Autonomy Support, Needs Satisfaction, Motivation, and Intention to Do Physical Activities in Adolescents: A Validation study

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Abstract

Background: Components of self-determination theory work very well in physical education settings. However, very few studies in Iran focused on this issue which might be due to the lack of validated questionnaires. The present study aimed to investigate the psychometric properties of a Persian questionnaire derived and translated from four scales assessing the self-determination components of physical activity/education in adolescent students.

Methods: This study used an exploratory-confirmatory method. The participants were 400 high-school students (16-18 years old) studying in Aliabad Katoul, Golestan, Iran, during 2019. The items of the English standard questionnaires were converted into Persian using the translation-retranslation method. Subsequently, nine experts confirmed the validity of the final Persian questionnaire. The questionnaires included Needs Support in Physical Education Questionnaire which is used to measure autonomy support; Sport Climate in Physical Education Questionnaire which is used for measuring needs satisfaction; Intrinsic Motivation Scale which is used to measure intrinsic motivation for having physical education in the leisure-time; and Intention to Physical Activity used to measure intention to perform physical activities outside the school. We employed factor analysis and structural equation modeling to examine the validity of the questionnaire.

Results: The descriptive statistics showed that all boys and girls were in almost identical ages. Exploratory and confirmatory factor analysis indicated that the Persian version of the questionnaires had relatively high powers for assessing self-determination components in physical education (GoF=0.729). Moreover, perceived autonomy support positively affected the needs satisfaction and intrinsic motivation in physical education. Moreover, intrinsic motivation in physical education was transferred into intrinsic motivation outside school and subsequently affected intention to do physical activities (all T>1.96).

Conclusions: The Persian questionnaire validated in this study enjoys a relatively high power for assessing the self-determination components in physical education. Moreover, autonomy support plays an important role in motivating students to be physically active.

Key Words: Autonomy support, Basic needs, Motivation, Physical activity, Reliability, Validity.

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1- INTRODUCTION

Physical activity (PA) is a phenomenon with potentials for developing essential health-promoting behaviors able to prevent or delay a variety of chronic illnesses and premature deaths. It has been reported that regular PA has positive effects on physical and mental health-related components such as physical fitness, self-confidence (1-3). However, in the modern era, advancement in technology has increased the tendency to have a sedentary lifestyle, which is also observed among children and adolescents. Furthermore, many researches have demonstrated that PA significantly decreases with age (4-5). These facts reveal that finding the ways for increasing PA in children and adolescents are among the major issues to the present and future health.

School and especially physical education (PE) classes at school can be considered as a potential environment for increasing students' motivation and participation in PA inside and outside school, which could subsequently result in a healthier society. International guidelines recommend children and adolescents to participate in at least 60 minutes in moderate-to-vigorous PA on a daily basis. However, some research has revealed that almost 80% of school students worldwide do not follow international guidelines (7-8). Moreover, on the days they have PE in school, students have more PA compared to the days without PE, which indicates the significant influence of sports and PE on the overall PA level of school students (7-8). A necessary issue in PE classes is that the PE teachers create an appropriate motivating environment for students to satisfy their psychological needs and increase their motivation to participate in class activities (6). Therefore, participation of school-students in PA has become a key topic in research on PA and PE over the past decades.

Most of the research studies conducted on increasing the motivation of school students to participate in PA are theoretically based on the Self-Determination Theory (SDT) (9-15). Based on SDT, there are three Basic Psychological Needs (BSNs) that, if satisfied, can facilitate one's growth, integration, and well-being (9-15). The BSNs include autonomy, competence, and relatedness. Autonomy refers to the freedom to make decisions and become independent in performing different activities and tasks (15-16). Competence is a multi-dimensional, dynamic, and interactive concept affecting the efforts for mastery and success (15-16). Relatedness refers to the experience of interpersonal relationships and reflects the extent of a person's sense of belonging to society, having caring relationships, and connection with significant others (15-16).

