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Identifying the Relationship of Food Addiction, Impulsiveness and Loneliness with Different Variables in University Students

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ABSTRACT

The term food addiction is rapidly attracting interests of psychologists as the evidence of the similarities between substance and food dependency has been increasing. It is important to find out what is associated with food addiction as it may lead to serious health conditions that can threaten people's lives. In this study, food addiction was examined to see if there is a significant relationship between impulsivity and loneliness. Total of 376 (216 male and 160 female) university students participated in Northern Cyprus. Turkish version of Yale Food Addiction Scale, Turkish version of UCLA Loneliness Scale and Turkish version of Barratt Impulsiveness Scale was used. It was found that there was a significant relationship between food addiction and impulsivity, as well as food addiction and loneliness.

Keywords: food addiction, impulsiveness, loneliness, university students

INTRODUCTION

Food, is crucially important for the human survival. In order to increase the quality of life, humans need to take good care of their eating and sleeping habits. Diet plays an important role in peoples' physical and mental health. Jacka, Kremer, Berk, Silva-Sanigorski, Moodie, Leslie, Pasco and Swinburn (2011) wrote that "Improving the quality of diet improves mental health in adolescents whereas; reducing the quality of diet is associated with declines in psychological functioning". Unless regular eating habits taken seriously, some psychological or physiological problems may appear, such as eating disorders and/or addiction. In DSM V, addiction is referred as substance dependence (American Psychiatric Association, 2013). In order to be clinically diagnosed with substance dependence, three or more of the eleven criteria has to be met along with significant impairment or distress occurring at any time in the same 12-month period. Some of them are tolerance, withdrawal symptoms, cravings, taking the substance in larger amounts or over a longer period than was intended, desiring or making unsuccessful trials to reduce or control substance use and continuing to use the substance despite physical or psychological issues The similarity between food addiction and substance dependency are noticeable.

The term food addiction was first introduced by Theron Randolph in 1956, however the publication about this concept has not started until 2009 (Meule & Gearhardt, 2014). Although the term food addiction created controversy in the scientific community, the evidence of being addicted to food has been increasing over decades. Food addiction hypothesis suggests that a person can be addicted to certain types of foods that are rich in sugar, salt, fat and the person displays addiction-like symptoms in respond to some food (Corsica & Pelchat, 2010). Food addiction and substance dependency both act on dopamine which makes it arguable to say that people want to self-medicate because of hypothetical reward deficiency as a result of decrease in basal dopamine levels due to elevated substance use or food consumption (Smith & Robins, 2013). Similarly, both food addiction and substance dependency activate the same brain regions as well as the same neuroal circuits. (Smith & Robins, 2013). Kim (2014) found that excessive food consumption might activate neural adaptation in reward circuitry, similar to drug and alcohol dependency.

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Contribution of this paper to the literature

- In the literature review, no such research was found on university students in North Cyprus. In this context, the results of this current research provide some clues for therapists and researchers about food addiction. This research also sheds light on future researches on food addiction.

In 2009, Yale Food Addiction Scale (YFAS) was designed by Gearhardt, Corbin and Brownell. This scale was developed to determine if the diagnostic criteria of substance dependency can be applied for certain foods. Davis, Zai, Levitan, Kaplan, Carter, Reid-Westoby and Kennedy (2011) conducted a research using YFAS with obese sample between the age of 25 to 45. One of the purposes of the study was to investigate the validation of YFAS to distinguish the ones with addictive weakness to food. The results showed that those who were addicted to food scored higher scores in binge eating, impulsivity and addictive personality traits and higher food cravings than controls.

Impulsivity is an important trait to focus on in terms of addiction. In the literature, impulsivity appears that it has taken a lot of attention for the researches due to its connection with many psychological problems. Therefore, it is defensible to consider the relationship between food addiction and impulsivity. In a simplest way, impulsivity is inability to prevent responses in spite of their negative consequences (Bakhshani, 2014). Due to the disagreements of the definition of impulsivity there are several different perspectives to this term. Barrat (1994) acclaimed three dimensions for impulsivity; (i) motor, such as acting without decent thinking, (ii) cognitive, such as, making rushed decisions, (iii) non-planning factors. One of the other distinguishing factors for impulsivity are (i) motor activation, (ii) inattentiveness and (iii) non-planning according to Patton, Stanford, and Barratt (1995). Furnham (2015) stated that "Impulsive people are not sensitive to punishment cues and very sensitive to reward cues". In other words, impulsivity can be defined as behaving without decent thinking, acting without planning and/or ignoring possible unpleasant outcomes, for instant pleasant outcome.

Chamorro et al. (2012) conducted a research aimed to find the prevalence of impulsivity in the general population. It was found that out of 653 US participants, 17% of the sample scored high impulsivity. The results revealed that men were more impulsive compared to the women. A strong relationship was found between impulsivity and drug dependence along with other. There is plenty of evidence of impulsivity and addiction has a relationship. Velazquez-Sanchez et al. (2014) conducted a study in order to find out if high trait impulsivity predicts addiction-like behavior in rats. High impulsive rats was compared with low impulsive rats and high impulsive rats shown some addiction-like behaviors such as excessive intake of food, increased motivation for food and compulsive-like eating. Another study was conducted by Muele, Zwaan, and Muller (2017) with 132 obese patients presenting for bariatric (stomach reduction) surgery. It was found that almost half of them (63 patients) met the criteria for food addiction and higher level of attentional impulsivity was linked with higher chance of diagnosing with food addiction than women without binge eating disorder. All three studies found the same results that; high impulsivity predicts food addiction.

Vander-Broek-Stice et al. (2017) conducted a study on 181 participants (32% were obese) to assess the relationship between impulsivity and food addiction. It was found that two aspects of impulsivity in the UPPS-P Impulsiveness Behavior Scale [(a) a composite of Positive and Negative Urgency, reflecting proneness to act impulsively during intense mood states, and (b) steep discounting of delayed rewards] significantly associated with food addiction. Research conducted by Pedram et al. (2013) to study the prevalence of food addiction and define the relationship between food addiction and obesity. The results of the study revealed that food addiction increases the body weight and the severity of obesity from normal to obese individuals in the general population. The study also found women had higher rate of food addiction as compared to men. Additionally, research explored how food addiction and impulsivity relate to body mass index.

