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Predicting Physical Activity Behavior among ICU Nurses based on a Transtheoretical Model Using Path Analysis

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Abstract

Aim: Regular physical activity has several physical, psychological and social benefits. However, it is a global health problem, especially among ICU nurses. Therefore, in order to improve nurses' physical activity, it is required to determine the effective correlated factors. The aim of this study was to delineate predictive factors on the physical activity of ICU nurses based on a trans-theoretical model (TTM) using path analysis.

Method: Accordingly, in this cross-sectional study, 82 nurses from eight intensive care units of six hospitals in Guilan University of Medical Sciences completed the translated version of Global Physical Activity Questionnaire (GPAQ) and another questionnaire, which included a range of constructs from the TTM. Data were analyzed using bivariate correlation and path analysis.

Findings: It was revealed that self-efficacy (β=0.24) and Pros (β=0.18) had a direct effect on the participants' physical activities. It is important to state that self-efficacy was effective on the participants, behavioral physical activity both directly and indirectly. Totally, self-efficacy with the path coefficient of 0.62 was considered as the strongest predictive factor of physical activity among the ICU nurses.

Conclusion: To enclose, the determined effective factors in improving the ICU nurses' physical activity were expected to be of more concern, especially self-efficacy as the strongest one.

Key words: Trans-theoretical Model, Physical activity behavior, ICU nurses

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Introduction

Regular physical activity has several physical, psychological and social benefits for all ages [1-5]. Besides, it is an important factor to prevent and treat chronic diseases [6-9], especially in lowering their risk of occurrence [10]. Regular physical activity contributes positively to physiological and psychological health [11-14]. Furthermore, it reduces the risk of many diseases such as arterial hypertension, type 2 diabetes mellitus, dyslipidemia, obesity, coronary heart disease, chronic heart failure, and chronic obstructive pulmonary disease. In addition, the risk of colon, breast, and possibly endometrial, lung and pancreatic cancer will also be lessened [15]. Generally, increasing PA helps minimize the burden on health and social care through enabling healthy ageing [16]. That is to say, the relative risk of death is approximately 20% to 35% lower in physically active persons than those in obesity and unfit conditions[17]. In spite of the fact that the health benefits of regular physical activity (PA) have been well-established [18], physical inactivity still remains a global health issue [19]. Evidence supports the conclusion that physical inactivity is one of the most important public health problems of the 21st century [20, 21]. Studies have indicated that physical inactivity is associated with a variety of non-contagious diseases, and an overall of 1.9 million deaths are attributable to physical inactivity [22]. Yet at least half of the common people fails to meet national recommended guidelines. As a result, the promotion of PA is of great importance to public health [23]. The literature from the Middle East shows high levels of physical inactivity among adults [24]. Despite the health threats posed by inactivity, data from three national surveys among Iranian adults show that more than 80% of Iranian population is physically inactive [21]. One of the challenges facing the development of disease prevention programs is the lack of reliable data for PA levels and trends [25]. Additionally, due to lack of sufficient PA in most populations, this potential health issue is in partial use only [26]. Moreover, the number of studies found in the literature examining the perceived benefits of exercise and nurses' reported physical activity is limited. Nurses have professional responsibility to patients; they also have the opportunity to be role models, suggesting the attitude that nurses need to exercise more. Despite the wealth of evidence supporting the positive impact of exercise on health, the majority of nurses do not commit to sufficient regular PA [27], especially those nurses who play a substantial role in the care provided in ICUs. It has been confirmed that nurses specialized in working for ICUs have a great impact on saving patients' lives [28]. However, another related challenge for ICUs is to improve the nurses'

