ORIGINAL

PSYCHOMETRIC PROPERTIES OF THE SELF-REPORT QUESTIONNAIRE OF BARRIERS TO PHYSICAL ACTIVITY PRACTICE (SRQBPAP)

PROPIEDADES PSICOMÉTRICAS DEL AUTOINFORME DE BARRERAS PARA LA PRÁCTICA DEL EJERCICIO FÍSICO (ABPEF)

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ABSTRACT

The objective of this study was to examine the psychometric properties of the self-report questionnaire for physical exercise (ABPEF). And to chek the effect of gender on those barriers. Their psychometric properties were studied with a sample of 342 adolescents (mean age: 15.02 ± 1.86). We performed reliability analysis, exploratory factor analysis, item correlation with total score and confirmatory factor analysis. We found a good internal reliability (α = .86), an adequate item correlation with total score, and the presence of four factors in the exploratory factor analysis with significant correlations between them. The confirmatory factor analysis showed adequate adjustment to the data of a tetrafactorial model of the questionnaire ($\chi2$ / gl = 3.696; GFI = .89; AGFI = .86;

RMSEA = .061). The female gender presents greater barriers to the practice of physical exercise. This questionnaire is a reliable and valid instrument for the population under study, and its use in future research is suggested.

KEYWORDS: Physical activity, barriers, psychometric properties, adolescence, SRQBPAP.

RESUMEN

El estudio consistió en examinar las propiedades psicométricas del cuestionario de autoinforme de barreras para la práctica del ejercicio físico (ABPEF) y comprobar el efecto del género sobre dichas barreras. Se han estudiado sus propiedades psicométricas con una muestra de 342 adolescentes (□:15.02±1.86). Se realizaron análisis de confiabilidad, análisis factorial exploratorio, correlación ítem con puntaje total y análisis factorial confirmatorio. Se encuentra una buena confiabilidad interna (α = .86), adecuada correlación ítem con puntaje total, y la presencia de cuatro factores en el análisis factorial exploratorio con correlaciones significativas entre las mismas. El análisis factorial confirmatorio mostró adecuado ajuste a los datos de un modelo tetrafactorial del cuestionario (χ2 /gl = 3.696; GFI=.89; AGFI=.86; RMSEA=.061). El género femenino presenta mayores barreras para la práctica del ejercicio físico. Este cuestionario es un instrumento fiable y válido y se sugiere su uso en futuras investigaciones.

PALABRAS CLAVE: Ejercicio físico, barreras, propiedades psicométricas, adolescencia, ABPEF.

INTRODUCTION

The importance of physical activity for health is supported by numerous studies (De Recende *et al.*, 2014; Díaz, Martínez & Morales, 2008; Dishman, Health & Lee, 2008; Janssen & Leblanc, 2010; Márquez, Rodríguez & De Abajo, 2006; Powell, Paluch & Blair, 2011; Powel *et al.*, 2011; Wilmot *et al.*, 2012). More specifically, the benefits of moderate to vigorous physical activity during childhood and adolescence include reduced cardiometabolic risk, less body fat mass, and increased physical fitness, especially cardiorespiratory fitness (Dobbins, Husson, DeCorby & LaRocca, 2013).

Globally, physical inactivity accounts for between 6% and 10% of major non-communicable diseases, such as coronary heart disease, type 2 diabetes, and breast and colon cancer. In addition, this unhealthy behavior causes 9% of premature mortality, that is, more than 5.3 out of 57 million deaths in 2008 (Lee *et al.*, 2012).

However, although physical activity in adolescence is considered to increase the likelihood of becoming an active and healthy adult, and reduces the risk of

future health problems (Uijtdewilligen *et al.*, 2011), sedentary lifestyle has gradually become common around the world (Janssen & Leblanc, 2010; Lee *et al.*, 2012; Powel *et al.*, 2011), to the point of considering inactivity as a risk factor for modern non-communicable diseases (Danaei *et al.*, 2009; Hallal *et al.*, 2012; Li & Siegrist, 2012; Park, Lee, Kang, Rhee & Park, 2012). Moreover, physical activity decreases during adolescence in both genders, but mainly among girls (Langguth *et al.*, 2015).