Furthermore, some of the studies focused on relationship between impulsivity and relapse rate of a substance and concluded that the higher impulsivity score participant's take, the more likely that the person will relapse to the substance. Trifilieff & Martinez (2014) stated that "Impulsivity predicts the acceleration of drug consume, and boosts the vulnerability to relapse after the absence of the substance".

Another factor that might have a connection with food addiction is loneliness. Cacioppo et al. (2015) defined loneliness as "the difference between the person's ideal social relationships and the actual social relationships that the person has leads to feelings of being lonely and isolated regardless of being around their closest". Loneliness has two dimensions; emotional loneliness and social loneliness. Feelings of lack of relations with the closest ones such as parents, spouse or children is called emotional loneliness whereas, feelings of lack of relations with the friends and neighbors is referred as social loneliness (Ayhan & Simsek, 2012). Although loneliness is not a mental health problem alone, it might lead to one of them.

Victor and Yang (2012) conducted a research in order to find out the prevalence of loneliness in the UK and the relationship between loneliness and some risk factors. The results showed that people who are younger than 25

and older than 65 had the highest scores of loneliness with higher women than men. Depression was strongly linked with loneliness at all age groups. Poor physical health was related with loneliness with all age groups except people who are older than 65.

The research in the literature revealed the relationship between loneliness and eating habits. Such as, Levine (2012) wrote that "loneliness directly increases binge eating and binge eating might lead to obesity". So, it is safe to say that loneliness indirectly increases the chances of being obese. As mentioned, loneliness is different than social isolation as a matter of fact it can be more dangerous than it. According to Winch (2016) "people who feel lonely reported more depressive symptoms than people who are socially isolated". The more you are depressed the more chance of being addicted to food. Previous research conducted by Şanlier, Türközü, and Toka (2016) on a total of 793 university students, aimed to find the relationship between body image, depression and food addiction. It was found that there was a positive correlation between food addiction and depression scores as well as food addiction and body mass index (BMI measures body fat depending on height and weight). Additionally, Zeeck et al. (2010) found out that, feelings of loneliness, disgust, extreme fatigue and shame lead to binge eating behavior. Southward et al. (2014) conducted a study in order to find if loneliness mediates the relationship between emotion dysregulation and bulimia nervosa/binge eating. 107 women with bulimia nervosa or binge eating disorder participated and were investigated using UCLA Loneliness Scale and Difficulties in Emotion Dysregulation Scale. It was found that loneliness mediated emotional dysregulation with bulimia nervosa/binge eating whereas; emotional dysregulation did not mediate loneliness and bulimia nervosa/binge eating. Therefore, emotional aspect of the eating disorders can be treated if loneliness is targeted. To sum up, there is a positive correlation between loneliness and unhealthy eating habits so, literature showed that as loneliness increases, unhealthy eating habits such as food addiction and bulimia nervosa/binge eating disorder increase.

Jaremka et al. (2015) looked at the relationship between loneliness and hunger. A double blind randomized crossover study conducted with 44 women in order to find out if loneliness predicts postprandial ghrelin and hunger in females. It was found that women who scored higher in loneliness had larger postprandial ghrelin (an important appetite-regulation hormone) and was hungrier compared with women who scored lower in loneliness. This means that loneliness may cause to weight gain and other weight-related health conditions. Rotenberg et al. (2017) conducted a study in order to find out relation between obesity and social withdrawal syndrome with 135 university students. It was found that obese students showed low emotional trust, low disclosure and high loneliness. This means that high loneliness can be a predictor of obesity.

It was shown that there is a relationship between food addiction, loneliness and impulsivity in the literature. It is important to examine these relationships with different variables in depth in order to find solutions for food addiction which can lead to other serious health problems. Nowadays, these problems are increasing rapidly and precautions need to be made with the help of the results of these studies. The goal of this study was to see if there is a relationship between food addiction, impulsivity and loneliness. First objective was to determine the relationship between loneliness and food addiction. Second objective was to analyze the relationship between impulsivity and food addiction. Last objective was to explore the difference in some variables.

The aim of the research was to identify the relationship between food addiction, loneliness and impulsivity on university students. Firstly, it is expected that the participants with food addiction will score higher points in loneliness than participants without food addiction. Secondly, it is expected that the participants with food addiction will score higher points in impulsivity than participants without food addiction. Thirdly, it is expected that the people who score higher scores in impulsivity and loneliness will have a higher score of BMI than participants who scored lower in impulsivity and loneliness. Lastly, it is expected that there is a significant difference between some variables (BMI, sex, snack frequency, cigarette and alcohol use, exercise) and impulsivity and loneliness.

METHODS

Design

The quantitative research design was used to gather the necessary data required for the study. The quantitative data were collected through survey method. It was a between subject design. Food addiction, impulsivity and loneliness were dependent variable whereas, sex, BMI, regular eating, snack frequency, cigarette use, alcohol use and exercise were independent variables.

Participants

The study was conducted to undergraduate students of University of Kyrenia located in Northern Cyprus. Total of 376 students who participated (N=40), 216 of the participants were male, while 160 of the participants were female with the mean age of 20.31 (M=20.31).

Materials

Various instruments are used in order to investigate the relationship between given variables. Firstly, demographic information sheet was given to the students. As seen below, both Turkish and English versions of the scales are given. For the research Turkish forms were used in order to eliminate cultural differences and language barriers and increase reliability and validity of the study. Turkish form of Yale Food Addiction Scale was used in order to measure participants' food dependency level. Turkish version of Yale Food Addiction Scale is a 27-item questionnaire. The scale's Turkish version was examined to check validity and reliability by Sevincer et al. (2015). Six factors from Turkish YFAS were extracted by factor analysis. This explains the total variance which was 67.51%. Internal consistency, and Cronbach's alpha was found 0.859. Item total correlation coefficients of scale ranged from 0.214-0.666.