Another important component in SDT is motivation (9, 11, 14-16). SDT postulated two kinds of motivation, namely autonomous motivation (e.g., intrinsic motivation and introjected regulation) and controlled motivation (e.g., extrinsic motivation and external regulation). It has been shown that autonomous motivation leads to better performance in different activities, while controlled motivation resulted in poor performance (14-18). According to SDT, appropriate satisfying BSNs lead to promote autonomous motivation in individuals to execute particular activities (9, 11, 14-16).

Regarding PA, it has been demonstrated that autonomy satisfaction was positively associated with the participation of the young in leisure time PA (18-19). Moreover, it increased autonomous motivation in fostering sport participation in children and adolescents (20). Some intervention studies also showed that intervention with autonomy-based exercises increase motivation and PA in young people (9, 21). Regarding PE

classes, it has been shown that perceived autonomy support within the PE class promotes motivation of children and adolescents for participating in leisure time PA and sports (22-25). These researchers indicated that if the goal of PE is to promote PA throughout life, it is necessary that the students have a pleasurable experience in these classes.

In Iran, there are very few studies focusing on the components of SDT in PE classes. A reason for this lack of studies may be the inaccessibility of validated scales for measuring SDT components. Accordingly, it is critical to put under research the validity of the Persian version of the questionnaires assessing the SDT components in PE classes. Thus, in the present study, we aimed to investigate the psychometric properties and validity of the Persian version of the questionnaires evaluating the SDT components in PE classes among adolescent students. The current research focuses on the main components within SDT including: 1) perceived autonomy support in PE class, 2) BSNs satisfaction in PE class, 3) intrinsic motivation in PE class, 4) intrinsic motivation outside school, and 5) intention to PA.

2- MATERIALS AND METHODS

2-1. Study Design and Population

The present study applied an exploratory-confirmatory approach. The participants were 400 students from regular high schools including 100 tenth-grade boys, 100 eleventh-grade boys, 100 tenth-grade girls, and 100 eleventh-grade girls (16-18 years old) living in Aliabad Katoul, Golestan, Iran, during 2019. We used the guidelines of Krejcie & Morgan (26) for selecting the participants. The participants were chosen by a cluster random sampling method.

2-2. Research Tools

2-2-1. Perceived Autonomy Support:
Perceived autonomy support in PE class was measured by 5 questions which was adopted from an English questionnaire (i.e., *Needs Support in Physical Education Questionnaire*) (27). These questions were as follows: In my PE class, 1) I feel that the PE teacher provides me with choices and options, 2) The PE teacher makes sure I really understand the goals of the lesson and what I need to do, 3) The PE teacher encourages me to ask questions, 4) The PE teacher answers my questions fully and carefully, and 5) The PE teacher listens to how I would like to do things. Each question was scored on a Likert scale from strongly disagree (1) to strongly agree (7). We averaged all the items of this questionnaire to calculate the total score. Reliability of the original form of this questionnaire was assessed by its designers, and Cronbach's alpha coefficient was 0.91 (27). In this study, the initial questionnaire was converted into Persian using the standard method of translation and retranslation. Subsequently, nine experts confirmed the validity of the Persian version of this questionnaire (CVI=1.00, CVR=0.78). The experts received the questionnaires via e-mail and expressed their opinions on the content of the questions. The results regarding the reliability of the Persian version of this questionnaire will be presented in the Results section.

