

RESEARCH ARTICLE

Does Body Image Affect Quality of Life?: A Population Based Study

Tufan Nayir¹, Ersin Uskun², Mustafa Volkan Yürekli², Hacer Devran², Ayşe Çelik², Ramazan Azim Okyay^{3*}

1 Administrative Department, Mersin Public Health Directorate, Mersin, Turkey, **2** Department of Public Health, Süleyman Demirel University Faculty of Medicine, Isparta, Turkey, **3** Department of Communicable Diseases, Ceyhan Community Health Center, Adana, Turkey

* razim01@gmail.com



OPEN ACCESS

Citation: Nayir T, Uskun E, Yürekli MV, Devran H, Çelik A, Okyay RA (2016) Does Body Image Affect Quality of Life?: A Population Based Study. PLoS ONE 11(9): e0163290. doi:10.1371/journal.pone.0163290

Editor: Massimo Ciccozzi, National Institute of Health, ITALY

Received: July 4, 2016

Accepted: September 5, 2016

Published: September 20, 2016

Copyright: © 2016 Nayir et al. This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Data Availability Statement: Data are available from Süleyman Demirel University Faculty of Medicine, Public Health Department, for researchers who meet the criteria for access to confidential data.

Funding: The authors received no specific funding for this work.

Competing Interests: The authors have declared that no competing interests exist.

Abstract

Body image (BI) can be described as the assessment of both positive and negative emotion for one's own body parts and their characteristics by himself or herself. Current research has concentrated mostly on the status of negative BI as a risk factor for mental health problems rather than as a public health problem, thereby little is known about the effects of BI on quality of life. Thus, the purpose of this study was to assess the BI and Quality of Life (QoL) of individuals and to investigate the relationship between the two. Individuals over 15 living in Isparta city center constitute the universe of this cross-sectional analytical study, carried out in 2014. The BI of individuals was measured by the Body Image Scale and The QoL of individuals was measured using the World Health Organization (WHO) Quality of Life Scale Short Form. The mean age of the participants was 31.9 ± 13.0 and 56.0% were female, 36.8% were married and 81.7% had education above high school. 25.7% had at least one chronic disease and 17.7% received medication regularly. Having good-very good health perception, having higher income than expenses, making regular exercises were predictors in enhancing the quality of life in certain aspects, however having a good body image came out as a predictor enhancing the quality of life in all sub-domains. BI was found closely related with QoL in all sub-domains. Our findings suggest that greater attention should be given to BI as a strong predictor of QoL.

Introduction

Body image (BI) can be described as the assessment of both positive and negative emotion for one's own body parts and their characteristics by himself or herself [1]. BI is a complicated construct that is composed of several components such as mental and emotional components, perceptual components and behavioral components [2].

It is well documented that a negative BI is associated with a range of adverse health outcomes, including low self-esteem, depressive mood and eating disorder symptoms [3,4].

However attention has concentrated mostly on the status of negative BI as a risk factor for mental health problems rather than as a public health problem in its own right, thereby little is known about the effects of BI on quality of life (QoL) [5].

The World Health Organization (WHO) defines QoL as the individual's assessment of their position in life in the scope of culture and values, considering their goals, expectations, standards and concerns [6].

The concept of life quality closely related to health status, is one of the topics that is paid much attention by a large group of researchers engaged in the field of medicine and found worthy to investigate. The concept of life quality related to health, alternative explanations exist though, means "the perception of health and illness experience from the individuals' point of view" [6,7].

As mentioned above not much attention was given to BI in terms of QoL. To the best of our knowledge, in Turkey, there is no previously conducted study investigating the association between BI and QoL. Therefore, the goal of this study is to assess the BI and QoL of individuals over 15 living in a city center and to investigate the relationship between the two.

Materials and Methods

Study Design

Individuals over 15 living in Isparta city center constitute the universe of this study which is a cross-sectional analytical study, carried out in 2014 (n:175.409). The sample size was calculated as 638 with an obesity prevalence of 30% with a 5% margin of error in OpenEpi Program (Open Source Epidemiologic Statistics for Public Health, Version 3.01, 2013). Using the cluster sampling method we reached a total of 650 people in 26 clusters and 25 people in each cluster.

The inclusion criterias for enrollment are to volunteer to participate in the study and to be over 15 years old. The exclusion criteria is to have mental retardation.

Data collection instruments

Socio-demographic characteristics (age, gender, education level, economical perception, having a chronic disease, smoking, drinking alcohol, doing sport, weight, height) and other characteristics (the thoughts and requests about the weight of himself/herself, family, friends and spouse/partner, the status of using any method to lose weight at the time of survey and in the past year, the status of skipping meals and snacking between meals etc.) were collected with a questionnaire prepared by authors and included 28 items.

The BI of individuals was measured by the Body Image Scale developed by Secord and Jourard [8] and adapted to Turkish by Hovardaoglu [9]. Body Image Scale consists of 40 articles aiming to measure the level of satisfaction of various body functions and various parts of the body of individuals. This scale is a quinary Likert-type scale evaluated from the total score obtained from the scale and can get a score ranging from 40 to 200. Higher scores got by an individual indicates a higher level of satisfaction of individual's own body. The QoL of individuals was measured using the Turkish version (TR) of WHO Quality of Life Scale Short Form (WHOQOL-BREF) [10]. WHOQOL-BREF (TR), a type of scale having the reliability and validity study [11,12], consists of 26 quinary Likert-type questions, two of which are general questions and the rest of which are questions about four different fields (physical, psychological, social and environment). Culture Standardized (CS) Environmental Area, which is obtained considering the answers to the 27th question added as a national question during the study for adaptation to Turkish, is an additional field used in national studies. The scale not having a total score, each area is evaluated independently and can have a value between 4–20 points. The increasing points for each area indicates the increasing QoL for this field. In this study, scores of the QoL were calculated for all fields of WHOQOL-BREF (TR) scale.

Data was gathered by making surveys prepared by researchers using face to face interview method.

Statistical analysis

The dependent variables of the study were the scores of QoL and BI. Age, gender, education level, economical perception, having a chronic disease, smoking, drinking alcohol, doing sport, body mass index (BMI), the thoughts and requests about the weight of himself/herself, family, friends and spouse/partner, the status of using any method to lose weight at the time of survey and in the past year, the status of skipping meals and snacking between meals were independent variables. Data was evaluated using descriptive statistics, t-test, Pearson and Spearman correlation and linear regression analysis in computer. Statistical Package for the Social Sciences software (SPSS, Version 9.0, Inc. California, 1999) was used for all the statistical calculations.

Ethical considerations

This study was conducted in accordance with the ethical standards of the Declaration of Helsinki, which promotes respect for all human beings and protects their health and rights. The Ethics Committee of Süleyman Demirel University Faculty of Medicine approved this study.

