Adaptation of the Achievement Emotions Questionnaire for Physical Education (AEQ- PE) to the Turkish Language[*]

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Abstract

Emotions affect students' cognitive development and performance, their personality and character, and their psychological and physical health. As a type of emotion, achievement emotions are among the most common and functionally important emotions in modern education and modern society. Lack of studies relevant to achievement emotions in the field of physical education in our country made this study necessary to be conducted. Therefore, the study aimed to adapt the Achievement Emotions Questionnaire for Physical Education (AEQ-PE) developed by Fierro-Suero et al. (2020) into Turkish. Data were collected from 369 secondary school students. Confirmatory Factor Analysis (CFA), item-total correlation, Cronbach's Alpha, Spearman Brown, test-retest (n= 90) and measurement invariance analyses were conducted to measure the validity and reliability of the scale. As a result of CFA, goodness-of-fit and factor loading values were found to be at acceptable and good levels. Cronbach's Alpha values of the sub-factors of the scale ranged between .620 and .815. The Spearman Brown coefficient was .767 and the test-retest result was .91. The measurement invariance analysis showed that there was no difference between the male and female students. In addition, the scale dimensions under positive and negative emotions were confirmed by second-order factor analysis. As a result of the analyses, the scale was found to be a valid and reliable measurement tool for the studies which will be conducted on Turkish population.
Keywords: Achievement emotions, Physical education and sport, Control-value theory

Beden Eğitimi için Başarı Duyguları Ölçeği'nin (BE-BDÖ) Türkçeye Uyarlanması

Öz

Duygular, öğrencilerin bilişsel gelişimlerini ve performanslarını, kişiliklerini ve karakterlerini, psikolojik ve fiziksel sağlıklarını etkilemektedir. Bir duygu türü olan başarı duyguları ise, modern çağ eğitiminde ve modern toplumda en sık görülen, işlevsel olarak da en önemli duygu türleri arasındadır. Başarı duyguları ile ilgili çalışmaların beden eğitimi alanında ülkemizde eksikliğinin hissedilmesi bu çalışmanın yapılmasını gerekli kılmıştır. Bu nedenle çalışmada, Fierro-Suero ve diğerleri (2020) tarafından geliştirilen Beden Eğitimi için Başarı Duyguları Ölçeği'ni (BE-BDÖ) Türkçeye uyarlamak amaçlanmıştır. 369 ortaokul öğrencisinden veriler toplanmıştır. Ölçeğin geçerlilik ve güvenirliğini ölçmek için Doğrulayıcı Faktör Analizi (DFA), madde toplam korelasyonu, Cronbach's Alpha, Spearman Brown, test-tekrar test (N=90) ve ölçüm değişmezliği analizleri yapılmıştır. DFA sonucunda uyum iyiliği ve faktör yük değerlerinin kabul edilir ve iyi seviyede olduğu görülmüştür. Ölçeğin alt faktörlerinin Cronbach's Alpha değerleri .620 ile .815 arasında değişmektedir. Spearman Brown katsayısı .767 ve test-tekrar test sonucu .91 olarak bulunmuştur. Ölçüm değişmezliği analizi sonucunda erkek ve kız öğrenciler arasında farklılık olmadığı görülmüştür. Ayrıca ölçek boyutları pozitif ve negatif duygular altında olmak üzere ikinci düzey faktör analizi ile doğrulanmıştır. Analizler sonucunda, ölçeğin Türk popülasyonu üzerinde yapılacak çalışmalarda kullanılması için geçerli ve güvenilir bir ölçme aracı olduğu görülmüştür.
Anahtar kelimeler: Başarı duyguları, Beden eğitimi ve spor, Kontrol-değer teorisi

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INTRODUCTION

Academic learning and achievement are crucial subjects of contemporary societies. Especially, to a large extent, research topics like education, professional careers, and social relations depend heavily on these subjects (Pekrun et al., 2002). The fundamentals of learning and achievement are established in childhood, during pupillage. Especially in achievement-oriented societies, learning and achievement are essential components of a student's daily life (Pekrun, 1992). As an academic setting, in our schools, there are many factors, such as physical structure of facilities, individual differences, and classroom climate, affecting learning and achievement (Çelik & Pulur, 2011; Hedjazi & Omidi, 2008). More specifically, the teacher's ability to prepare the student for learning, the physical environment such as soundscape, lighting and equipment, the learner's state of arousal, motivation, anxiety, and level of maturation are determinant factors for learning and achievement (Engin et al., 2009; Seven & Engin, 2008). Studies in the literature also emphasize that emotions are one of the building blocks of the above-mentioned factors that impact learning and achievement (Goetz et al., 2003; Pekrun, 2017; Pekrun et al., 2002).

For more than a decade, the interest in the role of emotions on academic learning and achievement has been growing (Linnenbrink-Garcia & Pekrun, 2011). There are studies which have identified the effect of emotions cognitive development and performance, personality and character formation, and their psychological and physical health (Destacamento, 2018; Pekrun, 2014: 6; Pekrun et al., 2002). In their research studies, Bolitho (2017) and Pekrun (2000, 2014) established a direct link between emotions and academic learning, classroom success, and the profound impact of emotions on students' overall academic achievements, while Linnenbrink-Gracia and Pekrun (2011) further emphasize the facilitating effect of emotions on students' academic achievement and their engagement with course materials. In addition, studies also support the relationship between emotions and self-learning (Pekrun et al., 2002; Schweder, 2020). On the other hand, Pekrun (1992) said that learning and success situations stimulate many emotions. Students may get excited during lessons, develop hope for success, feel proud when they succeed, be surprised when they discover something new, worry about failed exams, get angry with their teachers and friends, or get bored in classroom (Destacamento, 2018; Pekrun, 2014: 6).

The statements mentioned above imply diversity of emotions that students experience in the academic environment, and the positive contributions of emotions on their learning and achievement levels. All these emotions, which are experienced during learning and achievement situations, are called "Achievement Emotions" (Pekrun, 2000; 2006).

CONCEPTUAL FRAMEWORK

Achievement Emotions

Achievement emotions are among the most common and functionally the most important emotions in modern age education and generally in modern society (Pekrun, 2019: 154). Many emotions that arise during class, while working or doing sports can be associated with achievement emotions (Pekrun, 2019: 143). In this sense, achievement emotions which can manifest themselves everywhere, including educational settings (Destacamento, 2018; Pekrun,

2017; 2019: 142), can be intense, and deeply affect learning, performance, achievement, happiness, life satisfaction and psychological well-being (Pekrun, 2017; Pekrun et al., 2002).