2-2-2. Basic Psychological Needs Satisfaction:
Basic psychological needs satisfaction was measured by 11 questions adopted from an English questionnaire (i.e., *Sport Climate in Physical Education*) (28). These questions were as follows: In my PE class, 1) I decide how I do sports, 2) I feel that I am doing sports as I want, 3) How I do sports corresponds to my person, 4) I feel that the way I do sport is the way I want to, 5) I feel I have made a lot of progress in relation to the goal I want to

achieve, 6) I feel I perform successfully the exercises of my class, 7) I feel exercise is an activity which I do very well, 8) I am able to meet the requirements of my PE class, 9) My relationship with my classmates in PE class is very friendly, 10) I feel I have excellent communication with my classmates in PE class, and 11) my relationship with my classmate in PE class is very close. Questions 1 to 4 are related to "autonomy satisfaction"; Questions 5 to 8 are related to "competence satisfaction"; and questions 9 to 11 are related to "relatedness satisfaction". Each question was scored on a Likert scale from strongly disagree (1) to strongly agree (7). The total score of each component of this questionnaire was obtained by averaging all the items. The designers of this questionnaire measured its reliability with a reported Cronbach's alpha coefficient of 0.89 (28). In this research, we used the standard method of translation and retranslation to convert the initial questionnaire into Persian. Nine experts, who received the questionnaires via email, then confirmed the validity of the Persian version of this questionnaire (CVI=0.88, CVR=1.00). The results regarding the reliability of the Persian version of the questionnaire will be presented in the Results section.

2-2-3. Intrinsic Motivation

An English questionnaire (i.e., *Intrinsic Motivation Scale*) (29) with eight questions was used to measure intrinsic motivation in PE class (inducing 4 questions) and intrinsic motivation outside school (inducing 4 questions). The questions of intrinsic motivation in PE class included: I take part in PE, 1) because PE is enjoyable, 2) because PE is exciting, 3) because I enjoy learning new skills, and 4) because PE is fun. Furthermore, the questions of intrinsic motivation in leisure time included: 1) I exercise because it's fun, 2) I enjoy my exercise session, 3) I find exercise a

pleasurable activity, and 4) I get pleasure and satisfaction from participating in exercise. Each question was scored on a Likert scale from strongly disagree (1) to strongly agree (7). The total score of each component of this questionnaire was calculated by averaging all the items. Its designers assessed the reliability of its original form with a Cronbach's alpha coefficient of 0.90 (29). In this study, the initial questionnaire was converted into Persian with the standard method of translation and retranslation. Afterwards, nine experts confirmed the validity of the Persian version of this questionnaire (CVI=0.88, CVR=0.78). These experts received the questionnaire via e-mail and were asked to express their opinions on the content of the questions. Moreover, we measured the reliability of this questionnaire whose Cronbach's alpha coefficient was 0.97. The relevant results will be presented in the Results section.

2-2-4. Intention to PA

The intention to do PA was measured by using an English questionnaire (i.e., *Intention to PA*) (27). These questions included: 1) I intend to be physically active at least 60 minutes a day over the next 5 weeks (which was assessed from 7 (strongly agree) to 1 (strongly disagree)), and 2) I intend to do active sports and/or vigorous physical activities with the following regularity (which was assessed from 1 (not at all) to 7 (every day)). We averaged all the items of this questionnaire in order to measure the total score. The designers of the questionnaire measured the reliability of its original form and reported a Cronbach's alpha coefficient of 0.87 (27). Herein, the standard method of translation and retranslation was utilized to convert the initial questionnaire into Persian. Nine experts then expressed their opinions via email on the content of the questions and confirmed the validity of the Persian version (CVI=1.00, CVR=1.00). The results regarding the reliability of the

Persian version of the questionnaire will be presented in the Results section.

2-3. Inclusion and Exclusion Criteria

The inclusion criteria, in this study, were studying in the 10th and 11th grades of the regular and national high-schools in Aliabad Katoul city, Golestan province, Iran, in 2019.

2-4. Ethical Approval

Ethics Committee of Islamic Azad University of Aliabad Katoul approved the protocol of the current research (IR.IAU.AK.REC.1398.001). The participants voluntarily participated in this study. Students' parents gave their written informed consent.

