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The transtheoretical model: Changes in health beliefs among female adolescents in Iran during 3 years

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Original Article

Abstract

BACKGROUND: The present study aimed to track adolescents' attitudes towards changes in their health behavior considering perceived benefit and barrier in different stages of physical activity during a three-year transitional period from junior high school to high school.

METHODS: Data were collected amongst female adolescents in 2010 (n = 558) using random cluster sampling method, of whom 400 were provided by follow-up data in 2013. The stages of change and health beliefs regarding physical activity were measured using self-reported questionnaires. The research data were, then, analyzed in statistical analysis system (SAS), using inferential statistics.

RESULTS: The baseline participants had a mean age of 14.28 ± 1.54 and at follow-up were 17.52 ± 1.82. At the baseline and follow-up, proportions of participants in pre-adaption and adaption stages were 26.7%-73.3% and 72.3%-27.7%, respectively. At baseline, pre-contemplators showed significantly lower positive attitude and greater agreement for most of the barrier items than those on other stages. In the baseline, female in action and maintenance stages endorsed greatest agreement for the barrier item i.e. having too much homework. In comparison to females, in the maintenance stage pre-contemplators were more likely to agree that a "not knowing how to do a certain type of exercise"(OR = 10.30, CI = 4.42-23.99). At the follow-up, in the pre-contemplators and maintenance stages, the greatest amount of agreement for the barrier item was "not enough time".

CONCLUSION: This study revealed transition from junior high school to high school and showed lower physical activity in females. Consequently, perceived barriers increased and perceived benefits decreased in the transition from junior high school to high school.

KEYWORDS: Physical Activity, Female Adolescents, Tracking, Transtheoretical Model

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Introduction

The benefits of doing physical activity on health is well-established.[1,2] Regular physical activity has favorable effects on weight maintenance, psychological well-being in adolescents, and enhancement of mood, self-concept and self-esteem. Physical inactivity in female adolescent is a risk factor for obesity, higher triglyceride levels, anxiety and depression.[3,4] Adolescent is very significant in terms of physical activities because their attitudes to physical activities are being adopted during youth period.[1,5] Despite the importance of physical activity in youth, studies always show that participation in

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physical activity declines during adolescence.[6] This decrease in tendency have been observed in both cross-sectional and longitudinal studies.[7,8] Evidence has revealed that in Iranian students aged 12-14 years, the average time spent in daily sports activities was 45.7 minutes compared to 38.2 minutes among in those aged 15-17 years.[9] Several studies have shown that tracking of physical activity may differ between males and females.[10-13] Another study on Iranian adolescents showed that 35.9% of females in comparison to 61.4% of males reached the action and maintenance stages of physical activities. Furthermore, the average time spend on physical activities amongst females was 31.82 minutes on a daily basis.[9]

According to some studies, health beliefs on physical activities influence exercise behavior.[14] Perceived benefits and perceived barriers are the most major cognitive variables that are dependent on physical activity.[15,16] Empirical studies showed that exercise in adolescents was directly influenced by perceived benefits and inversely by perceived barriers.[17,18] Females compared to males have less perceived benefits and more perceived barriers in doing physical activity.[19] Due to cultural issues and a decline of physical activity during transition from junior high school to high school amongst female adolescents in Iran, we recruited only females in our study. There are various models to examine health behavior and to conduct educational interventions. One of the used models for the health behavior is transtheoretical model.[20] This model is useful to identify and promote these behaviors in adolescents.

Transtheoretical model (TTM) can help to comprehend behaviors such as physical activity, cancer screening, and smoking cessation. It engages pros and cons as benefits and barriers of the health belief model (HBM). According to TTM, a behavioral change necessitates changes in pros and cons and movements in all stages. Cons/barriers toward a health behavior overcome pros/ benefits. However, an equal balance between benefits and barriers can be observed. Consequently, when benefits are more than barriers action plan can be achieved.[20] This study utilized five stages of physical activity: (pre-contemplation, contemplation, preparation, action, and maintenance). The present study aimed to track adolescents' attitudes towards changes in their health behavior considering perceived benefit and barrier in different stages of physical activity during a three-year transitional period from junior high school to high school.

