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Relationship Between Regular Physical Activity and Transtheoretical Model Components Among Members of Municipality Councils in Selected Districts of Tehran

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Abstract

Background: The Trans theoretical model (TTM) is developed as a framework for understanding the process of behavior changes. It is known as the most popular approach for promoting exercise behavior. The main objective of this study is to determine the relationship between regular physical activity and TTM components among members of municipality councils in selected districts of Tehran.

Methods: This quasi-experimental research with non-equivalent control groups was conducted as a cross-sectional study with 207 members of municipality councils at districts 17 and 20 of Tehran. Data gathering instruments included: demographic; physical activity stage of change; processes of change (researcher-made); self-efficacy, and decisional balance questionnaires. Reliability, and construct validity were evaluated through appropriate statistical procedures. To analyze the data, applied statistical tests such as: chi-square, regression, Pearson correlation coefficient and ANOVA were performed using SPSS 22 software.

Results: The level of physical activity of municipality council's members were: 43.5%, 12.1%, and 44.4% at low, moderate, and appropriate activity levels, respectively. The results showed that 18.9, 15.9, 10.1, 24.7 and 30.4 percent of municipality council's members were in the pre contemplation, contemplation, preparation, operation and maintenance stages consequently. The stages of change could predict physical activity in the municipality councils ($P < 0.05$). However, all the components of this model were significantly associated with regular physical activity behavior. There was a significant relationship between the structures of the processes of change, benefits and barriers against regular physical activity.

Conclusions: Although, 43.5% of municipality council's members did not have any intention of performing physical activities in the next six months, it is important to them to recognize the need for physical activity as the main behavior to increase physical and mental health and to be in the maintenance stage of their physical activity behavior. According to the most important predicting components in this study, educational intervention must be focused on in order to increase the effectiveness of the programs to promote municipality councils' physical activity.

Keywords: Physical Activity, Transtheoretical Models, Educational, Municipality Council's

1. Background

Health consists of physical, mental, emotional, social and spiritual aspects which various factors endanger them. Much endeavor has been directed toward repairing health-related behavior. Modifying the life style associated with these health related risk factors may prevent some diseases and premature deaths. Regular physical activity is one of the main priorities in promoting health and preventing diseases such as cardiovascular, coronary heart, stroke, diabetes, some cancers and depression (1-5). Because of the explicit benefits of regular physical activity in prevention of disease complications and promoting individuals' physical and mental health, it has been emphasized in many studies (1-4).

Despite many benefits of it, a relatively small propor-

tion of people in different countries are doing regular physical activities. According to the world health organization (2009), more than 60% of the world population do not have physical activities of moderate intensity (6). Surveys conducted in Iran also showed that 80 percent of the Iranian people are physically inactive (7). According to some studies (e.g. Sanaei Nasab et al.) conducted in Tehran, about half of the population are at a low physical activity level (8).

In order to improve the quality and quantity of physical activity behavior, planning should be made to adopt, maintain, and improve the health behavior among the public (9, 10).

To plan for improving such behavior, there are several behavioral change models. TTM is one of them, developed

by Projaska and Diclemente as a comprehensive model of behavior change and as a framework for understanding health-related behaviors and directing efforts to improve the healthcare (11).

According to this model, the process of behavioral change is a gradual process with different stages and people passing through these stages of change (12). This model has four components including stages of change, processes of change, self-efficacy and decisional balance. Stages of change consists of five steps: pre-contemplation, contemplation, preparation, action and maintenance (13).

Many scientific research studies are carried out in the field of physical activity, indicating the inactivity of people in terms of physical activity; however, no study has been conducted in non-governmental communities and organizations (NGO). One of the new associations whose formation lasts for nearly a decade and is one of the best places to initiate promoting any kind of exercise or physical activity culture is the municipality council associations; since the facilities placed in entertainment places by municipalities can lead to enhancing physical activity and exercise culture among citizens.

This association is one of the cooperative social centers which are generally established by local people in different neighborhoods to meet the needs of different individuals.

In other countries such as Turkey, they are also acting under other names like Muhtar (14).