2-5. Data Analysis

Descriptive statistics including mean and standard deviation were used to describe the research variables. Cronbach's alpha coefficient was used to evaluate the reliability of the research tools. Kaiser-Meyer-Olkin (KMO) Test and Bartlett's test of sphericity were used to measure sampling adequacy and whether our data are appropriate for factor analysis. Factor analysis and structural equation methods were used to examine the reliability of the questionnaires. SPSS software version 24 and SmartPLS version 3 were used for statistical analyses.

3- RESULTS

3-1. Descriptive Data

The means and standard deviations of the participants' age and research variables are shown in **Table 1**. According to the results, boys and girls of the same grade are located in almost similar ages. Furthermore, boys had higher scores in comparison to girls in perceived autonomy support, basic needs satisfaction (including autonomy, competence, and relatedness), and motivation in PE, motivation in LT, and intention to PA.

Table-1: Descriptive data of the research variables across age and grade

Students	Age (years old)	Perceived Autonomy Support	Autonomy Satisfaction	Competence Satisfaction	Relatedness Satisfaction	Motivation in PE	Motivation in LT	Intention to PA
10th grade boys	15.43 ± 0.57	4.09 ± 0.90	4.31 ± 0.91	4.06 ± 0.96	4.18 ± 0.80	4.13 ± 0.87	4.24 ± 0.92	4.21 ± 0.90
11th grade boys	16.71 ± 0.62	4.08 ± 0.88	4.34 ± 0.89	4.08 ± 0.98	4.19 ± 0.80	4.15 ± 0.86	4.26 ± 0.93	4.22 ± 0.89
10th grade girls	15.37 ± 0.59	3.46 ± 0.92	3.36 ± 0.92	3.57 ± 0.90	3.77 ± 0.88	3.51 ± 0.86	3.63 ± 0.88	3.53 ± 0.87
11th grade girls	16.63 ± 0.86	3.37 ± 0.94	3.25 ± 0.91	3.47 ± 0.92	3.74 ± 0.90	3.43 ± 0.87	3.56 ± 0.91	3.44 ± 0.89

PE: Physical education; LT: Leisure time; PA: Physical activity

3-2. Exploratory Factor Analysis

First, exploratory factor analysis was used to explore the structures of this questionnaire. Before conducting the exploratory factor analysis, we, first, examined the appropriateness of data for factor analysis by calculating the Kaiser-Meyer-Olkin (KMO) test and the Bartlett's tests of sphericity (**Table 2**). Considering the KMO value (greater than 0.7) and the significance value of Bartlett test (<0.05), it can be stated that the data are suitable for performing factor analysis.

Table-2: Results of KMO and Bartlett's Test

Parameters		Value
KMO Measure of Sampling Adequacy.		0.885
Bartlett's Test of Sphericity	Approx. Chi-Square	13393.919
	df	153
	Sig.	0.000

KMO: Kaiser-Meyer-Olkin; df: Degrees of freedom

Then, the principal components analysis was performed on the 26 questions by Varimax method and finally, according to the scree plot and eigenvalues, a factor was extracted. This factor explains 93.079% of the variance. The matrix and extraction of questions are shown in **Table 3**. As shown in **Table 3**, the factor loading of all questions are greater than 0.5. Therefore, it can be concluded that these factors (questions) play a large role in the total variance.

Table-3: Component matrix

No.	Questions	Component
1	Autonomy Support_Question1	0.844
2	Autonomy Support_Question2	0.863
3	Autonomy Support_Question3	0.844
4	Autonomy Support_Question4	0.846
5	Autonomy Support_Question5	0.874
6	Autonomy Satisfaction_Question1	0.675
7	Autonomy Satisfaction _Question2	0.678
8	Autonomy Satisfaction _Question3	0.724
9	Autonomy Satisfaction _Question4	0.694
10	Competence Satisfaction_Question1	0.585
11	Competence Satisfaction _Question2	0.593
12	Competence Satisfaction _Question3	0.651
13	Competence Satisfaction _Question4	0.578
14	Relatedness Satisfaction_Question1	0.814
15	Relatedness Satisfaction_Question2	0.852
16	Relatedness Satisfaction_Question3	0.824
17	Intrinsic Motivation in PE_Question1	0.834
18	Intrinsic Motivation in PE_Question2	0.859
19	Intrinsic Motivation in PE_Question3	0.860
20	Intrinsic Motivation in PE_Question4	0.790
21	Intrinsic Motivation in LT_Question1	0.683
22	Intrinsic Motivation in LT _Question2	0.756
23	Intrinsic Motivation in LT _Question3	0.719
24	Intrinsic Motivation in LT _Question4	0.824
25	Intention to PA_Qustion1	0.763
26	Intention to PA_Qustion2	0.642

