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Factors Affecting Consumer's Choices of Milk Based on Reasoned Action Theory

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ABSTRACT

Background: Raw milk consumption can be associated with harmful side effects due to high risks of contamination; however, a large number of people still tend to consume raw milk. This study aimed to determine the factors affecting consumer's choice of milk (raw or pasteurized) based on Theory of Reasoned Action (TRA).

Methods: This cross-sectional study was performed on healthy individuals older than 20 years old referred to shopping centers in Tabriz, Iran. The data collection tool was a valid and reliable questionnaire designed based on the TRA to investigate the consumers' choice of milk.

Results: Overall, 266 individuals, including 104 (39.1%) males and 162 (60.9%) females with the mean age of 40.72±10.18 years participated in this study. A positive and direct correlation was observed between all TRA components including nutritional attitude, subjective norm, behavioral intention, and nutritional behavior. There was a significant direct correlation between education level and TRA components, while body mass index (BMI) showed an inverse correlation. Attitude, subjective norm, and behavioral intention could predict 87% of milk choices. Attitude and intention were the strong predictors of nutritional behavior ($p<0.05$).

Conclusion: This study provided clear evidence for the affecting role of educational level and BMI on consumers' choice of milk. In addition, it was shown that TRA can be used as a reference framework to investigate milk product preferences in future studies.

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Introduction

Dairy products are among the most nutritious foods that provide essential nutrients for consumers such as calcium, potassium, vitamin D, and protein, which are vital for a healthy life style (1). Milk consumption has a positive effect on bone health

and various diseases such as obesity, hypertension, cardiovascular disease, metabolic syndrome, and cancer (2). Given these health benefits, dairy products are the best supplements for a healthy meal, and eating 2 to 3 daily servings of milk or other dairy products has been recommended for adults (1, 3).

Microbial contaminations in raw milk and dairies have a key role in their quality and public health, which have been ignored. Aflatoxin is one of the dangerous fungal toxins produced in warm and humid storage environments (4). Various studies revealed high microbial contamination of raw milk and its products, based on the existing standards. According to a systematic review conducted by Sadeghi et al., the amount of aflatoxin in raw milk was in the range of 0-2420 ng/L in Iran (it is zero in Kurdistan and Ahvaz and the maximum contamination level belonged to Kermanshah). While its level in pasteurized milk was within the range of 0-600 ng/L and the lowest and highest levels were observed in Ahvaz (2.7 ng/L) and Shiraz (957 ng/L), respectively (4).

In addition to the health issues caused by raw milk and its products, they have a lower quality compared to pasteurized and packed dairy products due to the addition of additives by ranchers and sellers to prevent their spoilage during storage (5). Based on the numerous epidemiological studies, a large number of people tend to consume raw milk and its products because of misconceptions (5). Their consumption is associated with harmful side effects such as inhibition of RNA transcription and protein synthesis, mutagenicity, teratogenicity, carcinogenicity, brain injury, gastrointestinal disorders and suppression of immune system, as well as adverse effects on the liver, colon, kidney, and lungs, due to the high aflatoxin levels (4).

The Theory of Reasoned Action (TRA), one of the most widely used approaches in the field of food choices, was used in some recent studies to predict consumer's food choices (5-7). Based on this theory, the main determinant of a person's behavior is a person's behavioral intention. Behavior is a combination of attitudes toward the intention and subjective norms (Figure 1). This theory was designed to predict and explain behavior, to argue that an individual's decision to engage in a particular behavior is based on using available information in a reasonable manner and also to consider the consequences of his/her actions before making decisions (6).

Among the studies conducted on food choices, Mazloomi et al. investigated the cause of salt consumption in Yazd, based on the mentioned theory (8). To the best of our knowledge, there is not any study to investigate the affecting factors of consumers' preferences for using pasteurized versus raw milk based on the TRA. Hence, the present study aimed to determine the factors affecting consumers' choices of milk type based on TRA.

Materials and Methods

This cross-sectional study was conducted from October to December 2019 in Tabriz, Iran. A total of 314 apparently healthy individuals were invited to participate in the study from the people who referred to shopping centers (hypermarkets) of Tabriz, Iran. Overall, 266 individuals participated in the study using a convenience sampling method. The inclusion criteria were age ≥ 20 years, responsibility for food purchase, lack of cardiovascular diseases, diabetes or cancer, and willingness to participate in the study. People older than 65 years, patients with dementia and Alzheimer's disease, illiterate people, as well as pregnant and lactating women were excluded from the study. This study was approved by the Local Ethics Committee. All the study steps were performed in accordance with the Helsinki Declaration.

