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Dairy Foods Intake among Female Iranian Students: A Nutrition Education Intervention Using a Health Promotion Model

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Abstract

Introduction: This aim of this study was to increase dairy consumption in students following an education intervention based on Pender's Health Promotion Model (Pender's HPM) variables.

Methods: The study was done during September 2014-April 2015 in Savojbolagh, Alborz, Iran. The study sample included 142 middle-school female students who were allocated to either the intervention (n=71) or the comparison group (n=71). Pender's HPM variables and the daily servings of dairy foods consumed were measured in both groups by a self-administered questionnaire and a 3 d record before the intervention and 4 weeks later. The 4-week intervention was conducted for the intervention group. The data was analyzed through analysis of covariance and paired t tests.

Results: Compared to the comparison group, there were significant differences in Pender's HPM variables (except for the negative feelings, perceived barriers and competing demands), the daily servings of dairy foods consumed, and intakes of Calcium, riboflavin, and vitamin A in the intervention participants following the conducted intervention program.

Conclusion: Developing theory-driven nutrition education programs may increase student's dairy foods intake.

Keywords: health promotion model, intervention, student, dairy intake

1. Introduction

Despite the nutritional benefits of dairy foods, as a good source of protein and micronutrients (Mirmiran, Esmaillzadeh, & Azizi, 2005; Poddar, Hosig, Nickols-Richardson, Anderson, & Herbert, 2009; Weinsier & Krumdieck, 2000; Massey, 2001), the rate of it consumption is still lower than the recommended amounts (Larson, Story, Wall, & Neumark-Sztainer, 2006; Larson, Neumark-Sztainer, & Harnack, 2009; Murphy, Barraj, Toth, Harkness, & Bolster, 2015). It has also been reported that the intake of dairy foods is insufficient among Iranian population (Azadbakht & Esmaillzadeh, 2012; Azadbakht, Mirmiran, Hosseini, & Azizi, 2005; Dehdari, Manafi, & Saki, 2013), especially adolescents (Akbari & Azadbakht, 2014; Omidvar et al., 2015). Poor knowledge of Calcium requirements, personal negative beliefs to eat dairy products, unavailability of dairy foods at home, parents no expectations of their child to eat dairy foods, not providing social support, low socioeconomic status, no desire to drink milk, and skipping breakfast are known as the variables which may limit dairy foods intake (Omidvar et al., 2015; Poddar, Hosig, Anderson, Anderson, Herbert, & Duncan, 2010). Previous studies have demonstrated the need for nutrition education programs in order to address the variables (Poddar, Hosig, Anderson, Herbert, & Duncan, 2010; Sahyoun, Pratt, & Anderson, 2004; Baird, Syrette, Hendrie, Riley, Bowen, & Noakes, 2012). It is noteworthy that using behavior change theories in developing effective nutrition programs may improve dairy foods intakes among various groups (Poddar, Hosig, Anderson, Herbert, & Duncan, 2010; Sahyoun, Pratt, & Anderson, 2004; Babatunde, Himburg, Newman, Campa, & Dixon, 2011). Hence, in the present study, we used Pender's Health Promotion Model (Pender's HPM) as a conceptual framework in designing the content of training sessions. The model has been recommended for diet interventions (Dehdari, Rahimi, Aryaeian, & Gohari, 2014). It includes three main elements that influence health-enhancing behavior: (i) individual variables and experiences; (ii) cognitions and feelings about a behavior; and (iii)

favorable health promotion behavior (Pender, Murdaugh, & Parsons, 2002). Given the importance of adequate dairy foods consumption among the adolescents (Baird, Syrette, Hendrie, Riley, Bowen, & Noakes, 2007), and the clear need for delivering theory- driven education interventions in this field (Poddar, Hosig, Anderson, Nickols-Richardson, & Duncan, 2010; Sahyoun, Pratt, & Anderson, 2004; Baird, Syrette, Hendrie, Riley, Bowen, & Noakes, 2012), this study was developed to test the effectiveness of an education program based on Pender's HPM variables to increase dairy foods intake in a sample of students in Iran.