3-3. Confirmatory Factor Analysis

We used Smart PLS software to perform confirmatory factor analysis of the questionnaire. The basic premise is that each factor is related to a specific subset of variables, and the researcher has previously performed exploratory analysis on the number of factors in the model. First, we report the factor loading of all questions. The results are reported in **Table 4**. In the table, all values of factor loading coefficients of the questions are greater than 0.4, indicating that this criterion is appropriate. According to the data analysis algorithm in Smart PLS, after measuring the factor loading of the questions, it is time to calculate and report Cronbach's alpha coefficients and composite reliability, the results of which are shown in **Table 5**. Considering that the appropriate value for Cronbach's alpha and composite reliability is 0.7, this criterion has fitted to the values of the research variables. Therefore, it can be confirmed that the questionnaire enjoys an appropriate reliability. The second criterion for examining the fit of measurement models is the average variance extracted, which examines the degree of correlation of each structure with its questions. The results are represented in **Table 5**. Considering that the appropriate value for AVE is 0.5, this criterion has fitted to the values of the research variables. Thus, the appropriateness of the convergent validity of the research questions is confirmed.

Table-4: Component matrix

Component	Questions	Component
Autonomy Support	Question1	0.844
	Question2	0.863
	Question3	0.844
	Question4	0.846
	Question5	0.874
Autonomy Satisfaction	Question1	0.675
	Question2	0.678
	Question3	0.724
	Question4	0.694
Competence Satisfaction	Question1	0.585
	Question2	0.593
	Question3	0.651
	Question4	0.578
Relatedness Satisfaction	Question1	0.814
	Question2	0.852
	Question3	0.824
Intrinsic Motivation in PE	Question1	0.834
	Question2	0.859
	Question3	0.860
	Question4	0.790
Intrinsic Motivation in LT	Question1	0.683
	Question2	0.756
	Question3	0.719
	Question4	0.824
Intention to PA	Question 1	0.763
	Question 2	0.642

Table-5: The results of Cronbach's alpha coefficient and the composite reliability

Variables	Cronbach's alpha coefficient (Alpha>0.7)	Composite reliability (CR>0.7)	average variance extracted (AVE>0.5)
Autonomy Support	0.877	0.882	0.915
Needs Satisfaction	0.854	0.870	0.915
Intrinsic Motivation in PE	0.863	0.873	0.902
Intrinsic Motivation in LT	0.859	0.871	0.892
Intention to PA	0.868	0.884	0.969

CR: Composite reliability; AVE: Average variance extracted

The results of path analysis in SmartPLS are presented in **Table 6** and **Fig. 1**. As it is observed, all variables have significant relationships with each other (all T>1.96). The obtained results of model fit are demonstrated in **Table 7**. As it is observed, Goodness of Fit (GoF) indicates a very good fit for the research model (GoF=0.729). Therefore, the results show that the Persian version of the questionnaire used in this study for measuring the components of SDT has a relatively high power for assessing the autonomy support, needs satisfaction, and motivation in PE class as well as the motivation and intention to do PA outside school.

