Health Questionnaire (GHQ12), all with p-values less than 0.05. Additionally, correlations among the subscales of AAQW-R, GHQ12, and BMI were significant ($p < 0.05$), except for the correlation between BMI and AAQW-R-fc, which was not statistically significant ($p = 0.142$). Mediation analysis further showed that AAQW-R fully mediated the relationship between GHQ12 and BMI.

The complex and multidirectional relationship between psychological variables and obesity is supported by existing research [33]. There may be a reciprocal relationship between obesity and general psychological health, where factors like stress and depression are associated with increased metabolic syndrome risks due to elevated cortisol and oxidative chemicals [34]. Negative body image, low self-esteem, depression, and stress can lead to overeating and unhealthy food choices, exacerbating weight gain and reducing quality of life [25, 35]. The genetic overlap between obesity and psychological distress also suggests a biological aspect to this relationship [3].

Risk factors for weight regain, such as emotional eating, depression, and feelings of food-related deprivation, have been identified in prior studies (21, 22). A notable study highlighted that high General Health Questionnaire-28 scores predicted dropout rates in obesity treatment programs, indicating a possible link between anxiety, depression, and diet program failure [36]. This study's findings that GHQ scores predict BMI levels are in line with these observations.

Psychological inflexibility and experiential avoidance (EA) are known to be associated with obesity and challenges in weight control [12, 21, 22]. Individuals with avoidant or impulsive coping responses to distress often engage in emotional eating as an avoidance pattern. Conversely, active and flexible coping styles are more common among those who successfully control their weight [21, 37]. Therefore, EA, as an aspect of psychological inflexibility, could negatively impact weight control, a hypothesis supported by the mediation analysis results. Psychological inflexibility has been linked to binge eating and consumption of energy-dense foods, potentially contributing to higher BMI [14, 26, 21].

The study also addresses obesity-related stigma, including enacted stigma (social discrimination) and self-stigma (self-devaluation and fear of enacted stigma), both of which relate to general psychological symptoms, BMI, and EA [25]. The AAQW-R's weight-stigma subscale's correlation with BMI and general psychological symptoms aligns with previous studies [20, 23].

However, this study has limitations. Its cross-sectional nature, with data collected at a single point in time for each participant, may not fully capture the dynamic relationships among experiential avoidance, BMI, and general psychological health in obesity. The small sample size limits the generalizability of the results. Additionally, the reliance on self-reported data, including height and weight, may introduce inaccuracies.

Conclusions

Considering psychological constructs in interventions for weight loss in obese people may be necessary. In this context, the strength of this study is that it provides results about two possible and closely related mediators, EA and

psychological inflexibility, of the relation between general psychological symptoms and obesity. For weight management interventions, psychological inflexibility may mediate changes in emotional eating habits related to poorer weight control. So, weight loss intervention may need to target psychological inflexibility and EA -as modifiable factors- to achieve better weight control. Future studies can benefit from assessing potential common biological pathways between obesity and psychological variables.

Funding: *The authors received no financial support for the research, authorship, and/or publication of this article.*

Conflict of interest: *The authors declare that they have no conflict of interest.*

Ethical statement: *The Başakşehir City Hospital Ethical Committee granted approval for the study protocol (Dec 28, 2022; No:10-15).*

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