

Determining Intention, Fast Food Consumption and Their Related Factors Among University Students by Using A Behavior Change Theory

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۱ **Determining Intention, Fast Food Consumption and their**
۲ **Related Factors among University Students by Using a**
۳ **Behavior Change Theory**

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۱۳ **Running head:** Determining intention and fast food consumption
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۲۵ **Abstract**

۲۶ **Background**

۲۷ Today, with the advancement of science, technology and industry, people's lifestyles such as the
۲۸ pattern of people's food, have changed from traditional foods to fast foods. The aim of this
۲۹ survey was to examine and identify factors influencing intent to use fast foods and behavior of
۳۰ fast food intake among students based on the theory of planned behavior (TPB).

۳۱ **Methods**

۳۲ A cross-sectional study was conducted among 229 university students. The study sample was
۳۳ selected and entered to the study using stratified random sampling method. Data were collected
۳۴ using a four-part questionnaire including Participants' characteristics, knowledge, the TPB
۳۵ variables, and fast food consumption behavior. The study data were analyzed in SPSS software
۳۶ (version 16.0) using descriptive statistics (frequencies, Means, and Standard Deviation) and
۳۷ inferential statistics (t-test, Chi-square, correlation coefficient and multiple regressions).

۳۸ **Results**

۳۹ The monthly frequency of fast food consumption among students was reported 2.7 times. The
۴۰ TPB explained 35%, 23% variance of intent to use fast food and behavior of fast food intake,
۴۱ respectively. Among the TPB variables, knowledge ($r=.340$, $p<0.001$) and subjective norm
۴۲ ($r=.318$, $p<0.001$) were known as important predictors of intention to consume fast foods - In
۴۳ addition, based on regression analyses, intention ($r=.215$, $p<0.05$), perceived behavioral control
۴۴ ($r=.205$, $p<0.05$), and knowledge ($r=.127$, $p<0.05$) were related to fast food consumption, and
۴۵ these relationships were statistically significant.

۴۶ **Conclusions**

۴۷ The current study showed that the TPB is a good theory in predicting intent to use fast food and
۴۸ the actual behavior. It is supposed that health educators use from the present study results in
۴۹ designing appropriate interventions to improve nutritional status of students.

۵۰ **Keywords:** Fast food, Predictor, Student, Theory of Planned Behavior, Iran.

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۵۲ **Background**

۵۳ Over the past few decades, non-communicable diseases such as eczema, asthma, cancer, type 2
۵۴ diabetes, obesity, etc. have increased in developed countries [1, 2]. Also, these diseases are more
۵۵ prevalent with increasing urbanization in developing countries [3, 4, 5]. The occurrence of many

٥٦ non-communicable diseases is related to diet [6]. Food habits are rooted from cultural,
٥٧ environmental, economic, social and religious factors. An effective factor in the development of
٥٨ chronic diseases is lifestyle, dietary patterns and habits. Inappropriate food habits and unhealthy
٥٩ environments have increased the incidence of non-communicable diseases in the world [7, 8].

٦٠ Many developing countries with a tendency towards Western dietary culture go away from
٦١ traditional and local diets [6]. Healthy foods with nutrients have been replaced by new foods
٦٢ called fast foods [9]. Fast food is the food prepared and consumed outside and often in fast food
٦٣ restaurants [10]. Fast food is often highly processed and prepared in an industrial fashion, i.e.,
٦٤ with standard ingredients and methodical and standardized cooking and production methods.
٦٥ [10]. In fast food, vitamins, minerals, fiber and amino acids are low or absent but energy is high
٦٦ [9]. Fast food consumption has increased dramatically in the last 30 years in European and
٦٧ American countries [11].

٦٨ Previous studies reported patterns of inappropriate and harmful food consumption in Iranian
٦٩ children and adolescents [12, 13]. Most fast food customers are adolescents and youth, as these
٧٠ products are quickly and easily produced and relatively inexpensive [14]. One Iranian study
٧١ shows that 51% of children eat inappropriate snacks and drinks over a week [15]. It is also
٧٢ reported that adults today consume fast food more than previous generations [16]. Faqih and
٧٣ Anousheh reported that 20% of adolescents and 10% of adults consumed sandwiches 3 or more
٧٤ times a week [17].

٧٥ According to two studies, children and adolescents who consume fast food have received more
٧٦ energy, saturated fat, sodium, carbohydrates and more sugar than their peers, but they have less
٧٧ fiber, vitamin A and C, and less fruit and vegetables [18, 19]. Also, because of the use of oils to
٧٨ fry these foods at high temperatures, these types of foods may contain toxic and inappropriate
٧٩ substances that threaten the health of consumers [20].

٨٠ In a study in the United States on young people between 13 and 17 years old, it was found that
٨١ there is a significant relationship between weight gain and obesity with pre-prepared foods
٨٢ [21]. According to the Center for Disease Control and Prevention (2007-2008), 17% of children
٨٣ aged 2 to 19 years and 34% of those aged 20 years and older were obese [22]. Many Health
٨٤ problems were caused by human health behavior (e.g. exercising regularly, eating a balanced diet,

and obtaining necessary inoculations, etc.) and studying behavior change theories/models provides a good insight into the causes and ways of preventing these problems [23]. One of these theories is the Theory of Planned Behavior (TPB), which is a developed form of the Theory of reasoned action (TRA), and describes a healthy behavior that is not fully under the control of a person [24]. This theory can successfully predict eating habits and behaviors, and recently this theory has received considerable attention from researchers in identifying norms and beliefs related to the use of fast food [25].