In general, given the importance of determining barriers to physical activity, studies have been conducted in countries such as the United States, Australia, Japan, Brazil, Singapore, Malaysia or Spain, since in all of them, the perceived personal, environmental or social barriers are inversely associated with the level of physical activity. Therefore, the analysis of these barriers is important not only for avoiding them, but also because their perception is associated with a greater prevalence of leisure-time physical inactivity among adolescents (Dias, Loch & Ronque, 2015).

However, the barriers and extent of their association with physical inactivity depend on the population under study (Ibrahim, Karim, Lai Oon & Wan Ngah, 2013), as there are hardly any publications that could explain the relationship between behavior towards the practice of physical activity and social cognitive models (Plotnikoff, Costigan, Karunamuni & Lubans, 2013). Thus, among the most important barriers are: the lack of time, the perception that other recreational activities with family and friends are more fun, the lack of discipline, the cost of some activities, not being able to enjoy them with other people, the lack of motivation or the lack of facilities. Among the least cited barriers are the perception that physical activity is not beneficial to health and feeling ashamed (Ibrahim, Karim, Lai Oon & Wan Ngah, 2013; Justine, Azizan, Hassan, Salleh & Manaf, 2013; Kimberly Hultquist & McLester, 2013; Reichert, Barros, Domingues & Hallal, 2007; Zabinski, Saelens, Stein, Hayden-Wade & Wilfley, 2003). A significant importance is given to the influence of the physical education teacher as a role model, as well as friends' social influence (Serra Puyal, Zaragoza Casterad & Generelo Lanaspa, 2014).

The interest in studying the barriers that prevent the practice of physical activity began in the 1990s, when researchers began to use instruments for the measurement of barriers. Having a valid, reliable and applicable instrument in different populations is of vital importance for its widespread uptake and possible comparison of results. Thus, there are studies which analyze the topic using questionnaires with direct questions on the perception of certain barriers, whereas others choose Likert-type scales (Allison, Dwyer & Makin, 1999; Arzu, Handan, Tuzun & Eker, 2006; Costa & McCrae, 1992; Cheng *et al.*, 2003; Kenneth *et al.*, 2005; Rauh, Hovell, Hofdtetter, Sallis & Gleghorn, 1992; Robbins, Pender & Kazanis, 2003; USDHHS, 1999; Vasudevan, Rimmer & Kviz, 2015).

Among the most commonly used instruments are the Perceived Barriers Questionnaire (PBQ) developed by O'Neill and Reid (1991), the San Diego

Health and Exercise Questionnaire (SDHEQ; Rauh, Hovell, Hofdtetter, Sallis and Gleghorn, 1992), the Barriers to Being Active Quiz (BBAQ) carried out by the United States Department of Human Health Services (USDHHS,1999), the Kinesiophobia Causes Scale (KCS) questionnaire performed by Knapik, Saulicz and Gnat, 2011; the Exercise Benefits/Barriers Scale (EBBS) developed by Sechrist, Walker and Pender (1987), validated for adults by Brown (2005) or BPAQ-MI for people with disabilities, validated by Vasudevan, Rimmer and Kviz, 2015).

One of the few contributions made in Spanish is the Self-Report Questionnaire of Barriers to Physical Activity Practice (SRQBPAP), initially proposed by Capdevila (2005) and adapted by Niñerola, Capdevila and Pintanel (2006). Therefore, the objective of this study is to assess the psychometric properties of SRQBPAP (in the 17-item Spanish version) in adolescent populations, focusing on reliability and validity, as well as to check the influence of gender on these barriers.

METHOD

Participants

The sample consisted of 342 adolescents residing in the Autonomous Community of Galicia. The facts and figures of non-university education (Xunta de Galicia, 2015) were used as the base population framework. The sample was distributed as follows: 45.9% of the surveyed adolescents are females, whereas 54.1% are males. In addition, 26.9% are 12 or 13 years old, 24.6% are 14 or 15 years old, and 48.5% are 16 or 17 years old. The mean age was 15.1 (SD = 1.86).

Instrument

In order to analyze the perceived barriers or difficulties with regard to physical activity, a questionnaire elaborated *ad hoc* with personal data (age and gender) was used, along with the Self-Report Questionnaire of Barriers to Physical Activity Practice (SRQBPAP, Capdevila, 2005), adapted by Niñerola, Capdevila and Pintanel (2006). This version consists of 17 items that are answered on a Likert scale ranging from 0 (reason unlikely to prevent me from performing physical activity in the next few weeks) to 10 (reason most likely to prevent me from performing physical activity) points (Appendix I). The original study reported four different subscales (body image/physical-social anxiety, fatigue/laziness, obligations/lack of time, environment/facilities) with good reliability and adequate validity.