Materials and Methods

Participants

This was a longitudinal study in 2010. Adolescents were identified using random cluster sampling method. According to the results of a pilot study and using a 0.95 confidence level, it was concluded that a sample size of 558 would be enough. Eight junior high school females and high schools females were selected randomly in Sanandaj, Iran. Participants provided contact information; they were again contacted in 2013 for the follow-up study. Due to change of address, access to 158 students was not possible. Therefore, size of sample for the follow-up was 400.

Instruments

Health beliefs related physical activity

In this study the questionnaire of perceived benefit was as: perceived benefits are defined as positive or reinforcing aspects of physical activity and were examined using a modified version of the scale developed by Garcia et al.[21] The eight items measurement tool was adopted using a five-point Likert Scale (1 = strongly disagree to 5 = strongly agree). Perceived barrier: these refer to real or imagined obstacles that make participation in physical activity difficult or impossible and were measured using a modified version of the scale developed by Garcia et al.[22] The 10 items used a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Stage of change in physical activity was measured by stages of exercise change questionnaire (SECQ) by Kearney et al.[23] This questionnaire used various studies. Reliability of test retest was 85% by Philippaerts et al. in 2003.[24]

The kappa index of reliability for stage of change over a 2-week period study was 0.90 (n = 50). Cronbach's alpha reliability coefficients for the benefit and barrier subscales were 0.83 and 0.78, respectively. Content validity was used in order to determine the scientific validity of the tool for data collection.

The instruments were translated into Persian then validated using the standard back transition technique. Five bilingual Iranian Health Behavior researchers, Health Education researchers, exercise psychologist, and experts on Instrument development were asked to evaluate the pilot instrument for appropriateness and relevance of items. The instruments were then revised and modified. The questionnaire was pilot tested on 50 participants who were selected randomly (from eight females' high school in Sanandaj). This was a separate source of participants from those who took part in the larger study and their data were not included in the analyses. Revisions and presentation were based on empirical findings and recommendations from a pilot study. In order to create each stage of physical activity adoption of participants, this study utilized five stages of physical activity as follows:

- Pre-contemplation: No intention to take action within the next 6 months.
- Contemplation: Intends to take action within the next 6 months.
- Preparation: Intends to take action within the next 30 days and taken some behavioral steps in this direction.
- Action: Changed overt behavior in less than 6 months.
- Maintenance: Changed overt behavior for more than 6 months.[25]

***Ethics*:** Both protocols were evaluated by the Regional Committee Ethics for Medical Researches and were approved by the Kurdistan University of Medical Sciences. The baseline and the follow-up study carried out in the schools after agreement of school authorities in Sanandaj.

Data Analysis

Statistical analysis system (SAS) software, version 9.2 was conducted for the statistical analyses. Univariate analysis was performed for all outcomes on benefits and barriers for each stage of the physical activity. Because response on individual benefit and barrier items were based on multinomial responses classified as (1) strongly disagree, (2) disagree, (3) neutral, (4) agree and (5) strongly agree; therefore we adopted a proportional adds model for cumulative logics to examine differences in all five stages. Original score item was dependent variable and categorical stage was the independent variable. We modeled the higher score (greater agreement) as the outcome. In each logistic regression analysis, the reference stage group was pre-contemplation, means that contrasts based on the analysis compared the other four groups with the pre-contemplation group in terms of the probability of agreeing. Odds ratios (OR) and 95% confidence intervals (CI) were used to describe contrasts.

Results

Mean age of participants were 14.4 (standard deviation; SD = 1.6) years (range = 12-17 years) in this study. Among the 558 participants, at the baseline and follow-up, proportions of participants in pre-adaption and adaption stages were 26.7-73.3% and 72.3-27.7%, respectively.

Differences in perceived benefit and barriers according to the stage

Distributions of response for perceived benefit and barriers as well as the results compared results across the stages are shown in tables 1 and 2. Tables 3 and 4 illustrate the baseline and follow-up with estimated OR and 95% CIs for two-level comparison (i.e. agreement vs. disagreement) between stages.