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quality of working life (QWL). Improving nursing QWL is critical because poor QWL leads to high nursing turnover, a significant problem for ICUs in the United States [29]. Consequently, it is important to investigate factors that influence nurses' decisions about choosing to be active. Gaining a clearer understanding of these factors can provide insight into strategies that may encourage nurses to be active [19]. It has been reported that gender, social support, modeling, self-efficacy and perceived benefits and barriers to exercise directly influence physical activity behavior [27]. As a result, encouraging and supporting patients to embark on PA lifestyle changes is an everyday challenge faced many health professionals [30]. Likewise, factors associated with physical activity participation have been identified in many studies [21]. On the other hand, there are some cultural barriers opposing to Iranian women for exercising in public places. In addition, physical activity declines precipitously with age increase among females [1]. One of the most popular models for studying behavioral determinants is the Transtheortical Model (TTM) [21]. The TTM has been applied to many health behaviors since its introduction in the early 1980s (Prochaska & DiClemente, 1984). It has become one of the most widely used program planning models in health promotion [31]. According to this model, a special health behavior develops over time and progresses through five stages, which may be exploited to examine readiness and being physically active [1], pre-contemplation [6], contemplation [32] preparation [10], action [11], and maintenance [33]. The TTM is based on the premise that people are at different stages of readiness for engaging in health behaviors. Also intervention techniques are likely to be the most helpful methods in comparison to the individuals' current stage of change [34]. TTM consists of four key constructs including stages of change, processes of change, self efficacy and decisional balance [35]. Most of TTM studies have demonstrated the existence of significant relationship between exercise behavior and TTM constructs [36]. Furthermore, to our knowledge, there is no research on the exercise stages of change among nurses working in ICUs. Therefore, this study was conducted to help to determine the efficacy of TTM to explain exercise behavior among nurses who work in ICUs. Consequently, the aim of this study is to determine the possible correlation between TTM constructs (processes of change, decisional balance and self-efficacy) and exercise behavior using path analysis among the ICU nurses of Guilan University of Medical Sciences.

Methods

This cross-sectional study was conducted on

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82 nurses working in the ICUs of Guilan University of Medical Sciences who were selected by census method. Ethical approval for this study was gained from the Research Ethics Committee at Guilan University of Medical Sciences. All the participants provided informed consent to be involved in the study. They completed a range of self-report questionnaires assessing their physical activity level and constructs of the TTM.

Reliable and valid instruments used in this study were as follows:

Stage of exercise behavioral change questionnaire (SECQS), and a translated version of the SECQS developed by Marcus and colleagues [34] validated for Iranian people by Farmanbar with the announced intra-class correlation coefficient (ICC) of 0.92. The participants were asked to indicate which of the choices best described their present level of exercise behavior (e.g. walking, swimming, cycling, and playing ball sports for 30 minutes or more daily, five days a week): 'I have been active for more than six months (maintenance)'; 'I have been active for less than six months (action)'; 'I am not regularly active but I engage in activities occasionally and plan to start on a regular basis within the next month (preparation)'; 'I am not active but I am thinking of starting in the next six months (contemplation)'; and 'I am not active and not thinking of starting in the next six months (pre-contemplation). This questionnaire has been shown to be stable over a two-week period [12]. In this study, the two-week test re-test reliability measures were conducted as a measure of instrument stability [19]. Global Physical Activity Questionnaire (GPAQ) presented by WHO and METs (Metabolic Equivalents) were the commonly used instruments to express the intensity of physical activities, and also to analyze GPAQ data. MET is the ratio of a person's working metabolic rate relative to the resting metabolic rate. One MET is defined as the energy cost of sitting quietly, and is equivalent to a caloric consumption of 1 kcal/kg/hour. For the analysis of GPAQ data, existing guidelines have been adopted: It is estimated that, compared to sitting quietly, a person's caloric consumption is four times higher than when being moderately active, and eight times higher than when being vigorously active. Therefore, when calculating a person's overall energy expenditure using GPAQ data, four METs have been designated to the time spent in moderate activities, and eight METs to the time spent in vigorous activities. It is worth mentioning that intraclass correlation coefficient (ICC) was calculated as 0.80 [38].

Processes of Change Questionnaire (PCQ)

This questionnaire contains 30 items that measure cognitive and behavioural processes

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of change. The participants were asked to recall the past month and rate the occurrence frequency of each item with respect to the exercise behavior based on the five-point Likert scale ranked from 1 = 'never' to 5 = 'repeatedly'. The scale has demonstrated an acceptable reliability (α = 0.91) in the PCQ developed by Nigg and colleagues [36]. It was translated into Persian and used to assess the processes of exercise behavior change by Farmanbar in 2011 [19].