After informing the participants about the purpose of the trial (investigation, research, study), and where and how the obtained data would be used, written consents were obtained. The written consent was a separate standard document prepared according to the ethics committee suggestion. The participants of this study were over 15 years old. For over 18, written informed consent was provided by the participant himself and for between 16–18 the written informed consent to participate was provided by his/her legal representative.

Results

The mean age of the study group was 31.9 ± 13.0 and 56.0% were female, 36.8% were married and 81.7% had education of high school or above. 70.5% perceived their income as middle income (Table 1).

31.1% were smoking, 28.8% were drinking alcohol and 22.0% were making regular exercise. The average BMI of the study group was 24.0 ± 4.4 and 36.0% were fat or overweight (BMI ≥ 25 kg/m²). 25.7% had at least one chronic disease and 17.7% received medication regularly. 71.5% were skipping at least one meal during the day (Table 2). The most skipped meal was lunch (49.0%). 84.2% of the group were snacking between meals and the most preferred snack was fruit with 49.7%.

Specific Results on BI

The average of BI Score of the research group was 152.1 ± 24.0 . (Table 3). The average of BI Scores of women, those with a chronic disease, those using medication, those skipping meals, those having the opinion that they are not normal by their family, friends, spouse and himself/herself, those having the consideration that they need to make changes in their weight by their family, friends, spouse and himself/herself and those having the history of dieting in the past year were lower than others. ($p < 0.001$, $p < 0.001$, $p < 0.001$, $p < 0.05$, $p < 0.001$ and $p < 0.001$ respectively) (Tables 2 and 4).

Being a woman decreased the BI score of 3.7 units, the individual's own desire to make changes in body weight decreased the BI score of 7.7 units ($p < 0.05$ and $p < 0.01$ respectively). Working increased the BI score of 4.5 units, having good-very good economical sense increased the BI score of 6.8 units, having good-very good health perception increased the BI score of 9.3 units, smoking increased the BI score of 5.7 units and making regular exercise increased the BI score of 6.5 units. ($p < 0.05$, $p < 0.05$, $p < 0.001$, $p < 0.01$ and $p < 0.01$ respectively) (Table 5).

Table 1. Socio-demographic characteristics and body image of the study group and the distribution of WHOQOL-BREF (TR) sub-parameters according to these characteristics.

Characteristics		Number	%	Body Image Score (Mean ±SD)	WHOQOL-BREF (TR) parameters (Mean±SD)				
					Physical domain	Psychological domain	Social domain	Environmental domain	CS environmental domain
Gender	Male	286	44	157,4 ± 23,2***	15,8 ± 2,7**	14,9 ± 2,8***	15,3 ± 3,2**	14,9 ± 2,5***	14,1±4,0
	Female	364	56	147,9 ± 23,8	15,1 ± 2,8	14,1 ± 2,7	14,5 ± 3,0	14,1 ± 2,5	13,6±4,3
Marital status	Single/widowed	411	63,2	153,1 ± 23,8	15,7 ± 2,7**	14,6 ± 2,8	15,0 ± 3,2	14,7 ± 2,6*	13,6±4,2
	Married	239	36,8	150,4 ± 24,3	15,0 ± 2,8	14,4 ± 2,5	14,6 ± 2,9	14,1 ± 2,3	14,2±4,1
Education	Primary school or less	119	18,3	146,1±24,5**	14,8±3,3*	13,8±2,7**	14,5±3,1	13,9±2,6**	13,4±4,3
	High school or above	531	81,7	153,5±23,7	15,6±2,6	14,7±2,7	14,9±3,1	14,6±2,4	13,9±4,2
Occupational status	Working	338	52	156,1 ± 24,0***	15,5 ± 2,8	14,8 ± 2,7**	14,9 ± 3,3	14,6 ± 2,5	14,3 ± 4,1**
	Not working	312	48	147,8 ± 23,3	15,4 ± 2,7	14,2 ± 2,7	14,8 ± 2,9	14,4 ± 2,5	13,4±4,3
Economic perception	Good or very good	85	13,0	160,9±24,1***	16,4 ± 2,4***	15,7±3,0***	15,6±3,1*	16,2±2,3***	15,0±3,8**
	Moderate or worse	565	87	150,8±23,7	15,3±2,8	14,3±2,7	14,7±3,1	14,2±2,4	13,7±4,2
Income balance	Income > Expenses	170	26,2	157,2±23,6***	16,1 ± 2,6***	15,4±2,7***	15,2 ± 2,9***	15,7±2,3***	14,8±4,1***
	Income = Expenses	389	59,8	152,0 ± 23,2	15,4 ± 2,6	14,4 ± 2,5	15,0 ± 3,1	14,3 ± 2,3	13,9±4,1
	Income < Expenses	91	14	143,3 ± 25,4	14,4 ± 3,3	13,1 ± 3,1	13,5 ± 3,1	13,1 ± 2,6	11,9±4,1
Total		650	100	152,1 ± 24,0	15,4 ± 2,8	14,5 ± 2,7	14,8 ± 3,1	14,5 ± 2,5	13,8±4,2

Mean±SD: Mean±Standart Deviation, CS: Culture Standardized, WHOQOL-BREF(TR): Turkish Version (TR) of World Health Organization Quality of Life Scale Short Form.

* p<0,05

** p<0,01

*** p<0,001

doi:10.1371/journal.pone.0163290.t001

Specific Results on QoL

The mean scores of WHOQOL-BREF (TR) regarding physical, psychological, social, environment and CS environmental areas were 15.4±2.8, 14.5±2.7, 14.8±3, 14.5±2.5 and 13.8±4.2 respectively. (Table 3).

Physical domain scores were significantly lower for women, the married, the fat/overweight according to BMI, patients with chronic diseases, those using drugs, those having the opinion that they are not normal by their family, friends, spouse and himself/herself, those having the consideration that they need to make changes in their weight by their family, friends, spouse and himself/herself (p<0.01, p<0.01, p<0.01, p<0.001, p<0.001, p<0.001, p<0.01, p<0.01, p<0.001, p<0.001, p<0.001, p<0.001, p<0.001 and p<0.001 respectively) (Tables 2 and 4). Physical domain scores were higher for those having higher education than high school, those having good-very good economical sense, those having good-very good health perception, those drinking alcohol and those making regular exercises (p<0.05, p<0.001, p<0.001, p<0.001, p<0.01 and p<0.001 respectively) (Tables 1 and 2).

Psychological domain scores were significantly lower for women, patients with chronic diseases, those using drugs, those having the opinion that they are not normal by their family, friends, spouse and himself/herself, those having the consideration that they need to make changes in their weight by their family, friends, spouse and himself/herself (p<0.001, p<0.001, p<0.001, p<0.01, p<0.01, p<0.001, p<0.001, p<0.001, p<0.001 and p<0.001

Table 2. Characteristics of health status and body image of the study group and the distribution of WHOQOL-BREF (TR) sub-parameters according to these characteristics.