Procedure

The questionnaire was collectively administered to Compulsory Secondary Education students during regular school hours, during the academic year

2015-2016. After communicating the appropriate instructions and once the informed consent form was signed (by school and families), all students voluntarily completed the requested information. The ethical research protocols were fulfilled with special emphasis on confidentiality.

Data analysis

Data analysis was performed using the SPSS 21 and AMOS 21 statistical packages. First, a descriptive analysis was carried out for the items, mean, standard deviation, corrected item-total correlation, Cronbach's Alpha if item deleted, as well as the asymmetry and kurtosis indices used to assess the normal behavior of variables. Next, an exploratory factor analysis (Varimax with Kaiser normalization) was performed, to check the initial factorial structure. The obtained factors were then correlated and a confirmatory factor analysis (estimation method of unweighted least squares) was estimated for the four-factor model. Finally, the internal consistency of the indicators was evaluated, using Cronbach's alpha.

RESULTS

Descriptive statistics: analysis of the psychometric quality of the items

With the aim of assessing the normality distribution in the items of the questionnaire, an analysis was conducted (Table 1), showing homogeneous means with standard deviations away from zero, pointing out their discrimination. They also showed positive corrected item-total correlations and correlations higher than .30, indicating that all contribute to the calculation of what the test measures and in the same vein. This is also supported by an "if item deleted" analysis of Cronbach's Alpha, showing that removing any of the items would not improve the reliability of the entire questionnaire ($\alpha = .863$). Finally, the asymmetry values were lower than 2 and those of kurtosis lower than 7 in all cases, fulfilling the normality criteria. Consequently, the items that make up the SRQBPAP questionnaire follow a normal behavior in all its items.

Table 1. Descriptive statistics for the SRQBPAP questionnaire items

	M	SD	Corrected item-total correlation	Cronbach's alpha if item deleted	Asymmetry (ET=.132)	Kurtosis (ET=.263)
SRQBPAP1	2.30	1.91	.354	.851	1.81	3.22
SRQBPAP2	3.83	2.94	.465	.847	.834	-.497
SRQBPAP3	1.80	1.82	.449	.847	1.76	6.43
SRQBPAP4	4.67	3.02	.355	.850	.311	-1.14
SRQBPAP5	2.71	2.30	.331	.852	1.50	1.59
SRQBPAP6	2.25	2.19	.623	.839	1.92	2.94
SRQBPAP7	2.61	2.22	.445	.847	1.43	1.35
SRQBPAP8	2.25	2.11	.658	.838	1.86	2.82
SRQBPAP9	3.13	2.70	.578	.840	1.17	.308
SRQBPAP10	2.50	2.58	.644	.837	1.71	1.72
SRQBPAP11	3.79	2.91	.367	.853	.758	-.682
SRQBPAP12	2.58	2.35	.486	.845	1.63	1.80
SRQBPAP13	2.25	2.31	.593	.840	1.03	3.20
SRQBPAP14	2.16	1.92	.365	.850	1.86	3.08
SRQBPAP15	1.86	1.75	.544	.844	1.59	6.97
SRQBPAP16	2.09	2.18	.598	.840	1.30	4.55
SRQBPAP17	1.83	1.74	.339	.851	1.73	6.91

Psychometric properties of SRQBPAP

To evaluate the construct validity of SRQBPAP in the sample selected for this study, an Exploratory Factor Analysis (EFA) was first performed. Previously, Kaiser-Meyer-Olkin (KMO) indices and Bartlett's sphericity had proven to be fit to perform EFA (KMO = .85; Bartlett = 2170.64; p < .001). Therefore, EFA was carried out by means of the Principal Components Method, with a Varimax rotation to obtain the simplest and most coherent structure (only factorial weights higher than .40 were collected). The results showed that the seventeen items of the questionnaire were grouped into four factors: body image/physical-social anxiety (with values of factorial loadings within a range from .634 to .864); fatigue/laziness (with values of factorial loadings within a range from .422 to .767); obligations/lack of time (with values of factorial loadings within a range from .637 and .866); and, environment/facilities (with values of factorial loadings within a range from .421 and .712). These factors explain 59.12% of the total variance of the instrument (Table 2). Likewise, all items presented commonalities greater than 40%.