Based on the TPB, intention to conduct a behavior with following three concepts is controlled: 1. Attitudes (positive and negative evaluation of a behavior), 2. Subjective norms (social pressure received from peers, family, health care providers for doing or not doing a given health behavior), 3. Perceived behavior control (This refers to a person's perception of the ease or difficulty of performing the behavior of interest.) [26, 27, 28].

The TPB has been tested on different behaviors such as healthy food choice [31], physical activity [29], and fast food consumption [30]. For instance, the study conducted by Seo et al. showed that fast food consumption behavior was significantly associated with behavioral intention and perceived behavioral control. In addition, their findings highlighted that behavioral intention was significantly related to subjective norm and perceived behavioral control [28].

According to the mentioned materials, the researchers decided to test the study with the aim of investigating and explaining the intention and behavior of fast food consumption and their related factors based on the TPB among Urmia University of Medical Sciences students. The results of this study will increase the awareness and knowledge about fast food and, in addition, its results can be used in research, hospitals and healthcare settings.

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1.9 **Methods**

1.10 **Subjects**

111 This cross-sectional study was performed on students of Urmia University of Medical Sciences
112 located in northwest Iran in academic year of 2018-2019. The inclusion criteria for the study are
113 girls and boys who studied at Urmia University of Medical Sciences, and students' voluntary
114 participation in the study and obtaining written consent from the students and University
115 principals for the students' participation in the study. The lack of willingness to continue
116 participating in the study and not signing the informed consent form were considered as
117 exclusion criteria.

118 According to the results of the study of Yar Mohammadi and et al [32], with a 95% confidence
119 interval and an error of 0.05, using the formula for estimating the proportion in society, taking
120 into account the 10% drop rate, sample size was estimated 330students. A randomized stratified
121 sampling method was used to select the study samples. The study sample was randomly selected
122 from each of the strata based on the share of the total sample.

123 **Questionnaire**

124 The data gathering tool in this study was a self-reported questionnaire, which was designed
125 according to the existing measures in scientific literature. The study instrument was translated
126 from English to Persian using a standard forward-backward translation technique [33]. The
127 original instrument was translated by a bilingual specialist. The Persian version was then
128 retranslated into English by two independent bilingual professionals to assess retention of the
129 original meaning in the source language. Subsequently, translators worked separately in the
130 translation process and then prepared the final version of the Persian translation. Content validity
131 of The Persian version of questionnaire was evaluated by a panel of experts such as 3 nutrition
132 specialists, 3 health education specialists, and 2 instrument designers. After receiving their
133 comments, crucial revisions were conducted in the study tool. Finally, validity of the study
134 instrument was confirmed. The present questionnaire including four following sections:

135 **1. General characteristics**

136 The first part contains personal information such as age, gender, weight, height, field of study,
137 student education, father's education, mother's education, father job, mother's job, ethnicity,
138 marital status, participating in nutrition educational classes, students' monthly income, family's
139 monthly income, housing status, information resource for healthy nutrition.

140 **2. Constructs of the TPB**

141 The second part contains questions about the constructs of the theory of planned behavior
142 (attitude, subjective norms, perceived behavioral control and behavioral intention).In general,
143 attitudes, subjective norm and perceived behavioral control of students were measured using
144 indirect items. The internal reliability of all subscales of the TPB variables was good, with a
145 Cronbach's alpha of 0.852.

146 **Attitude toward fast food use**

147 The attitude of the people was evaluated using 28 indirect items (14 items of behavioral beliefs,
148 14 items of expectations evaluation) based on five-point the Likert scale (from strongly agree to
149 strongly disagree) or (from very important to not at all important), and the score of each item
150 varied from 1 to 5. The minimum and maximum score for the attitude subscale was 14 and 350,
151 respectively. The internal reliability of attitude subscale was good, with a Cronbach's alpha of
152 0.778.

153 **Subjective norm**

154 Subjective norms of students were measured by 10 indirect items (5 items of normative beliefs, 5
155 items of motivation to comply) based on five-point the Likert scale (from strongly agree to
156 strongly disagree) or (from very important to not at all important), and the score of each item
157 varied from 1 to 5. The minimum and maximum score for the subjective norm subscale was 5
158 and 125, respectively. The internal reliability of subjective norm subscale was good, with a
159 Cronbach's alpha of 0.726.

160 **Perceived behavioral control**

161 Perceived behavioral control were measured by 18 indirect items (9 items of control beliefs, 9
162 items of perceive power) based on five-point the Likert scale (from strongly agree to strongly
163 disagree) or (from extremely difficult to extremely easy), and the score of each item varied from
164 1 to 5. The minimum and maximum score for the perceived behavioral control subscale was 9
165 and 225, respectively. The internal reliability of subscale of perceived behavioral control was
166 good, with a Cronbach's alpha of 0.815.

167 **Behavioral intention**

168 Behavioral intention was evaluated by 8 items based on five-point the Likert scale (from strongly
169 agree to strongly disagree), and the score of each item varied from 1 to 5. The minimum and
170 maximum score for the Behavioral intention subscale was 8 and 40, respectively. The internal
171 reliability of behavioral intention subscale was good, with a Cronbach's alpha of 0.821.

