ORIGINAL RESEARCH

Mental health and sleep quality: are intuitive eating, hedonic hunger and diet quality, determinants? a cross-sectional study

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Abstract

Background

Intuitive eating may predict better psychological and behavioral health. Intuitive eating, hedonic hunger, and diet quality may affect individuals' mental health and sleep quality.

Methods

Descriptive cross-sectional study developed with an online questionnaire for randomly selected volunteers (n=351) aged 19-64 years. Hedonic hunger status was evaluated by Power of Food Scale (PFS), intuitive eating by Intuitive Eating Scale-2 (IES-2), mental health status by Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) and sleep quality by Pittsburgh Sleep Quality Index (PSQI). Food consumption records were taken to evaluate individuals' dietary quality, using Healthy Eating Index (HEI)-2015.

Results

It was found that 50.7% of the participants exhibited intuitive eating behavior, while 65.0% experienced hedonic hunger. When the diet quality was examined, it was found that 65.2% of the participants had poor diet quality, while 33.6% needed to improve their diet quality. Sleep quality and mental health status of individuals exhibiting intuitive eating behavior were significantly better ($p<0.05$). Diet quality was not associated with mental health, intuitive eating, hedonic hunger and sleep quality scores ($p>0.05$). While there was a weak negative correlation between intuitive eating and PSQI score ($r=-0.160$, $p<0.05$), while a positive correlation was found between hedonic hunger and PSQI score ($r=0.286$, $p<0.05$). Intuitive eating was associated with better sleep quality, as lower PSQI scores indicate better sleep quality. Intuitive eating was also associated with better mental health ($r=0.339$, $p<0.05$).

Conclusion

This study reveals that intuitive eating behavior is associated with better sleep quality and mental health, while hedonic hunger behavior is associated with poor sleep quality.

Keywords: diet quality, hedonic hunger, intuitive eating, mental health, sleep quality

Introduction

Intuitive eating is defined as an approach to eating that judges the amount and timing of food intake according to the body's hunger and satiety signals[1]. It has been suggested that nutritional approaches based on intuitive eating and mindful eating could be a solution in eliminating behavior problems related to eating[2]. Hedonic hunger (hedonic hyperphagia), refers to one's preoccupation with and irresistible desire to consume foods for the purposes of pleasure and in the absence of physical hunger. Intuitive eating, expressed by an individual's feeding in response to physiological hunger and satiety signals as opposed to emotional and environmental stimuli, is suggested to be related to the concept of hedonic hunger[3].

Unhealthy eating habits has been identified as a risk factor for mental health outcomes, such as disordered eating behaviors and depression. Dietary restriction reduces sensitivity to internal hunger cues and supports confidence in overeating, and a failed restricted dieting cyle leads to low self-esteem and depression. Taken together, adverse health consequences indicate the need for an alternative to dietary restriction[4]. Therefore, eating awareness may be a useful strategy to positively influence food intake for being healthy[5]. Intuitive eating which has received increased attention in the literature in recent years may be a promising alternative to dietary restriction[4].

The Mediterranean diet is low in saturated fat and animal protein, rich in antioxidants and fiber, and exhibits an high ratio of omega-3/omega-6 fatty acids. In addition, the diet also contains plant sterols and probiotics and therefore, it is thought to have positive impacts on health[6]. While, western style diet has been indicated to increase the risk of behavioral disorders such as depression and anxiety, Mediterranean diet has been suggested to decrease the risk of mental problems. Furthermore, there are opinions that the Mediterranean diet can moderate depressive symptoms such as major depression[7-9]. Mediterranean diet which reflects sustainable good diet quality may be a supportive factor for better mental health, as reduced depression has been associated with "healthy diet," contains healthy food choices such as fish, fruits, vegetables and whole grains[10].

Adequate and balanced nutrition and good quality sleep pattern were suggested to be the main determinants of physical and mental health. Poor sleep quality is associated

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with a number of health problems, especially obesity and mental diseases. Sleep restriction has been suggested to have negative effects on insulin sensitivity, insulin response and glucose tolerance. Furthermore, hunger-satiety pathways and food intake were affected in sleep deficiency[11]. Sleep quality has been suggested to be related to hedonic hunger and indirectly to intuitive eating behavior. In view of the above, we perceived that there was a gap in the literature. There are two follow-up studies focusing on the relationship between intuitive eating and improving mental health outcomes[12,13]. The possible effects of the intuitive eating approach on mental and behavioral health outcomes have not been examined in studies in the literature at a level to reach definitive conclusions[4]. Similarly, there are not enough studies in the literature examining intuitive eating and sleep quality. In particular, there seemed to be a need to assess the the relationship between intuitive eating, hedonic hunger, diet quality, mental health, and sleep quality. A holistic study is necessary to advance the understanding of how intuitive eating may be related to mental health and sleep. The purpose of the this study was to evaluate the relationship between intuitive eating, hedonic hunger, diet quality, mental health, and sleep quality, as a whole.