The greatest amount of agreement for the benefit items was reported by females in the action and maintenance stages. However, amongst the six benefits there was the least amount of agreement with "make more friends". There were significant differences between pre-contemplation, action and maintenance stages for this item. Actors displayed the most endorsement (98.5%) for the item "feel happier" compared with

Table 1. Perceived benefit items by stage of physical activity at baseline

Benefits	Agree (%)					Significant contracts	OR	CI	P
	Pre-contemplation (Pre)	Contemplation (C)	Preparation (P)	Action (A)	Maintenance (M)				
Look better	40.5	78.2	54.1	89.2	87.7	Pre vs. C	0.18	0.058-0.62	0.006
						Pre vs. P	0.57	0.24-1.37	0.214
						Pre vs. A	0.08	0.03-0.20	0.0001
						Pre vs. M	0.09	0.04-0.20	0.0001
Have more energy	67.5	78.2	72.9	96.0	96.0	Pre vs. C	0.57	0.17-1.93	0.374
						Pre vs. P	0.77	0.30-1.97	0.591
						Pre vs. A	0.08	0.02-0.28	0.0001
						Pre vs. M	0.08	0.03-0.23	0.0001
Feel happier	62.1	86.9	85.4	98.5	97.4	Pre vs. C	0.24	0.06-0.98	0.04
						Pre vs. P	0.28	0.09-0.79	0.01
						Pre vs. A	0.12	0.04-0.33	0.0001
						Pre vs. M	0.04	0.01-0.13	0.0001
Have fun	54.0	65.2	70.9	89.2	96.0	Pre vs. C	0.62	0.21-1.83	0.395
						Pre vs. P	0.48	0.19-1.18	0.113
						Pre vs. A	0.14	0.05-0.35	0.0001
						Pre vs. M	0.05	0.01-0.13	0.0001
Make more friends	21.6	30.4	39.6	73.6	73.5	Pre vs. C	0.63	0.19-2.06	0.445
						Pre vs. P	0.42	0.15-1.11	0.081
						Pre vs. A	0.09	0.04-0.24	0.0001
						Pre vs. M	0.10	0.04-0.23	0.0001
Get stronger	54.0	78.3	66.7	89.3	94.9	Pre vs. C	0.32	0.10-1.06	0.063
						Pre vs. P	0.58	0.24-1.42	0.238
						Pre vs. A	0.14	0.05-0.35	0.0001
						Pre vs. M	0.06	0.02-0.15	0.0001
Love myself more	51.3	52.1	52.1	83.3	80.1	Pre vs. C vs. P	0.96	0.34-2.74	0.95
						Pre vs. P	0.97	0.41-2.29	0.946
						Pre vs. A	0.21	0.09-0.48	0.0002
						Pre vs. M	0.26	0.12-0.54	0.0004
Feel healthier	64.8	82.6	98.0	92.1	97.4	Pre vs. C	0.38	0.10-1.38	0.145
						Pre vs. P	0.03	0.005-0.31	0.002
						Pre vs. A	0.11	0.04-0.33	0.0001
						Pre vs. M	0.04	0.01-0.14	0.0001

Abbreviations: Pre-contemplation; C: Contemplation; P: Preparation; A: Action; M: Maintenance; CI: Confidence Interval; df: Degree freedom; NS: not significant; OR: Odds Ratio

Estimated odds ratio and 95% Confidence Interval are presented for each two-level comparison; P < 0.04-0.001

those in other adoption. Significant differences were seen between pre-contemplators and the other stages for this item. The most agreement with a benefit item among pre-contemplators was “Have more energy". The ORs of this item is 92% higher in the action and maintenance groups relative to the pre-contemplation group (Table 1). The results from the comparisons across barrier items showed that participants in the pre-adoption stages had significantly greater agreement than those in action and maintenance stages for most of the barriers. In comparison to females in the maintenance stage pre- exercise" (OR = 10.30) "and exercise made me tried" (OR = 13.29). Actors was reported the least amount of agreement with "Too bad weather". Contemplators were more likely to agree that a "not knowing how to do a certain type of the differences for this statement across the stages were significant except between pre-contemplators, contemplation and preparation