172 **3. Knowledge of participants**

173 And the third and fourth parts are items related to food knowledge and fast food behavior.
174 Students' knowledge of fast food was evaluated by 14 items, and the score of each item varied
175 from 0 to 2. The minimum and maximum score for the knowledge subscale was 0 and 28,
176 respectively. The internal reliability of students' knowledge was good, with a Cronbach's alpha
177 of 0.783.

178 **4. Fast food use**

179 Students' fast food consumption was assessed by frequency of use in a past month. The term
180 "Fast food" was defined as hamburgers, doughnuts, hot dog, snack, pizza, fried chicken and fried
181 potatoes. The frequency of fast food use was analyzed for each food category.

182 **Statistical analyses**

183 All statistical analyzes were performed using SPSS 16.0 software. Descriptive statistics methods
184 such as frequencies, means and standard deviations were used along with independent t and χ^2
185 tests. Pearson correlation test was used to investigate the relationship between TPB variables
186 with intent to use fast food and the real use of fast food. Multiple regressions were used for
187 further analysis.

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۱۹۳ **Results**

۱۹۴ **Descriptives**

۱۹۵ A total of 330 students were selected and recruited to the study, but some subjects (31 samples)
۱۹۶ were excluded from the study due to incomplete questionnaires (21cases), and no return of
۱۹۷ questionnaires (10 cases). Statistical analyses were performed on 229 students. Of these, 28.4%
۱۹۸ of the students were boys and 71.6% were girls.The results of the study showed that the average
۱۹۹ age for all the students was 22.10 ± 3.30 (the average age for male and female sexes were $22.66 \pm$
۲۰۰ 4.47 and 21.84 ± 2.50 , respectively).The two sexes differed in terms of BMI, so that the mean of
۲۰۱ BMI was higher in boy students than in girls, and this difference was statistically significant.
۲۰۲ Almost more than 72 percent of the students had normal weight, and 28% of subjects were in
۲۰۳ other weights. Approximately 20.51%, 54.50%, 79.77% of the students reported the professional
۲۰۴ doctoral degree, Azeri ethnicity and single.

۲۰۵ In addition, findings revealed that 64.90 percent of the participants lived in the dormitory, and
۲۰۶ 35.10% of them lived in personal or rental housing. The most common level of education for
۲۰۷ father (37.10%) and mother (44.10%) of students was diploma. Nearly, 46.50% of students
۲۰۸ gained food information (especially fast food) from health care providers, while 53.50% of them
۲۰۹ received their food information from other sources. Most students had zero monthly income, but
۲۱۰ 61.61 percent of the students reported their family's monthly income more than 50 million Rials
۲۱۱ and 38.39% of their family had income lower than the mentioned amount. Table 1 provides
۲۱۲ detailed information on students' characteristics.

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Table1. The characteristics of the study sample