Achievement emotions which can be classified according to their values (positive, negative, neutral), contextual reference environment (individual, social) and time (synchronic, prospective, retrospective) are related to achievement activities and related to the success or failure conditions arising from these activities (Pekrun, 2000; Pekrun, 2006; 2014: 6; Pekrun, 2019: 143). Feeling of enjoyment while learning, hope for success, anxiety for failure, pride of success and shame of failure are some examples of achievement emotions which could be categorised as positive and negative emotions (Pekrun, 2014: 6). According to Destacamento (2018), positive emotions aid learning, whereas negative emotions suppress it. Therefore, identifying the evoked emotions in students during course practices provides valuable information for teachers to manage their classroom effectively and adapt their lessons according to the needs of their students (Destacamento, 2018; McCaughtry & Rovegno, 2003).

Achievement Emotion Studies in Various Academic Fields and Education Levels
As mentioned above, for two decades, in the field of education achievement emotions have been subject to scientific research studies. In this process, studies on achievement emotions have been conducted and continued to be conducted in various educational fields. Studies in these fields have been conducted in a wide range from elementary school (Lichtenfeld et al., 2012) to higher education (Pekrun & Stephens, 2010).

When the studies on achievement emotions are examined, the majority of the studies in the field of mathematics stand out. For example, Peixoto (2015) conducted a scale development study to measure anxiety of pre-adolescents towards math tests and exams. On the other hand, Luo et al., (2014) found that achievement emotions totally mediated the relationship between increased belief in math ability, class participation, and math achievement. Also, Bieleke et al., (2021) developed the AEQ-Short version within the scope of mathematics courses and they conducted the validity and reliability study. Additionally, Lichtenfeld et al., (2012) adapted the achievement emotions scale for use in primary school students and introduced it to the field. Pekrun and Stephens (2010), who wrote a book chapter related to achievement emotions, discussed the importance of achievement emotions on exam and test anxiety in higher education. Vierhaus et al., (2016) conducted a study that they examined the organization of learning environments in classrooms to prevent negative developmental patterns of achievement emotions. In another study, Liu et al., (2021) conducted a study that junior high school students' achievement emotions mediated the serial mediation effect between autonomy motivation, teacher support, and creative self-efficacy.

Physical Education and Achievement Emotions
Physical education (PE), which has significant contribution to the acquisition of individual development such as character and personality (Kuter & Kuter, 2012), self-expression, creativity, leisure time use, and cultural development (Kuter & Kuter, 2012; Taşmektepligil et al., 2006), is valued and encouraged as a tool which contributes to international development goals, ensures peace and social equality, improves interpersonal dialogue, and supports economic and social development (United Nations, 2005).

Although emotions experienced in educational settings are directly linked to students' motivation, interest, learning and achievement, and even PE is an essential component, such as maths, music, geography etc., of educational process, it has mostly been subject to the research studies in terms of its physical and cognitive benefits (Kuter & Kuter, 2012). Even though PE's rich experience enables a course environment and climate that induce various emotions (Kuter & Kuter, 2012), the achievement emotions related to PE as a research subject are underestimated, and there is a lack of research studies focused on student emotions in PE (Simonton & Garn, 2019) in national and international PE literature.

Measurement Tools Developed for Achievement Emotions

In the international literature, achievement emotions are measured in different countries and fields. Pekrun et al., (2011) developed the Achievement Emotions Questionnaire (AEQ) to measure the relationship between emotions and students' learning and achievement. Lichtenfeld et al., (2012) developed Achievement Emotions Questionnaire-Elementary School (AEQ-ES) to measure the achievement emotions of elementary school students. Peixoto et al. (2015) conducted validity and reliability studies of the Achievement Emotions Questionnaire to measure pre-adolescent students' feelings of achievement in mathematics. The Achievement Emotions Questionnaire developed by Pekrun et al., (2011) was adapted into PE by Fierro-Suero et al. (2020) and introduced to the field.

In the national literature, Hacıömeroğlu et al., (2013) adapted the Achievement Emotions Scale-Primary School (Lichtenfeld et al., 2012) to Turkish and Turkish culture to determine the achievement emotions of primary school students. Takunyacı and Karadağ (2019) conducted an adaptation study of the Achievement Emotions Questionnaire-Pre-Adolescent Students (Peixoto et al., 2015) and investigated students' achievement emotions towards mathematics.

Purpose of the Current Study

According to Destacamento (2018), positive emotions aid learning whereas negative emotions hinder it. Therefore, identifying the emotions that lesson practices evoke in students provides teachers with valuable information for managing the classroom and adapting lessons to their students' needs (Destacamento, 2018; McCaughtry & Rovegno, 2003). This situation, that is, having knowledge of students' emotional states, is also significant for PE teachers. However, when the literature was examined, although there are questionnaires that measure the achievement emotions in Turkish and Turkish culture (Hacıömeroğlu et al., 2013; Takunyacı & Karadağ, 2019), there is no questionnaire that measures achievement emotions specific to the field of PE. For this reason, bringing a questionnaire that identifies the emotional state for PE lessons, which differ from other lessons in terms of lesson environment and climate, to the literature will make significant contributions to the field. Therefore, in this study, it was aimed to adapt the "Achievement Emotions Questionnaire for Physical Education (AEQ-PE)" scale adapted to PE by Fierro-Suero et al., (2020) into Turkish.

MATERIAL AND METHODS

Participants and Procedure

The subject group of the study consisted of totally 459 students (female 213; age between 11-14) sampled from 5th, 6th, 7th and 8th grades of eight different secondary school in Kırıkkale. Due to the two-phase design of the study sampling was conducted twice; one for construct validity (n= 369; 169 female), one for test-retest reliability (n= 90, 44 female). In the determination of sample size for the construct validity 15 participants per variable were set as criteria (Pituch and Stevens, 2015).