Table 2. Matrix of rotated components, commonality and variance explained by SRQBPAP factors after the sample rotation (n = 342)

ITEMS	BI/PSA	F/L	O/LoT	E/F	h^2
SRQBPAP13	.864				.499
SRQBPAP16	.761				.667
SRQBPAP6	.755				.488
SRQBPAP10	.748				.690
SRQBPAP15	.721				.502
SRQBPAP3	.634				.647
SRQBPAP2		.767			.568
SRQBPAP9		.697			.584
SRQBPAP1		.679			.617
SRQBPAP8		.460			.642
SRQBPAP5		.449			.773
SRQBPAP12		.422			.532
SRQBPAP11			.866		.761
SRQBPAP4			.827		.456
SRQBPAP7			.637		.577
SRQBPAP17				.712	.641
SRQBPAP14				.421	.606
Explained Variance	24.01	13.79	12.42	8.88	59.11%

Source: Elaborated by the authors. Extraction method: Principal components method. Rotation Method: Varimax normalization with Kaiser

Next, the convergent validity was analyzed using Pearson's correlation coefficient to check the relationship between the factor scores of the SRQBPAP questionnaire (Table 3). Significant correlations (p <.01) were observed among the four factors, with moderate values in fatigue/laziness - body image/physical-social anxiety (r=.531) and in environment/facilities - body image/physical-social anxiety (r=.409) and low values in environment/facilities - fatigue/laziness (r=.346), obligations/lack of time - fatigue/laziness (r=.292), environment/facilities - obligations/lack of time (r=.241), and obligations/lack of time - body image/physical-social anxiety (r=.206).

Table 3. Correlation analysis of the SRQBPAP questionnaire factors

	Body image Physical-social anxiety	Fatigue Laziness	Obligations Lack of time	Environment Facilities
Body image Physical-social anxiety	_			
Fatigue Laziness	.531**	_		
Obligations Lack of time	.206**	.292**	_	
Environment Facilities	.409**	.346**	.241**	_

Finally, the confirmatory factor analysis (maximum likelihood estimation method) of the 17-item and four-factor questionnaire yields satisfactory results (Figure 1). The factorial loadings in the four factors vary in range from .30 to .86 (which are considered acceptable) and the standardized factor saturations are between moderate (.40) and high (.74). Thus, the mean values of the factorial loadings are: in body image/social-physical anxiety .73 (ranging from .60 to .84); in fatigue/laziness .58 (ranging from .40 to .72); in obligations/lack of time .69 (ranging from .54 to .86); and in environment/facilities .44 (ranging from .44 to .45). In addition, a strong correlation is observed between body image/social-physical anxiety and environment/facilities (r=.74), and between the former and fatigue/laziness (r=.68). A strong correlation is also found between laziness/fatigue and environment/facilities (r=.71). Similarly, low correlations are found between: obligations/lack of time and environment/facilities (r=.42); obligations/lack of time and fatigue/laziness (r=.37); and body image/physical-social anxiety and obligations/lack of time (r=.31).
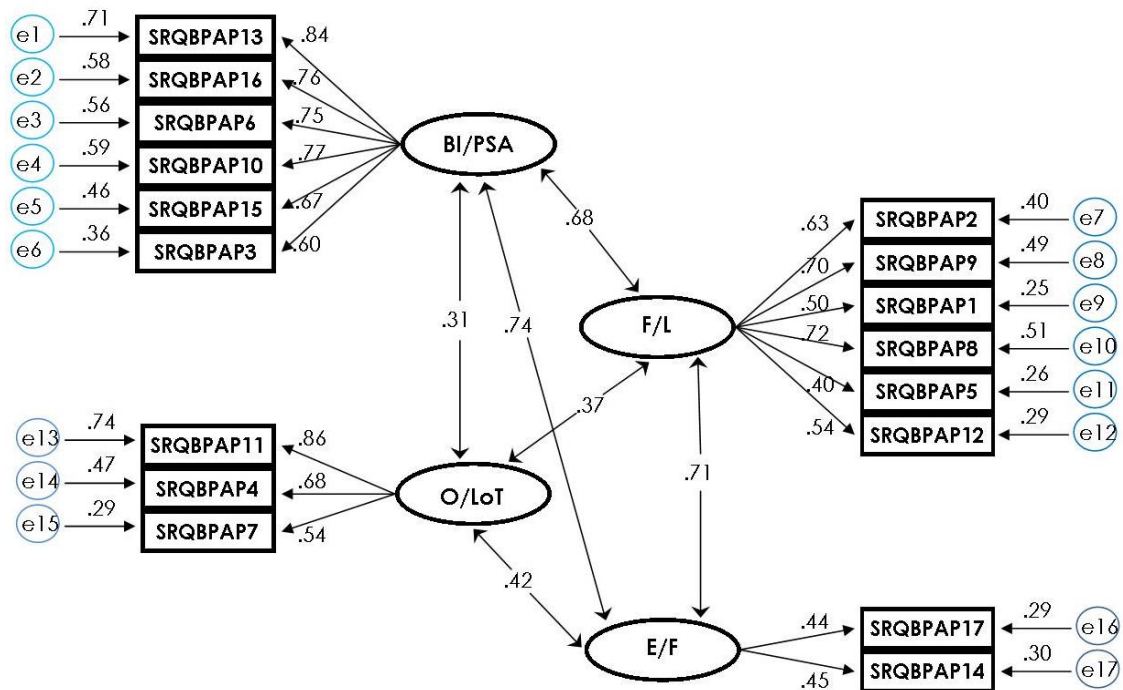