Characteristics	Number	%	Body Image Score (Mean ±SD)	WHOQOL-BREF (TR) parameters (Mean±SD)					
				Physical domain	Psychological domain	Social domain	Environmental domain	CS environmental domain	
Health perception	Good or very good	450	69,2	156,9±21,9***	16,1 ±2,4***	15,0±2,6***	15,2 ±2,9***	14,9±2,4***	14,1±4,1**
	Moderate or worse	200	30,8	141,4±25,1	13,8±3,0	13,3±2,7	13,9±3,3	13,5±2,4	13,2±4,2
BMI (kg/m ²)	Under 18	24	3,7	148,1±22,9	15,0±3,4*	14,5±2,9	14,6±2,7	14,3±3,1	13,3±4,0
	18–24,9	392	60,3	153,0±23,4	15,7±2,5	14,6±2,7	15,0±3,1	14,6±2,4	13,7±4,3
	25 and above	234	36	151,0±25,0	15,0±3,1	14,4±2,7	14,6±3,1	14,4±2,5	14,1±4,0
Smoking	No	448	68,9	149,8±23,2***	15,4±2,7	14,3±2,7*	14,7±3,0*	14,4±2,4	13,8±4,1
	Yes	202	31,1	157,2±24,9	15,5±2,8	14,9±2,8	15,2±3,4	14,7±2,6	14,0±4,4
Alcohol consumption	No	463	71,2	150,6±24,1*	15,2±2,9**	14,3±2,7**	14,5 ±2,9***	14,3±2,4**	13,8±4,2
	Yes	187	28,8	155,9±23,2	15,9±2,5	15,0±2,7	15,7±3,4	14,9±2,6	13,8±4,2
Making regular exercise	Yes	143	22	161,1±21,3***	16,5 ±2,4***	15,4±2,8***	15,7 ±2,9***	15,3±2,4***	14,3±4,6
	No	507	78	149,6±24,1	15,1±2,8	14,2±2,7	14,6±3,1	14,3±2,5	13,7±4,1
Having a chronic disease	No	483	74,3	154,4±23,8***	15,9 ±2,5***	14,7±2,6***	15,0±3,1	14,6±2,5	14,1±4,1**
	Yes	167	25,7	145,6±23,5	14,2±3,2	13,8±2,9	14,5±3,2	14,2±2,4	13,0±4,3
Receiving medication regularly	No	535	82,3	154,3±23,7***	15,8 ±2,5***	14,7±2,6***	15,0 ±3,1**	14,6±2,5*	14,0±4,2*
	Yes	115	17,7	142,2±23,1	13,8±3,3	13,4±2,9	14,0±3,2	14,0±2,4	13,1±3,9
Skipping meals	No	185	28,5	155,1±25,1*	15,7±3,1	15,0±2,7**	15,0±3,3	14,9±2,5**	14,4±3,9*
	Yes	465	71,5	150,9±23,5	15,3±2,6	14,3±2,7	14,8±3,0	14,3±2,4	13,6±4,3
Diet history in the past year	No	438	67,4	153,7±23,7*	15,5±2,8	14,6±2,8	14,9±3,0	14,5±2,5	14,2±4,1**
	Yes	212	32,6	148,7±24,2	15,2±2,7	14,2±2,7	14,7±3,3	14,5±2,4	13,1±4,3
Total		650	100	152,1±24,0	15,4±2,8	14,5±2,7	14,8±3,1	14,5±2,5	13,8±4,2

Mean±SD: Mean±Standart Deviation, CS: Culture Standardized, BMI: Body Mass Index, WHOQOL-BREF(TR): Turkish Version (TR) of World Health Organization Quality of Life Scale Short Form.

* p<0,05

** p<0,01

*** p<0,001

doi:10.1371/journal.pone.0163290.t002

respectively) (Tables 2 and 4). Psychological domain scores were higher for those having higher education than high school, those working, those having good-very good economical sense, those having good-very good health perception, those drinking alcohol and those making regular exercises (p<0.01, p<0.01, p<0.001, p<0.001, p<0.05, p<0.01 and p<0.001) (Tables 1 and 2).

Social domain scores were significantly lower for women, those having the opinion that they are not normal by their family, friends, wife and himself/herself, those having the consideration that they need to make changes in their weight by their family, friends, spouse and himself/herself (p<0.01, p<0.001, p<0.01, p<0.001 and p<0.01 respectively) (Tables 2 and 4). Social domain scores were higher for those having good-very good economical sense, those drinking alcohol, smoking and those making regular exercises (p<0.01, p<0.001, p<0.05, p<0.001 and p<0.001 respectively) (Tables 1 and 2).

Table 3. Correlation of age, number of applications to health institutions and body image scores of the study group with WHOQOL-BREF (TR) sub-parameters.

Characteristics	Mean ±SD	WHOQOL-BREF (TR) parameters (Mean±SD)				
		Physical domain	Psychological domain	Social domain	Environmental domain	CS environmental domain
Age (years)	31,9±13	-0,220***	-0,091*	-0,101*	-0,100*	0,028
Number of applications to health organizations	3,7±5,4	-0,251***	-0,178***	-0,056	-0,110**	-0,050
Body Image Score	152,1 ±24,0	0,478***	0,584***	0,495***	0,482***	0,245***

Mean±SD: Mean±Standart Deviation, CS: Culture Standardized, r: Pearson correlation coefficient, WHOQOL-BREF(TR): Turkish Version (TR) of World Health Organization Quality of Life Scale Short Form.

* p<0,05

** p<0,01

*** p<0,001

doi:10.1371/journal.pone.0163290.t003

Environmental domain scores were significantly lower for women, the married, those using drugs, those skipping meals, those having the opinion that they are not normal by their family, friends, spouse and himself/herself, those having the consideration that they need to make changes in their weight by their family, friends, spouse and himself/herself (p<0.001, p<0.05, p<0.01, p<0.05, p<0.01, p<0.001, p<0.001, p<0.001, p<0.01, p<0.01 and p<0.01 respectively) (Tables 2 and 4). Environmental domain scores were higher for those having higher education than high school, those having good-very good economical sense, those having good-very good health perception, those having more income than expenses, those drinking alcohol and those making regular exercises (p<0.01, p<0.001, p<0.001, p<0.001, p<0.01 and p<0.001 respectively) (Tables 1 and 2).

CS environmental domain scores were significantly lower for patients with chronic diseases and those using drugs, those skipping meals, those having the opinion that they are not normal by their family, friends, spouse and himself/herself, those having the consideration that they need to make changes in their weight by their family, friends, spouse and himself/herself (p<0.01, p<0.05, p<0.05, p<0.01, p<0.01, p<0.05, p<0.01, p<0.001, p<0.001, p<0.01, p<0.01 and p<0.01 respectively) (Tables 2 and 4).