The instrument used in the study included a validated questionnaire as described before (5) (Table 1). The questionnaire consisted of 4 sections, each consisting of specific questions on the factors affecting consumer's choices of raw or pasteurized milk including 18 questions on nutritional attitude, 3 questions on the subjective norm, 3 questions on behavioral intention, and 8 questions on nutritional behavior. A 5-point Likert scale was used to score different components of the proposed theory (from 1: strongly disagree to 5: strongly agree). Reverse scoring was used for the questions with the opposite meaning (1: strongly agree to 5: strongly disagree). As a result, the scores of the nutritional attitude section ranged from 18 to 90, the scores of the subjective norm section ranged from 3 to 15, the scores of the behavioral intention section ranged

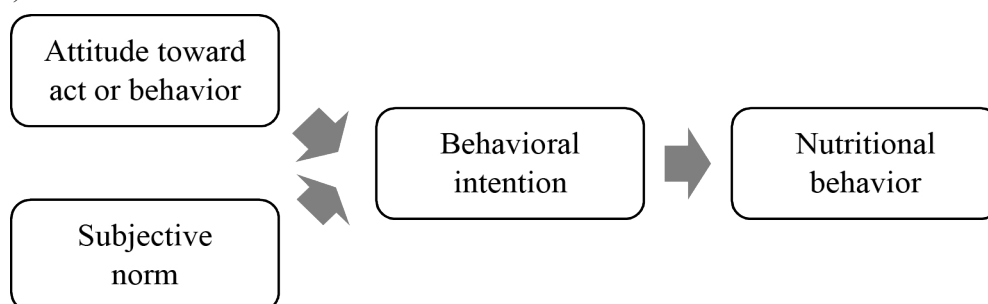


Figure 1: Theory of reasoned action (TRA) diagram.

Table 1: The questionnaire of factors affecting consumer choice of milk (raw or pasteurized) based on the Theory of Reasoned Action.

Component	Questions
Nutritional attitude	I believe that boiling reduces the vitamins and minerals of milk.
	The food label on the milk packaging is very important in my choice.
	I believe that pasteurized milk contains a lot of harmful additives.
	I believe that raw milk has a high microbial content.
	I believe that the fat status in raw milk is higher than pasteurized.
	I believe that the amount of vitamins and minerals in raw milk is higher than pasteurized.
	Raw milk is more perishable than pasteurized.
	Additives in pasteurized milk are carcinogenic.
	The pleasant taste of raw milk is due to its high fat content.
	The raw milk has not any palm oil.
	The quality of raw milk is higher than pasteurized.
	Pasteurized milk contains some milk powder.
	Consumption of pasteurized milk causes digestive problems.
	Consumption of raw milk is financially cheaper than pasteurized.
	The pasteurized milk has a pleasant taste.
The yellow color of raw milk is pleasant to me.	
Subjective norm	Pasteurized milk tastes like water.
	Raw milk is tastier than pasteurized dairy.
	The mother and child of the family have the most roles in choosing the type of consumed milk.
Nutritional intention	The media and advertising are influential in choosing the type of consumed milk.
	Public beliefs and misinformation lead people to consume raw milk.
Nutritional behavior	I want to increase my daily milk consumption.
	I prefer to drink raw milk.
Nutritional behavior	If I make sure the raw milk is healthy, I will definitely drink it.
	I drink milk daily.
	I often drink pasteurized milk.
	According to the pleasant taste of raw milk, I drink more of that compared to pasteurized milk.
	I boil the raw milk for 30 minutes.
	As, I do not have enough time to boil raw milk, I drink pasteurized.
	According to easier accessibility of pasteurized dairy, I drink it.
	I do not have enough time to buy raw milk from reliable stores.
Raw milk is cheaper than pasteurized, so I usually drink raw milk.	

Options for answers were: Strongly disagree; Disagree; Neither agree nor disagree; Agree; Strongly agree

from 3 to 15, the scores of the nutritional behavior section ranged from 8 to 40, and the questionnaire total score ranged from 32 to 160.