Figure 1. Regression coefficients and standardized factorial saturations of the SRQBPAP questionnaire (4FM)

Finally, the single-factor and four-factor hypotheses were tested. The results do not fit a unidimensional model (χ2= 757.941; gl= 119; χ2 /gl = 6.369; GFI=.77; AGFI=.71; RMSEA=.125), but expose an acceptable fit to the four-factor model: χ2= 417.612; gl= 113; χ2 /gl = 3.696; GFI=.89; AGFI=.86; RMSEA=.061.

Reliability of the questionnaire

The Cronbach's alpha for the SRQBPAP questionnaire is .86 for the entire sample, which is considered very acceptable. In addition, the values obtained for the four factors were higher than .70. More specifically: body image/physical-

social anxiety (α=.87), fatigue/laziness (α=.76); obligations/lack of time (α=.73); environment/facilities (α=.72).

Effects of gender interaction

The Student's t-test (Table 4) was performed with the sample, where significant differences (t_{341} = 11.65, $p < .001$) were found in relation to gender. These differences refer to the following factors: body image/physical-social anxiety (t_{341} = 11.65, $p < .001$), fatigue/laziness (t_{341} = 11.65, $p < .001$) and environment/facilities (t_{341} = 11.65, $p < .001$). These differences proved a higher presence of barriers to the practice of physical activity among girls (M = 17.67, M = 10.21, M = 10.09, respectively), compared to boys (M = 12.72, M = 8.44, M = 8.59, respectively). Thus, females perceived barriers to a greater extent than males (M = 49.86).

Table 4. Descriptive statistics and analysis of differences according to gender

SRQBPAP FACTOR	GENDER	M	SD	t	*p*
Body image/ Physical-social anxiety	Male	12.72	9.45	24.59	<.001
	Female	17.67	13.11		
Fatigue/Laziness	Male	8.44	5.41	13.07	<.001
	Female	10.21	6.57		
Obligations/Lack of time	Male	10.39	6.37	1.28	.258
	Female	11.87	6.81		
Environment/Facilities	Male	8.59	4.91	8.36	<.001
	Female	10.09	5.76		
Total score (17 items)	Male	40.15	19.09	11.65	<.001
	Female	49.86	23.37		

DISCUSSION AND CONCLUSIONS

This study was aimed at assessing the psychometric properties of the Self-Report Questionnaire of Barriers to Physical Activity Practice (SRQBPAP-17). In general terms, the validity and reliability results show that this is an adequate instrument to assess the barriers or impediments that make it difficult for adolescents to practice physical activity. Although further studies are recommended, the results found are consistent with those obtained in other studies (Niñerola, Capdevila & Pintanel, 2006; Reigal, Videra, Márquez & Parra, 2013; Samperio, Jiménez-Castuera, Lobato, Leyton & Claver, 2016).
The first aim was to confirm the structure obtained by showing the positive (Clark & Watson, 2003) corrected item-total correlations and those which were higher than .30 (Nunnally & Bernstein, 1995), concluding that all the items contributed to the calculation of what the questionnaire measured and in the same vein. In addition, it presented a normal behavior in all its items, since the asymmetry values were lower than 2 and those of kurtosis were lower than 7 in all cases, fulfilling the normality criteria (Curran, West & Finch, 1996).