2. Method

2.1 Sample

This quasi-experimental study was conducted in Savojbolagh, Alborz, Iran, from September 2014 to April 2015. First, two middle schools were randomly selected. In the next step, 71 female students in the 7th grade were selected from each school and then allocated to either intervention group (n=71) or the comparison group (n=71). Selection criteria were as follows: no history of vitamin or mineral supplement usage in the past six months, no history of lactose intolerance, allergy to milk proteins, galactosemia and phenylketonuria. The study was confirmed by the Ethic Committee of the Iran University of Medical Sciences. All female students were informed about the objectives of the study and a written consent was obtained from them.

2.2 Instruments

A self-administered 69-items questionnaire which was developed by the authors was used to measure demographics and Pender's HPM items in terms of dairy foods intake. According to the literature and the beliefs of twenty female students about dairy foods consumption, the scale items were developed. Face validity of the items was measured by the thirty students (Jenkinson & McGee, 1998). In this stage, seven items were edited. In this study, quantitative content validity of the instrument was measured by an expert panel of 10 specialists in health education and health promotion and nutrition. Based on the experts' opinions, content validity ratio and content validity index of the items were calculated. In this study, items having content validity ratio less than 0.62 and content validity index less than 0.80 were omitted from the questionnaire (Lawshe, 1975; Polit & Beck, 2004). In this stage, a total of ten items (3 items of prior related behavior sub-scale, 2 items of perceived benefit, 4 items of perceived barriers and 1 item of situational influences sub-scale) were deleted from the scale. In the present study, we assessed Cronbach's α of the variables. The estimate of $\alpha \geq 0.70$ is considered satisfactory (Cronbach, 1951). After calculating Cronbach's α, a total of one item of positive activity-related affect sub-scale was deleted from the scale. The remaining 69 items of the final instrument to measure Pender's HPM variables in terms of dairy foods consumption and Cronbach's alpha of the variables are shown in Table 1. Also, the number of servings of dairy foods consumed and the intakes of macro- and micronutrients of dairy foods eating were assessed using a 3 d record. The groups were completed the questionnaire at baseline and 4 weeks after the intervention (follow-up).

Table 1. Items of the instrument to measure Pender's Health Promotion Model associated with dairy foods consumption and Cronbach's alpha of variables

Variables	Items	Responses (coding used for analyses)	Cronbach Alpha
Past related behavior	**a)** What attempts have you made in the past for eating dairy foods? 1. I have tried to drink a glass of milk before going to bed. 2. I have tried to eat dairy foods such as milk instead of junk foods during the day. 3. I have tried to eat dairy foods such as yogurt instead of soft drinks in the main meals. 4. I have tried to eat dairy foods such as milk instead of soft drinks for the breakfast meals. **b)** What did you learn from these efforts? 1. I could concentrate more at class when I ate dairy foods. 2. When I consumed dairy foods, I got hungry late.	8 items on a 5-point scale (1 = never to 5=always).	0.73

	3. I had more energy when I consumed dairy foods. 4. When I drank milk, I had a better sleep.		
Perceived benefits	1. Eating dairy foods enhances bones strength. 2. Eating dairy foods enhances height. 3. Eating dairy foods increases the resistance to infection. 4. Eating dairy foods prevents from cardiovascular diseases. 5. Eating dairy foods improves memory. 6. Eating dairy foods promotes health. 7. Eating dairy foods enhances teeth strength.	7 items on a 5-point scale (1 = strongly disagree to 5 = strongly agree).	0.74
Perceived barriers	1. I don't feel like eating dairy foods such as milk. 2. Some of the dairy foods such as milk lack a good taste and smell. 3. Dairy foods are expensive. 4. Dairy foods contain a lot of preservatives. 5. Dairy foods increase brucellosis. 6. My family members are not in a habit of eating dairy foods.	6 items on a 5-point scale (1 = strongly disagree to 5 = strongly agree).	0.70
Self-efficacy beliefs	1. I can plan my schedule in a way to eat 2 to 3 servings of low-fat dairy foods every day. 2. Even if nobody eats dairy foods in our family, I can consume it myself. 3. I can eat yogurt instead of soft drinks in the lunch and dinner meals. 4. Even if I don't eat breakfast, I can provide a cheese and bread sandwich and eat it in the school. 5. I can eat milk or a cheese and bread sandwich instead of fast foods. 6. I can eat milk instead of low nutritional- value snacks. 7. In case I do not like the taste of milk, I can consume other dairy foods such as yogurt and cheese. 8. In case I do not like the taste of simple milk, I can consume the milk combined with natural substances such as cocoa, banana, dates, honey, etc. 9. In case of feeling nauseous after the milk consumption, I can drink it little by little, so my stomach gets used to it. 10. I can eat dairy foods in all meals.	10 items on a 5-point scale (1 = strongly unconfident to 5 = strongly confident).	0.72
Positive feelings	1. Eating dairy foods is enjoyable to me in the morning. 2. Eating dairy foods makes me happy. 3. Eating dairy foods makes me relax before sleeping. 4. I feel vigor by eating dairy foods.	4 items on a 5-point scale (1 = strongly disagree to 5 = strongly agree).	0.71
Negative feelings	1. I hate eating some of dairy foods such as milk. 2. Eating dairy foods makes me feel sleepy.	2 items on a 5-point scale (1 = strongly disagree to 5	0.71