Methods

Participants and Recruitment

This descriptive, cross-sectional study was conducted between January 2021 and April 2021, by means of an online questionnaire to 351 volunteers between 19-64 years of age selected by random sampling method. When calculating for the minimum sample using Gpower (package 3.1.9.2), 84 volunteers were calculated for 80% power at a 95% confidence level. Google forms was used for the online survey and the survey was delivered to the participants via social media (Instagram, Facebook). All of the participants included in the study had read and approved the voluntary consent form. Individuals with a diagnosis of mental illness and sleep apnea, those with a history of cardiovascular disease, hypertension, diabetes, cancer, liver and kidney disease or other neurological disorders, on a special diet program, under the age of 19 and over the age of 64, pregnant and lactating individuals were not included in the study.

The participant recruitment flowchart according to criteria has been provided in Figure 1. The research protocol was approved by the Non-Interventional Clinical Research Ethics Committee of Istanbul Medipol University, with the approval number E-10840098-772.02-597 dated 08/01/2021. An online questionnaire was conducted in order to obtain information on sociodemographics and health status of the participants.

Evaluation of Intuitive Eating Status

The Turkish validated version of the Intuitive Eating Scale-2 (IES-2), comprising of 4 sub-components: unconditional permission to eat, eating for physical rather than emotional reasons, reliance on hunger and satiety cues and body-food choice congruence, was used to evaluate the intuitive eating status of individuals[14]. Intuitive eating behavior increased with the increase in total score obtained by the participants. Participants who scored below the median value did not exhibit intuitive eating behavior, and those who scored above the median and median value were evaluated to exhibit intuitive eating behavior[14,15].

Evaluation of Mental Health Status

The Warwick-Edinburgh Mental Well-Being scale (WEMWBS), used to evaluate mental health status of individuals, was developed by Tennant et al.[16] The Turkish validated version by Keldal 17 consisted of 14 test items (sub-components). The WEMWBS was scored by summing the responses to each of the 14 test items on a 1 to 5 Likert scale (1=none of the time to 5=all of the time). All questions were equally weighted. Scores could range from a minimum of 14 to a maximum of 70 points. Higher scores were associated with higher levels of mental well-being[17].

Evaluation of Hedonic Hunger Status

Power of Food Scale (PFS), used to determine the hedonic hunger status of individuals, was developed by Cappelleri et al.18 and validated in Turkish by Ulker et al.[19] The scale measured appetite for, rather than consumption of, palatable foods at three levels of food proximity (food availability, food presence, and food tasted). The Turkish version of scale presented on a 5-point Likert scale ranging from 1 (don't agree at all) to 5 (strongly agree). Final score was obtained by summing up the responses of all the items and dividing it by the total number of items. An average PFS score of 2.5 and above indicated the presence of hedonic hunger. A higher score indicated a greater responsiveness to the food environment[18].

Evaluation of Sleep Quality

The Turkish validated version of Pittsburgh Sleep Quality Index (PSQI)20 originally developed by Buysse et al.[21] was used to evaluate sleep quality of the participants. The scale comprised of seven components representing areas routinely assessed in clinical interviews of patients with sleep/wake complaints. The seven components, each scored between 0-3, were summed to yield a total PSQI score, having a range between 0-21; higher scores indicating worse sleep quality. A total PSQI score in the range of 0-4 was considered as "good sleep quality" whereas a score in the range of 5-21 was considered as "poor sleep quality"[22].

Evaluation of Diet Quality

Food consumption records for 3 consecutive days (including one weekend) taken retrospectively from participants were used to determine their diet quality. The food consumption status of the participants was questioned by the researcher by telephone. A computer aided Nutrition Program, (Nutrition Information System-BeBIS) was used to calculate the energy and nutrient intakes of the participants, based on the food consumption records. The diet quality of the participants was evaluated by applying the Healthy Eating Index-2015 (HEI-2015)[23]. As per the scale, a total score less than 51 was considered "poor diet quality", a score of 51-80 was considered "diet quality to be improved", and a score of 80 and above was considered as "good diet quality"[23].

Evaluation of Anthropometric Measurements

Participants' height was measured with a stadiometer, their bodyweight was measured with a digital health-care scale, and their waist and hip circumference was measured with an ergonomic circumference measuring tape by the researchers. Body mass index (BMI) was calculated with the formula (body weight (kg) / height (m)2) and the waist–hip and waist–height ratios were calculated. Waist circumference, BMI and waist–hip ratio were evaluated as risk factors according to the World Health Organization (WHO) criteria[24-25].