Exercise Self-Efficacy Scale (ESS)

The ESS, developed by Nigg and Riebe [38] in 2002, was translated and nativated by Farmanbar. This questionnaire assesses how confident individuals feel about their ability to exercise in a range of adverse situations. The questionnaire consists of six items rated on four-point Likert scale, ranging from 1 = 'not at all confident' to 4 = 'completely confident', with the internal consistency of (α = 0.89) [19, 38].

Decision Balance Scale for Exercise (DBSE)

The original questionnaire consists of 10 items rated on a five-point Likert scale. The scale includes two sub-scales representing the positive (pros – five items) and negative aspects of exercise behavior (cons – five items). The participants were asked to indicate how important each statement was with respect to their decision whether or not to participate in exercise behavior. The scale is ranked from 1 = 'not at all important' to 5 = 'extremely important'. Additionally, Cronbach's alpha was used for internal consistency (α = 0.93 for exercise pros and α = 0.75 for exercise cons). The DBSE40 was translated into Persian and used to assess the participants' decisional balance. It was translated into Persian by Farmanbar in 2011 [19, 39].

Data were analyzed using SPSS 13 and LISREL 8.80. Data were checked for normality and satisfied the criteria. In the first instance, bivariate correlation was used to examine the relationship between the variables and to identify the strongest predictors of the exercise stage of change and exercise behavior. The proposed model was then explored using the path analysis method in LISREL 8.80. Model fit was assessed using a number of indices, including Chi-square index, goodness-of-fit index (GFI), adjusted goodness-of-fit (AGFI), root mean square of approximation (RMSEA), normed fit index (NFI), comparative fit index (CFI), and Parsimonious normed fit index (PNFI).

Results

The obtained findings showed that 97.6% of the participants were female and 92.8% were married. They were studied at two levels (B.Sc. and M.Sc.), including B.Sc. (92.8%), and M.Sc.

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(7.2%). Also 68.7% lived in apartments, 57.8% had physical activity in the past, and 66.3% of them had physical activity history in their family members. Additionally, 13.3% of the samples had a history of musculoskeletal disorders. Table 1 shows the correlations between the stage of exercise behavior change and constructs from TTM. Based on the obtained results, cognitive process of change with behavioral process, self-efficacy, pros and cons were statistically significant. Behavioral process with stage of change, cognitive process, self-efficacy and pros were statistically significant. Furthermore, self-efficacy with behavioral process and pros had a significant correlation. Similarly, pros about physical activity with cognitive process, behavioral process and self-efficacy, and cons with cognitive process were significantly correlated. More to the point, self-efficacy and behavioral process of change had the most correlation with the stage of exercise behavioral change. Relationship between TTM constructs and behavioral physical activity and stages of exercise behavioral change related to the theoretical model of stage of change is shown in Figure 1. It is worth noting that according to the Goodness of fit index and t-value, an acceptable fitting model could not be achieved .Therefore, in the next stage, based on t-value and modification index conducted by LISREL software, the proposed model was determined and the best fit model for the data of the study was exposed (Figure 2). As the figure shows, self-efficacy with the path coefficient of 0.24 and pros with the path coefficient of 0.18 had a direct effect on the participants' physical activity. Besides, self-efficacy and behavioral process of change with the respective path coefficient of 0.18 and 0.38 had an indirect effect on the physical activity stage of change. It is important to mention that self-efficacy had both direct and indirect effect on the participants' behavioral physical activity. On the whole, self-efficacy with the path coefficient of 0.62 was considered as the strongest predictive factor of physical activity in the ICU nurses. It is also worth mentioning that the proposed model explained 92% of behavioral physical activity change (Table 2). In order to select the proposed model, two indexes were employed:

1. Goodness of fit index (GFI), AGFI (equal or greater than 0.90 showing good goodness of fit), ratio of Chi-square/DF (less than 3 or even less than 4 or 5 is suitable, and if nearer to zero, it is more appropriate), RMR (Root Mean Square Residual) and RMSEA (Root Mean Square Error of Approximation); if it is closer to zero, it shows more suitable Goodness of fitting for the model, and generally, if it is less than 0.05, it shows very good fitness.
2. Comparative model indexes such as Comparative Fit Index and Normed Fit Index . The more they are close to 1, the better; even if

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the given indexes are more than 0.90, they are acceptable as well [30, 1]. Hence, according to the presented indexes in Table 2, the proposed model (Figure 2) indicates the most predictive model based on the constructs derived from TTM and physical activity.

