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Original

NECESIDADES PSICOLÓGICAS BÁSICAS Y AUTODETERMINADO MOTIVACIÓN EN LA EDUCACIÓN FÍSICA PARA PREDECIR EL NIVEL DE LA SALUD RELACIONADA CON LA SALUD

BASIC PSYCHOLOGICAL NEEDS AND SELF-DETERMINED MOTIVATION IN PHYSICAL EDUCATION TO PREDICT HEALTH- RELATED FITNESS LEVEL

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RESUMEN

El objetivo de este estudio fue comprobar si las regulaciones motivacionales tienen un papel de mediador entre las necesidades psicológicas básicas de los estudiantes y el nivel de aptitud física en la educación física de la escuela secundaria. Los estudiantes completaron el paquete de cuestionario para evaluar su nivel de satisfacción de necesidades psicológicas básicas y regulaciones motivacionales. Para evaluar el nivel de aptitud física de los estudiantes EUROFIT para adultos, se siguió la prueba de aptitud física y diez parámetros de aptitud motora (índice de masa corporal, sentarse y alcanzar, equilibrio de flamenco, salto vertical, agarre de la mano, , Suspensión del brazo curvado, carrera de lanzadera de 20 m, recorrido de lanzadera 10x5) durante la lección. La prueba de mediación se llevó a cabo mediante análisis de regresión en serie. Los resultados revelaron que las regulaciones motivacionales mediaron parcialmente la relación entre la competencia y el puntaje de aptitud. De mismo modo, las regulaciones motivacionales mediaron parcialmente la relación entre la relación y la puntuación de la aptitud. Los resultados apoyan los principios de la Teoría de la Autodeterminación y manifiestan que los maestros de educación física pueden aumentar el nivel de aptitud física de los estudiantes al crear un ambiente de lección que satisfaga sus necesidades de competencia y relación.

Palabras clave: EUROFIT, aptitud física, regulaciones motivacionales, adolescentes

ABSTRACT

The aim of this study was to test whether motivational regulations have a mediator role between students' basic psychological needs and physical fitness level in high school physical education. Students completed the questionnaire pack tapping their level of basic psychological needs satisfaction and motivational regulations. To assess students' health-related physical fitness level EUROFIT for adults physical fitness test battery was followed and ten motor fitness parameters (body mass index, sit and reach, flamingo balance, vertical jump, hand grip, plate tapping, sit ups in 30 seconds, bent arm hang, 20 m. shuttle run, 10x5 shuttle run) were assessed during the lesson. The mediation test was carried out through series regression analysis. The results revealed that the motivational regulations partially mediated the relationship between competence and the fitness score. Similarly, motivational regulations partially mediated the relationship between relatedness and the fitness score. The results support the tenets of Self-Determination Theory and manifests that physical education teachers can increase the students' physical fitness level by creating a lesson environment that satisfies their needs for competence and relatedness.

Keywords: EUROFIT, physical fitness, motivational regulations, adolescents



INTRODUCTION

Global concern for the decline in physical activity level among adolescents (Hallal et al., 2012) has been gradually increasing. The worldwide inactivity affair echoed in Turkey. Although adolescents are recommended to participate in 60 or more minutes of moderate-to-vigorous physical activity on a daily basis (Janssen and LeBlanc, 2010), 57% of individuals aged between 12-18 years never do physical activity, moreover only 8.73% of the adolescents meet minimal fitness standards (minimum 3 days a week, 30 minutes moderate level physical activity) in Turkey (Ministry of Health, Health Research General Directorate, 2014).

Based on the well documented link between physical activity and health related fitness level (e.g. Physical Activity Guidelines Advisory Committee, 2008), adolescents' inactivity problem could be solved by manipulating their fitness level. Harris and Cale (2006) argued that physical education (PE) lessons are important contexts to improve students' fitness levels by doing fitness tests and therefore regulate their physical activity habits. Ntoumanis (2001) argued that PE has an important role in public health by helping students to develop positive attitudes toward exercise and promoting health related fitness programs. Similarly, Wiersma and Sherman (2008) believed that if it is given in a supportive environment, fitness testing can become an enjoyable experience and PE teachers can use them to motivate students to do physical activity. Besides, McKenzie (2003) emphasized the link between PE and fitness testing by indicating that physical fitness is an ultimate goal of PE and teachers should use fitness testing to evaluate students' PE performance. Furthermore, PE teachers should take responsibility of collaborating with health professionals in terms of program development and research (Sallis and McKenzie, 1991).