As age and number of applications for health organizations increased, physical, psychological and environmental domain scores reduced (for age; p<0.001, p<0.05 and p<0.05 respectively, for applications for health organizations; p<0.001, p<0.001 and p<0.01 respectively). Furthermore, as age increased, social domain scores decreased (p<0.05). As BI score increased, QoL scores in five sub-areas also increased (for all p<0.001) (Table 3).

Regression analysis results

As a result of regression analysis of variables associated with the univariate analysis with sub parameters of WHOQOL-BREF (TR) (Table 5);

Having good-very good health perception increased physical domain score by 1.1 units, making regular exercises increased physical domain score by 0.7 units (p<0.001 and p<0.01 respectively). A unit increase in applications for health organizations reduced physical domain score by 0.1 units (p<0.05).

Having higher income than expenses increased psychological domain score by 0.6 units, having good-very good health perception increased psychological domain score by 0.6 units (p<0.05 and p<0.01 respectively). Skipping meals during the day reduced psychological domain score by 0.4 units (p<0.05).

Table 4. Social pressure factors and body image of the study group and the distribution of WHOQOL-BREF (TR) sub-parameters according to these characteristics.

Social pressure factors related to one's physical appearance		Number	%	Body Image Score (Mean ±SD)	WHOQOL-BREF (TR) parameters (Mean±SD)				CS environmental domain
					Physical domain	Psychological domain	Social domain	Environmental domain	
Family's thought	Normal	354	54,5	155,9±23,1***	15,7±2,6**	14,8±2,7**	15,0±3,1	14,7±2,4*	14,2±4,1**
	Not normal	296	45,5	147,6±24,3	15,1±2,9	14,2±2,7	14,7±3,2	14,3±2,5	13,3±4,2
Family's desire	Should remain the same	371	57,1	156,0±23,3	15,7±2,7	14,8±2,7	15,0±3,2	14,7±2,5	14,4±4,1
	Should change	279	42,9	146,9±23,9***	15,1±2,8**	14,1±2,7**	14,6±3,0	14,2±2,4**	13,2±4,2***
Friends' thought	Normal	404	62,2	156,6±23,1***	15,9 ±2,6***	14,9±2,7***	15,2 ±3,2***	14,9±2,5***	14,3±4,2**
	Not normal	246	37,8	144,8±23,7	14,7±3,0	13,8±2,7	14,3±2,9	14,0±2,4	13,1±4,0
Friends' desire	Should remain the same	431	66,3	156,2±22,7***	15,9 ±2,6***	14,9±2,7***	15,1 ±3,2**	14,8±2,5***	14,3±4,1***
	Should change	219	33,7	144,0±24,5	14,6±2,9	13,7±2,6	14,3±3,0	13,9±2,4	12,9±4,3
Spouse's thought	Normal	435	66,9	155,4±22,9***	15,8 ±2,6***	14,9±2,6***	15,1 ±3,2**	14,8±2,4***	14,1±4,2*
	Not normal	215	33,1	145,5±24,7	14,7±3,0	13,7±2,8	14,3±2,9	14,0±2,5	13,3±4,1
Spouse's desire	Should remain the same	436	67,1	155,1±23,2***	15,8 ±2,7***	14,8±2,7***	15,0±3,2	14,7±2,5**	14,1±4,1**
	Should change	214	32,9	146,0±24,4	14,7±2,9	13,8±2,7	14,5±2,9	14,1±2,4	13,2±4,3
Own thought	Normal	390	60	158,6±21,5***	15,9 ±2,6***	15,0±2,7***	15,1 ±3,1**	14,8±2,5**	14,3±4,2**
	Not normal	260	40	142,4±24,3	14,7±2,9	13,7±2,7	14,4±3,0	14,1±2,3	13,2±4,1
Own desire	Should remain the same	349	53,7	159,4±21,9***	15,9 ±2,7***	15,0±2,7***	15,2 ±3,2**	14,8±2,6**	14,3±4,1**
	Should change	301	46,3	143,6±23,5	14,9±2,8	13,9±2,6	14,4±3,0	14,2±2,3	13,3±4,3
Total		650	100	152,1±24,0	15,4±2,8	14,5±2,7	14,8±3,1	14,5±2,5	13,8±4,2

Mean±SD: Mean±Standart Deviation, CS: Culture Standardized, WHOQOL-BREF(TR): Turkish Version (TR) of World Health Organization Quality of Life Scale Short Form.

* p<0,05

** p<0,01

*** p<0,001

doi:10.1371/journal.pone.0163290.t004

Drinking alcohol increased social domain score by 1.0 units (p<0.001).

Being married reduced environmental domain score by 0.4 units (p<0.05). Having good-very good economical perception increased environmental domain score by 0.8 units, having higher income than expenses increased environmental domain score by 0.8 units and having good-very good health perception increased environmental domain score by 0.5 units (p<0.01, p<0.001 and p<0.01 respectively).

A unit increase in BI score results in 0.1 unit increased for every five domains (for all p<0.001).

Table 5. Regression analysis of the variables that are found to be associated in the univariate analysis with sub-parameters of WHOQOL-BREF (TR).