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Table 1: General characteristics and anthropometric measurements of participants

	Female (n=168)		Male (n=183)		Total (n=351)		χ2 /t/z	p
	n	%	n	%	n	%		
*Education level**								
Primary school graduate	4	2.31	13	7.3	17	4.85	6.518	0.089
Secondary school graduate	4	2.31	8	4.49	12	3.42		
High school grnduate	54	31.21	47	26.4	101	28.77		
University/postgraduate	111	64.16	110	61.8	221	62.96		
*Income level**								
Low	39	22.54	36	20.22	75	21.37	23.736	0.000
Middle	103	59.54	69	38.76	172	49		
High	31	17.92	73	41.01	104	29.63		
*Marital Status**								
Single	99	57.23	67	37.64	166	47.29	13.500	0.000
Married	74	42.77	111	62.36	185	52.71		
*Alcohol Consumption**	0	0.00	1	10.00	1	4.00		
Yes	9	5.2	22	12.36	31	8.83	5.582	0.018
No	164	94.8	156	87.64	320	91.17		
*Smoking**								
Yes	21	12.14	61	34.27	82	23.36	24.000	0.000
No	152	87.86	117	65.73	269	76.64		
Anthropometric Measurements								
*Body Mass Index**								
Underweight	10	5.8	-	-	10	2.8	34.280	0.000
Normal	87	50.3	49	27.5	136	38.8		
Overweight	55	31.8	92	51.7	147	41.9		
Obese	21	12.1	37	20.8	58	16.5		
x̄±SD **	24.86 ± 4.70		27.44 ± 4.25		26.19 + 4.69		-5.391	0.000
*Waist circumference**								
Low risk	93	55.4	60	35.1	153	45.1	15.541	0.000
Moderate risk	31	18.4	36	21.1	67	19.8		
High risk	44	26.2	75	43.8	119	35.1		
x̄±SD **	78.22 ± 16.43		99.81 ± 22.52		89.37 ± 21.98		-10.094	0.000
*Waist/hip ratio**								
Not at risk	123	73.7	28	16.4	151	44.7	112.148	0.000
At risk	44	26.3	143	83.6	187	55.3		
x̄±SD ***	0.80 ± 0.11		1.01 ± 0.22		0.91 ± 0.20		12.395	0.000
*Hip/height ratio**								
Not at risk	99	59.6	38	22.2	137	40.7	60.631	0.000
Increased risk	53	32.0	70	41.0	123	36.5		
High risk	14	8.4	63	36.8	77	22.8		
x̄±SD ***	0.48 ± 0.10		0.56 ± 0.13		0.52 ± 0.12		7.406	0.000

*Chi square test, ** Independent groups t-test, ***Mann Whitney U test, p<0.05

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Table 2: HEI-2015, PFS, IES-2 scores of participants

	Females (n=168)		Males (n=183)		Total (n=351)		χ2	p
	n	%	n	%	n	%		
HEI-2015 Categories*								
Poor	87	50.3	142	79.8	229	65.2		
Requires improvement	82	47.4	36	20.2	118	33.7	35.078	0.000
Good	4	2.3	0	0.0	4	1.1		
Intuitive Eating Behavior*								
Present	86	49.7	92	51.7	178	50.7	0.137	0.711
Absent	87	50.3	86	48.3	173	49.3		
PFS Category*								
Hedonic hunger present	116	67.1	112	62.9	228	65.0	0.658	0.417
Hedonic hunger absent	57	32.9	66	37.1	123	35.0		
	x̄±SD		x̄±SD		x̄±SD		t/z	p
HEI-2015 total score*	50.57 ± 13.96		42.56 ± 12.57		46.51 ± 13.85		5.649	0.000
Sub-component scores								
Total fruits**	2.32 ± 1.85		1.96 ± 1.72		2.14 ± 1.79		1.933	0.054
Whole fruits**	2.75 ± 2.14		2.22 ± 2.25		2.48 ± 2.21		2.245	0.025
Total vegetables**	3.42 ± 1.40		2.96 ± 1.39		3.19 ± 1.41		3.098	0.002
Greens and beans**	2.82 ± 1.79		2.49 ± 1.63		2.65 ± 1.72		1.753	0.081
Whole grains**	3.83 ± 4.34		1.80 ± 3.36		2.80 ± 4.00		4.875	0.000
Dairy**	4.76 ± 3.15		3.86 ± 2.26		4.30 ± 2.77		3.083	0.002
Total protein foods***	4.35 ± 1.38		4.34 ± 1.00		4.34 ± 1.20		-2.229	0.026
Sea food and plant proteins*	2.71 ± 2.22		2.47 ± 2.24		2.59 ± 2.23		0.980	0.328
Fatty acids*	3.42 ± 3.22		3.24 ± 3.09		3.33 ± 3.15		0.552	0.581
Refined grains*	6.51 ± 4.00		4.78 ± 3.92		5.63 ± 4.05		4.083	0.000
Sodium*	2.90 ± 3.48		1.67 ± 2.82		2.27 ± 3.22		3.624	0.000
Added sugars***	9.29 ± 1.89		9.01 ± 1.94		9.15 ± 1.92		-2.395	0.017
Saturated fats*	1.50 ± 2.49		1.76 ± 2.74		1.63 ± 2.62		-0.954	0.341
IES-2 total score	2.95 ± 0.61		2.93 ± 0.65		2.94 ± 0.63		0.228	0.820
Sub-component scores								
Unconditional permission to eat**	2.70 ± 0.52		2.78 ± 0.58		2.74 ± 0.55		-1.333	0.184
Eating for physical rather than emotional reasons**	2.58 ± 0.65		2.56 ± 0.66		2.57 ± 0.66		0.322	0.748
Reliance on hunger and satiety cues**	3.37 ± 1.11		3.35 ± 1.13		3.36 ± 1.12		0.198	0.843
Body-food choice congruence**	3.57 ± 1.08		3.40 ± 1.05		3.48 ± 1.07		1.472	0.142
PFS total score*	2.97 ± 1.04		2.88 ± 1.06		2.92 ± 1.05		0.789	0.431
Sub-component scores								
Food availability	2.73 ± 1.09		2.67 ± 1.07		2.70 ± 1.08		0.511	0.610
Food presence	3.11 ± 1.17		2.96 ± 1.18		3.03 ± 1.17		1.156	0.248
Food tasted	3.15 ± 1.10		3.07 ± 1.13		3.11 ± 1.11		0.660	0.510