		= strongly agree).	
Interpersonal influences	**a)** Do any of your family or friends expect you to consume dairy foods 2 to 3 servings per day? 1. Does your mother expect you to eat 2 to 3 servings of dairy foods per day? 2. Does your father expect you to consume 2 to 3 servings of dairy foods per day? 3. Do your sisters and brothers expect you to consume 2 to 3 servings of dairy foods per day? 4. Does your teacher expect you to consume 2 to 3 servings of dairy foods per day? 5. Do your friends expect you to consume 2 to 3 servings of dairy foods per day? **b)** Will anybody encourage you to consume 2 to 3 serving of dairy foods per day? 1. Does your mother encourage you to consume 2 to 3 servings of dairy foods per day? 2. Does your father encourage you to consume 2 to 3 servings of dairy foods per day? 3. Do your other family members encourage you to consume 2 to 3 servings of dairy foods per day? 4. Does your teacher encourage you to consume 2 to 3 servings of dairy foods per day? 5. Do your friends encourage you to consume 2 to 3 servings of dairy foods per day?	10 items on a 5-point scale (1 = never to 5=always).	0.78
Situational influences	1. I enjoy eating dairy foods at home. 2. I enjoy eating dairy foods such as milk in school. 3. I enjoy drinking a glass of warm milk in the cold weather. 4. I enjoy drinking dairy foods (e.g. milk) on the way to school. 5. I enjoy eating dairy foods (e.g. milk) in the reading room. 6. I enjoy eating dairy foods (e.g. milk) in front of TV. 7. I enjoy eating dairy foods at restaurant.	7 items on a 5-point scale (1 = strongly disagree to 5 = strongly agree).	0.77
Immediate competing demands and preferences	1. I prefer to eat junk foods instead of milk or other dairy foods. 2. I prefer to eat fast foods (such as pizza or sandwich) with a soft drink instead of eating yogurt. 3. I prefer to eat soft drinks instead of dairy products in the meals. 4. I prefer to eat pickles instead of dairy foods in the lunch and dinner meals.	4 items on a 5-point scale (1 = never to 5=always).	0.77
Commitment to planning for dairy foods eating	1. How much are you committed to eat dairy foods in the breakfast meals? 2. How much are you committed to eat dairy foods instead of pickles in the lunch and dinner meals? 3. How much are you committed to drinking	7 items on a 5-point scale (1 = non to 5= very much).	0.71

	one glass of milk before sleeping?
	4. How much are you committed to eat dairy foods such as yogurt in the dinner meals?
	5. How much are you committed to eat dairy foods instead of junk foods during the day?
	6. I have planned that in case I do not like the taste of simple milk, I can consume the milk combined with natural substances such as cocoa, banana, dates, honey, etc.
	7. I have planned to consume foods cooked with the dairy foods (for example, milk soap).

