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Relationship Between Hardiness and Achieving Desired Body Mass Index

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Abstract: The relationship between personality and various aspects of successful weight loss goals has been elucidated in recent studies. Hardiness is an important aspect of personality that is not addressed in this area of research. The aim of this cross-sectional study was to investigate the relationship between hardiness and successful attempts to reach ideal body mass index (BMI). The hardiness score of 123 women age between 20 to 55 years old with a BMI greater than 25 who randomly recruited from sports clubs located in different areas of Tehran measured using Barton's questionnaire. Initial BMI and BMI at the time of data collection extracted from the club archives. Analysis of covariance performed to evaluate whether hardiness score associated with BMI change. A significant BMI change was observed for the highest tertile of hardiness score (p-value = <0.001). After controlling for current age, educations, marital status, diet and occupation, hardiness score was positively associated with a reduction in BMI (b = 5.16, p<0.001). Findings from this study supports that hardiness is an important aspect of personality that influence weight loss attempts especially for people who are trying to reach this goal through exercise and therefore it should be, considered in weight loss programs.

Key words: BMI, barton's questionnaire, hardiness score, weight loss

INTRODUCTION

The prevalence of obesity is increasing significantly in both developed and developing countries (Deitel, 2003; Perfetti *et al*., 2008; Kuczmarski *et al*., 1994; Rossner, 2002). The risk of cardiovascular diseases, diabetes, osteoarthritis, other chronic health conditions, certain cancers and death, are increased in overweight and obese individuals (Adams *et al*., 2006; Calle *et al*., 2003; Field *et al*., 2002; Flegal *et al*., 2007; Roehling *et al*., 2008). Research has shown that even very small amount of weight loss as little as 5%, yields major health benefits (Stern *et al*., 1995; Sun and Ely, 2004; Powell *et al*., 2007).

The scientists are interested in investigating the effect of personality traits in obese and underweight individuals (Ryden *et al*., 2003, 2004; Byrne *et al*., 2012; Sullivan *et al*., 2007; Kakizaki *et al*., 2008). Personality is considered as an important characteristic, which can affect the response to the treatment of obesity (Van Heck, 1997; Corchs *et al*., 2008). Hardiness is an important aspect of personality, which has been conceptualized and measured as having three components: a commitment to tasks and challenges in life, a belief that one is able to control the outcomes of stressful events and being open to change as a natural part of life (Erbes *et al*., 2011).

Some scientists suggest that the personality of morbidly obese individuals is different from that of normal population (Guisado and Vaz, 2003). Nevertheless, others suggest that there is nothing as obese personality (Fox *et al*., 2000). Some studies have investigated in facets of personality related to diet and weight control (Corchs *et al*., 2008; Vollrath *et al*., 2012; Terracciano *et al*., 2009). However, to our knowledge no studies have investigated the relationship between hardiness and response to obesity treatments. Understanding this relationship may provide us crucial information about factors, which affect the success in weight loss programs. Therefore, we conducted a cross-sectional study to evaluate the relationship between hardiness and gaining Ideal body mass index (BMI)among Iranian women (Bartone *et al*., 1989).

MATERIALS AND METHODS

Study population: The subjects, 123 women aged 20-55 years, in present study, recruited from six gyms located in different regions of Tehran, which sought to be a representative of a middle class population. We excluded the cases whose BMI was less than 25 and patients with a prior history of diabetes, hypertension, renal diseases, Thyroidal problems, cardio vascular disease, cancers, metabolic or genetic disorders. In

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addition, patients with no weight loss surgery and those who lost weight using drugs or specific diets such as vegans, pregnancy, mental disorders (such as AN2, NES3) and other conditions related to decision-making were all omitted from our study. Cases were not engaged in weight loss or psychotherapy in other clinics during the study period and had been involved in physical training programs for at least 6 months. A perquisite for admittance was a BMI value of ≥25. All participants gave written informed consent and the Ethics Committee of Shahid Beheshti University of medical sciences approved the study.

After removal of the subjects who did not have the inclusion criteria, 111 participants agreed to participate in this study (participation rate = 85%).

Assessment of anthropometric measures: Weight loss was calculated using the BMI, which was computed from actual weight (kg) and height (m^2) taken at the beginning and after 24 weeks of the follow up period. A trained measurer measured weight while subjects were without shoes and with light clothes using a digital scale (Seca) with an accuracy of ±100.

Assessment of hardiness score: The questionnaire used here is the modified version of Koala's measure of personality hardiness. Hardiness also called resilience thought to be the ability to cope with or recover normal function in difficult situations.

This construct composed of three respective general temperamental aptitudes: commitment, control and challenge. Commitment can be clarified as the sense of existential purpose, an individual's self-perception, others and work tasks. Control is an ability to find methods to effect on distressful changes consequences, rather than falling back into helplessness and passivity. Finally, challenge defined as belief in transformation, relative to immutability, which is a normal life style and constitutes inspiring opportunities rather than threats.