Second, Kaiser-Meyer-Olkin (KMO) indices and Bartlett's sphericity had proven to be fit to perform EFA (Lloret-Segura, Ferreres-Traver, Hernández-Baeza & Tomás-Marco, 2014). In terms of factorial structure, four dimensions were found: body image/physical-social anxiety, fatigue/laziness, obligations/lack of time, and environment/facilities. The four factors explained 59.1% of the total variance of the barriers to physical activity practice. Thus, the number of dimensions is similar to those pointed out by Niñerola, Capdevila & Pintanel (2006) in the adapted version. However, one of the items loaded onto a factor different from that proposed in the adapted version (item 15 - *Not feeling comfortable with people who perform physical activity with me* is removed from the "environment/facilities" factor and becomes part of the "body image/physical-social anxiety" factor). In spite of this, the structure was theoretically consistent, so that the item affiliation was respected to the dimensions observed herein.

Next, the correlation among the four factors (convergent validity) was significant ($p < .01$), positive and moderate. In addition, CFA showed that the four latent variables made up the construct of barriers, which hindered the practice of physical activity, as found in the exploratory factor analysis. Finally, the single-factor and four-factor hypotheses were tested. The results did not fit a unidimensional model, but exposed an acceptable fit to the four-factor model according to the interpretation criteria established by Browne and Cudeck (1993), Hu and Bentler (1999), or Byrne (2001). Overall, the results obtained by means of the (exploratory and confirmatory) factor analysis informed us of the validity of the hypothesized structure, providing instructions for an adequate fit of the four-factor model. The internal consistency of the global questionnaire (α: .86) and the four factors (ranging from α: .72 to α: .86) was good, significantly exceeding the recommended value that should always be higher than .70 (Nunnally & Berstein, 1995).

In terms of gender, girls presented greater barriers to the practice of physical activity, indicating that their levels of physical activity are lower (Casado *et al.*, 2009; Fairclough & Stratton, 2006; Serra Puyal, Generelo Lanaspa & Zaragoza Casterad, 2010; Beltrán-Carrillo, Devís-Devís & Peiró-Velert, 2012; Langguth *et al.*, 2015). These data back up the studies carried out by Cordente (2006), Fairclough & Stratton (2006), Peiró, Devís, Beltrán & Fox (2008), Barquero, Barriopedro & Montil (2008), and Martínez-Gómez *et al.* (2009), who agree in pointing out that adolescent males are more active than their female counterparts.

Therefore, it can be concluded that SRQBPAP can be considered a valid and reliable instrument to measure the barriers that prevent or hinder the practice of physical activity during adolescence, although further research addressing this area is necessary, as well as in different contexts and populations. As main limitations of the study, there is the exclusive use of the self-report questionnaire data for the assessment of the different factors, with possible biases and restrictions associated, and the lack of external criteria, which provide the study with the convergent validity of the questionnaire.

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APPENDIX I. Self-Report Questionnaire of Barriers to Physical Activity Practice

Instructions: Over the next few weeks, how likely is it that the following reasons will prevent you from performing physical activity?

	Probability									
	Much									Little
Reason that prevents you from performing physical activity over the next few weeks	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1. Tiring myself out during physical activity or fear of getting injured										
2. Being lazy										
3. Feeling uncomfortable about my appearance while dressed in sportswear										
4. Having too much work to do										
5. Having muscle fever or muscle pain as a result of physical activity										
6. Feeling that my physical appearance is worse than that of others										
7. Having too many family obligations										
8. Not being "fit" to perform physical activity										
9. Lack of consistency										
10. Thinking that other people are in better shape than I am										
11. Not finding the time for physical activity										
12. Feeling tiredness or fatigue usually throughout the day										
13. Thinking that others judge me for my physical appearance										
14. Living too far from the place where I can perform physical activity										
15. Not feeling comfortable with people who perform physical activity with me										
16. Feeling ashamed because they are watching me while I perform physical activity										
17. The fact that the facilities or the instructors are not suitable										