Table 2. Perceived barrier items by stage of physical activity at baseline

Barriers	Agree (%)					Significant contracts	OR	CI	P
	Pre-contemplation (Pre)	Contemplation (C)	Preparation (P)	Action (A)	Maintenance (M)				
Not enough time	62.1	56.5	72.9	25.5	25.5	Pre vs. C	1.26	0.43-3.64	0.664
						Pre vs. P	0.61	0.24-1.53	0.292
						Pre vs. A	4.80	2.15-10.68	0.001
						Pre vs. M	4.79	2.29-10.03	0.001
Too many chores to do	70.2	78.2	54.1	22.6	25.0	Pre vs. C	0.65	0.19-2.21	0.497
						Pre vs. P	2.00	0.80-4.94	0.133
						Pre vs. A	8.11	3.49-18.88	0.001
						Pre vs. M	7.09	3.26-15.40	0.001
Not good place to exercise	45.9	69.6	56.3	12.7	15.3	Pre vs. C	0.37	0.12-1.11	0.077
						Pre vs. P	0.66	0.27-1.56	0.346
						Pre vs. A	5.81	2.43-13.88	0.001
						Pre vs. M	4.70	2.21-10.00	0.001
Too bad weather	56.7	78.2	56.3	9.8	14.8	Pre vs. C	0.36	0.11-1.19	0.095
						Pre vs. P	1.02	0.43-2.42	0.962
						Pre vs. A	12.07	4.80-30.34	0.001
						Pre vs. M	7.55	3.53-16.17	0.001
Have not right equipment	43.2	60.9	45.8	18.6	11.8	Pre vs. C	0.49	0.17-1.41	0.187
						Pre vs. P	0.90	0.38-2.13	0.811
						Pre vs. A	3.32	1.46-7.55	0.004
						Pre vs. M	5.73	2.62-12.53	0.001
Not knowing how to do a certain type of exercise	78.3	65.2	67.6	22.6	26.0	Pre vs. C	1.93	0.60-6.17	0.265
						Pre vs. P	2.37	0.89-6.28	0.081
						Pre vs. A	12.45	5.01-30.93	0.001
						Pre vs. M	10.30	4.42-23.99	0.001
Have too much homework	62.1	65.1	54.1	27.4	26.1	Pre vs. C	0.87	0.29-2.59	0.811
						Pre vs. P	1.39	0.58-3.33	0.460
						Pre vs. A	4.34	1.96-9.60	0.003
						Pre vs. M	4.67	2.23-9.76	0.001
Not anyone to exercise with me	48.6	65.2	45.9	16.7	10.7	Pre vs. C	0.50	0.17-1.47	0.212
						Pre vs. P	1.12	0.47-2.64	0.796
						Pre vs. A	4.73	2.06-10.84	0.002
						Pre vs. M	7.89	3.59-17.35	0.001
Not like to exercise	51.3	73.9	62.5	19.6	17.9	Pre vs. C	0.37	0.12-1.15	0.087
						Pre vs. P	0.63	0.26-1.51	0.303
						Pre vs. A	4.32	1.92-9.71	0.004
						Pre vs. M	4.85	2.31-10.18	0.001
Exercises made me tired	78.3	60.9	60.4	28.4	21.4	Pre vs. C	2.33	0.74-7.33	0.148
						Pre vs. P	2.37	0.89-6.28	0.081
						Pre vs. A	9.12	3.73-22.29	0.001
						Pre vs. M	13.29	5.65-31.21	0.001

Abbreviations: Pre-contemplation; C: Contemplation; P: Preparation; A: Action; M: Maintenance; CI: Confidence Interval; df: Degree freedom; NS: not significant; OR: Odds Ratio; Estimated odds ratio and 95% Confidence Interval are presented for each two-level comparison; P < 0.04-0.001