Variables included in the analysis	Body Image	WHOQOL-BREF (TR) parameters (Exp [B] (%95 Confidence Interval))				
		Physical domain	Psychological domain	Social domain	Environmental domain	CS environmental domain
Age (years)	-0,06 (-0,21–0,10)	-0,02 (-0,04–0,03)	0,01 (-0,01–0,02)	-0,01 (-0,02–0,01)	0,00 (-0,02–0,02)	a
Gender (female = 1, male = 0)	-3,68 (-7,34– -0,02)*	-0,13 (-0,52–0,26)	-0,02 (-0,40–0,35)	-0,10 (-0,56–0,36)	-0,15 (-0,51–0,20)	a
Marital status (married = 1, other = 0)	a	-0,10 (-0,57–0,38)	a	a	-0,44 (-0,87– -0,01)*	a
Education (high school or above = 1, other = 0)	0,90 (-3,81–5,61)	-0,33 (-0,83–0,16)	0,26 (-0,23–0,74)	a	0,15 (-0,31–0,60)	a
Occupational status (working = 1, other = 0)	4,49 (0,94–8,03)*	A	-0,16 (-0,53–0,21)	a	a	0,39 (-0,25–1,04)
Economic perception (very good-good = 1, other = 0)	6,80 (1,34–12,26)*	0,31 (-0,28–0,91)	0,29 (-0,28–0,85)	0,14 (-0,49–0,76)	0,83 (0,28–1,37)**	0,48 (-0,57–1,54)
Income balance (income>expenses = 1, other = 0)	0,25 (-4,01–4,52)	0,20 (-0,26–0,66)	0,56 (0,12–1,00)*	a	0,81 (0,39–1,22)***	0,62 (-0,19–1,43)
Health perception (very good-good = 1, other = 0)	9,27 (5,29–13,25)***	1,11 (0,68–1,55)***	0,56 (0,14–0,98)**	0,24 (-0,26–0,74)	0,53 (0,14–0,93)**	<-0,01 (-0,75–0,75)
BMI (≥ 25 kg/m ² = 1, other = 0)	a	0,04 (-0,41–0,49)	a	a	a	a
Number of applications to health organizations	-0,30 (-0,63–0,03)	-0,05 (-0,08–0,01)*	-0,03 (-0,06–0,01)	a	<-0,01 (-0,04–0,03)	a
Smoking (yes = 1, other = 0)	5,74 (1,65–9,84)**	A	0,15 (-0,28–0,57)	-0,32 (-0,83–0,20)	a	a
Alcohol consumption (yes = 1, other = 0)	-2,62 (-6,78–1,54)	0,25 (-0,17–0,66)	0,20 (-0,23–0,63)	1,02 (0,49–1,55)***	0,29 (-0,08–0,66)	a
Making regular exercise (yes = 1, other = 0)	6,54 (2,50–10,59)**	0,65 (0,21–1,08)**	0,27 (-0,15–0,69)	0,43 (-0,08–0,95)	0,29 (-0,11–0,69)	a
Having a chronic disease (yes = 1, no = 0)	1,58 (-4,28–7,44)	-0,36 (-0,99–0,27)	0,08 (-0,53–0,69)	a	a	-0,92 (-2,03–0,19)
Receiving medication regularly (yes = 1, no = 0)	-4,47 (-11,30–2,36)	-0,33 (-1,07–0,41)	-0,42 (-1,13–0,29)	-0,10 (-0,72–0,52)	0,19 (-0,30–0,68)	0,35 (-0,94–1,64)
Skipping meals (yes = 1, no = 0)	-0,89 (-4,69–2,91)	A	-0,40 (-0,80– -0,01)*	a	-0,36 (-0,73–0,02)	-0,48 (-1,19–0,23)
Diet history in the past year (yes = 1, no = 0)	2,40 (-1,57–6,35)	A	a	-0,09 (-0,59–0,42)	a	a
Family's thought (not normal = 1, normal = 0)	3,12 (-2,18–8,42)	0,43 (-0,14–1,01)	0,42 (-0,13–0,97)	a	0,35 (-0,18–0,87)	0,02 (-1,00–1,03)
Family's desire (Should change = 1, Should remain the same = 0)	-1,74 (-6,88–3,40)	0,22 (-0,34–0,77)	0,12 (-0,41–0,65)	a	-0,12 (-0,63–0,39)	-0,60 (-1,59–0,39)
Friends' thought (not normal = 1, normal = 0)	-3,99 (-9,57–1,60)	-0,09 (-0,70–0,51)	-0,14 (-0,72–0,44)	-0,33 (-0,99–0,34)	0,02 (-0,53–0,57)	0,04 (-1,03–1,11)
Friends' desire (Should change = 1, Should remain the same = 0)	-1,28 (-7,09–4,53)	-0,53 (-1,16–0,10)	-0,20 (-0,80–0,40)	0,17 (-0,51–0,85)	-0,48 (-1,06–0,09)	-0,85 (-1,97–0,26)
Spouse's thought (not normal = 1, normal = 0)	-3,47 (-9,54–2,60)	-0,40 (-1,05–0,26)	-0,34 (-0,97–0,29)	-0,14 (-0,67–0,40)	-0,35 (-0,95–0,25)	0,36 (-0,81–1,53)
Spouse's desire (Should change = 1, Should remain the same = 0)	2,62 (-3,62–8,85)	-0,26 (-0,94–0,42)	-0,27 (-0,92–0,38)	a	0,10 (-0,52–0,71)	-0,19 (-1,39–1,01)
Own thought (not normal = 1, normal = 0)	-5,05 (-10,63–0,54)	-0,23 (-0,83–0,38)	-0,26 (-0,84–0,32)	0,60 (-0,11–1,30)	0,06 (-0,49–0,62)	-0,19 (-1,26–0,88)
Own desire (Should change = 1, Should remain the same = 0)	-7,71 (-13,46–-1,97)**	0,45 (-0,16–1,05)	0,39 (-0,19–0,97)	0,13 (-0,58–0,85)	0,54 (-0,01–1,09)	0,48 (-0,57–1,54)
Body image	a	0,04 (0,03–0,05)***	0,06 (0,05–0,07)***	0,06 (0,05–0,07)***	0,04 (0,04–0,05)***	0,03 (0,02–0,05)***
Constant	151,57 (142,22–160,92)***	9,76 (8,15–11,38)***	5,22 (3,66–6,79)***	5,00 (3,25–6,75)***	7,38 (5,89–8,87)***	9,17 (6,73–11,6)***
Adjusted R ²	0,24***	0,34***	0,37***	0,26***	0,31***	0,07***

a: Variable not included in the model, CS: Culture standardized, WHOQOL-BREF (TR): Turkish Version (TR) of World Health Organization Quality of Life Scale Short Form.

* p<0,05

** p<0,01

*** p<0,001

doi:10.1371/journal.pone.0163290.t005

Discussion

This study revealed that BI significantly affects the QoL in every sub-domain. It is very important to create a positive BI perception to improve the QoL of individuals. When risk groups and risk factors associated with negative BI is known, particular attention may be given to these groups. Similarly, knowing the factors which positively affect BI may give hints for possible interventions. The findings of this study provide us important evidence on this aspect. Being a woman affects BI negatively, making women a risk group. In this respect steps should be taken to ensure a positive BI in females. Individuals who have a desire to change in terms of BI, are also a risk group. BI is positive in the individuals with a good or very good health perception. Also, making regular exercises was found to improve BI. Thus, regular exercise programs that positively affect health perception should be encouraged.

In this study we assessed the factors that are independently associated with BI perception and QoL among individuals over 15 living in Isparta city center, while controlling for all other factors. Below, only the factors that displayed significant associations in the regression analysis were discussed.

Anticipated relation between gender and BI perception is verified by the results of this study: females tended to have a more negative BI perception compared to males. This is supported by other studies showing that women were more likely to perceive themselves as being overweight than men [13,14]. At this point it should be noted that in women, many unhealthy attitudes such as bulimia and anorexia are the results of dissatisfaction with self image, especially dissatisfaction with aspects associated to body weight [15].

We found that working and making regular exercises increased the BI score. Positive effects of exercise on BI have been firmly established in the literature [16–19]. There is also evidence that exercise improves BI, even though body weight and shape do not change [20]. However, exercising compulsively and excessively is a prevalent purging strategy used to make up for caloric intake or to alter one's body weight, size, or shape, resulting in eating disorders related to body dissatisfaction, thus this fact should be considered while appraising exercise in regards to BI [21].

Having good-very good economical sense was found to increase the BI score in this study. Likewise, in a study conducted in Brazil in 2011 people with lower economic status were reported to be more dissatisfied with their current body silhouette [22]. However this result is controversial in the literature since some say BI dissatisfaction was most evident among people of higher socioeconomic classes [23]. The diversities in these studies are thought to be due to the differences in the methodologies.