Another questionnaire was also designed and completed to collect demographic data. This questionnaire consisted of questions on age, gender (male or female), marital status (single or married), occupation (housewife, employee, self-employed and retired), and educational level (a high school diploma or less, Bachelor's and Master's Degrees and higher). The questionnaires were completed by a trained nutritionist using a face-to-face method. The participants' body weight was measured at the lowest level of clothing and the accuracy of 0.1 kg using the SECA scale, model: 713. Their standing height was measured using a non-stretch tape meter fixed to the wall, without shoes. Finally, their body mass index (BMI) was calculated based on this formula: weight in kilograms divided by height in meters squared (9).

Data analysis was performed using SPSS software (Version 21, Chicago, IL, USA). Descriptive statistics, the independent sample t-test, ANOVA, the Pearson correlation coefficient, Spearman's correlation coefficient, and linear regression were used to analyze the results. A *p* value less than 0.05 was considered statistically significant.

Results

A total of 266 adults, including 104 (39.1%) males and 162 (60.9%) females, participated in the study. The mean age of the participants was 40.72±10.18 years and the mean BMI was 24.56±3.44 kg/m². The majority of the participants (84.2%) were married and 55.3% of them had a bachelor's degree. Table 2 summarizes the demographic and anthropometric characteristics of the participants. The mean total score of all 4 sections of the questionnaire was 103.25±20.10. The mean scores of the questions

Table 2: Demographic characteristics of the participants.

Variable		N (%)	Mean±SD	Minimum	Maximum
Gender	Male	104 (39.1)			
	Female	162 (60.9)			
Marital Status	Single	42 (15.8)			
	Married	224 (84.2)			
Occupation	Housewife	96 (36.1)			
	Employee	101 (38.0)			
	Self-Employed	59 (22.2)			
	Retired	10 (3.8)			
Education	Diploma or lower	82 (30.8)			
	BS.	147 (55.3)			
	Postgraduate	37 (13.9)			
Age (years)			40.72±10.18	20	65
Weight (Kg)			68.73±8.82	45	93
Height (cm)			167.57±6.84	152	183
BMI (Kg/(m) ²)			24.56±3.44	16.14	33.20

BMI: Body Mass Index, SD: standard Deviation, BS: Bachelor of Science

Table 3: Total theory of reasoned action and its components score based on the demographic and anthropometric characteristics of the participants.

Variable		Nutritional attitude	Subjective norm	Behavioral intention	Nutritional behavior
Total		55.45±10.44	9.33±2.25	9.90±2.78	28.54±6.92
Gender	Male	54.47±10.61	9.20±2.35	9.83±2.88	28.25±7.25
	Female	56.09±10.32	9.42±2.18	9.95±2.72	28.73±6.72
	<i>p</i> value*	0.21	0.43	0.74	0.58
Marital Status	Single	57.28±9.72	9.66±2.40	10.30±2.76	29.47±6.57
	Married	55.11±10.56	9.27±2.22	9.83±2.78	28.37±6.99
	<i>p</i> value*	0.21	0.30	0.30	0.34
Occupation	Housewife	55.19±9.94	9.22±2.20	9.82±2.84	28.43±6.91
	Employee	55.95±10.87	9.41±2.33	9.95±2.70	28.55±6.65
	Self-Employment	55.86±10.38	9.40±2.33	10.06±2.80	29.06±7.27
	Retired	50.60±11.40	9.20±1.54	9.30±3.19	26.50±8.19
	<i>p</i> value [#]	0.47	0.93	0.85	0.74
Education	Diploma or lower	51.75±8.76	8.63±1.97	9.10±2.78	26.56±7.08
	BS.	57.23±10.88	9.59±2.38	10.16±2.82	29.27±7.00
	Postgraduate	56.59±10.23	9.89±1.96	10.64±2.22	30.08±5.29
	<i>p</i> value [#]	<0.001	0.002	0.005	0.006
BMI	Underweight	54.11±6.72	9.55±1.67	11.22±1.30	32.33±4.00
	Normal	57.36±8.94	9.59±1.86	10.20±2.41	29.73±6.16
	Overweight	54.72±12.18	9.28±2.72	9.72±3.23	27.67±7.17
	Obese	55.61±10.45	8.26±2.30	9.91±2.80	23.65±8.83
	<i>p</i> value [#]	0.004	0.068	0.015	<0.001

TRA: Theory of Reason Action, BS: Bachelor of Science, BMI: Body Mass Index, *Independent sample t-test, [#]ANOVA, P value <0.05 considered as significant. Maximum score: Nutritional attitude=90, Subjective norm=15, Behavioral intention=15, Nutritional behavior=40

on nutritional attitude, subjective norm, behavioral intention, and nutritional behavior were 55.45±10.44, 9.33±2.25, 9.90±2.78, and 28.54±6.92, respectively.