*Chi square test, **Independent groups t-test, ***Mann Whitney U test, p<0.05. HEI-2015: Healthy Eating Index-2015, IES-2: Intuitive Eating Scale-2, PFS: Power of Food Scale

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Table III. Evaluation of WEMWBS and PSQI scores obtained by participants

	Females (n=168)		Males (n=183)		Total (n=351)		χ^2	p
	n	%	n	%	n	%		
PSQI Category*								
Good quality sleep	77	44.5	90	50.6	167	47.6	1.289	0.256
Poor quality sleep	96	55.5	88	49.4	184	52.4		
	x̄±SD		x̄±SD		x̄±SD		t	p
PSQI score*	4.57 ± 3.25		4.86 ± 3.10		5.16 ± 3.18		1.814	0.071
WEMWBS score*	49.42 ± 12.18		50.83 ± 11.12		50.13 ± 11.66		-1.128	0.260

*Chi square, **Independent groups t-test, p<0.05. PSQI: Pittsburgh Sleep Quality Index, WEMWBS: Warwick-Edinburgh Mental Well-Being Scale

The waist-height ratio, as an indicator of chronic disease risk, was calculated by dividing the waist circumference (cm) by the height (cm)[26]. A waist-to-height ratio of <0.5 was regarded as no cardiometabolic risk, 0.5 and 0.6 as an increased risk and 0.6 as a high risk[26].

Evaluation of Physical Activity

A validated short physical activity assessment tool was used to assess the physical activity levels of the participants. This assessment tool consists of 2 questions questioning the frequency of moderate and vigorous physical activities. If the total score calculated according to the answers to the two questions is in the range of 0-3 points, it is considered insufficient, and if it is ≥4 points, it is considered active enough[27].

Statistical Analysis of Data

IBM SPSS 23.0 software was used for statistical analysis of the findings obtained from the research. Quantitative variables were expressed as mean and standard deviation and min-max values, and categorical data were interpreted with frequency and percentage values. Paired comparisons independent groups t-test was used for statistical comparisons, Kruskal Wallis-H and ANOVA tests were used for multiple comparisons, and Mann-Whitney U test was used to compare two groups. Cross tables for frequency comparisons were analyzed using the Chi-square test. Spearman correlation was used to derive statistical correlations from continuous data. All analyzes were interpreted at the 95% confidence interval.

Results

The general characteristics and anthropometric measurements of the participants have been provided in Table I. Of the participants, 52.1% (n=183) were males and 47.9% (n=168) were females. It was found that 2.8% of the participants were underweight, 38.8% were normal, 41.9% were overweight and 16.5% were obese. BMI values of males (27.4 ± 4.25 kg/m2) were significantly higher (p<0.05) as compared to females (24.8±4.70 kg/m2). It was observed that the average physical activity score of the participants was 2.5± 2.47 and the majority (70.9%) were insufficiently active.

The scores obtained by the participants on hedonic hunger (PFS), intuitive eating behavior (IES-2) and diet quality (HEI-2015) have been provided in in Table II. It was observed that 50.7% of the participants exhibited intuitive eating and 65.0% hedonic hunger behavior. When evaluated in terms of diet quality, it was determined that the majority of the participants (65.2%) had poor, 33.7% required improvement and only 1.1% had good diet quality.

The scores obtained by participants on mental health status and sleep quality have been presented in Table III. The mean WEMWBS score of all participants was 50.1±11.66; females (49.4±12.18) and males (50.8±11.12). The mean PSQI score of the participants was 5.1±3.18 and only 47.6% of all participants were found to have a good sleep quality.