Table 3. Perceived benefit items by stage of physical activity at follow-up

Benefits	Agree (%)					Significant contracts	OR	CI	P
	Pre-contemplation (Pre)	Contemplation (C)	Preparation (P)	Action (A)	Maintenance (M)				
Look better	57.7	69.7	61.1	76.6	94.0	Pre vs. C	0.59	0.24-1.41	0.239
						Pre vs. P	0.86	0.37-2.02	0.742
						Pre vs. A	0.41	1.14-1.16	0.095
						Pre vs. M	0.08	0.02-0.31	0.002
Have more energy	57.7	85.2	84.0	85.1	83.6	Pre vs. C	0.23	0.09-0.59	0.002
						Pre vs. P	0.25	0.10-0.63	0.003
						Pre vs. A	0.23	0.07-0.73	0.010
						Pre vs. M	0.26	0.09-0.73	0.01
Feel happier	65.4	87.7	89.6	87.2	95.6	Pre vs. C	0.26	0.10-0.70	0.007
						Pre vs. P	0.22	0.08-0.57	0.002
						Pre vs. A	0.27	0.08-0.89	0.030
						Pre vs. M	0.08	0.02-0.36	0.008
Have fun	42.3	83.6	76.4	80.8	89.6	Pre vs. C	0.14	0.05-0.35	0.001
						Pre vs. P	0.22	0.09-0.54	0.008
						Pre vs. A	0.17	0.06-0.50	0.001
						Pre vs. M	0.08	0.02-0.25	0.001
Make more friends	34.6	41.8	43.1	61.7	40.3	Pre vs. C	0.73	0.30-1.78	0.499
						Pre vs. P	0.70	0.29-1.67	0.423
						Pre vs. A	0.32	0.12-0.89	0.020
						Pre vs. M	0.78	0.30-2.01	0.614
Get stronger	61.6	85.2	70.8	68.1	85.1	Pre vs. C	0.27	0.10-0.70	0.007
						Pre vs. P	0.65	0.27-1.56	0.346
						Pre vs. A	0.75	0.27-2.03	0.572
						Pre vs. M	0.28	0.09-0.79	0.010
Love myself more	46.2	64.8	61.6	70.2	70.2	Pre vs. C	0.46	0.19-1.09	0.080
						Pre vs. P	0.53	0.22-1.22	0.138
						Pre vs. A	0.36	0.13-0.98	0.040
						Pre vs. M	0.37	0.14-0.92	0.030
Feel healthier	84.6	87.7	91.0	97.8	98.5	Pre vs. C	0.77	0.23-2.54	0.669
						Pre vs. P	0.54	0.16-1.82	0.326
						Pre vs. A	0.12	0.01-1.13	0.669
						Pre vs. M	0.08	0.00-0.78	0.030

Abbreviations: Pre-contemplation; C: Contemplation; P: Preparation; A: Action; M: Maintenance; CI: Confidence Interval; df: Degree freedom; NS: Not significant; OR: Odds Ratio; Estimated odds ratio and 95% Confidence Interval are presented for each two-level comparison; P < 0.04-0.001

stages. Thorough questions, we found statistically significant differences between pre-contemplation, action and maintenance stages but no significant differences were seen between pre-contemplation, contemplation and preparation (Table 2).

In maintenance, females displayed the most percentage (98.5%) for "feel healthier". Significant differences were seen between pre-contemplation and maintenance stage for this item. Pre-contemplator was reported the least amount of agreement with "make more friends". No Significant differences were found between the stages and pre-contemplation except between pre-contemplators and actors for this item. Significant differences were seen between the pre-contemplators and female in other stage on their perceptions on the following three items benefits: "feel happier", "having fun", and "having more energy"(Table 3).

