ABSTRACT

Regular physical activity (PA) is an underlying factor since childhood and adolescence for having a healthy and active future for life. The aim of this study was to review the evidence on increasing the youth PA to develop the national program at country level. At first, the databases were searched using the sensitive keywords, and systematic reviews of the relevant databases were extracted. The studies were evaluated in terms of relevance and methodological quality for effective interventions that were detected. These cases were also identified in the effective interventions: disadvantages, benefits, costs, methods, and limitations of early studies, which were based on systematic review of the studies. Three interventions were identified as physical education curriculum reform, the creation of extra-curricular activities, as well as approaches to environmental and social support. Evidences showed that the relative impact of these interventions were not high. Thus, a combination of all three options of integrated approach is recommended for reducing the sedentary lifestyle of youths.

Key words: Behavioral change, evidence informed, life style, policy

INTRODUCTION

In spite of the public awareness about the health benefits of physical activity (PA) for youths, still there are barriers for an active lifestyle in many communities. The purpose of this study was to develop a national program to increase the PA in adolescents. Indeed, the obtained data from National School-Based Surveillance of Students’ High Risk Behaviors indicated the decrease in PA is a serious problem and an action must be done. As a result, some interventions should be chosen for implementation. Those interventions should be approved by using the best available evidences and they should also be practical. Due to the nature of the PA, it is necessary to consider the beneficiary of various interventions to make the final choice. In the literature of evidence informed policy making, for these cases, the recommendation of formulated policy brief (PB) have been suggested. PB is a new approach in producing and presenting the evidences for decision makers and policymakers and is consisted of a compilation of systematic reviews and local
evidences. Explaining the position of PB and the manner of its formulation is shown in another article, but according to the author’s knowledge, this is the first published PB in the peer review journals as the result of the conducted studies in Iran. For the formulation of PB and due to this fact that the respondent groups are the decision makers, the article format is slightly different.

Initially, the problem was introduced and then the global and local evidences have been reviewed. In order to decide the level of performance, those interventions have been targeted which there were good evidences for their effectiveness. It means that there were a set of synthesized evidences for their effectiveness. However, when introducing this option to the decision makers, various aspects of the intervention were offered to make better decisions. The introduction of policy options has been mentioned in this article.

**Introducing the problem**

Around the world, wide ranges of interventions and major policies have been performed for increasing the physical activity in children and adolescents. However, despite that, still no agreement exists for a certain type of intervention. Today, lack of physical activity is one of the dilemmas of modern life and the importance of this problem is more in adolescents’ age group and many of the beliefs and behavior habits can be formed and stabilized in the period of adolescence. In our country, the problem of sedentary lifestyle adolescents is among the priority issues of the healthcare system. Therefore, collecting the documentation, timely planning, and implementation of active interventions for adolescents can have a great influence in reducing the disease burden and population health in the long run. On the other hand, the local evidence in PA interventions was not enough and has some shortcomings. At the level of global evidence, the findings show that some interventions have been effective and others have been ineffective. The “Healthy people 2020” program also reflects a multiple approach to promote physical activity in children and adolescents. However, there is always a gap to prevent intervention recommendation in order to be defined in various settings. In fact, the differences in the structure of study (type of study, how to evaluate outcomes) and in addition, various aspects of the PA issue in different communities have impact on items such as culture, religion, ethnicity, facilities, and resources. Since most of the adolescents spend a significant amount of time in school, therefore the use of school-based interventions is considered as an effective approach to increase the physical activity. This can be a range of activities during the school time, before or after it, and the school is the focal point of these activities. Hence, this document was prepared to provide evidence-based policy options including barriers, facilitators, and resources for Iranian adolescents to promote physical activity. Therefore, the policy makers can make more confident decisions and have better choices for planning interventions.

**METHODS**

This review took place without time limit until September 2011, in order to receive the systematic reviews published in English. In the searching strategy, three points were considered as follows:

1. The target population (children, adolescents),
2. Intervention (education, behavior change and changing facilities) and
3. Behavior or consequences of the assessed cases (physical activity, health promotion outcomes).

Three types of databases were searched including:

- Databases of systematic reviews: Health Systems Evidence (McMaster University) - health-evidence.ca - Cochrane Library - Health Information Research Unit (HIRU) - Rapid Evidence Assessment (REA).
- Policy Brief (BP) databases: COHRED-EVIPNET Africa - Global and Social Policy program - Global Health Council - Health Action International - Health Systems Evidence, McMaster University - Management Sciences for Health (MSH) - Supporting Policy relevant Reviews and Trials (SUPPORT) Summaries - World Bank: Health Results Innovation Trust Fund (HRITF)
- General databases: Pubmed - Google Scholar - Magiran - Iranmedex - SID (three last databases are in Farsi).