The correlation between participants' PFS, PSQI, BMI, WEMWBS, IES-2 and HEI-2015 scores have been provided in Table IV. There was a significant negative correlation between the IES-2 total score and PSQI, BMI and PFS scores (r=-0.160, r=-0.112, r=-0.190 respectively, p<0.05). On the other hand, a significant positive correlation was found between the IES-2 total score and the WEMWBS score (r=0.339, p<0.05). A positive correlation was found between PFS total, all sub-component scores and PSQI (r=0.286, r=0.258, r=0.273 and r=0.278 respectively, p<0.05). PFS total and sub-component (food availability, food presence) scores had a negative correlation with IES-2 score (r=-0.190, r=-0.168 and r=-0.269 respectively, p<0.05). In addition, food availability sub-component of PFS, had a negative correlation with WEMWBS score (r=-0.130, p<0.05). No significant correlation was found between HEI-2015 total score and PSQI, BMI, WEMWBS, IES-2 and PFS scores (p>0.05). When examined in terms of sub-components, a negative correlation between greens and beans and PFS score (r=-0.118, p=0.026), and a positive correlation between whole grains, dairy and PSQI score (r =0.151 and r=0.122 respectively, p<0.05) was noted. In addition, a negative correlation was also found between fatty acids and IES-2 score (r=-0.117, p<0.05).

The PFS, HEI-2015, WEMWBS and PSQI scores obtained by participants, according to the IES-2 categories have been given in Table V. It was observed that individuals with intuitive eating behaviors exhibited lesser hedonic hunger as compared those who did not (PFS score 1.4±0.50 and 1.2±0.44). Similarly, mental health status (WEMWBS score 53.2±9.7 and 47.0± 12.7) and sleep quality (PSQI score 4.6±2.83 and 5.6±3.44) was also found to be significantly better in individuals with intuitive eating behaviors (p<0.05).

PSQI scores of individuals who experienced hedonic hunger were found to be significantly higher compared to those who did not (5.6±3.22 and 4.3±2.96, p<0.05). WEMWBS, HEI-2015, IES-2 scores had no significant correlation with hedonic hunger (PFS) sub-components. Similarly, no significant difference was found between the HEI-2015 sub-component scores and WEMWBS, PSQI, PFS and IES-2 scores (not shown in the table).

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Table IV. Correlation between PFS, PSQI, BMI, WEMWBS, IES-2, HEI-2015 scores

	PSQI		BMI		IES-2		WEMWBS		HEI-2015		PFS	
	r	p	r	p	r	p	r	p	r	p		
PFS total score	0.286	0.000*	-0.022	0.679	-0.190	0.000*	-0.097	0.071	0.001	0.991	-	-
Sub-component scores												
Food availibility	0.258	0.000*	-0.029	0.587	-0.269	0.000*	-0.130	0.015	0.029	0.584	-	-
Food presence	0.273	0.000*	0.003	0.954	-0.168	0.002*	-0.101	0.058	0.008	0.877	-	-
Food tasted	0.278	0.000*	-0.031	0.556	-0.083	0.120	-0.036	0.501	-0.039	0.463	-	-
HEI-2015 total score	0.046	0.387	-0.065	0.226	0.050	0.353	-0.030	0.575	-	-	0.001	0.991
Sub-component scores												
Total fruits	-0.047	0.380	-0.013	0.811	0.035	0.515	0.043	0.417	-	-	0.099	0.063
Whole fruits	-0.033	0.541	-0.021	0.699	0.023	0.673	0.056	0.293	-	-	0.094	0.080
Total vegetables	-0.084	0.115	0.069	0.198	-0.026	0.625	-0.025	0.641	-	-	-0.117	0.029*
Greens and beans	-0.007	0.898	0.037	0.489	0.028	0.604	-0.034	0.522	-	-	-0.118	0.026*
Whole grains	0.151	0.005*	-0.076	0.155	0.016	0.771	-0.078	0.142	-	-	-0.042	0.432
Dairy	0.122	0.022*	-0.075	0.159	0.051	0.339	-0.101	0.058	-	-	-0.040	0.456
Total protein foods	-0.076	0.153	-0.082	0.124	-0.002	0.971	0.031	0.557	-	-	-0.038	0.481
Sea and plant proteins	-0.046	0.389	-0.079	0.138	0.088	0.100	-0.040	0.459	-	-	-0.015	0.786
Fatty acids	-0.024	0.653	0.095	0.074	-0.117	0.029*	0.032	0.555	-	-	0.076	0.155
Refined grains	-0.010	0.859	-0.029	0.592	0.097	0.069	-0.008	0.879	-	-	-0.042	0.430
Sodium	0.061	0.257	-0.146	0.006*	0.060	0.261	0.023	0.670	-	-	0.049	0.364
Added sugars	0.020	0.711	-0.146	0.006*	0.016	0.767	0.020	0.703	-	-	-0.058	0.280
Saturated fats	0.022	0.683	0.088	0.099	-0.068	0.206	0.008	0.883	-	-	0.064	0.228
IES-2 total score	-0.160	0.003*	-0.112	0.035*	-	-	0.339	0.000*	0.050	0.353	-0.190	0.000*
Sub-component scores												
Unconditional permission to eat	-0.037	0.485	-0.151	0.005*	-	-	0.197	0.000*	-0.017	0.754	0.004	0.934
Eating for physical rather than emotional reasons	-0.155	0.004*	-0.071	0.183	-	-	0.228	0.000*	0.023	0.664	-0.189	0.000*
Reliance on hunger and satiety	-0.166	0.002*	-0.066	0.216	-	-	0.309	0.000*	0.055	0.301	-0.224	0.000*
Body-food choice congruence	-0.086	0.110	-0.096	0.072	-	-	0.309	0.000*	0.088	0.100	-0.087	0.102