Measurement Instrument

The Achievement Emotions Questionnaire for Physical Education (AEQ-PE; Fierro-Suero et al., 2020) which was adapted from Achievement Emotions Questionnaire (AEQ; Pekrun et al., 2011), was used in this study. AEQ-PE composed of 24 items were grouped under 6 sub-dimensions called as pride, enjoyment, anger, anxiety, hopelessness, and boredom. The internal consistency values were at an acceptable level (Büyüköztürk, 2020: 183) between .72-.83 (Fierro-Suero et al., 2020). In the evaluation of questionnaire items, a 5-point Likert scale (1 - Totally Disagree and 5 - Totally Agree) was used.

The Translation Process of Achievement Emotions Questionnaire for Physical Education

Two academicians from the field of PE who also were proficient in English, two language professionals in English (an expert lecturing in English and a certified public translator), and an academician who studies in the field of Turkish language contributed to the translation process of AEQ-PE. Initially, the items were translated from English to Turkish singly by all experts (Coster & Mancini, 2015). After that, in terms of semantic and conceptual clarity and according to the relevancy of items with the target population, an item-by-item evaluation on the four translated versions were made and a single version was constructed by the PE field experts (Çapık et al., 2018). Subsequently, to control if there was a semantic deterioration or deviation from the original language of the questionnaire, the single version constructed with consensus of PE experts, was check by the certified public translator. After getting grammatic and semantic confirmation from the Turkish language expert, the final version decision was made after a pilot study, testing comprehensibility of items, which were conducted on 30 secondary school students.

Ethical Approval

Ethics committee permission was obtained from Bolu Abant Izzet Baysal University, University Human Research Ethics Committee in Social Sciences. Additionally, the necessary permissions were obtained from Kırıkkale national education directorate and governorship by applying through the MEB AYSE (Ministry of National Education research, competition and social activity).

Statistical Analysis

The validity and reliability studies of the instrument were conducted in line with the data obtained from the students participating in the study. SPSS 26 and AMOS 22 programs were used in the analysis. First-order and second-order confirmatory factor analysis (CFA), item-total correlation, Cronbach's Alpha coefficient, Spearman Brown coefficient, test-retest, and measurement invariance analyses were conducted to determine the validity and reliability of the scale.

FINDINGS

### First-Order Confirmatory Factor Analysis

Confirmatory Factor Analysis (CFA) was applied to test whether the six-dimensional structure of the AEQ-PE was compatible with the sample in which data were collected. Since the data were normally distributed, maximum likelihood calculation method was used. As a result of the analysis, χ^2, p, χ^2/df, CFI, SRMR and RMSEA goodness of fit indices were reported due to the sample group being more than 250 (N>250) (Gürbüz, 2021, p. 40). The fit indices and maximum-minimum factor loadings obtained at the end of the CFA analysis are presented in Table 1.

Table 1. AEQ-PE First-order CFA Fit Indices

	χ^2	p	χ^2/df	CFI	SRMR	RMSEA	Factor Loadings min	Factor Loadings max
CFA Values	429.675	0.000	1.81	.928	.048	.047	0.42	0.79
Suggested Values	*p>.05*	*p<.05*	*x²/df<3*	*>.95*	*<.05*	*<.05*	*>0.30*	
Fitting			Good Fit	Acceptable	Good Fit	Good Fit		

χ2/df=Chi-square/degree of freedom, CFI=Comparative Fit Index, SRMR=Standardized Root Mean Square Residual, RMSEA=Root Mean Square Error of Approximation

When Table 1 is examined, the χ^2/df value was found to be less than 3 as a result of the analysis. This value indicates that the model and the data show good fit. The CFI value was calculated as .928. This value indicates that the tested model and the base model are in good fit. SRMR value was .048 and this value represents good fit. The RMSEA value was found to be .047 which indicates that the model has a good fit with the sample.
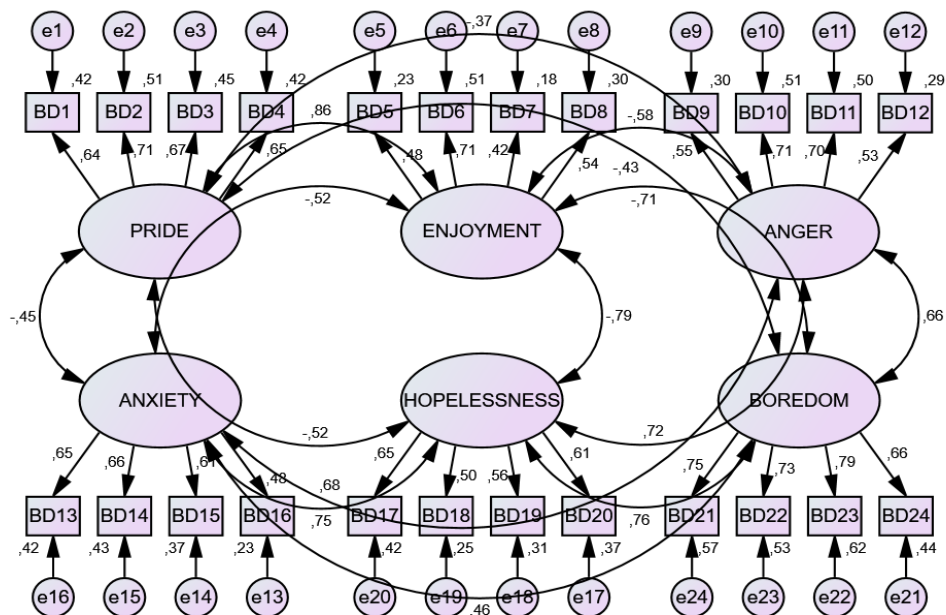
CMIN=429,675; DF=237; CMIN/DF=1,813; RMSEA=,047; CFI=,928;

Figure 1 First-order CFA path diagram

The CFA path diagram for the AEQ-PE is given in Figure 1. The diagram consists of 6 factors (pride, enjoyment, anger, anxiety, hopelessness, boredom) and 4 items under each factor. In the diagram drawn to test the model, it is seen that the standardized factor loadings are distributed between 0.42 and 0.79.