The mean score of each section was significantly associated with the participants' educational level; so that the scores of the participants who had high school diploma or less educational levels were significantly lower than others (*p*<0.05). Also, the female

participants had higher score than males; however, the difference was not statistically significant (104.20±19.86 and 101.76 ±20.72, respectively). The subjects in different BMI groups had different scores on attitude, intention, and nutritional behavior; the participants with normal BMI had the highest scores on nutritional attitudes and behaviors, while those with a low BMI had the highest scores on nutritional

Table 4: Correlation between educational level and BMI with theory of reasoned action components.

Variable	Nutritional attitude		Subjective norm		Behavioral intention		Nutritional behavior		Education		BMI	
	r*	p	r*	p	r*	p	r*	p	r*	p	r*	p
Nutritional attitude	-	-	0.656	<0.001	0.686	<0.001	0.717	<0.001	0.199	0.001	-0.208	0.001
Subjective norm	-	-	-	-	0.682	<0.001	0.640	<0.001	0.209	0.001	-0.165	0.007
Behavioral intention	-	-	-	-	-	-	0.924	<0.001	0.198	0.001	-0.213	<0.001
Nutritional behavior	-	-	-	-	-	-	-	-	0.191	0.002	-0.286	<0.001
Education	-	-	-	-	-	-	-	-	-	-	-0.154	0.012
BMI	-	-	-	-	-	-	-	-	-	-	-	-

TRA: Theory of Reasoned Action, BMI: Body Mass Index, *Pearson correlation, #Correlation is significant at the 0.01 level.

Table 5: Predictors of nutritional behavior among the participants.

Variable	Beta	p value*	R ²
Nutritional attitude	0.166	<0.001	0.87
Subjective norm	-0.038	0.251	
Behavioral intention	0.835	<0.001	

*Based on linear regression

intentions (Table 3).

Table 4 shows the relationship between the components of the TRA, as well as their relationship with the participants' level of education and BMI. There was a direct and significant correlation between attitude, subjective norm, intention, and nutritional behavior ($p < 0.05$). Among the components, the behavioral intention had the greatest influence on nutritional behavior ($r = 0.924$, $p < 0.001$). Educational level and BMI were also significantly correlated with all of the TRA components, so that a direct correlation was visible between educational level and the components; while an inverse correlation was found between BMI and the components. There was also a significant inverse correlation between the participants' educational level and their BMI ($r = -0.154$, $p = 0.012$).

The results of regression analysis showed that nutritional attitude, subjective norm, and behavioral intention could predict 87% of participants' nutritional behaviors. Attitude and intention were the strong predictors of nutritional behavior ($p < 0.05$) and behavioral intention ($\beta = 0.835$) was the strongest predictor of nutritional behavior; however, subjective norm could not predict nutritional behavior ($p = 0.251$) (Table 5). Among the questions on nutritional attitude, 46.6%, 49.2%, 47.5% and 45.5% of the participants disagreed with the statements 1: (I believe that boiling milk depletes its vitamins and minerals), 3: (I believe that pasteurized milk contains harmful additives), 6: (I believe that vitamins and minerals of raw milk are greater than those in pasteurized milk), and 17: (pasteurized milk tastes like water), respectively.

Among the questions on the subjective norm,

45.5% of the participants disagreed with statement 19: (mothers and children have the most important role in the choice of type of dairy). Among the questions on nutritional behavior, 45.5% of the participants disagreed with the statement 26: (I often consume pasteurized milk), and 50.8% and 45.9% of the participants disagreed with statements 31 and 32: (I do not have enough time to search for safe raw milk) and (raw milk is cheaper than pasteurized milk, that's why I consume it), respectively.

Discussion

Studying the factors affecting food choices through theories can lead to designing effective educational programs and increasing the effectiveness of educational interventions to promote healthy nutrition in communities. Since theories are suitable tools for providing information on the processes of intervention and evaluation, researchers believe that the effectiveness of theory-based interventions is greater than that of non-theory-based interventions (10). Therefore, the present study aimed to determine the factors affecting adults' choices of milk's type in Tabriz, Iran based on the TRA.