Variable	The whole group	Sex group		χ^2 value	p.value
		Male(85) N (%)	Female(214) N (%)		
Body weight status				20.44	<0.001
Underweight (less than 18.5)	23 (7.70)	2 (0.33)	21 (7.01)		
Normal (between 18.5 and 24.9)	216 (72.20)	53 (17.70)	163 (54.94)		
Overweight (Between 25 and 29.9)	52 (17.40)	25 (8.35)	27 (9.01)		
Obese (more than 29.9)	8 (2.70)	5 (1.66)	3 (1.00)		
Student education level				1.50	0.47
Bachelor	142 (47.50)	37 (12.37)	105 (35.13)		
Masters	4 (1.30)	2 (0.67)	2 (0.67)		
The professional doctor	153 (51.20)	46 (15.36)	107 (35.80)		
Ethnicity				0.65	0.72
Turkish	163 (54.50)	46 (15.36)	117 (39.22)		
Kurdish	98 (32.80)	30 (10.02)	68 (22.72)		
Other	38 (12.70)	9 (3.00)	29 (9.68)		
Marital status				0.01	0.91
Single	238 (79.60)	68 (22.72)	170 (56.92)		
Married	61 (20.40)	17 (5.67)	44 (14.69)		
Housing				0.63	0.72
Personal home	88 (29.40)	23 (7.68)	65 (21.71)		
Dorm	194 (64.90)	58 (19.37)	136 (45.42)		
Rented home	17 (5.70)	4 (1.33)	13 (4.34)		
Mother's education level				9.71	0.04
Illiterate	46 (15.40)	20 (6.68)	26 (8.68)		
Diploma and under diploma	132 (44.10)	28 (9.35)	104 (34.73)		
Bachelor	62 (20.70)	20 (6.68)	42 (14.02)		
Masters	46 (15.40)	12 (4.00)	34 (11.35)		
Doctor	13 (4.30)	5 (1.67)	8 (2.67)		
Father's education level				14.5	0.007
Illiterate	30 (10.00)	16 (5.34)	14 (4.67)		
Diploma and under diploma	111 (37.10)	22 (7.34)	89 (29.72)		
Bachelor	77 (25.80)	22 (7.34)	55 (18.37)		
Masters	60 (20.10)	17 (5.67)	43 (14.36)		
The doctor	21 (7.00)	8 (2.67)	13 (4.34)		
Father's job				3.59	0.46
Worker	7 (2.30)	4 (1.33)	3 (1.00)		
Employee	122 (40.80)	32 (10.68)	90 (30.06)		
Unemployed	27 (9.00)	9 (3.00)	18 (6.01)		
Free job	134 (44.80)	37 (12.35)	97 (32.39)		
The doctor	9 (3.00)	3 (1.00)	6 (2.00)		
Mother's job				3.45	0.48
Worker	6 (2.00)	3 (1.00)	3 (1.00)		
Employee	67 (22.40)	19 (6.34)	48 (16.06)		
Housewife	96 (32.10)	22 (7.34)	74 (24.71)		
Free job	123 (41.10)	39 (13.02)	84 (28.05)		
The doctor	7 (2.30)	2 (0.67)	5 (1.67)		
Participate in nutrition education class				1.71	0.19
Yes	106 (35.50)	35 (11.69)	71 (23.71)		
No	193 (64.50)	50 (16.70)	143 (47.76)		
The source of nutritional information				6.61	0.16
Health care personnel	139 (46.50)	40 (13.36)	99 (33.06)		
Family and friends	47 (15.70)	13 (4.34)	34 (11.35)		
Radio and TV	48 (16.10)	13 (4.34)	35 (11.69)		
Book, magazine and newspaper	33 (11.00)	5 (1.67)	28 (9.35)		
Other	32 (10.70)	14 (4.67)	18 (6.01)		
Student monthly income				17.21	0.002
Zero	238 (79.60)	56 (18.70)	182 (60.78)		
Less than 2000,000 Rials	22 (7.40)	12 (4.00)	10 (3.34)		
Between 2000,000 and 3499,000Rials	10 (3.30)	5 (1.67)	5 (1.67)		
Between 3500,000 and 5000,000 Rials	9 (3.00)	2 (0.67)	7 (2.30)		
More than 5000,000 Rials	20 (6.70)	10 (3.34)	10 (3.34)		
Family monthly income				10.31	0.015
Less than 20,000,000 Rials	37 (12.40)	18 (6.01)	19 (6.34)		
Between 20,000,000 and 34,990,00 0Rials	50 (16.70)	9 (3.00)	41 (13.69)		
Between 35,000,000 and 50,000,000Rials	28 (9.40)	7 (2.30)	21 (7.01)		
More than 50,000,000 Rials	184 (61.50)	51 (17.03)	133 (44.42)		

220 **Main analysis**

221 Table 2 presents the mean score of knowledge and variables of the study-related theoretical
 222 framework. As the mean score of subjective norm, perceived behavioral control and behavioral
 223 intention in male students compared to female students was high, but those were not significant
 224 statistically($p>0.05$).

225 **Table2. The mean score of knowledge and the constructs of the TPB among students in terms of sex**

Variable	The whole group	Sex group		t value	p.value
		Male	Female		
	^a M±SD ^b	M±SD	M±SD		
Knowledge	21.68±5.26	21.15±5.06	21.89±5.33	1.09	0.27
Attitude	190.30±43.54	188.42±40.08	191.06±44.90	0.47	0.63
Subjective norm	55.15±13.10	55.69±13.51	54.93±12.96	-0.44	0.65
Perceived behavioral control	98.13±36.52	101.61±39.80	96.75±35.14	-1.04	0.30
Behavioral intention	27.96±6.19	28.21±6.86	27.86±5.92	-0.43	0.66
Fast-food consumption	2.70±3.91	2.97±4.58	2.57±3.61	-0.79	0.43

226 a. Mean, b. Standard Deviation

227 Some variables of the TPB were significantly correlated with each other ($P < 0.01$, Table 3). In
 228 particular, fast food consumption behavior was highly ($r = 0.382$) correlated with behavioral
 229 intention. Multiple regression analyses were conducted to determine the relative importance of
 230 the variables of the TPB to behavioral intention and fast food consumption behavior (Tables 4,
 231 5). In these analyzes, when the attitude toward behavior, subjective norms, and perceived control
 232 was regressed to behavioral intention, the model was very significant ($P = 0.000$) and explained
 233 0.347 of variance of behavioral intention. While attitude and perceived behavioral control were
 234 not significant, the subjective norms and students' knowledge were significantly related to the
 235 intention to eat fast food. It seems that subjective norms and students' knowledge to be the most
 236 important predictors of behavioral intent. Table 4 shows more information about predictors of
 237 behavioral intention.

238 The second model, using fast food consumption as a dependent variable, was also very
 239 significant ($P = 0.000$), and explained nearly a quarter of the variance (0.231) of fast food
 240 consumption. Both behavioral intention and perceived behavioral control were significantly
 241 associated with fast food consumption, of which behavioral intention appeared to be more
 242 important. Table 5 presents more information about predictors of fast food consumption.