Table 1: Correlations for the TTM constructs

Constructs	1	2	3	4	5	6	7
SOC	1						
MET	0.067	1					
CPOC	0.115	0.027	1				
BPOC	0.291	0.032	0.603	1			
SE	0.4	0.2	0.337	0.573	1		
PROS	0.062	0.146	0.603	0.542	0.413	1	
CONS	0.12	0.078	0.228	0.661	0.071	0.202	1
Min	2.33	3592.2	3.508	3.03	2.26	3.58	2.11
SD	1.24	4928.8	0.62	0.84	0.95	1.04	0.95

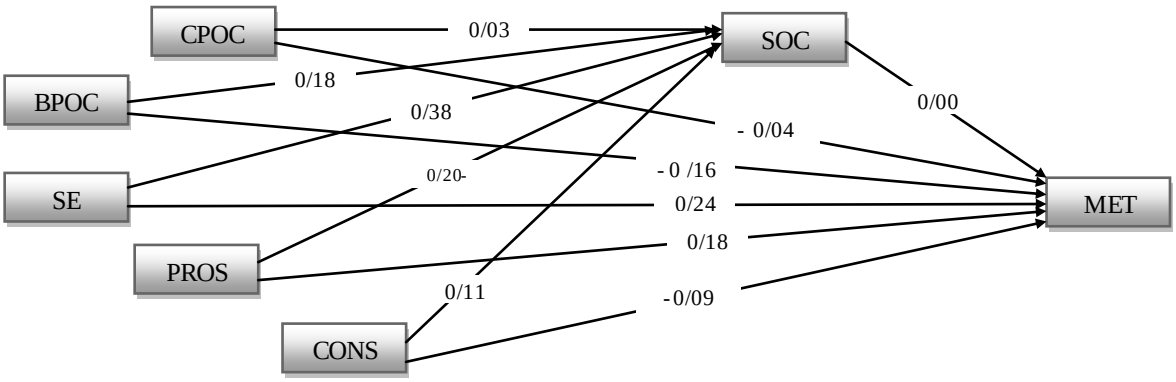


Fig. 1: Theoretical predictive complete Transtheoretical model of physical activity behavior in nurses.

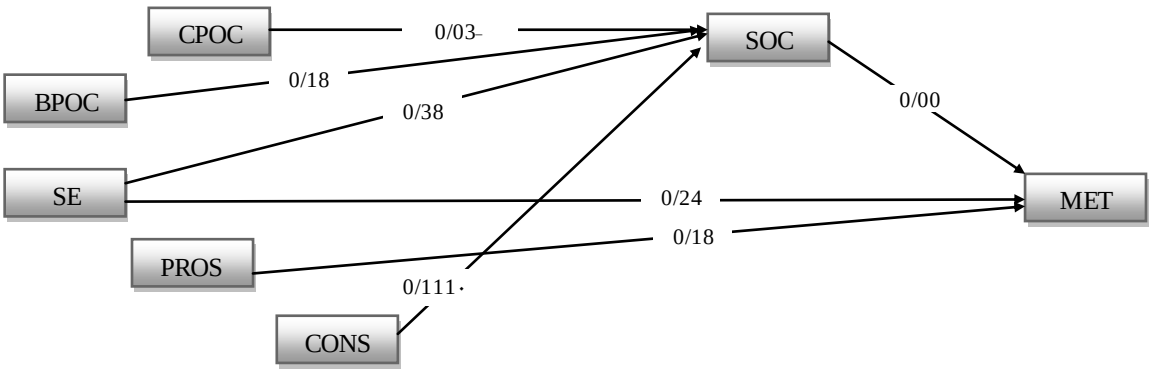


Fig. 2: Revised TTM to predict physical activity behavior in nurses.