Turkish form of Barratt's Impulsiveness Scale was used in order to measure participants' impulsivity. Turkish version of Barratt's Impulsiveness Scale is a 30-item with four point ratings. Psychometric properties of Turkish version of Barratt's Impulsiveness Scale was investigated by Gulec et al. (2008). Cronbach's alphas for internal consistency was found 0.78 and 0.81 and two-month test-retest reliability was found 0.83.

Lastly, Turkish version of UCLA Loneliness Scale was used in order to measure participant's loneliness. Turkish version of UCLA Loneliness Scale is a 20-item 4 questionnaire with four point ratings. Questions number 1, 4, 5, 6, 8, 10, 15, 16 and 20 are scored reversed. The maximum score is 80, where minimum is 20. A study was done by Dogan, Cotok, and Tekin (2011) to check the reliability and validity of the Turkish version of UCLA Loneliness scale. It was found that Cronbach alpha for the internal consistency was 0.72.

Also, demographic information sheet includes series of questions about personal information. This collected information were sex, height and weight (for bmi), as well as questions about students' eating, drinking alcohol, smoking and exercising habits.

Procedure

The study was conducted in Northern Cyprus in one of the classrooms of the University of Kyrenia. The duration of finding enough samples in order to represent the population was approximately 2 months. Participants were randomly selected by asking the students if are willing to participate. The students who did want to participate are asked to stay in the class after the lecture. First, informed consent was given to the participants in order to take their permission written. On the top right corner, there was a number which was for identifying the participant in case of withdrawal. Participants were asked to remember that number. Then, demographic information sheet was given to participants and the participants were asked to fill in the paper. Then, the three scales; Turkish version of Yale Food Addiction Scale, Turkish version of UCLA Loneliness scale and Turkish version of UPPS-P Impulsive Behavior Scale were given to the students and the participants were asked to give the closest answer to the questions. The participants needed only half an hour to finish answering questions. Lastly, debrieving form was given to the participants in order to explain the risks and the benefits of the study. After collecting the information from the students, the data were analyzed using (SPSS).

Data Analysis

The data were analyzed through several techniques using the computer software called SPSS version 23. These techniques were descriptive statistics (frequency, mean, standard deviation), multiple linear regression, Pearson's correlation coefficient and one-way ANOVA (analysis of variance).

RESULTS

Descriptive statistics, Pearson's correlation, Multiple regression correlation and ANOVA results are given in **Table 1**.

A Pearson product-moment correlation was run to determine the relationship between food addiction (FA), loneliness (LO), total impulsivity (TI), not planning impulsivity (NPI), motor impulsivity (MI), attention impulsivity (AI) and body mass index (BMI). There was a strong, positive correlation FA and LO (r= .411, p= .001),

Table 1. Pearson product-moment correlation results for relationship between food addiction (FA), loneliness (LO), total impulsivity (TI), not planning impulsivity (NPI), motor impulsivity (MI), attention impulsivity (AI) and body mass index (BMI) scores

	1	2	3	4	5	6	7
1 - BMI	1.00						
2 - ATTENTION IMPULSIVITY	0.16**	1.00					
3 - MOTOR IMPULSIVITY	0.171**	0.712**	1.00				
4 - NOT PLANNING	0.255**	0.620**	0.490**	1.00			
5 - TOTAL IMPULSIVITY	0.250**	0.915**	0.856**	0.790**	1.00		
6 - LONELINESS	0.23**	0.655**	0.603**	0.460**	0.662**	1.00	
7 – FOOD ADDICTION	0.423**	0.364**	0.589**	0.345**	0.505**	0.411**	1.00

Table 2. Multiple Regression results for prediction of Food Addiction

Variable	B	Standart Error$_B$	β	T	p	Zero Order r	Partial R
Constant	1.175	0.466		2.522	0.012		
BMI	0.69	0.017	0.169	3.961	0.000	0.223	0.202
AI	0.54	0.063	0.160	0.847	0.397	0.348	0.044
MI	0.378	0.060	1.023	6.286	0.000	0.624	0.311
NPI	0.044	0.056	0.108	0.780	0.436	0.205	0.041
TI	-0.091	0.053	-0.674	-1.170	0.090	0.456	-0.088
LI	-0.005	0.009	-0.030	-0.545	0.586	0.334	-0.028

$R = 0.661$ $R^2 = 0.437$

$F_{(6\ 369)} = 47.734$ $p = 0.000$

Table 3. One Way Anova result of body mass index, attention impulsivity, motor impulsivity, not planning impulsivity, total impulsivity, loneliness and food addiction by gender

		Sum of Squares	df	Mean Square	F	Sig.
BMI	Between Groups	538.550	1	538.550	56.742	.000
	Within Groups	3549.738	374	9.491		
	Total	4088.288	375			
ATTENTION IMPULSIVITY	Between Groups	382.096	1	382.096	25.187	.000
	Within Groups	5673.733	374	15.170		
	Total	6055.830	375			
MOTOR IMPULSIVITY	Between Groups	926.019	1	926.019	85.278	.000
	Within Groups	4061.215	374	10.859		
	Total	4987.234	375			
NOT PLANNING	Between Groups	531.065	1	531.065	54.706	.000
	Within Groups	3630.637	374	9.708		
	Total	4161.702	375			
TOTAL IMPULSIVITY	Between Groups	6354.641	1	6354.641	76.743	.000
	Within Groups	30968.593	374	82.804		
	Total	37323.234	375			
LONELINESS	Between Groups	2070.597	1	2070.597	37.453	.000
	Within Groups	20676.637	374	55.285		
	Total	22747.234	375			
FOOD ADDICTION	Between Groups	68.156	1	68.156	41.696	.000
	Within Groups	611.333	374	1.635		
	Total	679.489	375			

FA and TI (r= .662, p= .001), FA and NPI (r= .790, p= .001), FA and MI (r= .589, p= .001), FA and AI (r= .364, p= .001) and FA and BMI (r= .423, p= .001).