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Table3. Correlation matrix of variables of the study theory (TPB)

Variable	Behavioral intention	Fast-food consumption	Knowledge	Attitude	Subjective norm	Perceived behavioral control
Behavioral intention	1.00					
Fast-food consumption	.382**	1.00				
Knowledge	.355**	.234**	1.00			
Attitude	.068	.215**	-.111	1.00		
Subjective norm	.351**	.055	.073	.292**	1.00	
Perceived behavioral control	.037	.291**	-.276**	.539**	.325**	1.00

٢٤٦ ** p<0.01

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Table4. Multiple linear regression analysis on students' behavioral intention

Model 1	Unstandardized Coefficients		Standardized Coefficients	t-value	p-value	R ²
	B	Std. Error	Beta			
Constant	10.582	2.222		4.762	.000	0.347
Knowledge	.400	.064	.340	6.292	.000	
Attitude	.000	.009	-.002	-.038	.970	
Subjective norm	.005	.011	.318	5.726	.000	
Perceived behavioral control	.150	.026	.029	.441	.659	

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Table5. Multiple linear regression analysis on students' fast food consumption behavior

Model2	Unstandardized Coefficients		Standardized Coefficients	t-value	p-value	R ²
	B	Std. Error	Beta			
Constant	2.804	1.556		1.802	.073	0.231
Knowledge	.094	.046	.127	2.061	.040	
Attitude	.009	.006	.095	1.456	.146	
Subjective norm	.003	.019	.010	.161	.872	
Perceived behavioral control	.022	.007	.205	2.967	.003	
Behavioral intention	.013	.002	.215	3.155	.000	

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٢٥٢ Discussion

٢٥٣ This investigation was conducted on a sample of university students to assess the status of their
 ٢٥٤ fast-food consumption. It also examined the factors affecting behavioral intent and fast food
 ٢٥٥ consumption by applying the TPB. The results of the present study showed that students
 ٢٥٦ consumed fast food at an average of 2.7 times a month. Fast food in male students was often

۲۵۷ reported more than female students. A study on fast food consumption among students at
۲۵۸ Daejeon School reported monthly frequencies of fast food types: 2.7 for burgers, 2.1 for French
۲۵۹ fries, 1.8 for chicken [34]. Results of Kim study and other similar researches [35, 32]
۲۶۰ approximately were in line with findings of the present study.

۲۶۱ Given that most men do not have the time and skill to make traditional foods, and because of a
۲۶۲ lot of work, they prefer to turn to fast-foods, and so they are more likely to use fast foods.
۲۶۳ Meanwhile, the results of some studies indicate that most women are not very happy from high
۲۶۴ weight and are more likely to reduce their weight [36]. Therefore women do not have a positive
۲۶۵ attitude toward obesogenic foods compared to men [37], which can be a reason for consuming
۲۶۶ less fast food among women. Instead, the results of a study done by Seo et al. In Korea indicated
۲۶۷ that fast food consumption among high school students was 4.05 times a month and this
۲۶۸ consumption was reported among boys more than girls [28]. The results of the Korean study
۲۶۹ were contrary to the results of the study, meaning that fast food in Korean samples was more
۲۷۰ than Iranian. The reason for this difference can be traced to factors such as sample size, cultural,
۲۷۱ social, and economic characteristics of the samples.

۲۷۲ Performing and not performing the behavior by a person is a function of several factors based on
۲۷۳ the theory of planned behavior. One of these factors is the person's intention and desire to do the
۲۷۴ behavior. Behavioral intention itself is also affected by factors such as attitude, students'
۲۷۵ knowledge, social pressure, and perceived behavioral control. In the present study, based on
۲۷۶ linear regression analysis, students' knowledge and social pressure were both related to their
۲۷۷ intention and consume fast foods. That is, students who had the necessary information about
۲۷۸ nutrition, especially fast foods, had a high intent to choose and consume foods.

۲۷۹ Several studies have examined the relationship between knowledge of foods and their contents
۲۸۰ and attitudes toward fast foods and processed foods or relationship between attitudes toward
۲۸۱ food additives and food choice behavior [38, 39, 40, 41]. Aoki et al. [38] found that information
۲۸۲ about food and its contents positively or negatively affects attitudes and intentions towards food.
۲۸۳ They pointed out that food information was important for consumers in choosing food. Back and
۲۸۴ Lee [42] found that consumers had inadequate and incorrect information about foods, which
۲۸۵ could affect their attitudes or intent. These studies suggest that providing more information about
۲۸۶ foods and their compounds can help them to improve their attitude towards foods. Therefore,

٢٨٧ training on the performance, benefits and safety of foods, including positive and negative sides,
٢٨٨ should prevent misunderstandings about food supplements and reduce food safety concerns.

٢٨٩ The findings of the present investigation showed that subjective norms of students were effective
٢٩٠ on intent to use fast foods. Friends had the most impact on the plan to eat fast foods, as expected.
٢٩١ In addition, the normative beliefs of students were also more positive for friends than family and
٢٩٢ teachers. This conclusion suggests that most training programs should focus on their friends as a
٢٩٣ critical group that may affect intent to use fast foods.

٢٩٤ Results of some previous studies were similar to findings of the current study. One study
٢٩٥ conducted by Mirkarimi et al. highlighted that subjective norms had the main role on students'
٢٩٦ intent to use fast foods [43]. In the other words, they found that behavioral intention was affected
٢٩٧ by subjective norms. In addition, the study of Yarmohammadi and et al showed that subjective
٢٩٨ norms predict intention and behavior [32].