Table 2. Error variance, t-values, regression coefficient and factor loading values of AEQ-PE items

	Scale Items	Error Variance	t-values	R^2	Factor Loadings
Pride	1	.047	13.83	.416	.645
	2	.033	15.30	.506	.711
	3	.072	13.63	.454	.674
	4	.070	12.85	.419	.648
Enjoyment	5	.034	9.79	.229	.479
	6	.043	14.24	.506	.711
	7	.037	9.33	.177	.420
	8	.027	11.88	.509	.544
Anger	9	.040	10.76	.304	.552
	10	.046	14.95	509	.713
	11	.039	14.18	.497	.705
	12	.022	10.99	.285	.534
Anxiety	13	.049	12.36	.423	.483
	14	.049	12.76	.433	.609
	15	.082	11.57	.371	.658
	16	.046	9.04	.233	.651
Hopelessness	17	.058	13.88	.419	.606
	18	.065	11.38	.249	.559
	19	.056	13.01	.313	.499
	20	.059	12.84	.367	.647
Boredom	21	.064	17.14	.565	.752
	22	.085	17.07	.531	.729
	23	.029	18.43	.625	.790
	24	.052	16.91	.441	.664

As a result of the CFA, it is seen that all item t-values of the scale are above 2.56. Therefore, the parameter estimation values are significant at the 0.01 level. The error variances in the scale items are also below 0.90 (Table 2).

Item-total Correlation Analysis

Table 3. AEQ-PE item-total correlation

		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Factor 1 Items	1	**.751**	.383	.136	.273	.242	.182
	2	**.770**	.461	.300	.239	.290	.357
	3	**.771**	.499	.123	.247	.295	.227
	4	**.766**	.497	.192	.233	.272	.233
Factor 2 Items	5	.418	**.653**	.168	.200	.275	.244
	6	.499	**.675**	.349	.282	.478	.487
	7	.350	**.704**	.180	.129	.169	.259
	8	.416	**.713**	.233	.274	.324	.350
Factor 3 Items	9	.127	.168	**.783**	.237	.215	.282
	10	.218	.359	**.740**	.421	.409	.428
	11	.266	.344	**.726**	.420	.486	.468
	12	.117	.134	**.727**	.268	.280	.293
Factor 4 Items	13	.250	.300	.299	**.744**	.441	.293
	14	.271	.262	.430	**.711**	.374	.310
	15	.274	.225	.299	**.732**	.417	.241
	16	.147	.140	.271	**.695**	.268	.127
Factor 5 Items	17	.315	.405	.407	.364	**.668**	.477
	18	.226	.262	.286	.399	**.743**	.289
	19	.204	.246	.332	.351	**.716**	.397
	20	.300	.373	.284	.346	**.695**	.408
Factor 6 Items	21	.282	.408	.438	.265	.462	**.778**
	22	.263	.386	.379	.240	.398	**.817**
	23	.278	.391	.374	.306	.458	**.831**
	24	.225	.359	.387	.258	.428	**.800**

Factor 1=Pride, Factor 2=Enjoyment, Factor 3=Anger, Factor 4= Anxiety, Factor 5=Hopelessness, Factor 6=Boredom

Table 3 shows the item total correlations of the scale. In the item-total correlation analysis, the relationship between the items and the related dimensions is satisfactory (r>0.5). It is recommended that items that are not in the relevant dimension should be less than 0.5 (r<0.5) (Gürbüz, 2021: 81).

Internal Consistency Analysis

Table 4. Cronbach's Alpha, Spearman Brown and Test-Retest values of AEQ-PE

Factors	Items	Cronbach's Alpha	Spearman Brown	Test-Retest
1- Pride	4	.759		
2- Enjoyment	4	.620		
3- Anger	4	.728	.767	.905
4- Anxiety	4	.687		
5- Hopelessness	4	.650		
6- Boredom	4	.815		

When Table 4 is examined, it is seen that the Cronbach's Alpha coefficients of the AEQ-PE sub-dimensions vary between .620 and .815. These values can be interpreted as acceptable and good (Büyüköztürk, 2020: 183; Kılıç, 2016).

Spearman Brown Analysis

The split-half method is calculated using the Spearman Brown method based on the relationship between the two halves of the test by separating the items in the scale as odd-even.

This calculation method shows the consistency between test scores (Büyüköztürk, 2020: 182). The Spearman Brown coefficient was found to be .767 as a result of the two-half test reliability performed with 369 collected data. According to Büyüköztürk (2020: 32), this value is considered highly reliable.

Test-retest Analysis

The test-retest method is explained by the correlation between the tests applied to a group twice within a certain period of time (Büyüköztürk, 2020: 182). In the test-retest analysis, the correlation coefficient between the two measurements was found to be .905. According to Büyüköztürk (2020: 32), the test-retest correlation coefficient of the scale is highly reliable.

Measurement Invariance Analysis

Table 5. Measurement Invariance Analysis Results

Modeller	χ^2 (df)	χ^2/df	CFI	SRMR	RMSEA	Model Comparison	$\Delta\chi^2$ (Δdf)	ΔCFI
Gender (Male-Female)								
1. Configural	808.4 (474)	1.705	.884	.065	.044	-	-	-
2. Metric	856.4 (498)	1.720	.875	.0709	.044	2 vs. 1	97.9* (48)	.009
3. Scalar	906.3 (522)	1.736	.866	.0706	.045	3 vs. 2	20.9 (15)	.009
4. Strict	1016.5 (561)	1.812	.842	.0760	.047	4 vs. 3	89.2* (24)	.024

Not: *p<.05; *N*= 369 (Male= 200, Female= 169); *CFI*= Comparative fit index; *SRMR*= Standardized Root Mean Square Residual; *RMSEA*= Root mean square error of approximation.

In the measurement invariance analysis conducted for gender, configural invariance was first tested through the baseline model without equating any parameter values. In the literature, the generally accepted value for CFI is above 0.90 (Çokluk et al., 2021; Gürbüz, 2021; Hu & Bentler, 1999). However, it is also said that the CFI value can be considered as 0.80 as a lower limit, considering the model and analysis complexity (Hu & Bentler, 1999). According to the mentioned criteria, the goodness-of-fit values indicated that configural invariance was achieved. After configural invariance was achieved, metric invariance was tested by comparing the multiple-group CFA results obtained by equating the scale items with the configural model. In measurement invariance analyses, it is recommended to use CFI differences instead of χ^2 to compare models, and the ΔCFI value between the compared models should be <.01 (Byrne, 2010: 250). Since the ΔCFI values for the comparisons between the configural model and the metric model, and the metric model and the scalar model are <.01, the results indicated that the scale is equivalent across groups. However, because the ΔCFI for the comparison between scalar invariance and strict model is >.01, it was determined that strict invariance was not achieved. Cause of its stringency than other types of measurement invariance findings, strict model is not reported in most studies and is difficult to achieve (Gürbüz, 2021).