Table-6: Results of path analysis between the exogenous and endogenous variables

No.	Path	β	T-value
1	perceived autonomy support - basic needs satisfaction	0.704	18.181
2	perceived autonomy support - motivation in PE	0.110	2.099
3	basic needs satisfaction - motivation in PE	0.669	15.234
4	motivation in PE - motivation in LT	0.451	6.827
5	motivation in LT - intention to PA	0.530	7.052

PE: Physical Education; LT: Leisure Time; PA: Physical Activity
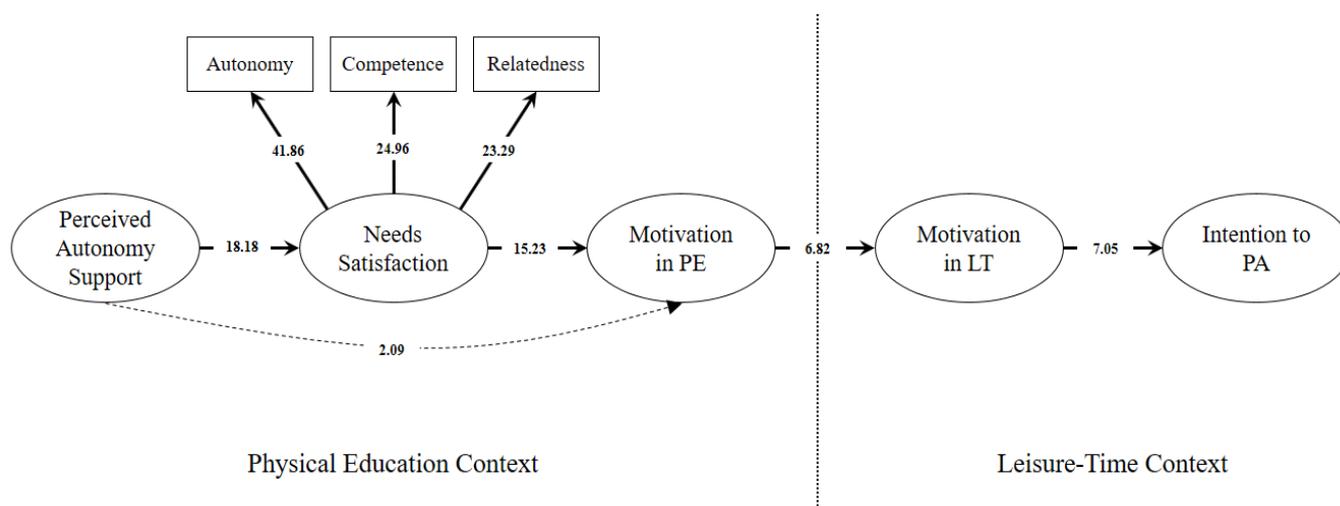
Fig. 1: Results of path analysis in the form of T-Values

Table-7: Results of model fitness

Variables	Communality	R^2
Autonomy Support	0.915	0.000
Needs Satisfaction	0.915	0.495
Intrinsic Motivation in PE	0.902	0.563
Intrinsic Motivation in LT	0.892	0.627
Intention to PA	0.969	0.632
Communality	R2	GoF
0.919	0.579	0.729

R^2: Value of regression; GoF: Goodness of Fit

4- DISCUSSION

It has been revealed that regular PA has positive effects on physical and mental health-related components. On the other side, many researches have demonstrated that PA decreases significantly with age (4-5). Therefore, finding ways for increasing PA in children and adolescents are among the major issues of the present and future health. Considering the significance of PE classes in school for fostering the level of PA of the students, it is important to find certain psychological factors within the PE class which may affect the students' tendency to perform PA. Many research studies have revealed that considering the components of SDT (such as autonomy, competence, relatedness, motivation) in the PE class would result in increasing the motivation of school students to participate in PA inside and outside school. However, in Iran, very few studies have focused on the components of SDT in PE classes. A possible reason may be the lack of validated questionnaires for measuring SDT components. Thus, in the present study, we aimed to investigate the psychometric properties and validity of the Persian version of questionnaires regarding SDT components in the PE class in adolescents. The current research focuses on the main components within SDT including: 1) perceived autonomy support in the PE class, 2) BSNs satisfaction in the PE class, 3) intrinsic motivation in the PE class, 4) intrinsic motivation outside school, and 5) intention to do PA.