In Iran, in addition to attracting the citizens to improve their life quality, the municipality councils are regarded as an appropriate model to promote physical activity behavior. Hence, to improve the quality and quantity of physical activity behaviors in the municipality councils with regard to the TTM components, the present study was to measure the relationship between these components and physical activity and designed to describe the physical activity behaviors of the municipality councils as the first contact point with the population, to assess the current situation in order to develop proper strategies to increase the quality and quantity of physical activity in this group and to explain their role to motivate and encourage the neighborhood residents as an external action guide to increase physical activity levels.

This study aimed to determine the relationship between regular physical activity and TTM components among the municipality council's members in selected districts of Tehran.

2. Methods

This research studies the relationship between regular physical activity and TTM components. Designed as a quasi-experimental study with non-equivalent control

groups and was conducted as a cross-sectional study with the participation of 207 municipality councils at districts 17 (n = 85 (and 20) n = 122) in Tehran. Data collection tools used in this study were a demographic questionnaire (including important information on subjects such as age, sex, educational level, employment status, marital status, BMI and work experience); a brief version of the international physical activity questionnaire (IPAQ) localized in Iran. The Cronbach's alpha coefficient reported by Abasi et al. for this questionnaire was 84.0 (15). Furthermore, stages of change for regular physical activity (16) and researcher-made processes of change, self-efficacy and decisional balance questionnaires which determine the positive and negative aspects of regular physical activity were used. At first, the objective of the study was explained to the municipality council's members to complete the questionnaires that took about 15 minutes. Then, after receiving their informed consent and making them ensured of their information confidentiality, they were asked to complete the questionnaire in the presence of the researcher. It was also stated that the survey is optional and it is not compulsory to complete the questionnaire. In the demographic questionnaire according to weight and height, the body mass index (BMI) was used to determine obesity and overweightness. In this regard, individuals were overweight and obese with BMI between 25 - 29.9, and above 30 (17).

Based on the stages of change questionnaire, people were classified based on various stages of physical activity behavior including pre-contemplation, contemplation, preparation, action and maintenance. Pre-contemplation and intention refer to a stage in which an individual is still not thinking about changing or adopting a behavior at least within the next six months. In the contemplation and intention stage, one is really thinking about a change (within the next six months); however, he is still not prepared to take necessary action. In preparation stage, one seriously thinks about a change of behavior and intends to make a change in the near future (usually in the next month) and provides preparations for initiation of that behavior. In action stage, one has made appropriate changes in his life style (during the past six months). Since performance is observable, the behavior change is often equated with performance. In maintenance stage, a longer period (over six months) of establishment and strengthening of behavior change is observed; however, active and conscious efforts are required to sustain it (18).

Accordingly, Cronbach's alpha was 0.8 for the questionnaire stages of change (19). The researcher-made questionnaires were submitted to 9 experts; asking them to comment on each question with one of the following: "essential", "useful but not necessary" and "unnecessary". Its content validity was measured after applying their com-

ments and removing and adding a number of questions according to their recommendations. The content validity index and content validity ratio were acceptable (0.94 - 0.99 and 0.70 - 0.81) respectively. Additionally, the reliability was confirmed by Cronbach's alpha. The reliability coefficients for components self-efficacy, processes of change, perceived benefits and perceived barriers were 0.80%, 0.90%, 0.91%, and 0.86%, respectively which represents the correlation between the questions. The questionnaire consisted of seven sections: (1) demographic information (10 items); (2) daily activity according to the IPAQ (7 items); (3) five stages of change; (4) processes of change (13 items); (5) self-efficacy (9 items); (6) perceived benefits (9 items); and (7) Perceived barriers (10 items). The items are in five-point Likert scale (from 0 to 4). Physical activity was measured by the short version of the international physical activity questionnaire. According to this scale, the scores below MET 600, MET 1500-600, and above MET 1500 are considered as low, medium, and intense levels of physical activity.

Data was analyzed by using descriptive statistics and descriptive tables and chi-square, regression, Pearson correlation coefficient and ANOVA tests.

3. Results

The participants were aged between 26 - 88 years with an average age of 46.5 and a standard deviation of 11.9. There were 189 male participants (91.3 percent) and 18 female participants (8.7 percent). A majority of the study population (90.3 percent) was married and had academic education (57.5 percent). More than half of the municipality council's members (52.2 percent) were overweight and 21.3 percent had obese.