In this study, it is found that having good-very good health perception increased the BI score. There are studies in line with our study, reporting body dissatisfaction was associated with the increased likelihood of impairment for certain aspects of health [24,25]. It is thought that personality characteristics related to body dissatisfaction, such as low self-esteem, depressive mood and perfectionism, may promote negative evaluation of physical health [26].

Interestingly we found that smoking increased the BI score. Although some local studies are in accordance with our results [27,28], it is widely accepted that smoking is associated with poor BI [29–32]. We believe that smoking may improve BI as a coping skill, however further research on this subject should be carried out.

In our study having good-very good health perception was a predictor in enhancing the QoL in physical, psychological and environmental domains. In the literature, it is well documented that several health problems, especially the chronic conditions are associated with a decreased QoL [33–35]. It is stated that subjective health parameters could be more significant factors of life satisfaction than objective ones [36]. Thus, it is not surprising that having a better health sense improves QoL.

We found that having higher income than expenses was a predictor in enhancing the QoL in psychological and environmental domains and having good-very good economical sense was a predictor in enhancing the QoL in environmental domain. Although there are studies in line with our study [37,38], the issue is inconclusive in the literature. For example, research by Kenny [39] and Stewart [40] reported that in middle-income countries and across several European countries, there was little proof of relationship between economic development and gross domestic product per capita and subjective well-being. The relation described in the present research is considered to be the result of richer individuals' having more access to social activities/services enhancing their social attendance and hence their QoL.

Our results demonstrated making regular exercises was a predictor in enhancing QoL only in the physical domain. Making exercises and physical activity have been shown to maintain good QoL in several studies [41,42]. There is a positive association between physical activity and perception of QoL, which varies according to the domains of QoL assessed [43]. Further studies should be encouraged to investigate the association between physical activity and exercise and the different domains of QoL.

We found that skipping meals during the day was reducing the QoL in psychological domain. Although there are numerous studies investigating the association between nutrition and QoL [44–46], we did not come across much evidence particularly regarding skipping meals. In a study from Mexico, however, low QoL was reported to be associated with skipping meals, which is in line with our results [47]. Since there is not sufficient evidence to discuss the association found in this study, we suggest further studies to be conducted.

In our study drinking alcohol was a predictor in enhancing QoL in the social domain. Some researches indicated a linear or inverse J-shaped relationship between QoL and alcohol use, in such a manner that at the greater levels of use of alcohol, which includes individuals diagnosed with alcohol use disorders, QoL is lower as compared to standard or low risk users and abstainers [48,49]. The association identified in the present study is thought to be due to the fact that alcohol consumption at a moderate level of may be positive in terms of stress relief and psychological health [50].

Another interesting result found in this study is that being married was reducing the QoL in environmental domain. In the literature considerable evidence points to the enjoyment of better health and QoL among married older adults relative to their non-married peers [51–53]. However, being in line with our study, there are studies reporting younger married people did not have better QoL than their non-married peers [54,55]. We believe that the negative impact of marriage on QoL is likely to be due to the younger sample in this study.

As a final result, this study demonstrated that having a good BI came out as a predictor enhancing the QoL in all sub-domains. In accordance with our study, Mond et al. reported higher levels of body dissatisfaction were associated with poorer QoL [5]. This finding is notable because interest in BI has principally focused on for more adverse outcomes, such as low self-esteem, depressive mood and eating disorders [56,57].

Conclusions

In conclusion, as distinct from all of the other parameters used to assess QoL, BI was found closely related with QoL in all sub-domains. Our findings suggest that greater attention should be to be given to BI as a strong predictor of QoL. We expect that the data collected in this study will serve as a base for other researchers to investigate BI from a different point of view.

Supporting Information

S1 File. Dataset.
(SAV)

S2 File. Questionnaire.
(DOC)

Author Contributions

Conceptualization: TN EU.

Data curation: MVY HD AÇ RAO.

Formal analysis: TN EU MVY HD AÇ.

Funding acquisition: TN EU MVY HD AÇ RAO.

Investigation: TN EU MVY HD AÇ RAO.

Methodology: TN EU.

Project administration: TN EU.

Resources: TN EU MVY HD AÇ RAO.

Software: TN EU MVY HD AÇ.

Supervision: TN EU.

Validation: TN EU MVY HD AÇ.

Visualization: MVY HD AÇ RAO.

Writing – original draft: TN EU RAO.

Writing – review & editing: TN EU RAO.

References

1. Aslan D. Beden algısı ile ilgili sorunların yaratabileceği beslenme sorunları. *STED*. 2004; 13(9): 326–329.
2. Alleva JM, Sheeran P, Webb TL, Martijn C, Miles E. A Meta-Analytic Review of Stand-Alone Interventions to Improve Body Image. *PLoS One*. 2015; 10(9):e0139177. doi: [10.1371/journal.pone.0139177](https://doi.org/10.1371/journal.pone.0139177) PMID: [26418470](https://pubmed.ncbi.nlm.nih.gov/26418470/)
3. Donaghue N. Body satisfaction, sexual self-schemas and subjective well-being in women. *Body Image*. 2010; 6:37–42.
4. Friedman KE, Reichmann SK, Costanzo PR, Musante GJ. Body image partially mediates the relationship between obesity and psychological distress. *Obes Res*. 2002; 10:33–41. PMID: [11786599](https://pubmed.ncbi.nlm.nih.gov/11786599/)
5. Mond J, Mitchison D, Latner J, Hay P, Owen C, Rodgers B. Quality of life impairment associated with body dissatisfaction in a general population sample of women. *BMC Public Health*. 2013; 13:920. doi: [10.1186/1471-2458-13-920](https://doi.org/10.1186/1471-2458-13-920) PMID: [24088248](https://pubmed.ncbi.nlm.nih.gov/24088248/)
6. World Health Organization (WHO). 1996. WHOQOL-BREF introduction, administration scoring and generic version of the assessment, Field Trial Version. Geneva: WHO, Programme on Mental Health. Available: http://www.who.int/mental_health/media/en/76.pdf. Accessed 2014 Sep 6.
7. World Health Organization (WHO). WHOQOL User Manual. Geneva: WHO, Programme on Mental Health; 1998.
8. Secord PF, Jourard SM. The appraisal of body-cathexis: bodycathexis and the self. *J Consult Psychol*. 1953; 17:343–347. PMID: [13109086](https://pubmed.ncbi.nlm.nih.gov/13109086/)
9. Hovardaoğlu S. Vücut Algısı Ölçeği. *Psikiyatri Psikoloji Psikofarmakoloji* 3P. 1993; 1(Supp 2): 26–27.
10. The WHOQOL Group. Development of the World Health Organization WHOQOL-BREF quality of life assessment. *The WHOQOL Group. Psychol Med*. 1998; 28(3): 551–8. PMID: [9626712](https://pubmed.ncbi.nlm.nih.gov/9626712/)
11. Eser E, Fidaner H, Fidaner C, Eser SY, Elbi H, Göker E. WHOQOL-Bref'in Psikometrik Özellikleri. *Psikiyatri Psikoloji Psikofarmakoloji* 3P. 1999; 7(2): 23–40.