Health-related PE programs and positive experiences instead of humiliating ones in PE have an impact on students to embrace physically active lifestyle (Sallis and McKenzie, 1991). To this direction Self-Determination Theory (SDT; Deci and Ryan, 1985a) as a commonly used approach to understand human motivation can be helpful. SDT explains three forms of motivation which are considered as a continuum from higher to lower levels of self-determined

motivation. Intrinsic, extrinsic or amotivated activity can vary considerably in terms of the degree to which it is autonomously regulated or controlled. Intrinsically motivated behaviour occurs when individuals do something because it is inherently interesting and/or enjoyable, while extrinsically motivated behaviour occurs when one feels externally propelled into action and adopted with a sense of volition. Ryan and Deci (1985a) indicated that intrinsic motivation has an important role particularly in the exercise and creative endeavours from sport. Besides, amotivation occurs when a person's behaviour lacks intentionality and a sense of personal causation (Ryan and Deci, 2000).

Four types of extrinsic motivation have been described, namely external regulation, introjected regulation, identified regulation, and integrated regulation. External regulation can be defined as participating an activity because of external pressure, threat or punishment; introjected regulation is participating an activity because of internal pressure, guilt or shame; identified regulation is participating an activity because of believing in its importance and utility and lastly, integrated regulation is participating an activity because of finding it congruent with personal goals and values (Deci and Ryan, 2000).

Basic Psychological Needs Theory (BPNT; Ryan and Deci, 2000) as a sub-theory of SDT claimed that basic needs are influenced by individuals' own competencies, demands, obstacles, and affordances in their social environments. BPNT maintains that an understanding of human motivation requires a consideration of innate psychological needs for competence, autonomy, and relatedness. Need for autonomy refers to experiencing choice concerning initiation and regulation of person's own behaviour (Deci and Ryan, 1985b). The need for competence is experiencing desired effects and outcomes, and the need for relatedness is related to feeling that person is connected to significant others. Fulfilment of these needs facilitates the nutrients for well-being whereas well-being is undermined when they are not met (Reis et al., 2000).

Hypothesized relationships between basic need satisfaction, motivational regulations and behavioural responses were explained with the hierarchical model of motivation by Vallerand (1997). Vallerand's model shows that satisfying one's basic



Table 1. Weight and height distribution of the participants.

	9th Grade	10th Grade	11th Grade	12th Grade
age (years)	15.06	16.11	16.94	17.82
weight (kg)	62.06	60.86	64.38	68.53
height (cm)	165.52	167.02	168.59	174.47

psychological needs leads to self-determined motivation and different types of motivation leads to cognitive, affective, behavioural, physical and psychological consequences. Since physical fitness has been considered as a well-being component and is the goal that physical educators most frequently assess in school settings (McKenzie, 2003), it was included to the study as a physical outcome of motivational sequence.

To date, limited number of studies (i.e. Wilson et al., 2003; Jaakkola et al., 2013) has explained motivational effects on physical fitness using SDT perspective. However, basic psychological needs and motivational regulations in PE as well as all components of physical fitness have not been assessed meanwhile. This study aims to test the hypothesized model of students' basic psychological needs, self-determined motivation and physical fitness level in PE.

METHODS

Participants

Responses were obtained from 368 high school students (Female = 172, Male = 196) aged between 14 and 19 years from the same school in central district of a large city in Turkey. In the school, students were recruited randomly in each grade level. Twelfth grade students had fewer school attendance than other graders because of general university entrance exam at the end of high school. Students' distribution among grade level was; 9th grade = 131, 10th grade = 114, 11th grade = 106, 12th grade = 17. No students were excluded from the study.

Procedure

Permissions from Ministry of Education and Ethics Committee were obtained. The purpose of the study was explained to the head teacher and two PE

teachers. Informed consent was obtained and the students who were not willing to participate were excluded from the study.

Students completed the questionnaire pack tapping the targeted variables in PE environment. EUROFIT was applied during regular PE lessons by the researchers under the supervision of PE teachers. EUROFIT took 50 minutes while the questionnaire pack took 15 minutes to complete.