Second-Order Confirmatory Factor Analysis

Following the confirmation of the 6 sub-dimensional structure of the AEQ-PE, a second-order CFA analysis of the positive and negative emotions in the scale was conducted.
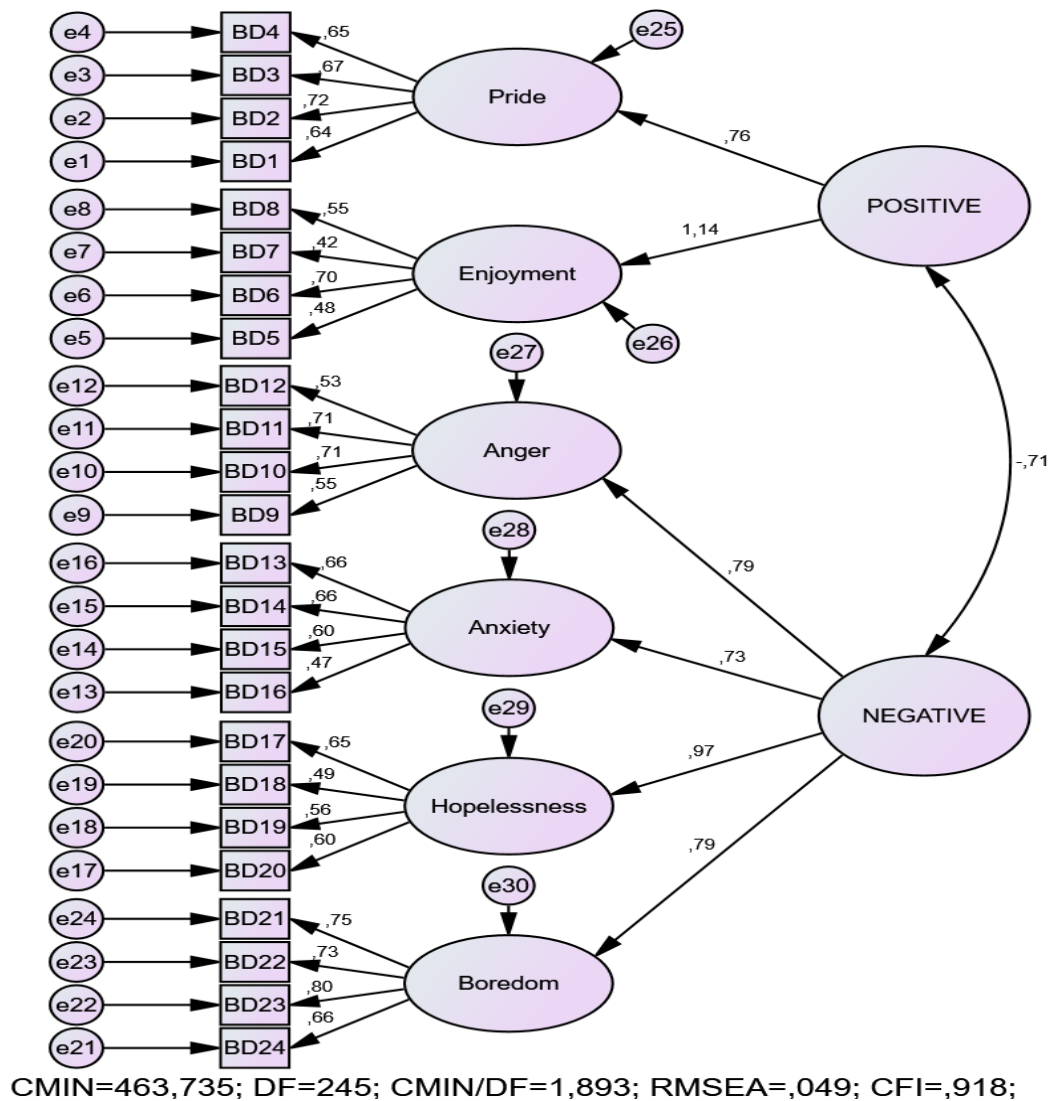

CMIN=463,735; DF=245; CMIN/DF=1,893; RMSEA=,049; CFI=,918;

Figure 2 Second-order CFA path diagram

Figure 2 shows the second order CFA path diagram of the AEQ-PE. Pride and enjoyment subscales were confirmed under the positive factor, while anger, anxiety, hopelessness and boredom were confirmed under the negative factor ($\chi2$=463.735, p<0.05, $\chi2$/df= 1.893, CFI= .918, SRMR= .052 and RMSEA .049). The factor loadings of the scale ranged between .420 and .798.

Table 6. Error variance, t-values, regression coefficient and factor loading values of second-order CFA of AEQ-PE items

		Items	Error Variances	t-values	R^2	Factor Loadings
POSİTİVE	Pride	1	.037	9.83	.406	.638
		2	.027	10.56	.521	.722
		3	.040	10.03	.446	.668
		4	.046	9.83	.421	.649
	Enjoyment	5	.039	7.36	.234	.484
		6	.022	8.34	.495	.704
		7	.049	6.20	.176	.420
		8	.049	7.36	.301	.549
NEGATİVE	Anger	9	.092	7.59	.305	.552
		10	.047	8.98	.502	.708
		11	.059	8.99	.503	.709
		12	.065	7.59	.284	.533
	Anxiety	13	.064	7.34	.442	.474
		14	.069	7.32	.432	.601
		15	.066	7.05	.361	.657
		16	.086	7.34	225	.664
	Hopelessness	17	.029	9.54	.428	.600
		18	.052	7.71	.242	.561
		19	.082	8.54	.315	.492
		20	.035	9.54	.360	.654
	Boredom	21	.031	11.89	.557	.662
		22	.016	11.67	.530	.798
		23	.020	12.46	.637	.728
		24	.015	11.9	.439	.747

The error variance, t-values, R^2 values and factor loadings of the second level CFA are given in Table 6. According to the results, t-values of all items are above 2.56. When the error variances are analyzed, there is no error variance value above .90. According to these results, the second level structure of the AEQ-PE was confirmed.