Table 4. Perceived barrier items by stage of physical activity at follow-up

Barriers	Agree (%)					Significant contracts	OR	CI	P
	Pre-contemplation (Pre)	Contemplation (C)	Preparation (P)	Action (A)	Maintenance (M)				
Not enough time	88.5	85.2	66.0	48.9	55.3	Pre vs. C	1.32	0.36-4.88	0.1670
						Pre vs. P	3.95	1.13-13.81	0.0300
						Pre vs. A	7.99	2.11-30.29	0.0020
						Pre vs. M	6.21	1.70-22.70	0.0050
Too many chores to do	88.4	86.9	61.8	57.5	41.8	Pre vs. C	1.15	0.31-4.29	0.8270
						Pre vs. P	4.73	1.35-16.50	0.0100
						Pre vs. A	5.67	1.49-21.55	0.0100
						Pre vs. M	10.67	2.91-39.04	0.0003
Not good place to exercise	84.7	73.0	53.5	46.8	28.4	Pre vs. C	2.03	0.65-6.36	0.2190
						Pre vs. P	4.78	1.57-14.58	0.0050
						Pre vs. A	6.24	1.86-20.94	0.0030
						Pre vs. M	13.89	4.22-45.67	0.0001
Too bad weather	76.5	68.9	52.8	38.2	34.4	Pre vs. C	1.50	0.56-4.05	0.4150
						Pre vs. P	2.98	1.13-7.86	0.0200
						Pre vs. A	5.37	1.81-15.90	0.0020
						Pre vs. M	6.37	2.24-18.08	0.0005
Have not right equipment	46.2	50.8	48.6	29.8	20.9	Pre vs. C	0.82	0.35-1.93	0.6660
						Pre vs. P	0.90	0.39-2.09	0.8170
						Pre vs. A	2.02	0.74-5.45	0.1640
						Pre vs. M	3.24	1.23-8.56	0.0100
Not knowing how to do a certain type of exercise	46.2	65.6	58.3	44.7	38.8	Pre vs. C	0.45	0.19-1.06	0.0670
						Pre vs. P	0.61	0.26-1.41	0.2510
						Pre vs. A	1.06	0.40-2.77	0.9030
						Pre vs. M	1.35	0.54-3.37	0.5180
Have too much homework	69.3	86.9	50.7	63.8	53.7	Pre vs. C	0.34	0.12-0.91	0.0300
						Pre vs. P	2.18	0.89-5.35	0.1860
						Pre vs. A	1.27	0.45-3.54	0.6410
						Pre vs. M	1.93	0.74-5.06	0.1770
Not anyone to exercise with me	53.8	45.9	40.3	31.9	15.0	Pre vs. C	1.37	0.58-3.21	0.4620
						Pre vs. P	1.73	0.74-4.00	0.2010
						Pre vs. A	2.48	0.92-6.66	0.0690
						Pre vs. M	6.64	2.39-18.48	0.0003
Not like to exercise	65.4	59.0	52.1	34.0	18.0	Pre vs. C	1.31	0.54-3.17	0.5470
						Pre vs. P	1.73	0.72-4.15	0.2140
						Pre vs. A	3.66	1.33-10.03	0.0100
						Pre vs. M	8.65	3.11-24.03	0.0001
Exercises tires me	73.1	64.1	54.9	51.1	46.3	Pre vs. C	1.47	0.57-3.79	0.4170
						Pre vs. P	2.23	0.88-5.64	0.0890
						Pre vs. A	2.60	0.92-7.34	0.0710
						Pre vs. M	3.15	1.17-8.48	0.0200

Abbreviations: Pre-contemplation; C: Contemplation; P: Preparation; A: Action; M: Maintenance; CI: Confidence Interval; df: Degree freedom; NS: not significant; OR: Odds Ratio; Estimated odds ratio and 95% Confidence Interval are presented for each two-level comparison. P < 0.04-0.001

Participants reported greatest amount of agreement for the barrier item "not enough time". The differences for this statement across the stages were significant except between pre-contemplators and contemplators. Those in the contemplation stage showed the most agreement with the perceived barrier items" too many chores to do" and "have too much homework" (86.9%). The differences for first item across the stages were significant except between pre-contemplators and contemplators but in the second item, significant differences were seen between the pre-contemplators and contemplators. No statistical significant difference was seen between the pre-contemplators and female in the other stages on their perceptions on the following item barrier "not knowing how to do a certain type of exercise" (Table 4).

Discussion

This study provides the first evidence about differences in perceived benefit and barrier items in female adolescents regarding physical activity behaviors across stages of changes during transition from junior high school to high school. These findings are an importance start for further studies about a theory based on interventions designed to increase physical activity amongst Iranian female adolescents. Such interventions would appear to be necessary because more than half of the female adolescents in this study in pre-adaption stages of exercise change their behavior at follow-ups. At the baseline and follow-up, in pre-adaption and adaption stages, percentage of participation was 26.7-73.3% and 72.3-27.7%, respectively. These findings are similar to several studies.[17,18,26,27] Perceived benefits and barriers were found to be significant for predictors of stage of behaviors change in females in our findings. This is similar to the findings of other studies showing that perceived benefits and barriers predicted the stage of behavior change for exercise.[9,19,28] To develop interventions promoting physical activity, it is critical to understand factors regarding stages of adaption. Our study illustrated that attitudes to physical activity differentiated in stages of physical activity adoption.