2.3 Intervention Program

A theory-driven education program was designed according to Pender's HPM items. Three posters illustrating the benefits of dairy foods intake were hung in the school. In a training session, a nutrition expert explained to participants' parents and teachers about the role of dairy foods in improving the health of adolescents and the influencing factors in dairy foods consumption such as availability of dairy foods at home and the role of parents in children's eating pattern and preferences. The researches asked them to encourage students about eating dairy products. Then, intervention participants were divided into 7 groups (10 persons in each group). Four 40-45 min training sessions were delivered for the groups within one month. In the first session, a group discussion to the necessity of consuming dairy foods such as milk, yogurt and cheese - for all the meals and benefits of eating dairy products was conducted. Meanwhile, the rate of daily need for intake of dairy foods was explained to them through a poster regarding food pyramid. In the second session, during a group discussion, students in the intervention group discussed about barriers and their positive and negative feelings to eating dairy foods. An instructional story-book about the benefits of dairy foods intake, barriers to dairy foods consumption and strategies to overcome them which were developed by the authors was presented to the intervention participants. Increasing self-efficacy beliefs for dairy foods eating was considered in the third session. For this purpose, students expressed and shared their experiences and feelings upon dairy foods intake with other participants during a group discussion session. Students were encouraged to eat 2 to 3 servings of low-fat dairy products per day (e.g. drink 2 to 3 cups of milk). In this session, practical strategies for eating dairy foods in the meals were also explained to the students. In the fourth session, through a role-playing, students discussed and reflected their opinions about the most competing demands of dairy foods intake (such as the tendency to eat low nutritional-value snakes such as biscuits and cakes for the breakfast meals instead of eating milk or other dairy foods, enjoying eating fast foods or the meals with a soft drink instead of dairy products and the tendency to eat pickles instead of dairy foods in lunch or dinner meals). In this session, the participants were encouraged to develop commitment to eating dairy foods in their diet. In addition, they received an educational CD which consisted of movies and texts about the intake of dairy foods. It is noteworthy that we emphasized the necessity of eating low-fat dairy foods in all educational sessions.

2.4 Statistical Analysis

The data were analysed by SPSS software package (version 21.0) and Food Processor 2 software. The homogeneity of demographics of both groups was analysed by Chi-square. Date normality was tested using Kolmogorov-Smirnov test. Paired *t* tests were used to test the within-group changes. Differences in outcomes between the two groups were tested with Analysis of Covariance. The data were expressed as mean±SD. Significant for all results was set at the $P<0.05$ level.

3. Results

Table 2 shows the demographic characteristics of the students in the two groups. Final results indicated that there were significant differences in Pender's HPM variables (except for the negative feelings, perceived barriers and competing demands), the number of servings of dairy foods consumed and intakes of Calcium, riboflavin, and vitamin A in the intervention group than the comparison group (See Table 3 and 4).

Table 2. Demographics of subjects in the intervention (n=71) and the comparison group (n=71)

	Intervention group		Comparison group	
	n	%	*n*	%
Occupation of father	71	100	71	100
Self-employed	26	37	20	28
Employee	12	17	25	35
Casual labourer	26	36	18	25
Retired	7	10	8	12
Occupation of mother	71	100	71	100
Self-employed	8	11	6	9
Employee	13	19	11	15
Household duties	50	70	54	76
Father's education level	71	100	71	100
lliterate	1	1	0	0
≤12th grade	29	41	22	31
>12th grade	41	58	49	69
Mother's education level	71	100	71	100
lliterate	2	3	1	2
≤12th grade	32	45	18	25
>12th grade	37	52	52	73

Table 3. Comparison of consumption of dairy foods and Pender's Health Promotion Model variables at baseline and follow-up in the intervention (n=71) and the comparison group (n=71)

	Intervention group				Comparison group			
	Baseline		Follow-up		Baseline		Follow-up	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Perceived benefits	30.54	4.31	31.29*†	3.91	29.46	3.70	29.12	3.62
Perceived barriers	14.14	4.84	13.76	5.92	12.84	4.49	12.91	4.30
Self-efficacy beliefs	38.94	7.07	40.36*†	7.52	36.92	7.51	35.31*	7.32
Positive feelings	14.71	4.11	15.78*†	3.73	13.73	4.31	13.88	5.09
Negative feelings	4.35	1.87	4.67	2.31	4.63	2.33	4.53	2.40
Interpersonal influences	53.33	8.18	56.84*†	8.70	50.56	10.04	51.67	9.86
Situational influences	26.83	5.76	28.64*†	5.70	25.50	5.72	25.12	6.08
Competing demands and preferences	11.42	4.32	11.04	4.72	11.81	4.38	11.82	4.44
Commitment to a plan of action	26.38	5.49	28.81*†	4.93	25.78	5.21	24.59*	6.19
The number of servings of dairy foods consumed per day	1.52	0.90	1.81*†	0.92	1.33	0.92	1.21	0.79

Results of paired t tests, *P<0.05.