Kobasa believe that hardiness is a very impressive life dimension that show the effect of one views manner and interaction with the world around (Kobasa *et al*., 1982). The hardiness measure we used here is a modified version of a scale originally developed to work on blue-collar workers. In this new version of questionnaire, some problems like long and boring sentences and negative item marks existed in the original version eliminated (Funk and Houston, 1987).

We used DHS (Dispositional Hardiness scale) to measure hardiness. DHS originally designed to measure the hardiness level of military disaster assistance officers. It used in many populations with its internal subscale reliability usually ranged from 50 to 80 s. Its construct validity indicated through the hypothetically expected positive relationships between hardiness and subjective well-being (Ghorbani and Watson, 2005). This questionnaire has been evaluated by NimaGhorbani to measure hardiness in Iranian managers in 2005.

Assessment of other variables: Demographic information such as age, weight change, marital status, education, diet, occupation and tendency toward weight loss gathered by trained interviewers through face to face interviews or extracted from their medical records.

Statistical methods: All analyses carried out by using the statistics software SPSS 19 (SPSS Inc., Chicago, IL, USA).

To compare general characteristics across tertiles, analysis of Variance (ANOVA) and chi-square tests were used. The relation between BMI change and adherence to the hardiness score was also assessed by using T-test and analysis of Covariance (ANCOVA). Analyses were first conducted without adjustments for covariates and were then adjusted for variables which were significantly ($p<0.05$) related to BMI difference (age, tendency toward weight loss and diet). p-value ≤0.05 was considered significant.

RESULTS

Descriptive statistics presented as means±standard deviation (Potthoff *et al*., 2009). Table 1 and 2 shows the baseline characteristics of the 111 participants in the present study.

Regarding education level, 27.9% had higher education (>16 yr), 68.5% had intermediate education or less (8-16) and 3.6% had elementary education (<8). The majority of the participants were not on any special diet during the study period (64%). The majority were employed (60.4%). A lot of them were living as single women (55.9%) (Table 1, 2). Participants in the study lost an average of 6.89 kg (±6.18) with a range of 2.6 to 32.9 (data not shown).

Hardiness score ($b = 5.165$, $p<0.001$) and tendency toward weight loss ($b = 1.38$, $p = 0.002$) were positively associated with a reduction in BMI. Conversely marital status ($b = 1.029$, $p = 0.016$) was negatively associated with a reduction in BMI. Age, education level, occupation and dieting during the study period were not significantly associated with BMI reduction. Findings remained significant after adjustments for these variables (Table 2).

Subjects having higher hardiness score (more than median 91) showed a significantly higher bmi change compared with those who have lower hardiness score ($p<0.001$) (Table 3).

DISCUSSION

In the current study we observed a significant positive relationship between hardiness score and changes in

Table 1: Characteristics of subjects according to tertiles of hardiness score among the study population

	Tertiles of Hardiness score			
	<85	85-95	>95	p-value
Age*	30.72±8.9	31.83±8.04	29.11±6.32	0.33
BMI change*	1.48±1.89	2.31±2.05	3.72±2.11	<0.001
Tendency toward weight loss[1]				
Yes	83.33	70	57.1	0.05
No	16.7	30	42.9	
Marital status[1]				
Married	41.7	50	34.3	0.59
Single	55.6	50	62.9	
Divorced	2.8	0	2.9	
Education[1]				
<8	5.6	2.5	2.9	0.65
8-16	75	67.5	62.9	
>16	19.4	30	34.3	
Occupation				
Employed	41.7	35	42.9	0.75
unemployed	58.3	65	57.1	
Diet				
Yes	38.9	27.5	42.9	0.35
No	61.1	72.5	57.1	

*p-values are calculated using one-way ANOVA; indicates mean (Potthoff, 2009); otherwise data are presented as (%)
[1]p-values is calculated using chi square test

Table 2: Results of the analysis of covariance (ANCOVA); factors associated with BMI reduction

	BMI change		
Variable	BCI (95%)		p-value*
Age	-0.045	-0.098 to 0.007	0.089
Hardiness score (19)	5.165	0.05 to 0.1	<0.001
Marital status			
Single	0 (ref)		
Married	-1.029	-1.85 to -1.19	0.016
Divorced	-0.95	-4.03 to -2.13	0.54
Tendency toward weight loss			
Yes	0 (ref)		
No	1.38	0.51 to 2.22	0.002
Education			
<8	0 (ref)		
8-16	0.75	-1.47 to 2.98	0.503
>16	1.47	-3.78 to -0.83	
Diet			
Yes	0 (ref)		
No	-0.06	-0.93 to 0.81	0.89
Hardiness score[1]	0.066	0.037 to 0.96	<0.001
Marital status			
Single	0 (ref)		
Married	-0.765	-1.52 to -0.011	0.047
Divorced	-1.084	-3.83 to 1.66	0.436
Tendency toward weight loss			
Yes	0 (ref)		
No	0.76	-0.079 to 1.59	0.075