DISCUSSION and CONCLUSION

This study was conducted to adapt the "Achievement Emotions for Physical Education" scale (Fierro-Suero et al., 2020) into Turkish and Turkish culture. To conduct the validity and reliability analyses of the scale, the scale items were first translated from the source language to the target language as suggested in the field. The first-order confirmatory factor analysis of the scale was performed with the collected 369 data. The results confirm that the goodness-of-fit values of the scale have good fit (see Figure 1). The item-total correlations of the six-dimensional scale was examined. According to these values, the relationship between the items and the relevant dimension is highly correlated to each other, while the relationship between the items and the non-relevant dimensions is found to be less than 0.5, as suggested in the literature (Gürbüz, 2021: 81). As we examined Cronbach's Alpha values of the scale, dimensions ranged from .620 to .815. These values are acceptable and good (Büyüköztürk, 2020: 183; Kılıç, 2016). Looking at the reliability of the scale with the two-half method, the scale items were divided into single-pairs and the Spearman Brown coefficient was found to be .767. This value is highly reliable according to Büyüköztürk (2020: 32). To measure whether

the scale is consistent over time, the scale was applied twice to a sample of 90 participants who were in 5th, 6th, 7th, and 8th grades, 10 days apart. In the test-retest analysis, the correlation coefficient between the two measurements was found to be .91. This value shows that the scale is highly reliable (Büyüköztürk, 2020: 32). One of the strengths of this study is the implementation of measurement invariance analysis. This analysis measures whether the scale is understood at the same level between groups with advanced statistical analyses (Gürbüz, 2021). The measurement invariance analysis revealed that the scale is understood at the same level between female and male students (see Table 5).

Achievement emotions consist of positive and negative emotions (Pekrun & Stephens, 2010). In the studies, positive and negative emotions are examined both individually (Bieleke et al., 2021) and under their positive and negative dimensions (Lichtenfeld et al., 2012). As it seen in Figure 1, the correlation between positive and negative achievement emotions clearly reveals the relationship between these dimensions. Therefore, in the study, the pride and enjoyment subscales were validated under the positive dimension, and the anger, anxiety, hopelessness, and boredom subscales were validated under the negative dimension by conducting a second-order factor analysis (see Figure 2). Thus, the emotions that are the dimensions of the scale can be considered individually, as well as grouped under positive and negative dimensions.

The achievement emotions questionnaire for physical education has been used by different researchers in the field. The scale was first adapted to the field of PE by Fierro-Suero et al., (2020). Fierro-Suero and his colleagues also conducted their study on a sample of 358 participants with a same age group similar with this present study. The confirmatory factor analysis findings in their study showed a high positive correlation between positive emotions, while negative emotions showed a moderate to high positive correlations, as it was stated in our study.

In another study in which the achievement emotions questionnaire for physical education was adapted to Malay language, the study was conducted on a sample of 607 Malaysian children (Ibrahim et al., 2021). The correlation between the dimensions of the scale in the confirmatory factor analysis of the scale was found moderate to high, as in this and the study by Fierro-Suero et al., (2020). The confirmatory factor analysis results in these three studies showed parallelism with each other.

Compared to the two previous adaptation studies, to empower the validity and reliability findings of the questionnaire, in this present research study additional tests, such as the item-total correlation, Spearman Brown, test-retest analyses and measurement invariance analysis were conducted which is the strength of this study when compared to Fierro-Suero et al., (2020) and Ibrahim et al., (2021). Additionally, in this present study, with a second-order confirmatory factor analysis it has been shown that the scale is combined under positive and negative factors.

As a conclusion, the AEQ-PE, with its short and understandable items (Ganassali, 2008), in this present study showed strong validity and reliability findings, making it an evaluative measurement instrument for research studies in Turkish culture and population. As a result of the analyses, the scale was found to be a reliable and valid measurement tool. The scale measures the feelings of achievement for PE.

Further Recommendations

The PE lessons should not be seen as a lesson that students take only in a certain period of their life, but as a lesson that they should apply the skills they have learned throughout their life. In this research, the importance of achievement emotions in the field of education is clearly emphasized. Therefore, feelings of achievement for PE are of particular importance. Students' positive sense of achievement for PE should be kept high and measures should be taken for this purpose. For future research, the effect of the concepts of control and value in the control-value theory on the achievement emotions in PE can be examined. It can be examined how the value and control that students give to the PE lesson affect their feelings of achievement for PE. In addition, examining AEQ-PE and variables such as pleasure, physical competence, performance, happiness, academic achievement and familial factors can add depth to the field.

Conflicts of Interest: There is no financial or personal conflict of interest on the part of the authors in this study.

Authors' Contribution: Research Design - MC and ÜK, Data Collection - MC, Statistical Analysis - MC and ÜK, Manuscript Preparation – MC.

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Ceylan, M., & Karlı, Ü. (2024). Adaptation of the achievement emotions questionnaire for physical education (AEQ- PE) to the Turkish language. *Journal of Sport Sciences Research, 9*(2), 132-148.

REFERENCES

Bieleke, M., Gogol, K., Goetz, T., Daniels, L., & Pekrun, R. (2021). The AEQ-S: A short version of the Achievement Emotions Questionnaire. *Contemporary Educational Psychology, 65,* 1-15. https://doi.org/10.1016/j.cedpsych.2020.101940

Bolitho, J. (2017). Inside the restorative justice black box: The role of memory reconsolidation in transforming the emotional impact of violent crime on victims. *International Review of Victimology*, *23*(3), 233–255. https://doi.org/10.1177/0269758017714549

Büyüköztürk, Ş. (2020). *Sosyal bilimler için veri analizi el kitabı* (28.). Pegem Akademi. https://doi.org/10.145279789756802748

Büyüköztürk, Ş., Kılıç-çakmak, E., Akgün, Ö. E., Karadeniz, Ş., & Demirel, F. (2018). *Eğitimde Bilimsel Araştırma Yöntemleri* (25.). Pegem Akademi. https://doi.org/10.14527/9789944919289

Byrne, B. M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming* (2nd ed.). Routledge.