Concerning the level of physical activity, 43.5%, 12.1%, and 44.4% of municipality councils were at low, moderate, and appropriate activity levels, respectively (Table 1). The results showed that 18.9% of municipality councils were in the pre contemplation stage, 15.9% were in the contemplation stage, 10.1% were in preparation stage, 24.7% were in the operation stage, and 30.4 percent were in the maintenance stage (Table 2).

The results showed that more than half of the councils (51.6 percent) were overweight (Table 3).

According to the correlation matrix findings, there is a significant relationship between stages of change, processes of change, self-efficacy, perceived barriers and benefits and regular physical activity behavior. A significant relationship also exists between BMI and barriers and benefits of doing regular physical activities ($P < 0.01$) (Table 4).

According to the regression test results, among the TTM components, the stages of change could predict the

Table 1. Absolute and Relative Distribution of Physical Activity (IPAQ) in Area Councils in Tehran

| Levels of Physical Activity | No. | % |
|-----------------------------|-----|------|
| Inactive | 90 | 43.5 |
| Moderate activity | 25 | 12.1 |
| Intense activity | 92 | 44.4 |
| Total | 207 | 100 |

Table 2. Absolute and Relative Distribution of the Stages of Change in Physical Activity in Area Councils in Tehran

| Stage of Change | No. | % |
|------------------|-----|------|
| Precontemplation | 39 | 18.9 |
| Contemplation | 33 | 15.9 |
| Preparation | 21 | 10.1 |
| Action | 51 | 24.7 |
| Maintenance | 63 | 30.4 |
| Total | 207 | 100 |

Table 3. Absolute and Relative Distribution of BMI in Area Councils in Tehran

| BMI | No. | % |
|--------------------|-----|------|
| Thin | 1 | 0.5 |
| Appropriate weight | 55 | 26.6 |
| overweight | 107 | 51.6 |
| obese | 44 | 21.3 |
| Total | 207 | 100 |

performance of regular physical activity in the municipality council's members (Table 5).

4. Discussion

This study aimed to determine the relationship between regular physical activity and TTM components among municipality council's members in selected districts of Tehran.

The results also revealed that 44.9 percent of the study population was in three initial stages of regular physical activity (pre-contemplation, contemplation and preparation). This means that these individuals have had a sedentary lifestyle. Due to the positive benefits of regular physical activity in many different aspects such as enhancing joy and vitality, enhancing longevity by preventing the occurrence of heart and brain strokes (1), contributing to individual and social tasks and responsibilities, strengthening

Table 4. The Correlation Matrix Structures of TTM Model, Age, BMI

| Row | Structures | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----|---------------------------|---|--------------------|--------------------|--------------------|--------------------|---------------------|--------|---------------------|
| 1 | Regular physical activity | 1 | 0.559 ^a | 0.425 ^a | 0.416 ^a | 0.263 ^a | -0.176 ^b | -0.49 | -0.030 |
| 2 | Stage of change | | 1 | 0.497 ^a | 0.539 ^a | 0.321 ^a | -0.243 ^a | -0.053 | -0.133 |
| 3 | Process of change | | | 1 | 0.661 ^a | 0.659 ^a | -0.420 ^a | 0.007 | 0.156 ^b |
| 4 | Self-efficacy | | | | 1 | 0.368 ^a | -0.260 ^a | 0.008 | 0.097 |
| 5 | Perceived benefits | | | | | 1 | -0.484 ^a | 0.069 | 0.202 ^a |
| 6 | Perceived barriers | | | | | | 1 | -0.122 | -0.201 ^a |
| 7 | Age | | | | | | | 1 | 0.046 |
| 8 | BMI | | | | | | | | 1 |

^bp < 0.01.
^ap < 0.05.

Table 5. Linear Regression Analysis for Predicting Regular Physical Activity in Area Councils in Tehran

| Structure | 95% CI | P | Beta | T | SE | B |
|--------------------|--------------------|-------|--------|--------|---------|---------|
| Stage of change | 576.224 - 1095.856 | 0.00 | 0.442 | 6.345 | 131.764 | 836.040 |
| Process of change | -95.736 - 4.815 | 0.076 | -0.172 | -1.783 | 25.497 | -45.460 |
| Self-Efficacy | -74.127-28.058 | 0.375 | -0.072 | -0.889 | 25.911 | -23.034 |
| Perceived Benefits | -71.790 - 82.311 | 0.893 | 0.011 | 0.135 | 39.075 | 5.260 |
| Perceived Barriers | -57.399 - 43.948 | 0/794 | -0/017 | -0.262 | 25.699 | -6.725 |

will improve conditions and quality of life, and decreasing corruption and anomalies, an energetic and active life is paramount importance (20). And to achieve a life mobility, effective planning, such as education should be used and it should be ensured that the activity is carried out in a mode and at an intensity that yields best benefits (21).