Instruments

Basic Psychological Needs. Pupils' psychological needs in PE were assessed with Basic Psychological Need Satisfaction Scale developed by Deci and Ryan (2000), adapted into Turkish by Cihangir-Çankaya and Bacanlı (2003). The scale contains 21 items and consists of three subscales, the 7 points Likerts' style was adopted and the original subscale has demonstrated a good internal consistency (α ranging from .66-.84 in PE, Ntoumanis, 2005). The Turkish version also demonstrated the good validity and reliability (Cihangir-Çankaya and Bacanlı, 2003). The three subscale includes autonomy (7 items), competence (6 items), and relatedness (8 items). Example item for autonomy including "Generally I feel free to express my opinions and thoughts", for competence is "People I know tell me I am good at what I do" and for relatedness is "I get on well with the people who I interact with".

Motivational Regulations. Students' different motivational types in PE were measured with Situational Motivation Scale (SIMS) developed by Guay et al. (2000), translated into Turkish by Kazak Çetinkalp (2010). The scale demonstrate good internal consistency in both original (α ranging from .62-.86) and Turkish version. Students were asked to respond to the items which followed the stem "Why do you participate PE class?". Students rated 7-point Likert 16 items in four subscales, intrinsic motivation (e.g. "Because I feel good when I participate"), identified regulation (e.g. "Because I believe that this lesson is important for me"), extrinsic regulation (e.g. "Because I feel that I have to participate"), and lastly amotivation (e.g. "I participate PE, but I am not sure whether it is a good thing to participate").

Health-Related Physical Fitness. To assess students' health-related physical fitness level EUROFIT for adults physical fitness test battery



protocol (Oja and Tuxworth, 1995) was followed and ten motor fitness parameters (body mass index, sit and reach, flamingo balance, vertical jump, hand grip, plate tapping, sit ups in 30 seconds, bent arm hang, 20 m. shuttle run, 10x5 shuttle run) were assessed during PE lessons. This test battery contains four components assessing 11 underlying general abilities. More in detail, morphological component, assessing body mass and height, body composition, and flexibility, is measured with body mass index and sit and reach. Muscular component, assessing muscle strength, muscle endurance and explosive strength, is measured with hand grip, dynamic sit-up, bent arm hang, and vertical jump. Motor component, assessing balance and speed, is measured with single leg balance (flamingo balance) and plate tapping. Lastly, cardio-respiratory component, assessing submaximal exercise capacity and maximal aerobic power, is measured with 20 m. shuttle run (Vanhees, et al., 2005).

Data Analysis

The data analyses were conducted via the SPSS statistic software package (SPSS, 23). Following the descriptive analysis, the mediation test was carried out through series of regression analysis.

RESULTS

Descriptive analysis

All the measures obtained from the scales were seven point scale and the all the mean scores were above the midpoint (namely, 3.5) except for the extrinsic motivation and amotivation. Fitness score was not correlated with autonomy while negatively correlated with extrinsic motivation and amotivation, positively correlated with all other variables in the study. All descriptive statistics and correlations are provided in Table 2.

Table 2. Descriptive statistics, internal reliabilities and correlations between study variables (*: $p < 0.05$; **: $p < 0.01$).

Variables	M	SD	Range	Alpha	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Autonomy	5.21	.95	1-7	.72	-						
(2) Competence	4.88	.96	1-7	.89	.64**	-					
(3) Relatedness	5.58	.86	1-7	.80	.62**	.62**	-				
(4) Intrinsic regulation	5.67	1.26	1-7	.86	.23**	.21**	.28**	-			
(5) Identified regulation	5.56	1.34	1-7	.82	.22**	.24**	.30**	.81**	-		
(6) Extrinsic regulation	3.41	1.71	1-7	.85	-.16**	-.17**	-.24**	-.60**	-.56**	-	
(7) Amotivation	2.17	1.27	1-7	.83	-.22**	-.23**	-.27**	-.58**	-.58**	.59**	-
(8) Fitness score	-0.06	26.53	0-89	-	.08	.12*	.11*	.16**	.17**	-.13*	-.20**