٢٩٩ In this study, TPB demonstrated to be a sound conceptual framework for explaining closely 35%
٣٠٠ of the variance in students' behavioral intention to consume fast-food. Among the TPB variables,
٣٠١ subjective norm and knowledge of students were the most important predictors of intention to
٣٠٢ use fast foods. These findings are consistent with other results that identify that subjective norms
٣٠٣ have a significant effect on consuming fruits and vegetables [44]. In study of Lynn Fudge, Path
٣٠٤ analysis highlighted that TPB explained adolescent fast-food behavioral intention to consume
٣٠٥ fast food. The model identified subjective norms had the strongest relationship with adolescent
٣٠٦ behavioral intention to consume fast food [45].

٣٠٧ The results of this study showed that the attitude toward fast food behavior did not predict intent
٣٠٨ and the behavior. However, some studies have reported contradictory findings with the study.
٣٠٩ For example, the findings of Stefanie and Chery's study showed that attitude was a predictor for
٣١٠ intent to use healthy nutrition [46]. Yarmohammadi and colleagues stated in their study that
٣١١ attitude was the most important predictor of behavioral intent [32]. In the study of determinants
٣١٢ of fast food intake, Dunn et al. has identified attitude as a predictor of the intent of fast food
٣١٣ consumption [47]. The results of studies by Seo et al., Ebadi et al., along with the findings of this
٣١٤ study, showed that attitude toward fast food consumption is not significantly related to
٣١٥ behavioral intention [28, 48]. Based on the findings of the current study, fast-food consumption

of students was also influenced by some the TPB variables. Multiple linear regression analyses revealed that the constructs of the TPB explained fast food use behaviors with R-squared (R^2) of 0.23. In these analyses, intention, perceived behavioral control, and knowledge were known as effective factors on fast-food consumption. Among the TPB constructs, behavioral intention was the most important predictor of fast-food consumption. The intention plays a fundamental role in the theory of planned behavior. The intentions include motivational factors that influence behavior and show how much people want to behave and how hard they try to do the behavior [49]. In study Ebadi et al., regression analysis showed the intention as a predictor of fast food consumption behavior [48]. In studies of Stefanie et al and Seo et al, has reported intention as correlate of the behavior [46, 28]. All these studies confirmed and supported this part of our study findings. In addition, the results indicated that perceived behavioral control directly influenced the behavior of fast-food consumption. Some investigations confirmed this portion of our results. For instance, the results of Dunn et al. showed that perceived behavioral control (PBC) and intent predicted the behavior of fast food consumption [47]. Also, in the study of Seo et al., regression analysis showed that fast food consumption behavior was correlated with perceived behavioral control [28]. Yarmohammadi et al. found that in predicting behavior, perceived behavioral control along with intention could predict 6% of behavior [32]. Although this study provides valuable knowledge regarding the relationships between behavioral intent and TPB variables, this study, like other studies, has a number of limitations. First, a cross-sectional study was used to examine the relationship between the variables. Due to the fact that in cross-sectional studies, all data are collected in a period of time, as a result, these studies do not have the necessary ability to examine the cause-and-effect relationships between variables. Second, the results of this type of study can only be generalized to populations with similar characteristics and have no generalizability beyond that. Third, since the data of this study were collected using the self-report questionnaire, the respondents may have errors and bias in completing the questionnaire and this can affect the results of the study.

3.4.2 Conclusions

In sum, this study was conducted to identify factors influencing intention and behavior of fast-food consumption among students by using the theory of planned behavior. The findings revealed that changeability of students' intention to use fast food and their real behavior is

۳۴۶ dependent on the TPB variables. As this theoretical framework explained 35%, 23% of intent to
۳۴۷ consume fast-foods and fast-food consumption, respectively. Among the TPB constructs,
۳۴۸ knowledge and subjective norm were known as the most important predictors of intention to use
۳۴۹ fast foods. In addition, the results indicated that intention and perceived behavioral control were
۳۵۰ the most important factors influencing consumption of fast foods among participants. It is
۳۵۱ imperative that health educators and promoters use these results in designing suitable educational
۳۵۲ interventions to improve people's nutritional behavior.

۳۵۳ **Abbreviations**

۳۵۴ TPB: Theory of Planned Behavior; TRA: Theory of Reasoned Action; SPSS: Statistical Package
۳۵۵ for Social Sciences; BMI: Body Mass Index

۳۵۶ **Ethics approval and consent to participate**

۳۵۷ Research has been presented in the ethics committee of Urmia University of Medical Sciences and has
۳۵۸ received the code of ethics (IR. UMSU.REC.1397.43). informed consent was obtained from all
۳۵۹ participants in this study, and all provisions of the Helsinki Statement on Research Ethics were
۳۶۰ considered.

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۳۶۴ **Conflict of interest**

۳۶۵ The authors declared no conflict of interest.

۳۶۶ **Authors' contributions**

۳۶۷ All authors contribute in conceive, design of this study. A.D, S.K, A.A and S.M contributed to
۳۶۸ the design and implementation of the research, to the analysis of the results and to the writing of
۳۶۹ the manuscript.

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373 **Availability of data and materials**

374 The datasets generated during and/or analyzed during the current study are not publicly available
375 due to confidentiality of data and subsequent research, but are available from the corresponding
376 author on reasonable request.

377 **Consent for publication**

378 Not applicable.

379 **Competing interests**

380 None of the authors have any competing interests.

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383 **References**

384 1. ISAAC Steering Committee. Worldwide variation in prevalence of symptoms of asthma,
385 allergic rhino conjunctivitis, and atopic eczema: ISAAC. *Lancet* 1998; 351:1225–32.