12. Yalcin SE, Fidaner H, Fidaner C, Elbi H, Göker E. Yaşam Kalitesinin Ölçülmesi, WHOQOL-100 ve WHOQOL-BREF. *Psikiyatri, Psikoloji, Psikiyatri* 3P. 1999; 7(Supp 2): 5–13.
13. Bergström E, Stenlund D, Svedjehäll B. Assessment of body perception among Swedish adolescents and young adults. *J Adolesc Health*. 2000; 26:43–57.
14. Unterhalter G, Farrell S, Mohr C. Selective memory bias for words reflecting sex-specific body image concerns. *Eat Behav*. 2007; 8:382–389. PMID: [17606236](#)
15. Porto D, Azevedo B, Melo D, Christofaro D, Codogno J, Silva C, et al. Factors associated with self-assessment of body weight in women who work out at fitness centers. *Rev Bras Cineantropom Desempenho Hum*. 2015; 17(2):175–185.
16. Campbell A, Hausenblas HA. Effects of exercise interventions on body image: A meta-analysis. *J Health Psychol*. 2009; 14:780–793. doi: [10.1177/1359105309338977](#) PMID: [19687115](#)
17. Duijts SF, Faber MM, Oldenburg HS, Van Beurden M, Aaronson NK. Effectiveness of behavioral techniques and physical exercise on psychosocial functioning and health-related quality of life in breast cancer patients and survivors: A meta-analysis. *Psychooncology*. 2011; 20: 115–126. doi: [10.1002/pon.1728](#) PMID: [20336645](#)
18. Hall EE, Baird SA, Gilbert DN, Miller PC, Bixby WR. Viewing television shows containing ideal and neutral body image while exercising: Does type of body image content influence exercise performance and body image in women? *J Health Psychol*. 2011; 16: 938–946. doi: [10.1177/1359105310396394](#) PMID: [21441363](#)
19. Hardoy CM, Seruis LM, Floris F, Carta MG. Benefits of exercise with mini tennis in intellectual disabilities: Effects on body image and psychopathology. *Clin Pract Epidemiol Ment Health*. 2011; 7:157–160. doi: [10.2174/1745017901107010157](#) PMID: [22016751](#)
20. Appleton KM. 6 x 40 mins exercise improves body image, even though body weight and shape do not change. *J Health Psychol*. 2013; 18(1):110–20. doi: [10.1177/1359105311434756](#) PMID: [22322989](#)
21. Voelker DK, Reel JJ, Greenleaf C. Weight status and body image perceptions in adolescents: current perspectives. *Adolesc Health Med Ther*. 2015; 6:149–58. doi: [10.2147/AHMT.S68344](#) PMID: [26347007](#)
22. Silva DAS, Nahas MV, Sousa TF, Del Duca GF, Peres KG. Prevalence and associated factors with body image dissatisfaction among adults in southern Brazil: a population-based study. *Body Image*. 2011; 8:427–431. doi: [10.1016/j.bodyim.2011.05.009](#) PMID: [21768003](#)
23. Holmqvist K, Frisén A. Body dissatisfaction across cultures: findings and research problems. *Eur Eat Disord Rev*. 2010; 18:133–146. doi: [10.1002/erv.965](#) PMID: [19806598](#)
24. Meland E, Haugland S, Briedablik HJ. Body image and perceived health in adolescence. *Health Ed Res*. 2007; 22:342–350.
25. Muennig P, Jia H, Lee R, Lubetkin E. I think therefore I am: perceived ideal weight as a determinant of health. *Am J Public Health*. 2008; 98:501–506. doi: [10.2105/AJPH.2007.114769](#) PMID: [18235062](#)
26. Bardone AN, Vohs KD, Abramson LY, Heatherton TF, Joiner TE. The confluence of perfectionism, body dissatisfaction, and low self-esteem predicts bulimic symptoms: clinical implications. *Behav Ther*. 2000; 31:265–280.
27. Pınar R. Obezlerde Depresyon, Benlik Saygısı Ve Beden İmajı:Karşılaştırmalı Bir Çalışma, Cumhuriyet Hem Der. 2002; 6:30–41
28. Pular A, Üstün E, Karabulut EO. Üniversiteli Üst Düzey Futbolcuların Kendi Bedenlerini Algılama Düzeylerinin Sigara ve Alkol Kullanımlarına Göre İncelenmesi, Selçuk Üniversitesi Beden Eğitimi ve Spor Bilim Dergisi. 2010; 2:157–161
29. Clark MM, Croghan IT, Reading S, Schoroeder DR, Stoner SM, Patten CA, et al. The relationship of body image dissatisfaction to cigarette smoking in college students. *Body Image*. 2005; 2:263–70. PMID: [18089193](#)
30. Jaworowska A, Bazylak G. An outbreak of body weight dissatisfaction associated with self-perceived BMI and dieting among female pharmacy students. *Biomed Pharmacother*. 2009; 63:679–92. doi: [10.1016/j.biopha.2008.08.005](#) PMID: [19179040](#)
31. Chung H, Park Y, Lanza ST. Latent transition analysis with covariates: Pubertal timing and substance use behaviours in adolescent females. *Stat Med*. 2005; 24:2895–2910. PMID: [16134129](#)
32. White MA. Smoking for weight control and its associations with eating disorder symptomatology. *Compr Psychiatry*. 2012; 53(4):403–7. doi: [10.1016/j.comppsy.2011.05.007](#) PMID: [21741037](#)
33. Adeyemo TA, Ojewunmi OO, Diaku-Akinwumi IN, Ayinde OC, Akanmu AS. Health related quality of life and perception of stigmatisation in adolescents living with sickle cell disease in Nigeria: A cross sectional study. *Pediatr Blood Cancer*. 2015; 62(7):1245–51. doi: [10.1002/pbc.25503](#) PMID: [25810358](#)