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Table 2: Fit index of the path model

SRMR	RMSEA	CFI	NFI	AGFI	GFI	Chi-Square.DF	DF	Chi-Square
0.05	0.06	0.99	0.96	0.88	0.98	1.27	5	6.33

Discussion

The purpose of this study was to present a predictive model of physical activity among ICU nurses based on TTM and path analysis. The results of path analysis showed that self-efficacy and pros were the most efficient factors for physical activity among the given sample of the study. Moreover, self-efficacy and behavioral process of change had an indirect effect on the stage of exercise change. Since self-efficacy had both direct and indirect effect on the ICU nurses' physical activity and behavior, it is treated as the strongest physical activity predictive factor. However, Farmanbar (2011) has announced self-efficacy as the second predictive factor of physical activity behavioral change [40]. Among the similar studies performed in different populations, there were similar findings in which self-efficacy was declared as the most effective predictor of behavioral physical activity [41, 42] .Likewise, the results of this study about the relationship of self-efficacy with behavioral physical activity among nurses were similar to the results of Kang et al. [43]. This similarity seems reasonable based on different studies. Self-efficacy is, in fact, a sort of self-confidence that a person has about his/her abilities to perform any task including physical activity. Moreover, pros have been determined as the second effective factor. This finding accompanies the results reported by Lovell et al. [44]. In contrast, in a study conducted by Farmanbar (2011), pros in comparison with behavioral process of change and self-efficacy had less predictive effect on physical activity [27]. However, Procheska (2009) and Kim (2007) supported the related findings of this study [45, 46]. In most studies, pros had positive correlation with progress in the stage of exercise behavioral change. It means that the more a person is aware of the pros of a physical activity, the more he/she will do it. The third effective factor was behavioral process of change. This finding accompanies the results of Lee et al. [47] and Moria et al. [48]. Therefore, in order to promote the physical activity stages of change, there should be much more concern and emphasis to the behavioral process of change. It seems that when people improve from cognitive processes to behavioral processes, their amount of physical activity will be increased sequentially. So it can be inferred that the relationship between behavioral process of change and the amount of physical activity will be completely reasonable. It is necessary to state that the results of this study would be exposed more emphatically, if this research were conducted in

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an interventional study. To enclose, the proposed model of this study reveals that if ICU nurses are expected to both promote and maintain their physical activity, their self-efficacy, pros and behavioral process of change should be enhanced. For instance, setting and subdividing goals, persisting in achieving them, happy feeling, rewarding, time management, stimulus control, counter conditioning and so on lead to physical behavior promotion and maintenance.

Conclusions

Overall, the results are, in general, congruent with the previous findings in the western countries; therefore, this study supports the external validity of TTM. In summary, we can say that these kinds of studies support and strengthen the theoretical framework and reinforcing the idea of the TTM as a logical and coherent explanation statistically established on physical activity. It is obvious that experimental studies like randomized control trials will be able to show using of TTM-based interventions' effect on promoting and maintenance of physical activity. In conclusion, the determined effective factors in improving the ICU nurses' physical activity are expected to be of more concern, especially self-efficacy as the strongest one.

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Conflict of interest statement

None declared.

References

1. Vahedian M, Alinia A, Hossini SRA Attarzadeh R, Esmaeeli H. Assessment of Physical Activity Among Female Students of Tonekabon- Iran Based on Trans-theoretical Model. Thrita J Med Sci 2012; 1: 127-32.
2. Boslaugh SE, Kreuter MW, Nicholson RA Naleid K. Comparing demographic, health status and psychosocial strategies of audience segmentation to promote physical activity. Health Educ Res 2005; 20: 430-38.
3. Ward DS, Saunders R, Felton G Williams E, Epping JN, Pate RR. Implementation of a school environment intervention to increase physical activity in high school girls. Health Educ Res 2006; 21: 896-910.
4. Graham DJ, Sirard JR, Neumark-Sztainer D. Adolescents' attitudes toward sports, exercise, and fitness predict physical activity 5 and 10 years later. Prev Med 2011; 52: 130-32.
5. Hinkley T, Teychenne M, Downing KL

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Ball K, Salmon J, Hesketh KD. Early childhood physical activity, sedentary behaviors and psychosocial well-being: A systematic review. Prev Med 2014; 62: 182-92.