Spearman correlation test, *p<0.05. BMI: Body Mass Index, HEI-2015: Healthy Eating Index-2015, IES-2: Intuitive Eating Scale-2, PFS: Power of Food Scale, PSQI: Pittsburgh Sleep Quality Index, WEMWBS: Warwick-Edinburgh Mental Well-Being Scale

Table V. PFS, HEI-2015, WEMWBS, PSQI scores obtained according to IES-2 categories

	Intuitive Eating Behavior	Non-Intuitive Eating Behavior	t	p
	x̄± SD	x̄± SD		
PFS total score	1.43 ± 0.50	1.27 ± 0.44	3.319	0.001*
Sub-component scores				
Food availibility	2.35 ± 0.88	3.05 ± 1.15	-6.403	0.000*
Food presence	2.73 ± 1.00	3.34 ± 1.25	-5.014	0.000*
Food tasted	2.95 ± 1.00	3.27 ± 1.20	-2.656	0.008*
HEI-2015 total score*	46.40 ± 13.66	46.62 ± 14.08	-0.148	0.882
Sub-component scores				
Total fruits*	2.10 ± 1.82	2.18 ± 1.77	-0.437	0.662
Whole fruits*	2.42 ± 2.24	2.55 ± 2.18	-0.589	0.556
Total vegetables*	3.21 ± 1.36	3.17 ± 1.47	0.267	0.790
Greens and beans*	2.69 ± 1.69	2.62 ± 1.75	0.364	0.716
Whole grains*	2.69 ± 3.92	2.91 ± 4.09	-0.520	0.603
Dairy*	4.41 ± 2.87	4.20 ± 2.66	0.723	0.470
Total protein foods**	4.40 ± 1.14	4.28 ± 1.26	-0.774	0.439
Sea and plant proteins*	2.76 ± 2.25	2.40 ± 2.20	1.513	0.131
Fatty acids*	2.87 ± 3.02	3.80 ± 3.22	-2.814	0.005*
Refined grains*	5.89 ± 4.07	5.36 ± 4.02	1.224	0.222
Sodium*	2.43 ± 3.32	2.11 ± 3.11	0.939	0.348
Added sugars**	9.21 ± 1.87	9.08 ± 1.96	-0.734	0.463
Saturated fats*	1.33 ± 2.44	1.95 ± 2.77	-2.231	0.026*
WEMWBS score*	53.2 ± 9.70	47.0 ± 12.7	5.092	0.000*
PSQI score*	4.67 ± 2.83	5.66 ± 3.44	-2.939	0.004*

*Independent groups t-test, **Mann Whitney U test, p<0.05. HEI-2015: Healthy Eating Index-2015, PFS: Power of Food Scale, PSQI: Pittsburgh Sleep Quality Index, WEMWBS: Warwick-Edinburgh Mental Well-Being Scale