Coster, W. J., & Mancini, M. C. (2015). Recommendations for translation and cross-cultural adaptation of instruments for occupational therapy research and practice. *Revista de Terapia Ocupacional Da Universidade de São Paulo, 26*(9), 50–57. https://doi.org/10.11606/issn.2238-6149.v26i1p50-57

Çapık, C., Gözüm, S., & Aksayan, S. (2018). Intercultural scale adaptation stages, language and culture adaptation: Updated guideline. *Florence Nightingale Hemşirelik Dergisi*, *26*(3), 199–210. https://doi.org/10.26650/fnjn397481

Çelik, Z., & Pulur, A. (2011). Ortaöğretim öğrencilerinin beden eğitimi ve spora ilişkin tutumları. *Yüzüncü Yıl Üniversitesi Eğitim Fakültesi Dergisi*, *316*, 115–121.

Çokluk, Ö., Şekercioğlu, G., & Büyüköztürk, Ş. (2021). *Sosyal bilimler için çok değişkenli istatistik spss ve lisrel uygulamaları* (6.). Pegem Akademi. https://doi.org/10.14527/ 9786055885670

Destacamento, R. (2018). Academic emotions and performance of the senior high school students: basis for intervention program. *SMCC Higher Education Research Journal*, *5*(1), 69–92. https://doi.org/10.18868/sher5j.05.01213.04

Engin, A. O., Özen, Ş., & Bayoğlu, V. (2009). Öğrencilerin okul öğrenme başarılarını etkileyen bazı temel değişkenler. *Sosyal Bilimler Enstitüsü Dergisi*, *3*(3), 125–156.

Fierro-Suero, S., Almagro, B. J., & Sáenz-López, P. (2020). Validation of the achievement emotions questionnaire for physical education (AEQ-PE). *International Journal of Environmental Research and Public Health*, *17*(12), 1–12. https://doi.org/10.3390/ijerph17124560

Ganassali, S. (2008). The influence of the design of web survey questionnaires on the quality of responses. *Survey Research Methods*, *2*(1), 21–32.

Goetz, T., Zirngibl, A., Pekrun, R., & Hall, N. (2003). Emotions, learning and achievement from an educational-psychological perspective. *Learning Emotions: The Influence of Affective Factors on Classroom Learning*, *1998*, 9–28.

Gürbüz, S. (2021). *AMOS ile yapısal eşitlik modellemesi* (2nd ed.). Seçkin Yayıncılık.

Hacıömeroğlu, G., Bilgen, S., & Tabuk, M. (2013). Başarı duygusu ölçeği-ilkokul'un türkçe'ye uyarlama çalışması. *Eğitim Bilimleri Dergisi*, *38*(38), 85–96. https://doi.org/10.15285/EBD.2013385568

Hedjazi, Y., & Omidi, M. (2008). Factors affecting the academic success of agricultural students at University of Tehran, Iran. *Journal of Agricultural Science and Technology*, *10*(3), 205–214.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Ceylan, M., & Karlı, Ü. (2024). Adaptation of the achievement emotions questionnaire for physical education (AEQ- PE) to the Turkish language. *Journal of Sport Sciences Research, 9*(2), 132-148.

Ibrahim, M. F., Kuan, G., Hashim, H. A., Hamzah, N. A., & Kueh, Y. C. (2021). Measuring achievement emotions questionnaire for physical education (AEQ-PE): A confirmatory study in Malay language. *BMC Public Health*, 21(1), 1-8. https://doi.org/10.1186/s12889-021-11869-4

Kılıç, S. (2016). Cronbach's alpha reliability coefficient. *Journal of Mood Disorders*, *6*(1), 47. https://doi.org/10.5455/jmood.20160307122823

Kuter, F., & Kuter, M. (2012). Beden eğitimi ve spor yoluyla değerler eğitimi. *Eğitim ve İnsani Bilimler Dergisi: Teori ve Uygulama*, *6*, 75–94.

Lichtenfeld, S., Pekrun, R., Stupnisky, R. H., Reiss, K., & Murayama, K. (2012). Measuring students' emotions in the early years: The Achievement Emotions Questionnaire-Elementary School (AEQ-ES). *Learning and Individual Differences*, *22*(2), 190–201. https://doi.org/10.1016/j.lindif.2011.04.009

Linnenbrink-Garcia, L., & Pekrun, R. (2011). Students' emotions and academic engagement: Introduction to the special issue. *Contemporary Educational Psychology*, *36*(1), 1–3. https://doi.org/10.1016/j.cedpsych.2010.11.004

Liu, B., Xing, W., Zeng, Y., & Wu, Y. (2021). Quantifying the influence of achievement emotions for student learning in MOOCs. *Journal of Educational Computing Research, 59*(3), 429-452. https://doi.org/10.1177/0735633120967318

Luo, W., Lee, K., Ng, P. T., & Ong, J. X. W. (2014). Incremental beliefs of ability, achievement emotions and learning of Singapore students. *Educational Psychology*, *34*(5), 619-634. https://doi.org/10.1080/01443410.2014.909008

McCaughtry, N., & Rovegno, I. (2003). Development of pedagogical content knowledge: moving from blaming students to predicting skillfulness, recognizing motor development, and understanding emotion. *Journal of Teaching in Physical Education*, *22*(4), 355–368. https://doi.org/10.1123/jtpe.22.4.355

Peixoto, F., Mata, L., Monteiro, V., Sanches, C., & Pekrun, R. (2015). The achievement emotions questionnaire: validation for pre-adolescent students. *European Journal of Developmental Psychology*, *12*(4), 472–481. https://doi.org/10.1080/17405629.2015.1040757

Pekrun, R. (1992). The impact of emotions on learning and achievement: towards a theory of cognitive/motivational mediators. *Applied Psychology*, *41*(4), 359–376. https://doi.org/10.1111/j.1464-0597.1992.tb00712.x

Pekrun, R. (2000). Social-cognitive, control-value theory of achievement emotions. In J. Heckhausen (Eds.), *Motivational Psychology of Human Development* (Vol. 131, Issue C, pp. 143-163). Elsevier Masson SAS. https://doi.org/10.1016/S0166-4115(00)80010-2

Pekrun, R. (2006). The control-value theory of achievement emotions: Assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, *18*(4), 315–341. https://doi.org/10.1007/s10648-006-9029-9

Pekrun, R. (2014). *Emotions and learning*. Educational practices series.