A multiple linear regression was calculated to predict FA based on their LI; TI, NPI, MI, AI and BMI scores. A significant regression equation was found ($F_{(6\ 369)} = 47.734$, $p < 0.000$), with an R^2 of .437. Participants' food addiction is equal to 1.175 + 0.069 BMI + 0.54 AI+ 0.378MI + 0.44 NPI – 0.91 TI -0.005 LI. Participants'food addiction increased 0.069 unit for each unit of BMI and 0.378 unit for each unit of MI. Both BMI and MI were significant predictors of FA, the rest of the cariables are not significant predictors of FA.

An analysis of variance showed that there are significant difference of participants' BMI scores by gender ($F_{(1\ 374)}$=56.742, p<.05). The BMI scores of male participants' (M= 23.66, SD=3.15) is significantly higher than BMI scores of female participants' (M= 21.24, SD= 2.97). There was a statistically significant difference between AI scores by gender as determined by one-way ANOVA ($F_{(1\ 374)} = 25.187$, p<.05). This means AI scores of male participants'

Table 4. One Way Anova result of body mass index, attention impulsivity, motor impulsivity, not planning impulsivity, total impulsivity, loneliness and food addiction by food addiction

		Sum of Squares	df	Mean Square	F	Sig.
BMI	Between Groups	733.089	1	733.089	81.717	.000
	Within Groups	3355.198	374	8.971		
	Total	4088.288	375			
ATTENTION IMPULSIVITY	Between Groups	802.726	1	802.726	57.151	.000
	Within Groups	5253.103	374	14.046		
	Total	6055.830	375			
MOTOR IMPULSIVITY	Between Groups	1730.958	1	1730.958	198.809	.000
	Within Groups	3256.276	374	8.707		
	Total	4987.234	375			
NOT PLANNING	Between Groups	496.537	1	496.537	50.668	.000
	Within Groups	3665.165	374	9.800		
	Total	4161.702	375			
TOTAL IMPULSIVITY	Between Groups	9522.529	1	9522.529	128.106	.000
	Within Groups	27800.705	374	74.333		
	Total	37323.234	375			
LONELINESS	Between Groups	3836.276	1	3836.276	75.870	.000
	Within Groups	18910.958	374	50.564		
	Total	22747.234	375			
FOOD ADDICTION	Between Groups	502.187	1	502.187	1059.306	.000
	Within Groups	177.303	374	.474		
	Total	679.489	375			

participants' (M= 24.88, SD=4.04) is significantly higher than AI scores of female participants' participants' (M= 22.85, SD=3.68). An analysis of variance showed that there are significant difference of subjects' MI scores by gender ($F_{(1\ 374)}$=85.278, p<.05). The MI scores of male subjects (M= 17.07, SD=3.59) is significantly higher than MI scores of female subjects' (M= 13.90, SD= 2.83). There was a statistically significant difference between NPI scores by gender as determined by one-way ANOVA ($F_{(1\ 374)}$ = 54.706, p<.05). This means NPI scores of male participants' (M= 20.70, SD=2.49) is significantly higher than NPI scores of female participants' (M= 18.30, SD=3.79). An analysis of variance showed that there are significant difference of participants' TI scores by gender ($F_{(1\ 374)}$=76.743, p<.05). The TI scores of male participants' (M= 67.81, SD=9.28) is significantly higher than TI scores of female participants' (M= 59.50, SD= 8.83). There was a statistically significant difference between LO scores by gender as determined by one-way ANOVA ($F_{(1\ 374)}$ = 37.453, p<.05). This means LO scores of male participants' (M= 47.29, SD=6.23) is significantly higher than LO scores of female participants' (M= 42.55, SD=8.79). Finally, a one-way analysis of variance (ANOVA) was calculated on participants' FA scores by gender. The analysis was significant ($F_{(1\ 374)}$ = 41.696, p<.05). Male Participants' Food Addiction levels was significantly higher (M= 5.11, SD=1.13) than female participants food addiction levels (M= 4.25, SD=1.44).

In order to examine if there was a difference between food addicted and non addicted subjects' BMI, AI, MI, NPI, TI, LO and FA scores a one way ANOVA has been conducted. The result of the analysis showed that the BMI scores of subjects' significantly differed by food addiction variables ($F_{(1\ 374)}$=81.717, p<.05). In other words, BMI scores of food addictes subjects (M= 23.73, SD=3.77) was higher than non addicted subjects BMI scores (M= 20.86, SD=2.46). The results of ANOVA also revealed that there was a significant difference in subjects' AI scores compared by food addiction ($F_{(1\ 374)}$=57.151, p<.05). The food addicted participants' AI scores (M= 25.17, SD=3.63) were higher than non addicted participants' AI scores (M= 22.16, SD=3.91), As shown on **Table 6**, MI scores of participants' were significantly different by food addiction ($F_{(1\ 374)}$=198.809, p<.05). The result showed that MI scores of participants' who are food addicted were higher (M= 17.41, SD=3.09) than participants' MI scores who were not food addicted (M= 13.00, SD=2.69). ANOVA results also revealed that there were a siginificant difference in participants' NPI scores by food addiction ($F_{(1\ 374)}$=50.668, p<.05). Food addicted participants' had siginificanty greater scores (M= 20.58, SD=2.40) than the participants' who were not food addicted (M= 18.22, SD=4.03). ANOVA results also revealed that there were a siginificant difference in participants' TI scores by food addiction ($F_{(1\ 374)}$=128.106, p<.05). Food addicted participants' had siginificanty greater scores (M= 68.24, SD=6.08) than the participants' who were not food addicted (M= 57.88, SD=9.41). There was a statistically significant difference between LO scores by food addiction as determined by one-way ANOVA ($F_{(1\ 374)}$ = 75.870, p<.05). This means LO scores of food addicted participants' (M= 47.79, SD=6.41) is significantly higher than LO scores of non addicted participants' (M= 41.22, SD=8.10). And finally a one-way analysis of variance (ANOVA) was calculated on participants' FA scores by food addiction. The analysis was significant ($F_{(1\ 374)}$ = 1059.306, p<.05). Food addicted

