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 hardness collection extracted from the club archives. Analysis of covariance performed to evaluate whether hardness score associated with BMI change. A significant BMI change was observed for the highest tertile of hardness score (p-value = <0.001). After controlling for current age, educations, marital status, diet and occupation, hardness score was positively associated with a reduction in BMI (β = 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, hardness 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; Roelhing et al., 2006). 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...
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 prerequisite 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 = 65%).

**Assessment of anthropometric measures:** Weight loss was calculated using the BMI, which was computed from actual weight (kg) and height (m²) 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 hardness score:** The questionnaire used here is the modified version of Koala’s measure of personality hardness. 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 hardness 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 hardness 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 hardness. DHS originally designed to measure the hardness 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 hardness and subjective well-being (Ghorbani and Watson, 2005). This questionnaire has been evaluated by NimaGhorbani to measure hardness 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 hardness 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 (8-18) 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 hardness score (more than median 81) showed a significantly higher bmi change compared with those who have lower hardness score (p<0.001) (Table 3).

**DISCUSSION**

In the current study we observed a significant positive relationship between hardness score and changes in
Table 1: Characteristics of subjects according to tertiles of hardness score among the study population

<table>
<thead>
<tr>
<th>Tertiles of Hardness score</th>
<th>Age</th>
<th>BMI change</th>
<th>Tendency toward weight loss</th>
<th>Marital status</th>
<th>Education</th>
<th>Occupation</th>
<th>Diet</th>
<th>BMI reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;85</td>
<td>85-86</td>
<td>&gt;86</td>
<td>p-value</td>
<td>Yes</td>
<td>&lt;8</td>
<td>Employed</td>
<td>Yes</td>
<td>BMI change</td>
</tr>
<tr>
<td>Age</td>
<td>30.72±8.9</td>
<td>31.83±8.04</td>
<td>29.1±6.32</td>
<td>0.33</td>
<td>Yes</td>
<td>83.33</td>
<td>70</td>
<td>57.1</td>
</tr>
<tr>
<td>BMI change</td>
<td>1.48±1.99</td>
<td>2.31±2.06</td>
<td>3.72±2.11</td>
<td>&lt;0.001</td>
<td>No</td>
<td>16.7</td>
<td>30</td>
<td>42.9</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Variable</th>
<th>BMI change</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.045</td>
<td>-0.098</td>
</tr>
<tr>
<td>Hardiness score (19)</td>
<td>5.165</td>
<td>0.05 to 0.1</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>0 (ref)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>-1.029</td>
<td>-1.85 to -1.19</td>
</tr>
<tr>
<td>Divorced</td>
<td>-0.95</td>
<td>-4.03 to -2.13</td>
</tr>
<tr>
<td>Tendency toward weight loss</td>
<td>Yes</td>
<td>0 (ref)</td>
</tr>
<tr>
<td>No</td>
<td>1.38</td>
<td>0.51 to 2.22</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;8</td>
<td>0 (ref)</td>
<td></td>
</tr>
<tr>
<td>8-16</td>
<td>0.75</td>
<td>-1.47 to 2.98</td>
</tr>
<tr>
<td>&gt;16</td>
<td>1.47</td>
<td>-3.78 to -0.83</td>
</tr>
<tr>
<td>Diet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0 (ref)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>-0.06</td>
<td>-0.93 to 0.81</td>
</tr>
<tr>
<td>Hardiness score*</td>
<td>0.066</td>
<td>0.037 to 0.96</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>0 (ref)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>-0.785</td>
<td>-1.52 to -0.011</td>
</tr>
<tr>
<td>Divorced</td>
<td>-1.084</td>
<td>-3.83 to 1.66</td>
</tr>
<tr>
<td>Tendency toward weight loss</td>
<td>Yes</td>
<td>0 (ref)</td>
</tr>
<tr>
<td>No</td>
<td>0.89</td>
<td>-0.079 to 1.59</td>
</tr>
</tbody>
</table>

* p<0.05, t, regression coefficient (a positive coefficient implies greater adherence to the pattern); CI, confidence interval.

*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 hardness score

<table>
<thead>
<tr>
<th>Variable</th>
<th>BMI</th>
<th>BMI change</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unadjusted BMI</td>
<td>26.36±(0.50)</td>
<td>29.10±(0.40)</td>
<td>0.001</td>
</tr>
<tr>
<td>Unadjusted BMI change</td>
<td>1.86±(0.24)</td>
<td>3.47±(0.30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Adjusted BMI</td>
<td>26.79±(0.74)</td>
<td>26.09±(0.54)</td>
<td>0.001</td>
</tr>
<tr>
<td>Adjusted BMI change</td>
<td>1.33±(0.48)</td>
<td>3.36±(0.42)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

* Obtained by t-test for unadjusted values and by analysis of covariance for adjusted values.

* Covariates included: age, tendency toward weight loss and diet.
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 hardship are more susceptible to the problems such as 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; Lipowitz 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 Pekanin 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 hardship 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.

REFERENCES