The used key words were as follows (although searching with the key words was performed by the specific strategies in each database):

(adolescent OR young people OR child * OR ...
pediatric * OR student) AND (school) AND (physical activity OR exercise OR sport OR cycling OR walk * OR physical education OR television viewing OR TV viewing OR sedentary) AND (intervention OR effectiveness OR promotion OR initiative * OR behavior change OR policy OR strategies OR health education)

The study inclusion criteria were included: (1) Children, adolescents (up to 19 years), (2) One or more subsequent interventions used to improve physical activity with or without considering the health consequences, (3) The main focus of interventions was on school (school based), respectively. However, the intervention also could be combined with multi-level actions, including family or community support. Those interventions were not considered, which were based solely on family, community or clinical settings, and (4) The main purpose of the intervention was not to change in specific diseases or health problems (such as obesity, skeletal problems, or...).

The results of this searching were included 640 systematic reviews. Titles and abstracts were reviewed independently by two browsers. Thirty articles met the inclusion criteria, which the full text of all of the articles were studied by three browsers. After the assessment with the ‘Critical Appraisal Skills Programme’ (CASP) critical appraisal tool, 17 articles were remained which had the minimum quality required for their inclusion. Finally, all the interventions used for the improvement of the physical activity were identified by three researchers independently after careful and complete study of the text articles. Then, by holding a meeting and exchanging the ideas between the research team members, the general classification of the existing interventions were performed with consensus.

**Policy options**

The first policy option (PA curriculum reforms) is the curriculum change in PA strategy with increasing the duration and intensity of physical activity to improve the quantity and quality of education and physical activities,[27] which has been considered in the secondary and high schools of the country. Educational provision of these classes can be a combination of the followings: physical activity programs, programs to reduce the time spent for watching television and sedentary activities along with teaching healthy eating and non-tobacco use.[28] New educational approaches based on behavioral theories are well known (such as health promotion model (HPM) and social cognitive theory).[29] Training aids can be used in most types of traditional methods (education using leaflets and brochures) and modern methods (CD or instructional video and internet applications).[19,30]

The second policy option (creation of extracurricular activities) includes the followings: entertainment programs (in the form of games and enjoyment), holding regular competitions and summer camps (such as hiking, biking, etc). Strategies employing short physical breaks (on average 10 minutes) have been fixed as a part of this program in addition to the existing curriculum.[31,32] The final policy option (environmental approaches and social support) is included a range of strategies for capacity building, providing sports facilities and other cooperation from the community and families.[33,34] Considering the available resources, it will be possible to exploit one or more interventions. Policy options for promoting physical activity and the implementing strategies of three alternative policy options are shown in Tables 1, 2.

**DISCUSSION**

This PB was developed with three policy options based on the evidences collected by searching in existing reviews. The global evidences showed that altogether, implementing of interventions and school-based multilevel can promote physical activity including training programs, physical activity (with the family and community support) and also may be effective to some extent in improving the adolescent health and fitness indicators.[5,18,29,43-45] However, it should be noted that reviews of the initial studies due to the heterogeneity, i.e., different types and quality of studies and implementing a variety of interventions, did not have a quantitative assessment (meta-analysis) of the used interventions. Their conclusion was based on the aggregate findings of the studies. These findings also showed that there are still shortcomings and gap, such as lack of the interventions effectiveness on different social-economic groups, ethnicities and separate programs for boys and girls. However, it was emphasized that the national associations and research organizations have the priority in promoting the PA. They should identify the financial resources and existing
Table 1: Policy options for promoting physical activity, their description, and attributes