Table 5. One Way Anova result of body mass index, attention impulsivity, motor impulsivity, not planning impulsivity, total impulsivity, loneliness and food addiction by eating regularly

		Sum of Squares	df	Mean Square	F	Sig.
BMI	Between Groups	65.434	1	65.434	6.083	.014
	Within Groups	4022.854	374	10.756		
	Total	4088.288	375			
ATTENTION IMPULSIVITY	Between Groups	97.491	1	97.491	6.119	.014
	Within Groups	5958.339	374	15.931		
	Total	6055.830	375			
MOTOR IMPULSIVITY	Between Groups	22.315	1	22.315	1.681	.196
	Within Groups	4964.919	374	13.275		
	Total	4987.234	375			
NOT PLANNING	Between Groups	18.154	1	18.154	1.639	.201
	Within Groups	4143.548	374	11.079		
	Total	4161.702	375			
TOTAL IMPULSIVITY	Between Groups	53.815	1	53.815	.540	.463
	Within Groups	37269.419	374	99.651		
	Total	37323.234	375			
LONELINESS	Between Groups	1.879	1	1.879	.031	.861
	Within Groups	22745.355	374	60.816		
	Total	22747.234	375			
FOOD ADDICTION	Between Groups	26.522	1	26.522	15.191	.000
	Within Groups	652.968	374	1.746		
	Total	679.489	375			

Participants' Food Addiction levels was significantly higher (M= 5.65, SD=0.65) than non addicted participants food addiction levels (M= 3.27, SD=0.73).

An analysis of variance showed that there are significant difference of participants' BMI scores by eating regularly ($F_{(1\ 374)}$=6.083, p<.05). The BMI scores of regular eating participants' (M= 23.21, SD=3.87) is significantly higher than BMI scores of not regular eating participants (M= 22.33, SD= 2.92). There was a statistically significant difference between AI scores by eating regularly as determined by one-way ANOVA ($F_{(1\ 374)}$ = 6.119, p<.05). This means AI scores of not regular eating participants (M= 24.38, SD=3.68) is significantly higher than AI scores of regular eating participants (M= 23.31, SD=4.52). An analysis of variance showed that there is no significant difference of subjects' MI scores by eating regularly ($F_{(1\ 374)}$=1.681, p>.05). There was not a statistically significant difference between NPI scores by eating regularly as determined by one-way ANOVA ($F_{(1\ 374)}$ = 1.639, p>.05). An analysis of variance showed that there is no significant difference of participants' TI scores by eating regularly ($F_{(1\ 374)}$=0.540, p>.05). There was not a statistically significant difference between LO scores by eating regularly as determined by one-way ANOVA ($F_{(1\ 374)}$ = 0.031, p>.05). And finally A one-way analysis of variance (ANOVA) was calculated on participants' FA scores by eating regularly. The analysis was significant ($F_{(1\ 374)}$ = 15.191, p<.05). Not regular eating participants' Food Addiction levels was significantly higher (M= 4.93, SD=1.32) than regular eating participants food addiction levels (M= 4.37, SD=1.32).

A one-way between group analysis of variance was conducted to explore the impact of snacking frequency on participants' BMI, AI, MI, NPI, TI, LO and FA scores. Participants were divided into three groups according to their snacking frequency during the day (once daily, 2-3 times daily and more than 3 times daily). There was a statistically significant difference at the p<.01 level in BMI, MI, NPI, TI and FA scored for three snacking frequency groups (($F_{(2\ 373)}$ = 19.303, p<.01; $F_{(2\ 373)}$ = 5.260, p<.01; $F_{(2\ 373)}$ = 37.646, p<.01; $F_{(2\ 373)}$ = 10.677, p<.01; $F_{(2\ 373)}$ =10.512, p<.01). Post-hoc comparison using LSD test indicated that the BMI score of the group eating snack once daily (M= 22.88, SD=4.53) was significantly different from the group eating snack more than 3 times a day (M= 20.57, SD=2.00). LSD test also indicated that the BMI score of the group eating snack 2-3 times daily (M=23.21, SD=2.75) was significantly different from the group eating snack more than 3 time a day (M= 20.57, SD=2.00).

Post-hoc comparison using LSD test indicated that the MI score of the group eating snack 2-3 times daily (M= 16.22, SD=3.44) was significantly different from the group eating snack once daily (M=14.81, SD=2.13).

LSD test also indicated that the NPI score of the group eating 2-3 snacktimes daily (M=20.81, SD=2.76) was significantly different from the group eating once daily (M= 18.63, SD=1.72) and eating snack more than 3 times daily group (M=17.55, SD=4.67). Also the NPI scores of the group eating snack once daily (M= 18.63, SD=1.72) was significantly different from the group eating more than 3 times daily(M=17.55, SD=4.67).

Table 6. One Way Anova result of body mass index, attention impulsivity, motor impulsivity, not planning impulsivity, total impulsivity, loneliness and food addiction by snacking frequency

		Sum of Squares	df	Mean Square	F	Sig.	Post-hoc
BMI	Between Groups	383.447	2	191.723	19.303	.000	1-3/2-3
	Within Groups	3704.841	373	9.933			
	Total	4088.288	375				
ATTENTION IMPULSIVITY	Between Groups	25.446	2	12.723	.787	.456	
	Within Groups	6030.384	373	16.167			
	Total	6055.830	375				
MOTOR IMPULSIVITY	Between Groups	136.810	2	68.405	5.260	.006	2-1
	Within Groups	4850.424	373	13.004			
	Total	4987.234	375				
NOT PLANNING	Between Groups	698.968	2	349.484	37.646	.000	2-1
	Within Groups	3462.734	373	9.283			1-3
	Total	4161.702	375				2-3
TOTAL IMPULSIVITY	Between Groups	2021.093	2	1010.546	10.677	.000	2-1
	Within Groups	35302.141	373	94.644			2-3
	Total	37323.234	375				
LONELINESS	Between Groups	23.409	2	11.705	.192	.825	
	Within Groups	22723.825	373	60.922			
	Total	22747.234	375				
FOOD ADDICTION	Between Groups	36.257	2	18.129	10.512	.000	2-1
	Within Groups	643.232	373	1.724			2-3
	Total	679.489	375				