Mediation analysis

Mediation test was carried out via a series of regression analysis following Barron and Kenny's (1986) four step analysis. Firstly the mediation effect of motivation regulation was test between competence to fitness test. According to the results, competence was positively associated with all the motivation regulations (intrinsic regulation, $\beta=.21$, $p<.01$; identified regulation $\beta=.24$, $p<.01$; extrinsic regulation $\beta=-.17$, $p<.01$; amotivation $\beta=-.23$, $p<.01$), also to the z score of the fitness test ($\beta=.12$, $p<.05$), and all the regulation significantly associated with fitness test z score (intrinsic regulation, $\beta=.16$, $p<.01$; identified regulation $\beta=.17$, $p<.01$; extrinsic regulation $\beta=-.13$, $p<.05$; amotivation $\beta=-.20$, $p<.01$).

However when considering the effect of motivation regulations, the association from competence to fitness test became insignificant (intrinsic regulation $\beta=0.91$, $p=.09$; identified regulation $\beta=.81$, $p=.14$; extrinsic regulation $\beta=.10$, $p=.06$; amotivation $\beta=.71$, $p=.18$) whereas the motivation regulation remained the association with the fitness score significantly (intrinsic regulation $\beta=.15$, $p<.01$; identified regulation $\beta=.16$, $p<.05$; extrinsic regulation $\beta=-.13$, $p<.05$; amotivation $\beta=-.20$, $p<.01$). According to Barron's and Kenny's (1986), the motivation regulations partially mediated the relationship between competence and the z score of the fitness score.

Table 3. The summary of regression analysis examining mediation effect of motivation regulations between competence and fitness score (*: $p<0.05$; **: $p<0.01$).

	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
Competence	.21**	.12*		.09	.24**	.12*		.08	-.17**	.12*		.10	-.23**	.12*		.07
Regulations			.16**	.15**			.17**	.15**			-.13*	-.12*			-.20**	-.20**
R^2	.02	.02	.03	.04	.06	.02	.03	.04	.03	.02	.02	.03	.06	.02	.04	.05
Adj R^2	.01	.01	.02	.03	.06	.01	.03	.03	.03	.01	.02	.03	.05	.01	.04	.05
F	16.65*	5.28*	9.77**	6.60**	21.48**	5.28*	11.18**	6.67**	10.74**	5.28*	6.52*	5.45**	20.34**	5.28*	15.21**	9.70**
df	(1, 351)	(1, 353)	(1, 363)	(2, 350)	(1, 351)	(1, 353)	(1, 363)	(2, 350)	(1, 350)	(1, 353)	(1, 362)	(2, 349)	(1, 353)	(1, 353)	(1, 364)	(2, 351)

Table 4. The summary of regression analysis examining mediation effect of motivation regulations between relatedness and fitness score (*: $p < 0.05$; **: $p < 0.01$).

	<i>Intrinsic regulation</i>				<i>Identified regulation</i>				<i>Extrinsic regulation</i>				<i>Amotivation</i>			
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
relatedness	.28**	.12*		.07	.30**	.12*		.07	-.24**	.12*		.08	-.27**	.12*		.06
regulations			.16**	.15**			.17**	.15**			-.13*	-.12*			-.20**	-.18**
R^2	.08	.01	.03	.03	.09	.01	.03	.03	.06	.01	.02	.03	.07	.01	.04	.04
Adj R^2	.08	.01	.02	.03	.09	.01	.03	.03	.05	.01	.02	.02	.07	.01	.04	.04
F	30.61**	4.42*	9.77**	5.79**	33.58**	4.42*	11.18**	6.05**	21.16**	4.42*	6.52*	4.45*	26.79**	4.42*	15.21**	7.85**
df	(1, 353)	(1, 355)	(1, 363)	(2, 352)	(1, 352)	(1, 355)	(1, 363)	(2, 351)	(1, 351)	(1, 355)	(1, 362)	(2, 350)	(1, 353)	(1, 355)	(1, 364)	(2, 352)