| Policy options                                                                 | Physical activity (PA) curriculum reforms                                                                 | Creation of extracurricular activities (competitive and recreational)                                                                 | Environmental approaches and social support                                                                 |
|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| The intervention description                                                   | - Physical activity programs in schools, including at least 30 minutes daily of moderate to vigorous activity\[31,35\]    | - In addition to PA curricula, in order to activate the students in their leisure time, PA routinely is performed in recreational or competitive programs (with competitions), in or outside the school environment. Such as sports clubs and other places\[31,32\] | - This policy option depending on the available circumstances could be a combination of the following:        |
|                                                                                | - This program is conducted with the following modes:                                                                                                           |                                                                                                                                       | 1 - The provision of sports facilities\[33\]                                                                 |
|                                                                                | 1 - Adding new training classes                                                                                                                                 |                                                                                                                                       | 2 - Health Screening                                                                                                                                               |
|                                                                                | 2 - Increasing the time of available classes                                                                                                                    |                                                                                                                                       | 3 - Distribution of healthy food                                                                                                                                  |
|                                                                                | 3 - To increase the physical activities from moderate to severe during the classes\[32\]                                                                     |                                                                                                                                       | 4 - Using of pedometer\[36\]                                                                                                                                    |
| Benefits                                                                      | - Effectiveness of PA training classes\[27\]                                                                                                                  | - Leisure aspects and non-compulsory activities                                                                                         | 5 - Gaining support from the other beneficiary organizations\[37\] (such as the Ministry of Education - Ministry of Health - Ministry of Youth and Sports) |
|                                                                                | - Increasing the quality of training programs through:                                                                                                          | - The opportunity to perform desired activities\[38\]                                                                                   | 6 - Involving the parents in PA training programs\[18\]                                                                                                           |
|                                                                                | 1 - Increasing the duration of PA\[18\]                                                                                                                      | - Expanding group of friends and strengthen social relationships\[38\]                                                             |                                                                                                              |
|                                                                                | 2 - Using modern methods of learning (such as behavioral theories – computer programs)\[19,29\]                                                           |                                                                                                                                       |                                                                                                              |
| Disadvantages                                                                 | - Time consuming coordination and compliance with new programs                                                                                               | - Restrictions to allocate specific time to exercise out of the curriculum, especially in high school level                         | Poor coordination between the sectors                                                                                                                                |
|                                                                                | - The need for human resources                                                                                                                                  | - The need for financial resources                                                                                                    | - The need for financial resources                                                                                                                                  |
|                                                                                | - The need for financial resources                                                                                                                               | - Increase in sports facilities in schools. Most likely, the issue of sports injuries will have its own importance\[40\]          |                                                                                                              |
| Costs**                                                                       | *                                                                                                                                                        | *                                                                                                                                       |                                                                                                              |
| Acceptability                                                                 | *                                                                                                                                                        | *                                                                                                                                       |                                                                                                              |
| Equality considerations                                                        | Altogether, the evidence found on implementing effective interventions in physical activity in European adolescents (performing the secondary analyses) did not show any significant difference in the inequality of economic - social programs in heterogeneous classes (SES). It was suggested to perform separate studies to identify the potential disparities in the upper classes and lower SES.\[41\] National evidence was not found in this context. |                                                                                                                                       |                                                                                                              |

*There is a lack of evidence on the costs of these strategies.

**Based on systematic reviews in America, the cost of school-based interventions was 48.86 (cost/person ($)).\[25\]

facilities for a long term monitoring program implementation.\[5,18,46\] In searching local evidences, single studies showed the positive effects of multi-level interventions the same as the global evidences, but in neither of them there were comprehensive documentation for providing scientific evidences.\[13,47-50\] There were numerous challenges in the field of financial resources, human resources and
Table 2: Implementation characteristics of policy options for improving physical activity

| Barriers to implementation | Physical activity (PA) curriculum reforms | Creation of extracurricular activities (competitive and recreational) | Environmental approaches and social support |
|----------------------------|------------------------------------------|-------------------------------------------------|--------------------------------------------|
|                            | - Personal negative experiences[^38]       | - Fear of competition[^38]                         | - Lack of suitable place for the activities |
|                            | - Health problems and disabilities         | - Inequality of educational potential in different areas[^42] | - The most important problem in the implementation of this strategy is the high cost |
|                            | - Low educational attraction due to the mandatory case[^38] | - Lack of coordination with agencies outside the school (including municipalities) | - Cost of repair and maintenance of sports facilities |
|                            | - Applying pressure from school officials to reduce the PA programs due to financial problems or the time limit (such as preparing students for university entry)^[35] | - Time limit | - Lack of adequate cooperation of families |
|                            | - Lack of trained manpower                 |                                                | - The difficulty of coordinating the activities of different departments, institutions and ministries[^37] |
|                            | - Inequality of educational potential in different areas[^42] |                                                |                                            |
| Implementation strategies  | - Increasing the participation of students in PA classroom programs considering: 1 - Specific legislation to exempt students from exercising[^35] | - Creation of lively atmosphere and fun during the program | - Effective participation of families in programs[^18] |
|                            | 2 - Considering the equivalent activities for the students with respect to specific diseases (such as obesity - asthma) | - Taking regular short break times throughout the week at school[^32,33] | - Application of appropriate, user friendly and safe equipment[^38] |
|                            | 3 - Increasing physical activity during the PA class time[^33] | - Recreational programs outside of school | - Encouraging and awards[^38] |
|                            | 4 - Creation of athletic specific skills with new classes | - Organizing a student committees on school health | - Enhancing the capacity and quality of sport halls |
|                            | 5 - Implementation of trained teachers to perform programs |                                                | - Coordination and cooperation of concerned organizations[^37] |
|                            | 6 - Encouraging school teachers to act as a model for the students[^18] |                                                |                                            |
|                            | 7 - Application of known theories of behavior |                                                |                                            |