Table 7. One Way Anova result of body mass index, attention impulsivity, motor impulsivity, not planning impulsivity, total impulsivity, loneliness and food addiction by smoking frequency

		Sum of Squares	df	Mean Square	F	Sig.	Post-Hoc
BMI	Between Groups	268.072	2	134.036	13.087	.000	2-1
	Within Groups	3820.215	373	10.242			3-1
	Total	4088.288	375				
ATTENTION IMPULSIVITY	Between Groups	58.788	2	29.394	1.828	.162	
	Within Groups	5997.042	373	16.078			
	Total	6055.830	375				
MOTOR IMPULSIVITY	Between Groups	324.993	2	162.496	13.000	.000	2-1
	Within Groups	4662.241	373	12.499			3-1
	Total	4987.234	375				
NOT PLANNING	Between Groups	290.456	2	145.228	13.993	.000	2-1
	Within Groups	3871.246	373	10.379			3-1
	Total	4161.702	375				
TOTAL IMPULSIVITY	Between Groups	1506.375	2	753.188	7.844	.000	2-1
	Within Groups	35816.859	373	96.024			3-1
	Total	37323.234	375				
LONELINESS	Between Groups	973.428	2	486.714	8.338	.000	3-1/3-2
	Within Groups	21773.806	373	58.375			
	Total	22747.234	375				
FOOD ADDICTION	Between Groups	30.947	2	15.473	8.899	.000	2-1
	Within Groups	648.542	373	1.739			3-1
	Total	679.489	375				

Post-hoc using LSD test also indicated that the TI score of the group eating snack 2-3 daily (M=66.22, SD=8.20) was significantly different from the group eating snack once daily (M=62.36, SD=5.86). LSD result also showed that the TI score of the group eating snack 2-3 times daily (M=66.22, SD=8.20) was significantly different from the group eating snack more than 3 times daily (M=60.77, SD=15.84).

Finally, LSD test indicated that the FA score of the group eating snack 2-3 times daily (M=5.00, SD=1.21) was significantly different from the group eating snack once daily (M=4.27, SD=1.36) and eating snack more than 3 times daily (M=4.55, SD=1.50).

Table 8. One Way Anova result of body mass index, attention impulsivity, motor impulsivity, not planning impulsivity, total impulsivity, loneliness and food addiction by alcohol intake of participants

		Sum of Squares	df	Mean Square	F	Sig.	Post-Hoc
BMI	Between Groups	544.455	2	272.228	28.653	.000	2-1/2-3
	Within Groups	3543.833	373	9.501			
	Total	4088.288	375				
ATTENTION IMPULSIVITY	Between Groups	148.404	2	74.202	4.685	.010	
	Within Groups	5907.426	373	15.838			1-3
	Total	6055.830	375				
MOTOR IMPULSIVITY	Between Groups	57.617	2	28.808	2.180	.115	
	Within Groups	4929.617	373	13.216			
	Total	4987.234	375				
NOT PLANNING	Between Groups	40.450	2	20.225	1.830	.162	
	Within Groups	4121.252	373	11.049			
	Total	4161.702	375				
TOTAL IMPULSIVITY	Between Groups	289.808	2	144.904	1.459	.234	
	Within Groups	37033.426	373	99.285			
	Total	37323.234	375				
LONELINESS	Between Groups	214.834	2	107.417	1.778	.170	
	Within Groups	22532.400	373	60.409			
	Total	22747.234	375				
FOOD ADDICTION	Between Groups	73.055	2	36.527	22.467	.000	2-1
	Within Groups	606.435	373	1.626			3-1
	Total	679.489	375				

A one-way between group analysis of variance was conducted to explore the impact of smoking frequency on participants'BMI, AI, MI, NPI, TI, LO and FA scores. Participants were divided into three groups according to their smoking frequency during the day (below half package daily, between half and one package daily, more than one package daily). There was a statistically significant difference at the p<.01 level in BMI, MI, NPI, TI, LO and FA scored for three smoking frequency groups ($F_{(2\ 373)}$ = 13.087, p<.01; $F_{(2\ 373)}$ = 13.000, p<.01; $F_{(2\ 373)}$ = 13.993, p<.01; $F_{(2\ 373)}$ = 7.844, p<.01; $F_{(2\ 373)}$ =8.338, p<.01; $F_{(2\ 373)}$ =8.899, p<.01).

Post-hoc comparison using LSD test indicated that the BMI score of the group smoking between half and one package daily (M= 23.04, SD=4.03) was significantly different from the group smoking below half package daily (M= 21.81, SD=2.78). LSD test also indicated that the BMI score of the group smoking more than one package daily (M=23.84, SD=2.89) was significantly different from the group smoking below half package daily (M= 21.81, SD=2.78).

Post-hoc comparison using LSD test indicated that the MI score of the group smoking between half and one package daily (M= 16.46, SD=2.91) was significantly different from the group smoking below half package daily (M= 14.78, SD=4.17). LSD test also indicated that the MI score of the group smoking more than one package daily (M=16.81, SD=2.63) was significantly different from the group smoking below half package daily (M= 14.78, SD=4.17).

Post-hoc comparison using LSD test indicated that the NPI score of the group smoking between half and one package daily (M= 20.84, SD=2.57) was significantly different from the group smoking below half package daily (M= 18.82, SD=4.05). LSD test also indicated that the NPI score of the group smoking more than one package daily (M=20.09, SD=1.45) was significantly different from the group smoking below half package daily (M= 18.82, SD=4.05).

Post-hoc comparison using LSD test indicated that the TI score of the group smoking between half and one package daily (M= 66.84, SD=7.15) was significantly different from the group smoking below half package daily (M= 62.30, SD=12.38). LSD test also indicated that the TI score of the group smoking more than one package daily (M=65.36, SD=5.32) was significantly different from the group smoking below half package daily (M= 62.30, SD=12.38).