386 2. Anonymous. Variations in the prevalence of respiratory symptoms, self-reported asthma
387 attacks, and use of asthma medication in the European Community Respiratory Health Survey
388 (ECRHS). *EurRespir J* 1996; 9:687–95.

389 3. Hijazi N, Abalkhail B, Seaton A. Diet and childhood asthma in a society in transition: a study
390 in urban and rural Saudi Arabia. *Thorax* 2000; 55:775–9.

391 4. Asher MI, Montefort S, Björkstén B, et al. Worldwide time trends in the prevalence of
392 symptoms of asthma, allergic rhinoconjunctivitis, and eczema in childhood: ISAAC Phases One
393 and Three repeat multicountry cross-sectional surveys. *Lancet* 2006; 368:733–43.

394 5. Beaglehole R, Bonita R, Horton R, et al. Priority actions for the non-communicable disease
395 crisis. *Lancet* 2011; 377:1438–47.

396 6. Devereux G. The increase in the prevalence of asthma and allergy: food for thought. *Nature*
397 *Rev Immunol* 2006; 6:869–74.

- ۳۹۸ 7. Nazari B, Asgari S, Sarrafzadegan N, et al. Evaluation and types of fatty acids in some of the
۳۹۹ most consumed foods in Iran. *Journal of Isfahan Medical School* 2010; 27 (99): 526-34.
- ۴۰۰ 8. World Health Organization (WHO). Diet, nutrition and the prevention of chronic diseases
۴۰۱ report of a joint WHO/FAO expert consultation. Geneva: WHO.2003. Available at:
۴۰۲ <http://whqlibdoc.who.int/publications/9241590416.pdf>. [Accessed Jun 21, 2011].
- ۴۰۳ 9. Ashakiran S, Deepthi R. Fast foods and their impact on health. *JKIMSU* 2012; 1 (2):7–15.
- ۴۰۴ 10. Vaida N. Prevalence of fast food intake among urban adolescent students. *IJES* 2013;
۴۰۵ 2(1):353–359.
- ۴۰۶ 11. Bowman SA, Vinyard BT. Fast food consumption of US adults: impact on energy and
۴۰۷ nutrient intakes and overweight status. *Journal of the American College of Nutrition* 2004;
۴۰۸ 23(2):163-8.
- ۴۰۹ 12. Abdollahi M, Amini M, Kianfar H, et al. Qualitative study on nutritional knowledge of
۴۱۰ primary-school children and mothers in Tehran 2008; 14(1): 82-89.
- ۴۱۱ 13. Shahanjarini A, Shojaezadeh D, Majdzadeh R, et al. Application of an integrative approach to
۴۱۲ identify determinants of junk food consumption among female adolescents. *Iranian Journal of*
۴۱۳ *Nutrition Sciences & Food Technology* 2009; 4(2):61-70.
- ۴۱۴ 14. Lee JS. A comparative study on fast food consumption patterns classified by age in Busan.
۴۱۵ *Korean Journal of Community Nutrition* 2007; 12(5):534-44.
- ۴۱۶ 15. Dehdari T, Mergen T. A survey of factors associated with soft drink consumption among
۴۱۷ secondary school students in Farooj city, 2010. *Journal of Jahrom University of Medical*
۴۱۸ *Sciences* 2012; 9(4):33-9.
- ۴۱۹ 16. Brownell KD. Does a " Toxic" Environment Make Obesity Inevitable? *Obesity Management*
۴۲۰ 2005; 1(2):52-5.
- ۴۲۱ 17. Faghieh A, Anousheh M. Evaluating some of the feeding behaviors in obese patients visiting
۴۲۲ affiliating health centers. *Hormozgan Med J* 2008; 12(1):53-60.

18. Paeratakul S, Ferdinand DP, Champagne CM, et al. Fast-food consumption among US adults and children: dietary and nutrient intake profile. *Journal of the American dietetic Association* 2003; 103(10):1332-38.
19. Timperio AF, Ball K, Roberts R, et al. Children's takeaway and fast-food intakes: Associations with the neighbourhood food environment. *Public health nutrition* 2009; 12(10):1960-64.
20. Pour Mahmoudi A, Akbar TabarTuri M, Pour Samad A, et al. Determination of peroxide in the oil consumed in restaurants and snack bar Yasuj. *Journal of knowledge* 2008; 13(1): 116-123 [In Persian].
21. SadrizadehYeganeh H, AlaviNaein A, DorostiMotlagh A, et al. Obesity is associated with certain feeding behaviors in high school girls in Kerman. *Payesh Quarterly Summer* 2007; 6(3): 193-199 [In Persian].
22. Greger N, Edwin CM. Obesity: a pediatric epidemic. *Pediatric Annals* 2001; 30(11): 694-700.
23. Ghaffari M, Gharghani Z.G, Mehrabi Y, et al. Premarital sexual intercourse-related individual factors among Iranian adolescents: A qualitative Study. *Iranian Red Crescent Medical Journal* 2016; 18(2): e21220.
24. Kim KW, Ahn Y, Kim HM. Fast food consumption and related factors among university students in Daejeon. *Korean Journal of Community Nutrition* 2004; 9(1):47-57.
25. K. M. Harris, P. Gordon-Larsen, K. Chantala, et al. "Longitudinal trends in race/ethnic disparities in leading health indicators from adolescence to young adulthood," *Archives of Pediatrics & Adolescent Medicine* 2006; 160(1):pp. 74–81.
26. I. Ajzen, "The theory of planned behavior," *Organizational Behavior and Human Decision Processes*, vol. 50, no. 2, pp. 179–211, 1991.
27. P. Branscum and M. Sharma, "Using the theory of planned behavior to predict two types of snack food consumption among Midwestern upper elementary children: implications for practice," *International Quarterly of Community Health Education* 2011; 32(1): pp. 41–55.