Evidences

Numerous evidences obtained from systematic reviews show multilevel school-based interventions and sometimes with families and community participation can be effective to increase the duration of physical activity, fitness and improving some health indicators (such as cholesterol reduction and increasing the lung capacity).[^5,18,29,43,44] However, the impact of these programs in the long run is not clear. Anyhow, if they are not profitable, loss is not expected for them.[^18]

Note: It is necessary to be considered that none of the policy options was considered alone. It is expected that the application of options are more effective together.

- Strong evidences suggest that physical training in the following ways will increase the levels of PA. They are effective and improve the fitness:
  1. Adding new training classes
  2. Increasing the hours of existing classes
  3. Increasing the moderate to severe physical activities during the classes[^33]

- Having a short break time to increase the health indicators and can be effective in increasing the PA levels[^31,32]

- Application of recreational programs for children and adolescents is effective to increase the physical activity[^39]

- Creation of capacities or access to sports facilities at the community level along with extensive information of activities is effective to increase the levels of PA and the percentage of people who carry out these activities[^33]
equipments. Severe weaknesses in inter-sectoral cooperation give rise to these problems. Finally, by considering the existing documents and aggregating the results of the interventions with appropriate quality and effectiveness, three available policy options were prepared. It seems that implementing the combination of policy options can be more effective.

However, it should be noted that implementing the proposed interventions have their own specific circumstances. The results can be effective only by respecting the limitations, resources and facilities. Therefore, since the possibilities and potential of different regions of the country is different, implementing a similar policy for all areas is not possible (e.g., using the pedometer, providing specific sports equipment and the usage of sports halls or equipped athletic places). This is recommended that the aspects of work to be measured by organizing a meeting with attending the planners and experts in order to prepare an equivalent program. Finally, it is expected that developing operational plans with using a combination of the three policy options will be instrumental in promoting physical activity in the secondary and high school students (ages 12 to 18 years) of the country.

ACKNOWLEDGEMENT

This study was supported by “Bureau of Population, Family and School Health, Ministry of Health and Medical Education” through securing of a grant for Tehran University of Medical Sciences.