LSD test also indicated that the LO score of the group smoking more than one package daily (M=48.00, SD=5.21) was significantly different from the group smoking below half package daily (M= 4.47, SD=1.21) and group smoking between half and one package daily (M= 4.84, SD=1.23).

Post-hoc comparison using LSD test indicated that the FA score of the group smoking between half and one package daily (M= 4.84, SD=1.23) was significantly different from the group smoking below half package daily (M= 4.47, SD=1.21). LSD test also indicated that the FA score of the group smoking more than one package daily (M=5.18, SD=1.59) was significantly different from the group smoking below half package daily (M= 4.47, SD=1.21).

Table 9. One Way Anova result of body mass index, attention impulsivity, motor impulsivity, not planning impulsivity, total impulsivity, loneliness and food addiction by average exercise time

		Sum of Squares	df	Mean Square	F	Sig.	Post-Hoc
BMI	Between Groups	147.505	2	73.752	6.981	001	2-1
	Within Groups	3940.783	373	10.565			3-1
	Total	4088.288	375				
ATTENTION IMPULSIVITY	Between Groups	757.753	2	378.876	26.674	000	3-1/3-2
	Within Groups	5298.077	373	14.204			
	Total	6055.830	375				
MOTOR IMPULSIVITY	Between Groups	554.696	2	277.348	23.339	.000	3-1/3-2
	Within Groups	4432.538	373	11.883			
	Total	4987.234	375				
NOT PLANNING	Between Groups	371.241	2	185.620	18.266	.000	3-1/3-2
	Within Groups	3790.462	373	10.162			
	Total	4161.702	375				
TOTAL IMPULSIVITY	Between Groups	5906.926	2	2953.463	35.066	.000	3-1/3-2
	Within Groups	31416.308	373	84.226			
	Total	37323.234	375				
LONELINESS	Between Groups	1081.696	2	540.848	9.311	.000	3-1/3-2
	Within Groups	21665.538	373	58.085			
	Total	22747.234	375				
FOOD ADDICTION	Between Groups	6.336	2	3.168	1.755	.174	
	Within Groups	673.154	373	1.805			
	Total	679.489	375				

A one-way between group analysis of variance was conducted to explore the impact of alcohol intake of participants' BMI, AI, MI, NPI, TI, LO and FA scores. Participants were divided into three groups according to their alcohol intake (no never, used but quit, using). There was a statistically significant difference at the p<.01 level in BMI, AI and FA scored for three alcohol intake groups (($F_{(2\ 373)}$ = 28.653, p<.01; $F_{(2\ 373)}$ = 4.685, p<.01; $F_{(2\ 373)}$ = 22.467, p<.01).

Post-hoc comparison using LSD test indicated that the BMI score of the group used but quit (M=26.51, SD=4.93) was significantly different from the group no never use (M= 22.02, SD=2.63) and group using (M= 22.48, SD=3.03).

LSD test also indicated that the AI score of the group no never use (M=24.70, SD=4.83) was significantly different from the group using (M= 23.39, SD=3.30).

Post-hoc comparison using LSD test also indicated that the FA score of the group used but quit (M=4.75, SD=.43) was significantly different from the group no never used (M= 4.25, SD=1.26). LSD test also indicated that the FA score of the group using (M=5.17, SD=1.37) was significantly different from the group no never used (M= 4.25, SD=1.26).

A one-way between group analysis of variance was conducted to explore the average exercise time of weekly of participants' BMI, AI, MI, NPI, TI, LO and FA scores. Participants were divided into three groups according to their average exercise time (less than 1 hour weekly, 1-3 hours weekly, more than 3 hours weekly). There was a statistically significant difference at the p<.01 level in BMI, AI, MI, NPI, TI and LO scored for three average exercise time groups ($F_{(2\ 373)}$ = 6.981, p<.01; $F_{(2\ 373)}$ = 26.674, p<.01; $F_{(2\ 373)}$ = 23.339, p<.01; $F_{(2\ 373)}$ = 18.266, p<.01; $F_{(2\ 373)}$ = 35.066, p<.01; $F_{(2\ 373)}$ = 9.311, p<.01).

Post-hoc comparison using LSD test indicated that the BMI score of the group 1-3 hours weekly (M=23.20, SD=4.44) was significantly different from the group less than 1 hour weekly (M= 22.07, SD=2.95). LSD test also indicated that BMI score of the group more than 3 hours weekly (M= 23.51, SD=1.22) was significantly different from the group less than 1 hour weekly (M= 22.07, SD=2.95).

Post-hoc comparison using LSD test indicated that the AI score of the group more than 3 hours weekly (M=27.12, SD=3.85) was significantly different from the group less than 1 hour weekly (M= 23.23, SD=4.14) and group 1-3 hours weekly (M= 23.69, SD=2.79).

Post-hoc comparison using LSD test indicated that the MI score of the group more than 3 hours weekly (M=18.37, SD=4.12) was significantly different from the group less than 1 hour weekly (M= 15.03, SD=3.54) and group 1-3 hours weekly (M= 15.46, SD=2.71).

Post-hoc comparison using LSD test indicated that the NPI score of the group more than 3 hours weekly (M=21.75, SD=1.57) was significantly different from the group less than 1 hour weekly (M= 19, SD=3.84) and group 1-3 hours weekly (M= 19.76, SD=2.36).

Post-hoc comparison using LSD test indicated that the TI score of the group more than 3 hours weekly (M=72.75, SD=8.95) was significantly different from the group less than 1 hour weekly (M= 61.76, SD=10.12) and group 1-3 hours weekly (M= 64.07, SD=7.06).