Results of analysis of covariance, †P<0.05.

Table 4. Daily nutrient intake and comparisons with the recommended daily allowances (RDA) at baseline and follow-up in the intervention (n=71) and the comparison group (n=71)

	Intervention group								Comparison group							
	Baseline				Follow-up				Baseline				Fallow-up			
			% of RDA				% of RDA				% of RDA				% of RDA	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Energy (kJ)	1945.59	177.68	93.94	8.57	2075.95*	248.18	100.23*	11.98	1832.12	131.37	88.46	8.27	2032.31*	225.59	98.13*	10.89
Total protein (g)	63.64	10.01	186.59	29.44	67.00*	16.38	197.06*	48.20	59.85	13.21	176.05	38.87	65.96	15.28	194.02	44.95
Carbohydrate (g)	249.40	36.86	191.84	28.36	286.10 *	58.61	220.08*	45.08	229.26	31.49	176.35	24.22	277.89*	57.85	213.76*	44.50
Dietary fibre (g)	14.08	2.71	54.16	10.46	18.47*	7.14	71.06*	27.49	13.47	3.06	51.83	11.79	17.39*	9.48	66.92*	36.49
Cholesterol (mg)	201.60	127.45			198.30	127.45			173.76	75.51			222.89*	148.91		
Total fat	79.63	14.72			77.46	19.35			75.49	15.06			75.38	20.68		
Saturated fatty acid	23.03	7.75			21.10	8.39			19.66	6.27			19.72	6.99		
Monounsaturated fatty acids	30.91	5.47			30.51	9.36			29.12	5.17			30.14	10.19		
Polyunsaturated fatty acids	20.03	5.30			20.01	8.32			20.51	7.34			19.93	8.38		
Vitamin A - total (mg)	535.66	465.35	89.27	77.55	951.3 *†	1247.23	158.55*†	207.87	452.50	243.53	75.41	40.58	608.42*	489.17	101.40*	81.52
Riboflavin (mg)	1.29	0.20	143.64	22.91	1.67 *†	0.54	186.64*†	60.70	1.22	0.22	136.05	24.62	1.47*	0.37	163.82*	41.65
Thiamin (mg)	1.02	0.28	114.22	32.12	1.36 *	0.53	152.04*	59.38	0.93	0.30	104.18	33.86	1.37 *	0.57	152.46*	64.24
Niacin (mg)	18.44	3.57	153.72	29.77	20.80*	6.60	173.36*	55.04	17.57	4.15	146.46	34.66	20.17*	6.73	168.16*	56.11
Vitamin B6 (mg)	1.40	0.35	140.40	35.82	1.87*	0.84	187.28 *	84.75	1.28	0.37	128.66	37.73	1.83*	0.64	183.13*	64.24
Vitamin B12 (mg)	2.46	0.94	137.03	52.48	2.67	1.70	153.74	94.67	2.20	0.96	122.55	53.81	2.82*	1.50	156.73*	83.74
Folic acid (mg)	247.75	64.17	82.58	21.39	346.73*	128.13	115.57*	42.71	238.25	63.55	79.41	21.18	334.30*	133.99	111.43*	44.66
Pantothenic acid (mg)	4.31	1.00	107.93	25.20	3.92*	1.09	139.65*	47.43	3.92	1.09	98.20	27.27	5.43*	1.49	135.99*	37.43
Vitamin C (mg)	70.90	25.97	157.56	57.72	92.71*	51.60	206.03*	114.68	63.50	32.92	141.11	73.17	82.90*	1.59	184.23*	98.00
Vitamin E (mg)	19.91	8.16	181.04	74.21	20.70	9.37	188.25	85.21	20.69	12.33	188.18	112.15	20.17	9.41	183.44	85.59
VIT D (mg)	0.33	0.25	2.20	1.71	0.47*	0.31	3.14*	2.11	0.26	0.22	1.76	1.52	0.43*	0.42	2.90*	2.82
Calcium (mg)	639.63	215.05	49.20	16.54	709.10*†	315.33	54.54*†	24.25	581.68	224.81	44.74	17.29	605.13	272.36	46.54	20.95
Cu (mg)	1.12	0.23	160.05	33.07	1.35*	0.47	193.43*	67.14	1.04	0.28	149.78	40.71	1.22*	0.36	174.97*	51.71
Fe (mg)	10.60	1.63	132.51	20.44	13.20*	4.07	165.10*	50.88	10.27	1.68	128.39	21.07	13.41*	4.53	167.65*	56.69
Mg (mg)	224.13	40.82	93.39	17.01	297.84*	107.25	124.10*	44.69	212.59	39.73	88.58	16.55	271.56*	69.92	113.15*	29.13
P (mg)	1084.23	194.27	86.73	15.54	1133.21	333.85	90.65	26.70	1023.07	245.94	81.84	19.67	1112.60	322.65	89.00	25.81
K (mg)	0.33	0.25	2.20	1.71	0.47*	0.31	3.14*	2.11	0.26	0.22	1.76	1.52	0.43*	0.42	2.90*	2.82
Se (mg)	0.03	0.01	90.91	30.45	0.04*	0.03	117.35*	80.13	0.03	0.01	95.07	41.20	0.04*	0.03	124.36*	83.33
Zn (mg)	8.23	1.36	102.92	17.03	9.31*	3.00	116.49*	37.52	7.76	1.76	97.06	22.09	9.05*	2.47	113.17*	30.96