28. Seo H-s, Lee S-K, Nam S. Factors influencing fast food consumption behaviors of middle-school students in Seoul: an application of theory of planned behaviors. *Nutrition research and practice* 2011; 5(2):169-78.
29. Hewitt AM, Stephens C. Healthy eating among 10-13-year-old New Zealand children: understanding choice using the theory of planned behavior and the role of parental influence. *Psychol Health Med* 2007; 12:526-35.
30. Didarloo A, Shojaeizadeh D, EftekharArdebili H, et al. Factors Influencing Physical Activity Behavior among Iranian Women with Type 2 Diabetes Using the Extended Theory of Reasoned Action. *Diabetes Metab J* 2011; 35(5): 513–522.
31. Kim KW, Ahn Y, Kim HM. Fast food consumption and related factors among university students in Daejeon. *Korean J Community Nutr* 2004; 9:47-57.
32. Yarmohammai P, Sharirad GH, Azadbakht L, et al. Assessing predictors of Behavior of High School Students in Isfahan on Fast Food Consumption Using Theory of Planned Behavior. *Journal of Health Systems Research* 2011; 7(4): 449-59.
33. Brisling RW. The wording and translation of research instruments. In: Loner WJ, Berry JW, eds. *Field Methods in Cross-cultural Research*. Beverly Hills, CA: Sage; 1986:134-164.
34. Kim KW, Ahn Y, Kim HM. Fast food consumption and related factors among university students in Daejeon. *Korean J Community Nutr* 2004; 9:47-57.
35. Sanaye S, Azarghashb A, Derisi M, et al. A survey on knowledge and attitude of students of ShahidBeheshti University of Medical Sciences toward fast food. *Scientific Journal of the Medical Council of the Islamic Republic of Iran* 2016; 34(1):23-30.
36. Driskell JA, Meckna BR, Scales NE. Differences exist in the eating habits of university men and women at fast-food restaurants. *J Nutres* 2006; 26(10):524-530.
37. Morse KL, Driskell JA. Observed sex differences in fast-food consumption and nutrition self-assessments and beliefs of college students. *Science Direct Journal, Nutrition Research* 2009; 29(3):173–179.

38. Aoki K, Shen J, Saijo T. Consumer reaction to information on food additives: evidence from an eating experiment and a field survey. *J Econ Behav Organ* 2010; 73:433-8.
39. Stern T, Haas R, Meixner O. Consumer acceptance of wood-based food additives. *Br Food J* 2009; 11:179-95.
40. Kim H, Kim M. Consumers' awareness of the risk elements associated with foods and information search behavior regarding food safety. *J East Asian Soc Diet Life* 2009; 19:116-29.
41. Seo S, Kim OY, Shim S. Using the theory of planned behavior to determine factors influencing processed foods consumption behavior. *Nutrition Research and Practice* 2014; 8(3):327-335.
42. Back BS, Lee YH. Consumer's awareness and policies directions on food additives-focusing on consumer information. *J Consum Stud* 2006; 17:133-50.
43. Mirkarimi K, Mansourian M, Kabir MJ, et al. Fast Food Consumption Behaviors in High-School Students based on the Theory of Planned Behavior (TPB). *Int J Pediatr*, 2016; 4(7): 2131-42.
44. Murnaghan D A, Blanchard CM, Rodgers WM, et al. Predictors of physical activity, healthy eating and being smoke-free in teens: A theory of planned behavior approach. *Psychology and Health* 2010; 25:925-941. Doi: 10.1080/08870440902866894
45. Julie Lynn Fudge. Explaining adolescent behavior intention to consume fast food using the theory of planned behavior. Dissertation Submitted to the Graduate Faculty Of the North Dakota State University Of Agriculture and Applied Science. 2013.
46. Stefanie A, Chery S. Applying the theory of planned behavior to healthy eating behaviors in urban Native American youth. *International Journal of Behavioral Nutrition and Physical Activity* 2006; 30(3):1-10.
47. Dunn K, Mohr Ph, Wilson C, et al. Determinants of fast food consumption: an application of the theory of planned behavior. *Appetite* 2011; 23(57): 349-57.

- ٥٠١ 48. Ebadi L Rakhshanderou S, Ghaffari M. Determinants of Fast Food Consumption among
٥٠٢ Students of Tehran: Application of Planned Behavior Theory. Int J Pediatr, 2018; 6 (10): 8307-
٥٠٣ 8316.
- ٥٠٤ 49. Pender NJ, Murdaugh C, Parsons MA. Health promotion in nursing practice. 4th edition.
٥٠٥ Upper Saddle River, NJ: Prentice-Hall Health Inc 2002; P: 250-55.