*p<0.05. b, regression coefficient (a positive coefficient implies greater adherence to the pattern); CI, confidence interval;
[1]Data adjusted for the variables marital status and tendency toward weight loss

Table 3: Means and standard errors of body mass index (BMI) and BMI changes according to hardiness score

	Hardiness		
Variable	<91	≥91	p-value*
Unadjusted BMI	28.36 (0.50)	26.10 (0.40)	0.001
Unadjusted BMI change	1.65 (0.24)	3.47 (0.30)	<0.001
Adjusted BMI[1]	29.79 (0.74)	26.09 (0.54)	0.001
Adjusted BMI change[1]	1.33 (0.48)	3.36 (0.42)	<0.001

*Obtained by t-test for unadjusted values and by analysis of covariance for adjusted values
[1]Covariates included: age, tendency toward weight loss and diet

body mass index. In this case, with increasing the hardiness score, the BMI index changes were also proportionally increased.

The strengths of this study are the population-based design and high participation rate (85%). Another strong point was the adjustment of other confounders and covariates especially age, tendency toward weight loss and diet. However, although we cannot entirely rule out residual confounding due to imprecise measurement of important confounders, it is unlikely that errors in measuring the confounders would be so huge because the crude and multivariable results were essentially the same.

Before the implications of our findings are considered, it is necessary to concern potential biases. The sample size of the current study was relatively small and the study was only conducted on people living in Tehran city. These could limit the precision of the study and generalization of study findings to the entire Iranian population. Furthermore we used DHS (Dispositional Hardiness scale) to measure hardiness. Since hardiness was assessed through a self-administered questionnaire, measurement errors were inevitable. Finally due to the cross-sectional design of the study, one cannot infer causality.

Although weight loss attempts to achieve ideal body weight (according to Standard height and weight charts) might be successful, but the long-term maintenance of weight loss is not always permanent (Brownell and Jeffery, 1987).

Furthermore despite the growth and expansion of weight loss programs, products and procedures, the prevalence of overweight is increasing progressively and clinical interventions for weight loss does not provide a solution to the growing crisis of obesity. According to the present study, diets focusing on BMI regulation alone are not successful and behavioral therapy as a psychological intervention in order to adjust BMI is recommended. Some other studies have investigated the relationship between obesity and psychological well-being. Although psychological factors are undoubtedly important in the development of obesity, to what extent can these factors lead to obesity is not stated comprehensively (Simon *et al*., 2006; Wadden *et al*., 2006).

The researchers has emphasized on the lack of efficacy of di*et al*one. Failure to lose weight and weight loosing long-term maintenance, leads to a vicious cycle, in a way that the life story of obese and overweight individuals affected in terms of psychological and social conditions which prevents them from succeeding in weight loss (Cash and Pruzinsky, 1990). Although background research that directly investigates the impact of hardiness on weight loss does not exist and there had been little studies performed on the interaction between personality and weight, the evidence confirm the effect of

psychological changes on weight (Bayer *et al*., 2005). Thus, we decided to investigate other aspects of the factors influencing weight change.

It maybe that obese people are suffering from any mental disorders and different life turmoil, which are underlying obesity (Mousaviyan *et al*., 2010). So, obese patients are vulnerable to overeating as a means of coping with problems. Since individuals with low hardiness are more susceptible to the problems such slow self-esteem and frustration in the community. The probability of them failing in weight loss attempts is very high (Powell *et al*., 2007; Douketis *et al*., 2005).

In our study the average BMI was higher in married women than single women which was consistent with other studies conducted in this area (Sobal *et al*., 2003; Lipowicz *et al*., 2002; Nielsen *et al*., 2006; Al-Kandari, 2006). One study in Turkey that examined the association between marital status and obesity showed that marital status increased the risk of obesity about 2.5 times (Al-Kandari, 2006).

The study by Pekarnin and colleagues on 25-64 years old Chinese people showed that, there was a positive relationship between marital status and overweight in both male and female (Hu *et al*., 2002). Our study implies that marriage alone has negative impact on desirable weight loss; however, along with other factors investigated, its influence was insignificant.

Some researches suggest that personality test offer unreliable and sometimes conflicting results, other studies however indicate that, character features measured by KSP is very stable and predict health behaviors (Carlos Poston *et al*., 1999).

Overall, our study found that, the most tenacious individuals with regard to their marital status, age, education and diet and employment status are more likely to reach their ideal body weight. since they show more persistence in exercising and trying to lose weight. Among these facts they also can control their appetite in eating different kind of food.

In conclusion, our results from this population-based cross-sectional study support the hypothesis that a high hardiness score is associated with a increased chance of achieving desired Body Mass Index among Iranian women.

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We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

We understand that the Corresponding Author is the sole contact for the Editorial process. He is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs.

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