While previous studies examined differences in individual perceived benefit, and it reported the perceived benefit as a mediator.[19] In Taymoori et al. study also found, perceived benefit influenced direct effects on regular physical activity.[28] This study is the first research that examined differences in perceived benefits items in female adolescents according to preparation stages for physical activity. Perceived barrier is another concept that can be linked to physical activity.[29] The results of our study indicated that barrier had a direct path with physical activity. In the first phase of the study, the most important perceived barriers "did not know how to do a certain type of exercise" and "exercise made me tired". It is likely that causes are lack of suitable places and access to safe recreational facilities. According to previously mentioned reasons, it is possible that one cause can be having limited sorts of sports especially at schools. Economic problems could also be another cause. Some of the reasons are as follows: swimming opportunity is limited, lack of knowledge about exercise, social and family norms regarding inaccessibility of outdoor exercises for females, lack of walking path, cultural limitation regarding some activities and lack of a role model. In Iranian culture, Parents are concerned about unsuitable facilities and they also think that homework or family responsibilities are more important than physical activity.

Indeed, we found both direct and indirect effects of perceived benefit and barrier on physical activity. Consequently, effects of perceived benefits on perceived barriers lead to an increase of physical activity. For example, the incentives for being physically active could be body fitness. This is very significant for females in Iranian culture. Although female students do not have enough time for physical activity and must take a lot of time for academic success, they spend little time for exercise due to mentioned incentive. However, the relationship between perceived benefits and perceived barriers suggest the

perception of high perceived benefits to overcome barriers may increase physical activity indirectly.

In order to improve physical activity, adolescents should be consulted to choose their preferred activities and not only competitive sports. Although females are influenced by external motivations, the agreements of their parents, friends and teachers could be beneficial as well. Sending educational messages to students such as "active life span" could create interests amongst females and it also could encourage them to exercise regular physical activity. For instance, raising awareness programs such as a lecture about the advantages of physical activity can be beneficial, as well. In addition, the duration of exercise should be increased gradually and exercise for a long period of time should not be done suddenly.

Three years later, follow-up showed that physical activity was less than the baseline. During the three-year period, perceived benefits decreased, and perceived barriers increased. At follow-up, participants reported the greatest amount of agreement for the barrier "not enough time". In Iran, entrance to high school coincides with preparing for university entrance examination. In recent years, a substantial increase to continue further education can be observed amongst female adolescents.[30] Thus; they spend a great deal of time for studying. This leads to having insufficient time for physical activities. Yet, results of several studies indicated that physical activity during the three years decreased to a greater extent in female adolescents compared to males.[17,18,31,32] Thus, daily time management during their study is of paramount significance.

Schools play a major role in promoting involvement of children in recreational activities that they can enjoy for a lifetime. By involving adolescents on a daily basis in physical activity, teaching the personal value of regular activity, and encouraging continuing involvement in moderate or vigorous activities both at school and at home, schools contribute to the goal of an "active" generation. School-based programs should be supplemented by family-based activities. Family-based programs encourage parents to be active with their adolescents in building relationships. According to the three-year period of this study, longitudinal studies identifies in a short period of time changes in beliefs associated with physical activity is recommended. Furthermore, tailored interventions to improve positive attitudes related to exercise and to support physical activity behavior in females is essential.

Limitations

There were several limitations to the present study. The data were measured by a self-report questionnaire. Despite acceptable internal consistency reliability of the instrument used in the current study, there is still a need to explore other possible benefit and barrier items that tap individual and normative expectations as suggested by Rakowski et al.[33] Physical activity Behavior has not been evaluated. The most important limitation of this study, which is common in longitudinal studies and may cause lots of bias, is the loss to follow-up and declined response rate in repeated measurement.

Recommendation for future studies

According to a decline of physical activity in female adolescents during transition from junior high school to high school and a decrease in perceived benefits and increase in perceived barriers, it is necessary to plan and carry out studies in future in order to do tailored interventions. It is also important to do such research to positively influence cognitive and psychosocial factors regarding exercise and increase physical activity in female adolescents during high school.

Conclusion

According to the results of this study, several barriers were responsible for the decline in physical activity among females, such as transition from junior high school to high school, importance of academic success and cultural barriers for female adolescents.

Conflict of Interests

Authors have no conflict of interests.

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