Our findings demonstrated that the questionnaire used in this study has a good validity for implementation among Iranian students. According to the results of the KMO value (greater than 0.7) and the significance value of Bartlett test (<0.05), our data were found to be suitable for performing factor analysis. Moreover, the results of the principal component analysis by Varimax method on the 26 questions revealed that our 5 factors (including autonomy support, needs satisfaction, intrinsic motivation in PE, intrinsic motivation in LT, and intention to PA) explained 93.079% of the variance. In addition, the factor loadings on all questions were greater than 0.5. Therefore, it can be concluded that all questions play a considerable role in the total variance.

In confirmatory factor analysis, it has been revealed that all values of factor loading coefficients of the questions were greater than 0.4, confirming the appropriateness of all the factors and items of the questionnaire. Moreover, according to the composite reliability and Cronbach's alpha coefficients, it can be confirmed that the questionnaire enjoys an appropriate reliability. Additionally, the findings demonstrated that all AVE values are greater than 0.5 and this criterion has fitted to the values of the research variables; thus, confirming the appropriateness of the convergent validity of the questionnaire.

Results of path analysis showed that all variables had significant relationships with each other (all T>1.96). Moreover, regarding the goodness of fit (GoF), the results indicated a very good fit for the research model (GoF=0.729). Therefore, the results indicated that the Persian version of the questionnaire used in this study for measuring the components of SDT has a relatively high power for assessing the autonomy support, needs satisfaction, and motivation in the PE class as well as the motivation and intention to PA outside the school.

The components of SDT have been numerously validated in various languages (30-31). For example, Burgueño, Macarro-Moreno, and Medina-Casaubón (30) investigated the psychometry of the multidimensional perceived autonomy support scale in PE with Spanish secondary school students and found that "Autonomy Support Scale in Physical Education" is a valid and reliable instrument to multidimensionally measure the secondary school students' perception of the autonomy support they receive from their physical education teachers in the Spanish context. Granero-Gallegos et al. (31) also examined the psychometry of the autonomy support scale with the Spanish students demonstrating that the Spanish version of the instrument for PE has acceptable levels of internal consistency and temporal stability. The results of the present study, in the same line, show that the questionnaire related to the SDT components is valid and reliable in the Iranian context.

Finally, results of examining the research model revealed that the perceived autonomy support positively influences the basic needs satisfaction and intrinsic motivation in PE at school. Moreover, intrinsic motivation created in the PE environment at school is transferred into the intrinsic motivation outside school. Subsequently, the motivation outside school could positively affect the intention to perform PA. These findings were consistent to those of previous studies (27, 32-33). Regarding these results, it can be stated that intrinsic motivation is an important factor in the occurrence of PA behavior. Therefore, by promoting the perceived autonomy support in the PE class, PE teachers are able to enhance students' intrinsic motivation in PE classes and outside the school to perform PA.

5- CONCLUSION

The present study was designed to investigate the psychometric properties and validity of the Persian questionnaire derived from four scales assessing SDT components in the PE class among the adolescents. The results of exploratory and confirmatory factor analysis indicate that the questionnaire used in this study for measuring the components of SDT has a relatively high power for assessing the autonomy support, needs satisfaction, and motivation in PE class as well as the motivation and intention to PA outside the school. Thus, future studies in Iran which aim to investigate the components of SDT in the PE context could use this questionnaire for assessing these items. Moreover, it can be claimed that the perceived autonomy support in PE classes positively affects the teenagers' basic needs satisfaction and intrinsic motivation in PE classes. In addition, intrinsic motivation in the PE class can be transferred into the intrinsic motivation outside the school and it can subsequently increase the students' intention to do PA outside the school.

6- ACKNOWLEDGMENTS

7- CONFLICTS OF INTEREST

None.

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