Post-hoc comparison using LSD test indicated that the LO score of the group more than 3 hours weekly (M=49.00, SD=6.57) was significantly different from the group less than 1 hour weekly (M= 44.65, SD=8.73) and group 1-3 hours weekly (M= 44.25, SD=5.53)

DISCUSSION

The aim of the research was to identify the relationship between food addiction, impulsivity and loneliness between some variables. All four hypothesis were supported by the results. Firstly, Participants with food addiction scored higher points in loneliness than participants without food addiction. Secondly, participants with food addiction scored higher points in impulsivity than participants without food addiction. Thirdly, people who scored higher scores in impulsivity and loneliness had a higher score of BMI than participants who scored lower scored in impulsivity and loneliness. Lastly, there was a significant difference between some variables (BMI, sex, snack frequency, cigarette and alcohol use, exercise, sleep) and impulsivity and loneliness. To conclude, the results of the study will encourage researchers in investigating in this area and have a better understanding in the link between food addiction, impulsivity and loneliness. The results showed that high impulsivity and high loneliness scores are related with addiction-like eating habits in university students.

There was a positive strong relationship between all food addiction, bmi, attentional impulsivity, motor impulsivity, not planning impulsivity, total impulsivity and loneliness scores. This means that when impulsivity increases and loneliness increases, food addiction also increases. Hypothesis related with food addiction has been supported. Burrows et al. (2017) findings also supported the results of the study. In Burrows et al. study found out when food addiction increases, bmi also increases. In this study the correlation results showed that as bmi, impulsivity and loneliness increases also food addiction increases. These results were expected.

The multiple linear regression results regarding the prediction of food addiction showed that BMI and motor impulsivity are strong predictors of food addiction. The findings of Pivarunas and Conner (2015) also supported this research's' findings. It was found that impulsivity and emotion dysregulation are predictors of food addiction (Pivarunas & Conner, 2015). Wolz and collegues (2016) found that high negative urgency, high reward dependency and lack of premediation are also predictors of food addiction. Moreover, Muele et al. (2017) has found that higher attentional impulsivity was associated with higher food addiction. Therefore, we can conclude that high impulsivity is linked with food addiction as the results proved the same.

The results showed that the males scored higher BMI, attentional impulsivity, motor impulsivity, non-planning impulsivity, total impulsivity and loneliness and food addiction than females. Unlike the previous Pedram et al. (2013) study which found that food addiction was higher in women than man. This difference in the results might be because of the cultural differences. For instance, according to some cultures like Cypriot culture, people celebrate special occasions with food. It is a part of the Cypriot tradition that all the women in the family cook best dishes and serve them to men. It is believed that men eat more than women, therefore, this might be the reason why another study found a different result. Furthermore, Victor and Yang (2012) study found that women had more loneliness than man, unlike the current findings. On the other hand, Chamorro et al. (2012) study supported the current study's findings that man are more impulsive compared to women.

The findings displayed that the students with food addiction has scored significantly higher scores in bmi, attentional impulsivity, motor impulsivity, non-planning impulsivity, total impulsivity, loneliness and food addiction scores than students without food addiction. All three of the previous study; Velazquez-Sanchez et al. (2014), Muele et al. (2017), Dawe and Loxton (2004) supported the results of the current study that people with food addiction has higher impulsivity scores than people without food addiction.

The results showed that the students who smoke had scored significantly higher scores in BMI, motor impulsivity, non-planning impulsivity, total impulsivity, loneliness and food addiction scores than students who do not smoke. Moreover, those who smoke 1-2 pack a day had significantly higher score in non-planning impulsivity and motor impulsivity than other smokers and non-smokers. There was no research found in the literature to support the relationship between smoking and other variables.

Furthermore, it was found out that the students who drink alcohol has scored significantly higher scores in BMI than students who do not drink alcohol. This means that people who drinks alcohol had a higher body fat than people who do not drink. Students who use alcohol had significantly higher scores in attentional impulsivity than non-users and other users. Alcohol users had significantly higher scores in food addiction than students who do not use alcohol or drink alcohol rarely. The results shown similar findings with the Pattij and De Vries (2013) study that found high impulsivity is related with alcohol consumption, alcohol dependency maintenance as well as relapse vulnerability.

The findings showed that the students who exercise has scored significantly higher scores in BMI, attentional impulsivity, motor impulsivity, non-planning impulsivity, total impulsivity, loneliness than students who do not exercise. Surprisingly, students who exercise more than 3 hours weekly had greater BMI means than those who exercise less than 1 hour weekly. Additionally, those who exercise 1-2 hours weekly have greater BMI means than those who exercise less than 1 hour weekly. This might be because the more you exercise the more muscles you are likely to have. Therefore, the reason of students who exercise has a greater BMI than others might be because of the amount of the muscles students who exercise is greater than the students muscles who do not exercise.

Lastly, the results demonstrated that the students who eat regularly have scored significantly higher scores in BMI, attentional impulsivity, and food addiction scores than students who do not eat regularly. There was no relevant study in the literature to back this result.

When the findings of this research are considered all together it is all clear that loneliness and impusivity has an affect on food addiction. In todays modern era people are becoming more and more lonely because of their lifestyles. According to this reserah findings it can be said that when people are either emotionally or socially feeling lonely they try to compensate these feelings by eating. According to DSM V food addiction is a kind of substance addiction. In order to feel free from loneliness people direct their attentions and emotions and may be attach their feelings to food. Whenever they feel sad and lonely, instead of getting socialized and finding comfort from other people they choose search comfort in food. This feeling of search is too strong that unconciously they direct their attention to food which is where impulsivity comes. Although the main purpose of this research is not to deal with eating disorders, the result guides us to the point where focusing on coping with loneliness and impulsiveness can ease our way helping people with eating disorders.

LIMITATIONS AND RECOMMENDATIONS

One of the strengths of the study was that there were 376 students participated in the study which represents the university students in North Cyprus. These results can be generalized to the population.

There were few limitations in this study. First of all, all of the information obtained was self-reported questionnaires which might not be accurate all the time. It was assumed that the information given was correct. In order to eliminate this limitation, researchers can add another task to measure impulsivity along with the self-repot questionnaire. Another limitation was, binge-eating, which is considered as associated with food addiction, was not measured in this study. Researchers should include binge-eating in future researches about food addiction. It would be beneficial to look at the relationship between food addiction, binge-eating, impulsivity and loneliness. Lastly, this data can be collected longitudinally in order to look at the relationships between food addiction, BMI, impulsivityand loneliness and how they change over time.

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