34. Bodnár R, Kádár L, Szabó L, Hernádi M, Mikóczi M, Mészáros Á. Health Related Quality of Life of Children with Chronic Respiratory Conditions. *Adv Clin Exp Med*. 2015; 24(3):487–95. doi: [10.17219/acem/24991](https://doi.org/10.17219/acem/24991) PMID: [26467139](https://pubmed.ncbi.nlm.nih.gov/26467139/)
35. Kotsis K, Voulgari PV, Drosos AA, Carvalho AF, Hyphantis T. Health-related quality of life in patients with ankylosing spondylitis: a comprehensive review. *Expert Rev Pharmacoecon Outcomes Res*. 2014; 14(6):857–72. doi: [10.1586/14737167.2014.957679](https://doi.org/10.1586/14737167.2014.957679) PMID: [25193010](https://pubmed.ncbi.nlm.nih.gov/25193010/)
36. Ziólkowski A, Błachnio A, Paçhalska M. An evaluation of life satisfaction and health—Quality of life of senior citizens. *Ann Agric Environ Med*. 2015; 22(1):147–51. doi: [10.5604/12321966.1141385](https://doi.org/10.5604/12321966.1141385) PMID: [25780845](https://pubmed.ncbi.nlm.nih.gov/25780845/)
37. Schuler BR. Health Perceptions and Quality of Life among Low-Income Adults. *Health Soc Work*. 2015; 40(3):225–32. PMID: [26285362](https://pubmed.ncbi.nlm.nih.gov/26285362/)
38. Salehi A, Harris N, Sebar B, Coyne E. Self-perception of quality of life and its association with lifestyle behaviours of young Iranian women. *Iran J Public Health*. 2015; 44(3):332–40. PMID: [25905076](https://pubmed.ncbi.nlm.nih.gov/25905076/)
39. Kenny C. Does Development Make You Happy? Subjective Well-Being and Economic Growth in Developing Countries. *Soc Indic Res*. 2005; 73(2):199–219.
40. Stewart K. Dimensions of Well-Being in EU Regions: Do GDP and Unemployment Tell Us All We Need to Know? *Soc Indic Res*. 2005; 73(2): 221–46.
41. Mummery K, Schofield G, Caperchione C. Physical activity dose-response effects on mental health status in older adults. *Aust N Z J Public Health*. 2004; 28(2):188–92. PMID: [15233360](https://pubmed.ncbi.nlm.nih.gov/15233360/)
42. Okano Y, Hirawa N, Tochikubo O, Mizushima S, Fukuhara S, Kihara M, et al. Relationships between diurnal blood pressure variation, physical activity, and health-related QOL. *Clin Exp Hypertens*. 2004; 26(2):145–55. PMID: [15038625](https://pubmed.ncbi.nlm.nih.gov/15038625/)
43. Pucci GC, Rech CR, Fermio RC, Reis RS. Association between physical activity and quality of life in adults. *Rev Saude Publica*. 2012; 46(1):166–79. PMID: [22249758](https://pubmed.ncbi.nlm.nih.gov/22249758/)
44. Fereshtehnejad SM, Ghazi L, Shafieesabet M, Shahidi GA, Delbari A, Lökk J. Motor, psychiatric and fatigue features associated with nutritional status and its effects on quality of life in Parkinson's disease patients. *PLoS One*. 2014; 9(3):e91153. doi: [10.1371/journal.pone.0091153](https://doi.org/10.1371/journal.pone.0091153) PMID: [24608130](https://pubmed.ncbi.nlm.nih.gov/24608130/)
45. Sheard JM, Ash S, Mellick GD, Silburn PA, Kerr GK. Improved nutritional status is related to improved quality of life in Parkinson's disease. *BMC Neurol*. 2014; 14:212. doi: [10.1186/s12883-014-0212-1](https://doi.org/10.1186/s12883-014-0212-1) PMID: [25403709](https://pubmed.ncbi.nlm.nih.gov/25403709/)
46. Shoff SM, Tluczek A, Laxova A, Farrell PM, Lai HJ. Nutritional status is associated with health-related quality of life in children with cystic fibrosis aged 9–19 years. *J Cyst Fibros*. 2013; 12(6):746–53. doi: [10.1016/j.jcf.2013.01.006](https://doi.org/10.1016/j.jcf.2013.01.006) PMID: [23410621](https://pubmed.ncbi.nlm.nih.gov/23410621/)
47. Hidalgo-Rasmussen CA, Hidalgo-San Martín A, Rasmussen-Cruz B, Montaño-Espinoza R. Quality of life according to self-perceived weight, weight control behaviors, and gender among adolescent university students in Mexico. *Cad Saude Publica*. 2011; 27(1):67–77. PMID: [21340105](https://pubmed.ncbi.nlm.nih.gov/21340105/)
48. Saatcioglu O, Yapici A, Cakmak D. Quality of life, depression and anxiety in alcohol dependence. *Drug Alcohol Rev*. 2008; 27(1):83–90. PMID: [18034385](https://pubmed.ncbi.nlm.nih.gov/18034385/)
49. Van Dijk AP, Toet J, Verdurmen JE. The relationship between health-related quality of life and two measures of alcohol consumption. *J Stud Alcohol*. 2004; 65(2):241–249. PMID: [15151356](https://pubmed.ncbi.nlm.nih.gov/15151356/)
50. Kim K, Kim JS. The association between alcohol consumption patterns and health-related quality of life in a nationally representative sample of South Korean adults. *PLoS One*. 2015; 10(3):e0119245. doi: [10.1371/journal.pone.0119245](https://doi.org/10.1371/journal.pone.0119245) PMID: [25786249](https://pubmed.ncbi.nlm.nih.gov/25786249/)
51. Kim HK, McKenry PC. The relationship between marriage and psychological well-being: A longitudinal analysis. *J Soc Issues*. 2002; 23:885–911.
52. Pienta AM, Hayward MD, Jenkins KR. Health consequences of marriage for the retirement years. *J Fam Issues*. 2000; 21:559–586.
53. Umberson D, Liu H, Powers DA. Marital status, marital transitions, and body weight: Gender, race, and life course considerations. *J Health Soc Behav*. 2009; 50:327–343. PMID: [19711809](https://pubmed.ncbi.nlm.nih.gov/19711809/)
54. Han KT, Park EC, Kim JH, Kim SJ, Park S. Is marital status associated with quality of life? *Health Qual Life Outcomes*. 2014; 12:109. doi: [10.1186/s12955-014-0109-0](https://doi.org/10.1186/s12955-014-0109-0) PMID: [25104276](https://pubmed.ncbi.nlm.nih.gov/25104276/)
55. Tabolli S. Limited role of marital status in the impact of dermatological diseases on quality of life. *Eur J Dermatol*. 2012; 22:672–677. doi: [10.1684/ejd.2012.1822](https://doi.org/10.1684/ejd.2012.1822) PMID: [22947338](https://pubmed.ncbi.nlm.nih.gov/22947338/)
56. Neumark-Sztainer D, Paxton SJ, Hannan PJ, Haines J, Story M. Does body satisfaction matter? Five-year longitudinal associations between body satisfaction and health behaviors in adolescent females and males. *J Adolesc Health*. 2006; 39:244–251. PMID: [16857537](https://pubmed.ncbi.nlm.nih.gov/16857537/)
57. Stice E, Shaw HE. Role of body dissatisfaction in the onset and maintenance of eating pathology: a synthesis of research findings. *J Psychosom Res*. 2002; 53:985–993. PMID: [12445588](https://pubmed.ncbi.nlm.nih.gov/12445588/)