Secondly the series of analysis was conducted with relatedness as predictor, and test the mediation effect of the motivation regulations. According to the results, relatedness was positively associated with all the motivation regulations (intrinsic regulation, $\beta = .28$, $p < .01$; identified regulation $\beta = .30$, $p < .01$; extrinsic regulation $\beta = -.24$, $p < .01$; amotivation $\beta = -.27$, $p < .01$), also to the z score of the fitness test ($\beta = .11$, $p < .05$), and all the regulation significantly associated with fitness test z score (intrinsic regulation, $\beta = .11$, $p < .05$; identified regulation $\beta = .17$, $p < .01$; extrinsic regulation $\beta = -.13$, $p < .05$; amotivation $\beta = -.20$, $p < .01$). However when considering the effect of motivation regulations, the association from relatedness to fitness test became insignificant (when considering the effect of intrinsic regulation $\beta = .07$, $p = .21$; identified regulation $\beta = .07$, $p = .21$; extrinsic regulation $\beta = .08$, $p = .13$; amotivation $\beta = 0.06$, $p = .27$) whereas the motivation regulation remained the association with the fitness score significantly (intrinsic regulation $\beta = 0.15$, $p < .01$; identified regulation $\beta = .15$, $p < .01$; extrinsic regulation $\beta = -.12$, $p < .05$; amotivation $\beta = -.18$, $p < .01$).

Lastly the analysis was conducted for testing the mediation effect on autonomy to fitness score, however the association between autonomy and fitness score was insignificant ($\beta = -.08$, $p = .12$) even without considering the motivation regulations, therefore there was no further examination.

DISCUSSION

The aim of this study was to test whether motivational regulations have a mediator role between students' basic psychological needs and physical fitness level in PE. According to the regression analysis, the motivation regulations partially mediated the relationship between competence and the fitness score, also between relatedness and the fitness score. These results both support and extend previous research that has examined the relationship between psychological need satisfaction, motivational regulations, and the consequences within the SDT framework (Deci and Ryan, 1985a). To date, limited number of studies (i.e. Wilson et al., 2003; Jaakkola et al., 2013) has explained motivational effects on physical fitness using SDT perspective. However, basic psychological needs and motivational regulations in PE as well as all components of physical fitness have not been assessed meanwhile. This study was the first attempt to use Vallerand's (1997) motivational sequence and assess all physical fitness parameters as outcome variables.

Autonomy was not the predictor of motivational regulations in this research. One possible explanation for this finding is that the autonomy need satisfaction has lesser importance compared to other needs in the collectivist culture (Iyengar and Lepper, 1999). An alternative explanation to this finding is that need for autonomy was not as strongest as need for



competence and relatedness among high school students. During adolescence, students inclined to concentrate on social relationships, which is linked to need for relatedness and social comparison which is linked to need for competence (Nicholls, 1989).

When considering psychological variables of the study, students' mean scores of the different types of motivation show consistency with the results of other studies (e.g. Yetim et al., 2014) conducted with same ethnic group with same age. However Erturan-İlker (2014) examined Turkish high school students' basic psychological needs satisfaction level and the results revealed lower autonomy mean score (Mean = 4.52) than the mean score in our study (Mean = 5.21). Depending on the high level of satisfaction, need for autonomy may not predict motivational regulations in this study. In other words, the participants mostly had high level of autonomy satisfaction and their satisfaction level did not show heterogeneous structure. Therefore it might not be related to different types of motivations in a learning environment.

A limitation of this study concerns the cross-sectional nature of the research design which does not allow analysing the reciprocal relationships likely to appear over time. Future research should address this debate by examining the longitudinal impact of creating need-supportive PE environment and focus on its physical fitness outcomes.

Despite these limitations the results of this study have important practical implications. The practical implication of this study is that creating physically fit generations might be accomplished through creating a need-supportive PE environment. Improving adolescents' physical fitness level may help to improve their physical activity level, since the physical fitness components were proved to be correlated with physical activity in both male and female adults and children (Sallis et al., 1987; Bouchard et al., 1994; Solmon and Bryan, 2006). To prevent adolescents from obesity and other illnesses due to inactive life style physical educators are recommended to organize need-supportive (Standage et al., 2005) PE environment. More specifically, physical educators are recommended to organize activities and games tailored to meet individual's current experience and ability levels, also emphasize improvement based on self-referenced standards

(Ntoumanis, 2001) in order to develop sense of competence and create opportunities for students to have a meaningful relationships with their counterparts and the teacher in order to fulfil need for relatedness in PE.

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