Results of paired t tests, *P<0.05.

Results of analysis of covariance, †P<0.05.

4. Discussion

The results showed that designing the content of intervention based on Pender's HPM variables was able to significantly increase the dairy foods consumption in the intervention group from baseline to follow-up and from a mean of 1.52 (±0.90 to 1.81 (±0.92) servings/day. The findings were also consistent with those of Poddar et al. and Sahyoun et al. (Poddar, Hosig, Anderson, Nickols-Richardson, & Duncan, 2010; Sahyoun, Pratt, & Anderson, 2004). Also, Dehdari et al. reported that using Pender's HPM as a framework for planning education intervention can increase breakfast eating in the female students (Dehdari, Rahimi, Aryaeian, & Gohari, 2014). We found that despite the almost 19% increase in dairy foods intake in the intervention group; they still consumed fewer than two dairy servings daily. Similarly, Weaver reported an increase of 11% in daily dairy foods eating after the implementation of a population-level campaign (Weaver, 2010). This finding may contribute to frequent barriers

for eating Calcium foods (especially dairy products) among Iranian students. Although perceived benefits of consuming dairy foods improved considerably in the intervention group than the comparison group, there was no significant difference in the perceived barriers between both groups following the intervention (Table III). Results of this study confirmed prior research findings which indicated that despite the students' sufficient awareness of eating Calcium foods benefits in preventing osteoporosis (Harel, Riggs, Vaz, White, & Menzies, 1998), various environmental and individual factors may impact on the intake of these foods (Larson, Story, Wall, & Neumark-Sztainer, 2006; Vue & Reicks, 2007). There is a need to identify further barriers involved in dairy foods consumption among Iranian students. In addition, several efforts with an emphasis on increasing availability of the dairy foods at home and also providing milk in Iranian schools as part of national nutrition programs is recommended. The experiences of other countries show that distribution of dairy foods in the breakfast or lunch meals may be an effective strategy in increasing Calcium intake among the Students (Hendrie, Baird, Syrette, Riley, Bowen, & Noakes, 2012; Gordon & McKinney, 1995).

In this study, significant differences were observed in the percentage of the RDA met for Calcium, riboflavin, and vitamin A, between the two groups after the education intervention. These findings are consistent with Dehdari et al. (Dehdari, Rahimi, Aryaeian, & Gohari, 2014). It was interesting to find that students in the comparison group reported higher energy intake compared with the intervention group after the intervention. This discrepancy may be attributed to low dairy foods in the comparison group (Table 4). This result is approved by Zemel, Barba et al. and Dougkasm et al. who considered the impact of the dairy products consumption and/or high dietary Calcium intake in regulating body energy metabolism and appetite, and weight management (Zemel, 2004; Barba, & Russo, 2006; Dougkas, Reynolds, Givens, Elwood, & Minihane, 2011). Further studies are needed to explore the effectiveness of nutrition education programs in body composition and appetite of school-aged children at baseline and long-term follow-up.