REFERENCES

1. Kelishadi R, Heshmat R, Motlagh ME, Majdzadeh R, Keramatian K, Qorbani M, et al. Methodology and Early Findings of the Third Survey of CASPIAN Study: A National School-based Surveillance of Students' High Risk Behaviors. Int J Prev Med 2012;3:394-401.
2. Rajabi F. Evidence-informed health policy making: The role of Policy Brief. Int J Prev Med 2012;3:596-8.
3. De Meester F, van Lenthe FJ, Spittaels H, Lien N, De Bourdeaudhuij I. Interventions for promoting physical activity among European teenagers: A systematic review. Int J Behav Nutr Phys Act 2009;6:82.
4. van Sluijs EM, Kriemler S, McMinn AM. The effect of community and family interventions on young people's physical activity levels: A review of reviews and updated systematic review. Br J Sports Med 2011;45:914-22.
5. Kriemler S, Meyer U, Martin E, Van Sluijs EM, Andersen LB, Martin BW. Effect of school-based interventions on physical activity and fitness in children and adolescents: A review of reviews and systematic update. Br J Sports Med 2011;45:923-30.
6. Lubans DR, Foster C, Biddle SJ. A review of mediators of behavior in interventions to promote physical activity among children and adolescents. Prev Med 2008;47:463-70.
7. Timperio A, Salmon J, Ball K. Evidence-based strategies to promote physical activity among children, adolescents and young adults: Review and update. J Sci Med Sport 2004;7:20-9.
8. Kelishadi R, Ardalan G, Gheiratmand R, Gouya MM, Razaghi EM, Delavari A, et al. Association of physical activity and dietary behaviours in relation to the body mass index in a national sample of Iranian children and adolescents: CASPIAN Study. Bull World Health Organ 2007;85:19-26.
9. Neumark-Sztainer D, Story M, Hannan PJ, Croll J. Overweight status and eating patterns among adolescents: Where do youth stand in comparison with the healthy people 2010 objectives? Am J Public Health 2002;92:844-51.
10. Ortega FB, Ruiz JR, Castillo MJ, Sjöström M. Physical fitness in childhood and adolescence: A powerful marker of health. Int J Obes (Lond) 2007;32:1-11.
11. Health and Development through Physical Activity and Sport: World Health Organization, Noncommunicable Diseases and Mental Health, Noncommunicable Disease Prevention and Health Promotion 2003.
12. Organization WH. Sedentary lifestyle: A global public health problem. Available from: http://www.who.int/moveforhealth/advocacy/information_sheets/sedentary/en/index.html. [Last accessed date 2008].
13. [Estebsari F. Barasie tasire barname amuzeshie modakheleh dar zamineye faaliyate fiziki. PS. 1387;2:56-63]. (In persian)
14. Ziaee V, Kelishadi R, Ardalan G, Gheiratmand R, Majdzadeh S, Monazzam M. Physical activity in Iranian students, Caspian study. Iran J Ped. 2006;16:157-64. (In persian)
15. Kelishadi R, Ghatrehsamani S, Hosseini M, Mirmoghtadaee P, Mansouri S, Poursafa P. Barriers to Physical Activity in a Population-based Sample of Children and Adolescents in Isfahan, Iran. Iran J Prev Med 2010;1:131.
16. Kelishadi R, Ziaee V, Ardalan G, Namazi A, Noormohammadpour P, Ghayour-Mobarhan M, et al. A National Experience on Physical Activity Initiatives for Adolescent Girls and Their Mothers: CASPIAN Study. Iran J Pediatr 2010;20:420-6.
17. Taymoori P, Niknami S, Berry T, Lubans D, Ghofranipour F, Kazemnejad A. A school-based randomized controlled trial to improve physical activity among Iranian high school girls. Int J Behav Nutr Phys Act 2008;5:18.

18. Dobbins M, De Corby K, Robeson P, Husson H, Tirilis D. School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6-18. Cochrane Database Syst Rev 2009;1:CD007651.

19. Hamel LM, Robbins LB, Wilbur J. Computer-and web-based interventions to increase preadolescent and adolescent physical activity: A systematic review. J Adv Nurs 2011;67:251-68.

20. Chillón P, Everson KR, Vaughn A, Ward DS. Asystematic review of interventions for promoting active transportation to school. Int J Behav Phys Act 2011;8:1-10.

21. Jago R, Baranowski T. Non-curricular approaches for increasing physical activity in youth: A review. Prev Med 2004;39:157-63.

22. Stone EJ, McKenzie TL, Welk GJ, Booth ML. Effects of physical activity interventions in youth: Review and synthesis. Am J Prev Med 1998;15:298-315.

23. Hoehner CM, Soares J, Parra Perez D, Ribeiro IC, Joshu CE, Pratt M, et al. Physical Activity Interventions in Latin America: A Systematic Review. American journal of preventive medicine. 2008;34:224-33.

24. Koh HK. A 2020 vision for healthy people. N Engl J Med 2010;362:1653-6.

25. Wu S, Cohen D, Shi Y, Pearson M, Sturm R. Economic analysis of physical activity interventions. Am J Prev Med 2011;40:149-58.

26. Booth SL, Sallis JF, Ritenbaugh C, Hill JO, Birch LL, Frank LD, et al. Environmental and societal factors affect food choice and physical activity: Rationale, influences, and leverage points. Nutr Rev 2001;59:S21-36.

27. The Association Between School-Based Physical Activity, Including Physical Education, and Academic Performance: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Adolescent and School Health. 2010.

28. Information Package for Evidence-Informed Interventions: Effective school-based physical activity interventions: Canadian Cancer Society Manitoba Division, Knowledge Exchange Network, 2011.

29. Camacho-Miñano MJ, LaVoi NM, Barr-Anderson DJ. Interventions to promote physical activity among young and adolescent girls: A systematic review. Health Educ Res 2011;26:1025-49.

30. Dunn AL, Andersen RE, Jakicic JM. Lifestyle physical activity interventions: History, short-and long-term effects, and recommendations. Am J Prev Med 1998;15:398-412.