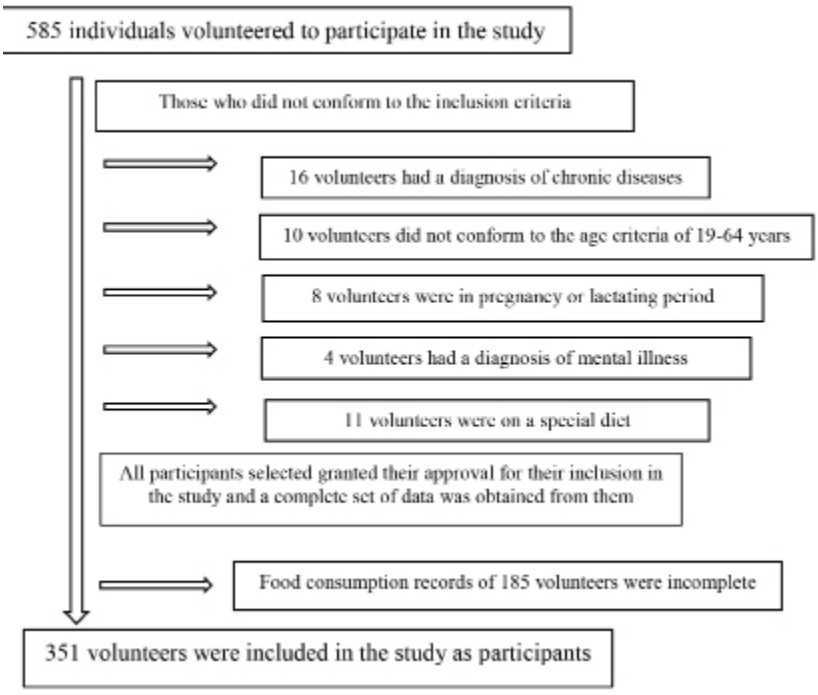

Figure I. Flowchart showing participant recruitment process

Discussion

Intuitive Eating and Mental Health

Intuitive eating approach is suggested to be strongly related to psychological health, and may be useful for mental health problems, including self-esteem, anxiety, and depression[28,29]. Intuitive eating can reduces depressive symptoms and has positive effects on physical health parameters[28,29]. In a study, higher intuitive eating scores in elderly women (n=200) were associated with lower body and eating anxiety and lesser depressive symptoms[30]. An eight-year follow-up study with 1491 individuals, having higher baseline and follow up intuitive eating score were associated with better self-esteem, lower depressive symptoms and body dissatisfaction[4]. In a meta-analysis (n=97), intuitive eating and eating pathology was negatively correlated with body image disorders and multi-indices of psychopathology (rs =-.23 and -.58) and positively associated with positive body image, self-esteem and well-being (rs = .20 vs .58)[31]. In a study investigating the effects of intuitive eating on physical and psychological outcomes in women with small children (n=419), intuitive eating was associated with lower depressive symptoms (β=- 0.183) and lower negative body image (β=-0.615)[32]. In this study, a positive and significant correlation (p= 0.000) found between the IES-2 total and sub-component scores with WEMWBS scores (Table IV) conforms to the findings above. WEMWBS scores of those who fed intuitively were significantly higher than those who did not. Intuitive eating can suppress hedonic hunger and prevent unhealthy eating behaviors. Intuitive eating may have a mental health-supporting role, as unhealthy eating habits are a contributing factor to behavioral health problems, including depression and eating disorders. Intuitive eating may be a helpful strategy for a healthy body, positively influencing food intake. However, more studies are required in order to reach a clear conclusion regarding intuitive eating and mental health.

Intuitive Eating and Sleep Quality

It has been suggested that intuitive eating is a mediator of sleep patterns. Leptin levels decrease and ghrelin levels increase with shortening of sleeping period. Therefore, intuitive eating and sleep quality may be related through hunger and satiety signals trigerred by these hormones[33]. Moreover, adequate and balanced nutrient intake is associated with good sleep quality and intuitive eating responding to body's requirements for optimal nourishment, highlights its effect on sleep quality. In this study, the individuals who fed intuitively was found to be have a better sleep quality than those who did not (p<0.05). Moreover, a negative correlation was found between PSQI score and IES-2 total score and two of its sub-components, (eating for physical rather than emotional reasons & eating based on hunger and satiety signals) (r=-0.160, r=-0.155 and r=-0.166 respectively, p<0.05) stressing on the effect of

intuitive eating on sleep quality. There is no study developed to enlighten this issue in the literature. This issue needs to be investigated in depth. Intuitive eating may be associated with better sleep quality by choosing healthy foods, as poorer self-assessed ability to recover and sleep problems were linked to more frequently choosing unhealthy foods[34].

Diet Quality and Intuitive Eating

Intuitively fed individuals have tendencies to prefer foods that support health and it is presumed that such approaches would affect diet quality[35]. Strategies that focus on well-being and minimize emotional eating may be associated with higher diet quality in general. In a recent study with 307 individuals, the IES-2 total score was positively associated with higher diet quality[36]. However, in another recent systematic review including 13 randomized studies of mindful and intuitive eating interventions, no significant difference was found between the groups in terms of energy intake and diet quality[37]. In another study examining the intuitive nutritional status and diet quality of 758 university students, no significant correlation was found between the IES-2 total score and diet quality[38]. Similarly, in this study, no significant relation was found between IES-2 (total and sub-component) scores and HEI-2015 sub-component scores ($p>0.05$). Contrary to this study, there are different perspectives. One of these perspectives is that intuitive eating promotes body harmony, which in turn helps improve diet quality due to increased awareness of physiological cues. Also, reducing emotional/binge eating may improve diet quality[39]. It is not possible to make a clear judgment as the results of the literature studies contradict each other.

Hedonic Hunger and Sleep Quality

Body's homeostatic system regulates energy metabolism by coordinating hunger and satiety by means of hormones as leptin, ghrelin and insulin. On the other hand, short sleep duration may lead to increases in food intake by disrupting the homeostatic system, causing changes in leptin and ghrelin release and activating the hedonic hunger behavior[40]. In sleep deprivation, there is a faster transition from carbohydrates to fats as energy store for easy access. Sleep deprivation has been associated with hunger pathways, increased appetite, food intake, certain inflammatory markers and chronic diseases[11]. In a recent cross-sectional study on 1144 individuals, an inverse relationship was found between increased hedonic hunger and sleep quality as well as ideal sleep duration. Therefore it may be suggested that, increasing sleep duration and quality may help prevent hedonic hunger and weight gain[41]. Vidafar et al.[42] examined the relationship between sleep and hedonic hunger in 63 individuals and reported that poor sleep quality and shorter sleep duration were associated with a higher urge to eat delicious foods (greater hedonic urge). Supporting the above findings, in this study, sleep quality of individuals exhibiting hedonic hunger was found to be significantly lower than those who did not ($p<0.05$). Furthermore, a positive correlation was found between the total PFS and sub-component scores with PSQI scores ($p<0.05$).