No study has yet been done in Iran and the world in this group. Therefore these results with studies in different population groups and countries were different. The results of the studies conducted by Mazloomi et al. on students at office personnel of the city of Yazd (22) and by Arango et al. on urban population in Colombia (23) indicate that a vast majority of university students (73.6 percent) and 66.6 percent of the urban population were also in three early stages. As it can be observed, the present study is not consistent with the above studies and the municipality councils were in a better condition in terms of regular physical activity. The findings of this study are in the same line with the findings of Abdi et al. (24). In their study, half of the subjects were in the three initial stages.

Regarding regular physical activity, the results showed that 56.5 percent of the participants were active and 43.5 percent of them were inactive. This is not in a similar vein with findings in studies conducted by Abdi et al. (49.2% active and 50.8% inactive) (24) and Lee et al. (53.4% inactive) (25), Uz Tunçay et al. (33.6% active and 27.2% inactive) (26) and Oyewole et al. (68.9% active and 31% inactive) (27), Va-

hedian et al. (8/7% active) (28). This shows that the participants in the present study are in a more accepted condition in terms of regular physical activity. The difference among the studied participants may be due to differences in terms of measurement criterion, mean age and socio-economic status and their demographic information and various physical activity definitions. Regression analysis in this study indicated that the component stages of change can predict the regular physical activity. This means that individuals in more active stages, are more willing to do physical activities and this is not consistent with Sullum's et al. study (29), indicating that the perceived barriers have a high predictive power in doing regular physical activities. It is likely that this discrepancy is due to the fact that the majority of students, particularly female students, were in the early stages of physical activity which decreases the benefits of physical activity and enhances its barriers.

Results of this study showed that there is a significant relationship between stage of change and component of perceived benefits of regular physical activity. This means that, after perception more benefits of regular physical activity, individuals are at higher levels of stage of change. These findings are consistent with the Simon and et al. study (30).

The findings of study showed that there is a significant relationship between regular physical activity and component of self-efficacy. This means that probably by in-

creasing self-efficacy, regular physical activity will increase. These findings are consistent with the Keating and et al. (31) and study and Marshal and et al. study (30). Results of this study showed that there is contrary significant relationship between regular physical activity and component of perceived barriers. This means that, by reducing perceived barriers, regular physical activity will increase. These findings are consistent with the Simon and et al. study (30).

4.1. Conclusion

According to the findings, about 45% of municipality council's members do not have any intention to do physical activities. It is necessary for them to recognize the need for health behaviors in order to increase physical and mental health and to be in the maintenance stage of their physical activity behavior. The results revealed that the most important predicting component in this study was the stage of change; therefore, some programs strengthening this factor should be considered to promote municipality councils' physical activity.

With regard to the results indicating the relationship between the model components, it can be mentioned that if self-efficacy in regular physical activity upgrade and the processes used to change behavior employ the conditions are provided to experience the perceived benefits, despite of the obstacles, individuals will pay attention to physical activity behavior more.

There may be two limitations for the present study. The first: the rate of physical activity is based on self-reporting, that there is a possibility of under-reporting or over-reporting. However, in the questionnaire studies the report of samples should be trusted. The second: lack of prior research studies in members of municipality councils.