31. Kang H, Gutin B, Barbeau P, Owens S, Lemmon CR, Allison J. School-based physical activity interventions to prevent or treat childhood overweight. A Summery of Research and Findings 2005;1:30.

32. Barr-Anderson DJ, AuYoung M, Whitt-Glover MC, Glenn BA, Yancey AK. Integration of short bouts of physical activity into organizational routine: A systematic review of the literature. Am J Prev Med 2011;40:76-93.

33. Kahn EB, Ramsey LT, Brownson RC, Heath GW, Howze EH, Powell KE, et al. The effectiveness of interventions to increase physical activity: A systematic review 1 and 2. Am J Prev Med 2002;22:73-107.

34. Kargarfard M, Kelishadi R, Ziaee V, Ardalan G, HALABCHI F, MAZAHERI R, et al. The impact of an after-school physical activity program on health-related fitness of mother/daughter pairs: CASPIAN study. Prev Med 2012;54:219-23.

35. Diamant AL, Babey SH, Wolstein J. Adolescent physical education and physical activity in California. Policy Brief UCLA Cent Health Policy Res 2011;(PB2011-5):1-8.

36. Dungan J, Scott Duncan J, Schofield G. Pedometer-determined physical activity and active transport in girls. Int J Behav Nutr Phys Act 2008;5:2.

37. Yancey AK. The meta-volition model: Organizational leadership is the key ingredient in getting society moving, literally! Pre Med 2009;49:342-51.

38. National Institute for Health and Clinical Excellence.[ updated 13 July 2012; cited 8 September 2011]. Available from: http://www.nice.org.uk/guidance/index.jsp?action=download&o=43036.

39. Salmon J, Booth ML, Phongsavan P, Murphy N, Timperio A. Promoting physical activity participation among children and adolescents. Epidemiol Rev 2007;29:144-59.

40. Strong WB, Malina RM, Blimkie CJ, Daniels SR, Dishman RK, Gutin B, et al. Evidence based physical activity for school-age youth. J Pediatr 2005;146:732-7.

41. De Bourdeaudhuij I, Simon C, De Meester F, Van Lenthe F, Timperio A. Promoting physical activity among children and adolescents. Epidemiol Rev 2005;29:144-59.

42. Ferreira I, Van der Horst K, Wendel-Vos W, Kremers S, van Lenthe F, Brug J. Environmental correlates of physical activity in youth—A review and update. Obes Rev 2007;8:129-54.

43. Pate RR, Davis MG, Robinson TN, Stone EJ, McKenzie TL, Young JC. Promoting physical activity in children and youth a leadership role for schools: Ascientific statement from the American Heart Association Council on Nutrition, Physical Activity, and Metabolism (Physical Activity Committee) in collaboration with the councils on...
Cardiovascular Disease in the Young and Cardiovascular Nursing. Circulation 2006;114:1214-24.
44. van Sluijs EM, McMinn AM, Griffin SJ. Effectiveness of interventions to promote physical activity in children and adolescents: Systematic review of controlled trials. Bmj 2007;335:703.
45. Youngblade LM, Theokas C, Schulenberg J, Curry L, Huang IC, Novak M. Risk and promotive factors in families, schools, and communities: A contextual model of positive youth development in adolescence. Pediatrics 2007;119(Suppl 1):S47-53.
46. BYRD-Williams C, Kelly LA, Davis JN, SPRUJT-Metz D, Goran MI. Influence of gender, BMI and Hispanic ethnicity on physical activity in children. International Journal of Pediatric Obesity. 2007;2;159-66
47. Azadi A, Anoosheh M, Elhani F, Hajizadeh E. The effect of implementation of health promotion program in school to control risk factors for obesity in adolescents. Iran South Med J. 2009;2:153-62. (In persian)
48. Estebsari F, shojaeizadeh D, Mostafaei D, Farahbakhsh M. Planning and Evaluation of an Educational Program Based on PRECEDE Model to Improve Physical Activity in Female Students. Hayat 1389:16;48-54. (In persian)
49. Taymoori P, Lubans DR. Mediators of behavior change in two tailored physical activity interventions for adolescent girls. Psychol Sport Exerc 2008;9:605-19.
50. Kelishadi R, Khavarian N, Ghatreh-Samani S, Beizaei M, Ramedan R, Poursafa P. Effect of Different Methods of Physical Activity Training for Overweight Children and Adolescents. Knowl Health 2010;2:9-25.

Source of Support: Nil. Conflict of Interest: None declared.