This study revealed a positive and direct correlation between the components of the TRA and nutritional behavior. Among the components, intention had the highest correlation with behavior. In the study conducted by Baji et al. on high school female students, self-efficacy and intention had the highest correlation with students' nutritional behaviors (11). In the present study, all the components of the TRA could predict behavior as 87%. According to the study conducted by Baji et al., the TRA could predict 24% of the changes in

the students' nutritional behaviors (11). Further, in the study conducted by Taghipour et al., the TRA could predict 24% of the variances in self-care behavior among women with type 2 diabetes (12). Furthermore, in the study conducted by Tavousi et al., the mentioned theory could predict 28% of the variances in the substance abuse behavior (13).

In the current study, the nutritional attitude played an important role in predicting behavior of participants. In the studies conducted by Gholami and Babazadeh, who assessed the predictors of fruit and vegetable consumption, the attitude was recognized as a strong predictor of behavior (14, 15), which is consistent with the results of the present study. Attitude refers to a set of beliefs toward a particular subject and reflects a person's general feeling on desirability or non-desirability of many things. Sometimes people's attitudes and experiences may lead to goal achievement and realization of the target behavior, i.e. consumption. Therefore, different beliefs and attitudes originating from internal factors affected people's consumption behavior (14).

The consumers' subjective norms, as perceptions of social pressures from family, friends, and colleagues, did not have any effects on milk consumption and could not predict nutritional behavior of the study participants. This finding is consistent with the findings of Gholami et al. who evaluated the predictors of fruit and vegetable consumption (14). Also, in the study conducted by Tavousi et al., subjective norms were the weakest predictors of substance abuse behavior (13). Further, in the study conducted by Beigi Davarani et al. who predicted nutritional behaviors among cardiovascular patients, subjective norms could not predict the behavior (16).

In consistent with the results of these studies, in a study on predictors of fast food consumption behaviors among students in Seoul, the intention to consume fast food was strongly correlated with subjective norms. The students were more likely to consume fast food in the company of friends, and friends were introduced as the most important people influencing the students' nutritional behavior (17). It seems that people at younger ages are more affected by social pressures to have unhealthy dietary behavior and inconsistent findings across studies can be attributed to different characteristics of the study population and the type of behavior under investigation (17).

In this study, the intention was the best predictor of nutritional behavior. The high predictive capability of intention in this study is consistent with the results of other studies (16-18). Behavioral intention included the action and motivation for engagement in

a particular behavior. So, people with the motivation to engage in a given behavior were more likely to show that behavior. Therefore, the performance of a behavior is determined by the individual's behavioral intention (14). Also, the results of the present study showed that educational level and BMI had significant effects on the choice of milk products. As people's level of education increased, they were more inclined to consume pasteurized milk. However, people with lower BMI were more persuaded to consume pasteurized milk; in other words, higher BMI was related to consumption of raw milk. Based on the TRA, demographic variables were among the variables that can affect healthy behaviors (19).

Accordingly, in this study, the level of education was one of the factors affecting consumers' choices of milk (pasteurized vs. raw), and people with higher levels of education were more inclined to consume pasteurized milk. This finding was also confirmed in other studies which assessed the factors affecting food choices (3, 8, 20). The study of Mazloomi et al. illustrated a significant correlation between the level of education and attitude toward refraining from eating salty foods (8). Also, the study conducted by Bleakly et al. revealed a positive correlation between educational level and the intention to replace consumption of sugar-sweetened beverages with unsweetened ones (20). It is suggested that people with higher levels of education had more positive attitudes and they were more exposed to health messages during their studies, so they were motivated to stay healthy (20).

The present study showed that people with higher BMI were more inclined to consume raw milk, while the participants with normal BMI had the highest scores of nutritional attitudes and behaviors and preferred pasteurized milk. In the line of current study, the study conducted by Esmaeili et al. demonstrated that individuals with abdominal obesity, preferred to eat high-fat products such as raw unpasteurized dairy products (19). According to the findings of Rahnema et al., one of the factors influencing consumer choice of dairy products in Iran was their effective role on the body weight (2).

The studies conducted by Kratz et al. and Scharf et al. have shown that observational evidences did not support the hypothesis that high-fat dairy or whole milk increased the risk of obesity. An inverse correlation has been reported between the consumption of high-fat dairy products or whole milk in regular diets and the risk of obesity. At least, in theory, consumption of high-fat milk may lead to less weight gain. The fat can induce satiety caused by cholecystokinin release. This can potentially reduce

the appetite for other high-calorie foods (21, 22).