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References

- Juraschek SP, Blaha MJ, Whelton SP, Blumenthal R, Jones SR, Keteyian SJ, et al. Physical fitness and hypertension in a population at risk for cardiovascular disease: the Henry Ford Exercise Testing (FIT) Project. *J Am Heart Assoc.* 2014;3(6):e001268. doi: [10.1161/JAHA.114.001268](https://doi.org/10.1161/JAHA.114.001268). [PubMed: 25520327].
- Porebska M, Mazurek W. The influence of physical training on endothelial function in patients with stable coronary artery disease. *Adv Clin Exp Med.* 2014;23(5):743-8. [PubMed: 25491688].
- Reed JL, Prince SA, Cole CA, Fodor JG, Hiremath S, Mullen KA, et al. Workplace physical activity interventions and moderate-to-vigorous intensity physical activity levels among working-age women: a systematic review protocol. *Syst Rev.* 2014;3:147. doi: [10.1186/2046-4053-3-147](https://doi.org/10.1186/2046-4053-3-147). [PubMed: 25526769].
- Connelly J, Kirk A, Masthoff J, MacRury S. The use of technology to promote physical activity in Type 2 diabetes management: a systematic review. *Diabet Med.* 2013;30(12):1420-32. doi: [10.1111/dme.12289](https://doi.org/10.1111/dme.12289). [PubMed: 23870009].
- Shafieinia M, Hidarnia A, Kazemnejad A, Rajabi R. Effects of a Theory Based Intervention on Physical Activity Among Female Employees: A Quasi-Experimental Study. *Asian J Sports Med.* 2016;7(2):e31534. doi: [10.5812/asjasm.31534](https://doi.org/10.5812/asjasm.31534). [PubMed: 27625759].
- Adams J, White M. Why don't stage-based activity promotion interventions work?. *Health Educ Res.* 2005;20(2):237-43. doi: [10.1093/her/cyg105](https://doi.org/10.1093/her/cyg105). [PubMed: 15253998].
- Sadrollahi A, Hosseinian M, Masoudi Alavi N, Khalili Z, Esalatmanesh S. Physical Activity Patterns in the Elderly Kashan Population. *Iran Red Crescent Med J.* 2016;18(6):e25008. doi: [10.5812/ircmj.25008](https://doi.org/10.5812/ircmj.25008). [PubMed: 27621923].
- Sanaei Nasab H, Delavari A, Tavakoli R, Samadi M, Naqzadeh M. Knowledge, attitudes and practices toward physical activity by staff of a medical university Journal of Military medicine [In Persian]. *J Mil Med.* 2009;11(1):25-30.
- Ronda G, Van Assema P, Brug J. Stages of change, psychological factors and awareness of physical activity levels in The Netherlands. *Health Promot Int.* 2001;16(4):305-14. [PubMed: 11733449].
- Nakamura Y, Kikuchi H, Oka K, Ota A, Miyauchi T. Stage of change of exercise affects health-related quality of life. *J Sport Health Sci.* 2006;4:67-73. doi: [10.5432/ijshs.4.67](https://doi.org/10.5432/ijshs.4.67).
- Huang HY, Lin YS, Chuang YC, Lin WH, Kuo LY, Chen JC, et al. Application of the Transtheoretical Model to Exercise Behavior and Physical Activity in Patients after Open Heart Surgery. *Acta Cardiol Sin.* 2015;31(3):202-8. [PubMed: 27122871].
- Hall KL, Rossi JS. Meta-analytic examination of the strong and weak principles across 48 health behaviors. *Prev Med.* 2008;46(3):266-74. doi: [10.1016/j.ypmed.2007.11.006](https://doi.org/10.1016/j.ypmed.2007.11.006). [PubMed: 18242667].
- Steptoe A, Kerry S, Rink E, Hilton S. The impact of behavioral counseling on stage of change in fat intake, physical activity, and cigarette smoking in adults at increased risk of coronary heart disease. *Am J Public Health.* 2001;91(2):265-9. doi: [10.2105/AJPH.91.2.265](https://doi.org/10.2105/AJPH.91.2.265). [PubMed: 11211636].
- coordination of staff of islamic consultative councils. *Monthly councilor Tehran.* 2015;9:61.
- Abasi MH, Eslami AA, Rakhshani F, Shiri M. Development and psychometric properties of a self-regulation scale about leisure time physical activity in Iranian male adolescents. *Iran J Nurs Midwifery Res.* 2016;21(2):183-90. doi: [10.4103/1735-9066.178246](https://doi.org/10.4103/1735-9066.178246). [PubMed: 27095993].
- Guidelines for data processing and analysis of the international physical activity questionnaire (IPAQ)- Short Form [Internet]. *The office guidance of talented University of Medical Sciences.* 2014.
- Saffari M, Pakpour AH, Mohammadi-Zeidi I, Samadi M, Chen H. Long-term effect of motivational interviewing on dietary intake and weight loss in Iranian obese/overweight women. *Health Promot Perspect.* 2014;4(2):206-13. doi: [10.5681/hpp.2014.027](https://doi.org/10.5681/hpp.2014.027). [PubMed: 25648690].
- Horiuchi S, Tsuda A, Kobayashi H, Fallon EA, Sakano Y. Self-efficacy, pros, and cons as variables associated with adjacent stages of change for regular exercise in Japanese college students. *J Health Psychol.* 2016 doi: [10.1177/1359105315621779](https://doi.org/10.1177/1359105315621779). [PubMed: 26786174].
- Ghahremani L, Mousavi Z, Kaveh MH, Ghaem H. Self-Care Education Programs Based on a Trans-Theoretical Model in Women Referring to Health Centers: Breast Self-Examination Behavior in Iran. *Asian Pac J Cancer Prev.* 2016;17(12):5133-8. doi: [10.22034/APJCP.2016.17.12.5133](https://doi.org/10.22034/APJCP.2016.17.12.5133). [PubMed: 28122446].
- Saburi H, editor. Sport in islam Qom. The Islamic Propagation Office Qom Seminary. 2003; .