The follow-up results indicated that self-efficacy belief to Calcium intake was also significantly higher in the intervention group compared with the comparison group. This finding is in line with those of Dehdari et al. and Lv and Brown (Dehdari, Rahimi, Aryaeian, & Gohari, 2014; Lv, & Brown, 2011). Also Tussing and Chapman-Novakofski reported that osteoporosis prevention education can increase self-efficacy belief for Calcium intake among women (Tussing & Chapman-Novakofski, 2005). Given that self-efficacy is one of the significant predictors to make healthy choices (Tussing & Chapman-Novakofski, 2005; Dehdari, Rahimi, Aryaeian, Gohari, & Esfeh, 2014; Reddan, Wahlstrom, & Reicks, 2002), nutrition education programs should potentially address the students' self-efficacy belief to eating dairy foods.

The final results also showed that intervention participants reported greater interpersonal influences and situational influences for eating dairy foods than the comparison group. Similar results have been reported in conducted nutrition education interventions for students (Dehdari, Rahimi, Aryaeian, & Gohari, 2014). Such interpersonal and environmental influencing variables on the intake of Calcium foods in students were reported in several studies. For example, Vue and Reicks demonstrated that parent' expectations for their child to consume Calcium foods, availability of dairy foods at home and encouraging child to drink milk by parents may influence eating dairy foods among students (Vue, & Reicks, 2007). Larson et al. also reported that two variable including low socioeconomic status and social support may limit dairy consumption among adolescents (Larson, Story, & Wall, 2006). Through identification of the factors, literature suggests that conducting nutrition programs with a focus on creating healthful home food environments and also fostering parenting skills to support children's healthy eating behavior are needed (Cullen, Lara Smalling, Thompson, Watson, Reed, & Konzelmann, 2009).

In the present study, positive feelings regarding dairy products intake among the intervention participants significantly increased compared to the comparison group following the intervention. In this regard, Robbins et al. found that positive feelings can predict perceived self-efficacy and greater enjoyment of the recommended task among the adolescents (Robbins, Pis, & Pender, 2004). Previous studies underscored the importance of attending to person's motivation and feelings to eating food. For example, Desmet and Schifferstein surveyed experienced emotions by individuals in response to tasting or eating food. They indicated that sensory attributes, experienced and anticipated consequences, personal or cultural meanings, and actions of related agents were five different sources of food emotions (Desmet, & Schifferstein, 2008). Evers et al. also demonstrated that emotion was a trigger for eating foods. What is concluded here is that eating behavior in humans frequently changes according to changes in their feelings and emotions and it is necessary to attend more to it for designing education nutrition programs (Evers, Adriaanse, Ridder, & Witt Huberts, 2013).

This study also indicated that compared with the comparison group, there was a significant increase in commitment to planning for dairy foods intake in the intervention participants after the conducted education

intervention. In line with, Dehdari et al. demonstrated that students who had more perceived self-efficacy and positive feelings to eating breakfast were most likely to commitment to planning for eating breakfast regularly (Dehdari, Rahimi, Aryaeian, & Gohari, 2014). Shin et al. reported that women differed with respect to commitment to a plan for exercise and self-efficacy belief was the most important predictor of commitment to a plan for exercise (Shin, Hur, Pender, Jung Jang, & Sil Kim, 2009). Findings of the present study also supported the importance of the commitment to a plan of action as sources of influence on eating dairy foods among Iranian students.

In contrast to some past studies (Dehdari, Rahimi, Aryaeian, & Gohari, 2014), there was no significant decrease in immediate competing demands and preferences and negative feelings variables for either the intervention or comparison group in this study. Few studies have considered these two variables in designing the content of nutrition education intervention (Dehdari, Rahimi, Aryaeian, & Gohari, 2014). In this study, the tendency to eating soft drinks and unhealthy snacks in the meals were the competing demands to dairy foods intake. Also, feelings bad after drinking milk and sleepiness after eating dairy foods were two negative affects among the participants. These factors should be exactly studied in a qualitative research and considered when designing training sessions.

In this study, two limitations must also be addressed. One limitation was the short term follow-up. Future studies are needed to determine whether increase in dairy foods intake can be sustained over a longer period. Also, the results were obtained of a sample of female students which considerably constrains the generalizability of the findings to other similar groups.

5. Conclusion

Pender's HPM is a theoretical framework for developing nutrition education programs in terms of dairy foods consumption for students.

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Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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