6. Nelson ME, Rejeski WJ, Blair SN Duncan PW, Judge JO, King AC, Macera CA, Castaneda-Sceppa C. Physical activity and public health in older adults: Recommendation from the American College of Sports Medicine and the American Heart Association. Med Sci Sports Exerc 2007; 39: 1435-45.
7. Arne M, Janson C, Janson S Boman G, Lindqvist U, Berne C, Emtner M. Physical activity and quality of life in subjects with chronic disease: chronic obstructive pulmonary disease compared with rheumatoid arthritis and diabetes mellitus. Scand J Prim Health Care 2009; 27: 141-47.
8. Kaushal N, Rhodes RE. The home physical environment and its relationship with physical activity and sedentary behavior: A systematic review. Prev Med 2014; 67: 221-37.
9. Suchert V, Isensee B, Sargent J, Weisser B, Hanewinkel R; läuft. Study Group. Prospective effects of pedometer use and class competitions on physical activity in youth: A cluster-randomized controlled trial. Prev Med 2015; 81: 399-404.
10. Charlotte Hayes, Kriska A. Role of Physical Activity in Diabetes Management and Prevention. J Am Diet Assoc 2008; 108: S19-S23.
11. Moattari M, Shafakhah M, R SS. Assessing Stages of Exercise Behavior Change, Self Efficacy and Decisional Balance in Iranian Nursing and Midwifery Students. IJCBNM 2013; 1: 121-29.
12. Ribera AP, McKenna J, Riddoch C. Physical activity promotion in general practices of Barcelona: a case study. Health Educ Res 2006; 21: 538-48.
13. Williams S, French D. What are the most effective intervention techniques for changing physical activity self-efficacy and physical activity behaviour—and are they the same? Health Educ Res 2011; 26: 308-22.
14. Plotnikoff RC, Costigan SA, Karunamuni N, Lubans DR. Social cognitive theories used to explain physical activity behavior in adolescents: A systematic review and meta-analysis. Prev Med 2013; 56: 245-53.
15. Reimers CD,Knapp G,Reimers AK. Does Physical Activity Increase Life Expectancy? A Review of the Literature. J Aging Res 2012; 2012: 1-9.
16. Fei Sun, Ian J Norman, While AE. Physical activity in older people: a systematic review. BMC Public Health 2013; 13: 449.
17. Melissa A, Napolitano, Hayes S. Behavioral and Psychological Factors

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Associated with 12-MonthWeight Change in a Physical Activity Trial. J Obes 2010; 2011: 1-10.

18. Ulrich CM, Wiskemann J, Steindorf K. Physiologic and molecular mechanisms linking physical activity to cancer risk and progression. Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz 2012; 55: 3-9. [In German]
19. Farmanbar R, Niknami Sh, Luban DR, Hiedarnia AR. Predicting exercise behaviour in Iranian college students: Utility of an integrated model of health behaviour based on the transtheoretical model and self-determination theory. Health Educ J 2012; 72: 56-69.
20. Blair S.N. Physical inactivity: the biggest public health problem of the 21st century. Br J Sports Med 2009; 43: 1-2.
21. Salehi L, Eftekhar H, Mohammad K, Taghdisi MH, Shojaeizadeh D. Physical Activity among a sample of Iranians Aged over 60 years: An Application of the transtheortical model. Arch Ir Med 2010; 13: 528-36.
22. Dobbins M, Husson H, DeCorby K, Robeson P, Husson H, Tirilis D. School-based physical activity programs for promoting physical activity and fitness in children and adolescents aged 6 to 18. Cochrane Database Syst Rev 2013; 28: 1.
23. Ryan E Rhodes, Leila AP. Mediators of physical activity behavior change among adult non-clinical populations: a review update. Int J Behav Nutr Phys Act 2010; 11(7): 37.
24. Al-Isa AN, Campbell J, Desapriya E, Wijesinghe N. Social and Health Factors Associated with Physical Activity among Kuwaiti College Students. J Obes 2011; 2011: 1-6.
25. Hallal PC, Andersen LB, Bull FC, Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U; Lancet Physical Activity Series Working Group. Global physical activity levels: surveillance progress, pitfalls, and prospects. Lancet 2012; 380(9838): 247-57
26. Vuori IM. Role of Primary Health Care in Physical Activity Promotion. Dtsch Z Sportmed 2013; 64: 176-82.
27. Esposito EM, Fitzpatrick JJ. Registered nurses' beliefs of the benefits of exercise, their exercise behaviour and their patient teaching regarding exercise. Int J Nurs Pract 2011; 17: 351-56.
28. Cho SH, Hwang JH, Kim J. Nurse Staffing and Patient Mortality in Intensive Care Units. Nurs Res 2008; 57: 322-30.
29. Gurses AP, Carayon P, Wall M. Impact of Performance Obstacles on Intensive Care Nurses' Workload, Perceived Quality and Safety of Care, and Quality of Working Life. Health Serv Res 2009; 44: 422-43.