21. Amin-Shokravi F, Rajabi R, Ziaee N. Exercise Effects on Risk of Cardiovascular Disease among Iranian Women. *Asian J Sports Med.* 2011;**2**(1):37-43. [PubMed: [22375216](#)].
22. Mahmoodabab SS, Mohammadi M, Abad MA. Application of Trans-theoretical Model to Exercise in Office Staff. *Electron Physician.* 2013;**5**(1):588-93. doi: [10.14661/2013.588-593](#). [PubMed: [26120387](#)].
23. Arango EF, Patiño FA, Quintero MA, Arenas MM. Levels of physical activity, barriers, and stage of change in an urban population from a municipality in Colombia. *Colombia Méd.* 2011;**42**(3):352-61.
24. Abdi J, Eftekhar H, Mahmoodi M, Shojayzadeh D, Sadeghi R. Physical Activity Status and Position of Governmental Employees in Changing Stage Based on the Trans-Theoretical Model in Hamadan, Iran. *Glob J Health Sci.* 2015;**7**(5):23-32. doi: [10.5539/gjhs.v7n5p23](#). [PubMed: [26156899](#)].
25. Lee Y, Kim J, Han ES, Chae S, Ryu M, Ahn KH, et al. Changes in physical activity and cognitive decline in older adults living in the community. *Age (Dordr).* 2015;**37**(2):20. doi: [10.1007/s11357-015-9759-z](#). [PubMed: [25708946](#)].
26. Uz Tuncay S, Yeldan I. [Is physical inactivity associated with musculoskeletal disorders?]. *Agri.* 2013;**25**(4):147-55. doi: [10.5505/agri.2013.09825](#). [PubMed: [24264549](#)].
27. Oyewole OO, Odusan O, Oritogun KS, Idowu AO. Physical activity among type-2 diabetic adult Nigerians. *Ann Afr Med.* 2014;**13**(4):189-94. doi: [10.4103/1596-3519.142290](#). [PubMed: [25287033](#)].
28. Vahedian-Shahroodi M, Amin-Shokravi F, Hidarnia A, Jabbari Nooghabid H. A survey on the effects of the Pender's health promotion model on prediction of the employees' physical activity. *J Educ Health Promot.* 2013;**1**(1):51-66.
29. Sullum J, Clark MM, King TK. Predictors of exercise relapse in a college population. *J Am Coll Health.* 2000;**48**(4):175-80. doi: [10.1080/07448480009595693](#). [PubMed: [10650735](#)].
30. Marshall SJ, Biddle SJ. The transtheoretical model of behavior change: a meta-analysis of applications to physical activity and exercise. *Ann Behav Med.* 2001;**23**(4):229-46. doi: [10.1207/S15324796ABM2304_2](#). [PubMed: [11761340](#)].
31. Keating XD, Guan J, Pinero JC, Bridges DM. A meta-analysis of college students' physical activity behaviors. *J Am Coll Health.* 2005;**54**(2):116-25. doi: [10.3200/JACH.54.2.116-126](#). [PubMed: [16255324](#)].