Based on this theory, the results of the present study was not unexpected. These findings indicated that people with higher BMI were more inclined to consume raw milk which is considered high-fat milk and caused a decreased appetite. Since they were highly sensitive to their appetite, they were more inclined to consume this type of milk. The findings of the present study also showed that underweight people had the highest nutritional intention to consume pasteurized milk. It seems that their intention to consume pasteurized milk does not lead to behavior due to the higher price of pasteurized milk and the financial inability of these people to provide these products (23).

As reported in the results section, the answers of the majority of the subjects to the questions of the attitude section showed that they had a positive attitude towards pasteurized milk. The positive attitude towards pasteurized milk in the present study can be attributed to the health messages helping to teach and encourage them. In another study on food choices, most participants reported that reducing sodium-rich convenience foods was more important than adding salt and the intention to reduce sodium in the next six months was correlated with attitudes toward the importance of reduction in sodium (23).

The positive correlation between attitude and intention indicated that the more positive an individual's attitude toward a behavior, the greater was his/her intention to perform the behavior (8). The study conducted by Mazloomi et al. revealed a strong positive and significant correlation between the attitude towards refraining from salt intake and intentional addition of less than a teaspoon of salt during cooking (8). According to the results of the present study, most of the subjects did not consume pasteurized milk. However, most of the participants stated that they did not have enough time to search for safe raw milk; many of them consumed raw milk; since it was cheaper than pasteurized milk. This shows that people prefer to consume raw milk due to its lower price despite not having enough time to search for safe raw milk. It seems that consumers are concerned about the rising prices of dairy products caused by Iran's economic crisis (2).

Therefore, the price can be one of the most important factors influencing consumers' dairy product preferences (2). Various studies have shown the effect of food prices on food consumption (3, 24). In the study conducted by Rezabeigi et al. (16) to "predict the factors influencing nutritional behaviors related to cardiovascular diseases", 52.3% of the subjects agreed or strongly agreed that they

could not afford a healthy diet due to the high prices of nutritious foods. A study on the predictors of fruit consumption status among the students of Tehran University of Medical Sciences showed that increased income was associated with increased fruit consumption (25).

The findings of Babazadeh et al. indicated that the amount of students' pocket money was significantly correlated with their fruit and vegetable consumption (15). The results of a study on factors affecting consumers' dairy product preferences also showed that the rise in prices and household expenses could reduce the probability of choosing healthy dairy products such as low-fat yogurt and it was shown that a unit increase in prices could reduce this probability by 0.31% (3). Therefore, it seems that a lack of financial resource can be one of the barriers that easily affect healthy nutritional behavior (16).

The results of the present study also showed that the majority of people disagreed that mothers and children had the most role in consumer's choice of milk. This can be attributed to the fact that in Iran, fathers are often responsible for household expenses and food purchases, and probably, for this reason, they have the most important role in the choice of milk type. The TRA has so far been used in many studies on food choices (8, 19, 26-28); however, no study has been conducted so far on the factors affecting consumers' choice of milk type (raw or pasteurized) using this theory. Although the findings of the present study increased our insight into the factors affecting consumers' choice of milk type based on the proposed model.

There were also some limitations: The first limitation was that a cross-sectional study was used to describe the relationships between the variables. One of the critical characteristics of a cross-sectional study was that data was collected at one given point in time leading to a limited ability to determine causal relationships between variables. The second limitation was self-report data which may not reflect the actual performance of the subjects, so an attempt was made to remove this limitation by explaining the research objectives and establishing trust between the research participants and the researcher via maintaining the confidentiality of data and ensuring the participants that participation was voluntary and they could leave the research at any time. The third limitation was the convenience sample of people living in Tabriz who participated in this study. Therefore, it is necessary to conduct this study on other ethnic groups too.

Conclusion

Given the research findings, the educational level and

BMI played important roles in consumer's choice of milk type. Hence, educational interventions should be designed taking into account these two factors in the target population. Further, TRA showed to be an appropriate model for predicting dairy consumption by adult population. This theory can also be used (emphasizing the importance of behavioral intention and attitude) for educational interventions to reduce raw milk consumption. Moreover, the results can be confirmed in larger studies, so that appropriate educational interventions can be designed to reduce raw milk consumption considering the high rate of its contamination.

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Conflict of Interest

None declared.

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