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30. Hutchison AJ, Breckon JD, LH. J. Physical activity behavior change interventions based on the transtheoretical model: a systematic review. J Health EDU Behav 2009; 36: 829-45.
31. Leslie Spencer, B. T, Adams SM, Spencer L1, Adams TB, Malone S, Roy L, Yost E. Applying the Trans theoretical Model to Exercise: A Systematic and Comprehensive Review of the Literature. Health Promot Pract 2006; 7: 428-43.
32. Arne M, Janson C, Janson S, Boman G, Lindqvist U, Berne C, Emtner M. Physical activity and quality of life in subjects with chronic disease: Chronic obstructive pulmonary disease compared with rheumatoid arthritis and diabetes mellitus. Scand J Prim Health Care 2009; 27: 141-47.
33. Haaakstad LAH,Voldner N, Bo K. Stages of Change Model for Participation in Physical Activity during Pregnancy. J Preg 2013; 2013: 1-7.
34. Mohsen MM, Saafan NA, Attia A, El-Abassy A. Lifestyle Behavior Modification of Mothers of Diabetic Children's through Application of Transtheoretical Model of Change. J Nurs Care 2014; 3: 153.
35. Amoyal NR, Robbins ML, Paiva AL, Burditt C, Kessler D, Shaz BH. Measuring the Processes of Change for Increasing Blood Donation in Black Adults Transfusion. Transfusion 2013; 53: 1280-90.
36. Farmanbar R, Niknami Sh, Heydarnia A, Lubans DR. Predicting Exercise Behavior Among Iranian College Students Using the Transtheoretical Model and Structural Equation Modeling. J Sci Res 2009; 31: 355-65.
37. Surveillance and Population-based Prevention of Non-communicable Diseases Department, World Health Organization, 20 Avenue Appia G, Switzerland. For further information. Available from: www.who.int/chp/steps.
38. Massey WV. Behavior Change in Applied Sport Psychology: The Use of Processes of Change in Psychological Training for Athletes" (2013). Theses and Dissertations, Paper 138. University of Wisconsin Milwaukee U WM Digital Commons
39. Noia JD, Prochaska JO. Dietary Stages of Change and Decisional Balance: A Meta-Analytic Review. J Health Behav 2010; 34: 618-32.
40. Schumacker R, Lomax RGA. Beginner`s guide to structural equation modeling: Lawrence Erlbaum Associates, 2004; Inquiry and Pedagogy Across Diverse Contexts Series.
41. 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.
42. Kilpatrick M, Hebert E, Bartholomew J. College students, motivation for physical

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activity: differentiating men`s and women`s motives for sport participation and exercise. J Am Coll Health 2005; 54: 87-94.

43. Kang SJ, Kim SC, Kim Y. Korean older Adults Physical Activity and Its Related Psychosocial Varieables. J Sports Sci Health 2012; 13: 89-99.
44. Lovell GP1, El Ansari W, Parker JK. Perceived Exercise Benefits and Barriers of Non-Exercising Female University Students in United Kingdom. Int J Environ Res Public Health 2010; 7: 784-98.
45. Prochaska JO, R Edding CA, Parker JK. The transtheoretical model and stage of change. In: Rimer K, Lewise FM (Eds). Health Behavior and health education. Theory, Research and Practice, San Francisco: Jossey- Bass Publishers; 2008.
46. Younh-Ho K. Application of The Transtheoretical Model to Identify Psychological Constructs Influencing Exercise Behavior: A Questionnaire Survey. Int J Nurs Stud 2007; 44: 936-44.
47. Lee Y, Park NH, Kim YH. Process of change, decisional balance, self-efficacy and depression across the stage of change for exercise among middle aged women in korea. J Korean Acad Nurs 2006; 36: 587-95.
48. Moria K, Suzukib H, Wang DH, Takaki J, Takigawa T, Ogino K. Relationship of Psychological Factors wit Physical Activity Stage of Change in Prime and Middle-aged Japanese. Acta Media Okayama 2009; 63: 97-104.

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