Hedonic Hunger and Mental Health

Hedonic hunger is a process associated with the activation of the neuronal reward system in response to any food that produces a pleasurable sensation, leading to unhealthy food selection[43,44]. The ghrelinergic system has been suggested to mediate hedonic rewarding and motivational aspects via the mesolimbic dopaminergic circuit. A connection between ghrelin and affective disorders such as depression and anxiety, has been suggested[45]. Neuroimaging data confirm a decreased perfusion in reward, motivation, and appetite regions in the brain, are associated with depressive symptoms[46,47]. Furthermore, positive and negative moods are reported to precede the desire for food intake[48]. In a recent observational cohort study in 373 pregnant females, severe stress and depressive symptoms during pregnancy and postpartum were associated with increased hedonic hunger ($\beta \pm SE = 1.17 \pm 0.57$, $p = 0.01$ and 1.71 ± 0.76 respectively, $p<0.05$).49 In this study, a negative non-significant relationship was found between hedonic hunger total score and mental health score. In addition, a negative significant relationship was found between a sub-component of hedonic hunger (food availability) and mental health ($r=-0.130$, $p<0.05$). Binge eating behaviors are an important risk factor for mental health. Hedonic hunger may negatively affect mental health because hedonistic behaviors causes overeating.

Diet Quality and Mental Health

A poor diet quality is a risk factor for common mental disorders, while optimal nutrition is critical to well-being and a healthy lifespan[50]. Reduced depression was associated with increased intake of "healthy diet," defined as a diet high in fruits, vegetables, fish, and whole grains[10]. In a study conducted on 4249 students, individuals having a healthy diet pattern were found to have lesser emotional stress and a better emotional health as compared to others ($p<0.001$)[51]. Another study reported a positive correlation between adherence to a Mediterranean style diet and reduced risk of depression[52]. Individuals with high levels of stress and/or severe neuroticism may be more prone to unhealthy eating habits. Another study reported that general diet quality did not cause high stress levels or mediate neurotic processes leading to depression/anxiety pathways[53]. In this study, no significant relationship was found between diet quality and mental health ($p>0.05$). This study has some limitations as it does not provide an opportunity to evaluate the direct impact of diet quality on mental health. Since determining the mental health and diet quality of individuals depends on their memory level and perception, the direct effect of diet quality on mental health cannot be evaluated. Evaluation of mental health and sleep quality with a scale is one of the limitations of this study. Since the evaluation of mental health by clinicians is a more reliable method, it would be useful for future studies to focus on this issue.

Diet and Sleep Quality

It has been suggested that sleep deprivation may change dietary choices and adequate sleep may be positively related to healthy lifestyle behaviors such as adopting a healthy diet pattern. Individuals who sleep less are more likely to consume high-energy foods, consume lower amounts of vegetables and fruits, have higher energy intakes from fat and processed grains, and have more irregular meals than those who sleep normally[54]. The serotonin and melatonin synthesis pathways play a significant role in modulating the effects of eating/food on sleep. On the other hand, ingested food is known to induce local secretion of many intestinal peptides (especially cholecystokinin) known to mediate sleep. Bioactive peptides or the non-protein nitrogen fraction of the diet can promote sleep[54]. A systematic review investigating 29 studies, reported that healthy food consumption was

associated with better sleep quality, while higher intake of processed and sugar added foods were associated with poor sleep characteristics[55]. In another study investigating the relationship between diet pattern and sleep quality in 495 female participants, poor sleep quality was associated with higher energy intake and low quality diet[56]. Similarly, in a cross-sectional study evaluating 1548 participants, a high-quality diet was significantly associated with good sleep quality[57]. In this study, however, no significant relationship was found between diet and sleep quality. This may be due to the fact that the majority of the participants had poor diet quality (65.2%) and the rest needed improvement. Since the percentage of participants with good diet quality (1.1%) was very low, a correlation between the two could not be formed.

Conclusion

According to the results of the study, the mental health status and sleep quality of those who fed intuitively were significantly better than those who did not. Intuitive eating was associated with good sleep quality, mental health, and low body mass index, while hedonic hunger status was associated with poor sleep quality. There are no studies that fully evaluate the relationship between intuitive eating, hedonic hunger, diet quality, mental health, and sleep quality. It is thought that this study will contribute to the literature as it provides an opportunity for holistic evaluation of these factors and may be an useful guidance for further studies conducted in this direction. The sample of the study may not be large enough and this may be a limitation. However, there is a need for comprehensive studies with larger samples and detailed investigation on the concepts of intuitive eating and hedonic hunger. Nevertheless, the authors recommended that clinicians take proactive role in raising awareness among individuals for adopting intuitive eating behavior and control their responsiveness to food environment, not only for mental health and sleep quality but also for a healthy lifestyle that would eventually have positive impact on general health of the society and decreased health care expenditures.

Disclosure statement

There is no potential conflict of interest declared by the authors.

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