Pekrun, R. (2017). Emotion and achievement during adolescence. *Child Development Perspectives*, *11*(3), 215–221. https://doi.org/10.1111/cdes.12237

Pekrun, R. (2019). Achievement emotions a control-value theory perspective. In R. Patulny, A. Bellocchi, R. E. Olson, S. Khorana, J. McKenzie & M. Peterie (Eds.), *Emotions in Late Modernity* (pp. 142–157). Routledge Studies in the Sociology of Emotions. https://doi.org/10.4324/9781351133319-8

Pekrun, R., Elliot, A. J., & Maier, M. A. (2006). Achievement goals and discrete achievement emotions: A theoretical model and prospective test. *Journal of Educational Psychology*, *98*(3), 583–597. https://doi.org/10.1037/0022-0663.98.3.583

Pekrun, R., Goetz, T., Frenzel, A. C., Barchfeld, P., & Perry, R. S. (2011). Measuring emotions in students' learning and performance: The Achievement Emotions Questionnaire (AEQ). *Contemporary Educational Psychology*, *36*(1), 36–48. https://doi.org/10.1016/j.cedpsych.2010.10.002

Ceylan, M., & Karlı, Ü. (2024). Adaptation of the achievement emotions questionnaire for physical education (AEQ- PE) to the Turkish language. *Journal of Sport Sciences Research, 9*(2), 132-148.

Pekrun, R., Goetz, T., Frenzel, A. C., & Perry, R. P. (2011). *Achievement Emotions Questionnaire (AEQ)*. APA PsycTests. https://doi.org/10.1037/t21196-000

Pekrun, R., Goetz, T., Titz, W., & Perry, R. P. (2002). Academic emotions in students' self-regulated learning and achievement: a program of qualitative and quantitative research. *Educational Psychologist*, *37*(2), 91–105. https://doi.org/10.1207/S15326985EP3702_4

Pekrun, R., & Stephens, E. J. (2010). Achievement emotions: A Control-value approach. *Social and Personality Psychology Compass*, *4*(4), 238–255. https://doi.org/10.1111/j.1751-9004.2010.00259.x

Peixoto, F., Mata, L., Monteiro, V., Sanches, C., & Pekrun, R. (2015). The achievement emotions questionnaire: Validation for pre-adolescent students. *European Journal of Developmental Psychology*, *12*(4), 472-481. https://doi.org/10.1080/17405629.2015.1040757

Pituch, K. A., & Stevens, J. P. (2015). *Applied multivariate statistics for the social sciences* (3th Edition). Lawrence Erlbaum. https://doi.org/10.4324/9781315814919

Schweder, S. (2020). Mastery goals, positive emotions and learning behavior in self-directed vs. teacher-directed learning. *European Journal of Psychology of Education, 35,* 205–223

Seven, M. A., & Engin, A. O. (2008). Öğrenmeyi etkileyen faktörler. *Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 2*(12), 189–212. https://doi.org/10.14527/9786053187547.02

Simonton, K. L., & Garn, A. (2019). Exploring achievement emotions in physical education: The potential for the control-value theory of achievement emotions. *Quest*, *71*(4), 434–446. https://doi.org/10.1080/00336297.2018.1542321

Takunyacı, M., & Karadağ, B. (2019). Ergenlik öncesi öğrencilerin matematiğe yönelik başarı duyguları ölçeğinin Türkçeye uyarlanması. *International Journal of Educational Studies in Mathematics*, *6*(4), 206–218.

Taşmektepligil, Y., Yılmaz, Ç., İmamoğlu, O., & Kılcıgil, E. (2006). İlköğretim okullarında beden eğitimi ders hedeflerinin gerçekleşme düzeyi. *SPORMETRE Beden Eğitimi ve Spor Bilimleri Dergisi*, *IV*(4), 139–147.

United Nations. (2005). *2005 International year for sport and physical education why use sports as a tool for peace and development?* United Nations.

Vierhaus, M., Lohaus, A., & Wild, E. (2016). The development of achievement emotions and coping/emotion regulation from primary to secondary school. *Learning and Instruction, 42,* 12-21. https://doi.org/10.1016/j.learninstruc.2015.11.002

APPENDIX l.

		Beden Eğitimi için Başarı Duyguları Ölçeği (BE-BDÖ)	Tamamen Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Tamamen Katılıyorum
GURUR	1	Beden eğitimi dersine ayak uydurabildiğim için gurur duyuyorum.					
	2	Beden eğitimi derslerine katılmaktan gurur duyuyorum.					
	3	Beden eğitimi ile ilgili bildiklerim için gurur duyabileceğimi düşünüyorum.					
	4	Beden eğitimi derslerindeki başarılarımdan duyduğum gurur beni derse katılımım için motive ediyor.					
EĞLENCE / ZEVK	5	Beden eğitimi derslerinin heyecan verici olması beni derse katılmaya motive ediyor.					
	6	Beden eğitimi derslerine katılmaktan zevk alıyorum.					
	7	Beden eğitimi derslerinde olmak ve öğretmenin önerilerini yerine getirmek beni heyecanlandırıyor.					
	8	Beden eğitimi derslerinin faydasını gördüğüm için derse katılmaktan/gitmekten mutluyum.					
ÖFKE	9	Beden eğitimi dersi esnasında öfkemin arttığını hissediyorum.					
	10	Sinirli olduğum için beden eğitimi derslerinde huzursuz oluyorum.					
	11	Beden eğitimi dersinde öğrenmek zorunda olduğum gereksiz şeyleri düşünmek beni sinirlendiriyor.					
	12	Beden eğitimi dersinden çıktığımda sinirli oluyorum.					
KAYGI	13	Beden eğitimi dersinde yapmam gereken şeylerin çok zor olabileceği beni endişelendiriyor.					
	14	Beden eğitimi dersinde kendimi gergin hissediyorum.					
	15	Beden eğitimi dersinde yanlış birey söylemekten/yapmaktan korkarım ve hiçbir şey söylememeyi/yapmamayı tercih ederim.					
	16	Beden eğitimi dersinde anlamadığım bir şey olursa kalbim hızla çarpar.					
UMUTSUZLUK	17	Beden eğitimi dersine hazırlanmak anlamsız çünkü zaten bu derste kötüyüm.					
	18	Beden eğitimi dersine girmeden önce bile dersi doğru anlamayacağımı/yapamayacağımı biliyorum.					
	19	Egzersizleri doğru yapmak imkânsız olduğu için beden eğitimi dersine gitmemeyi tercih ediyorum.					
	20	Beden eğitimi dersindeki etkinlikleri etkili bir şekilde yapma konusundaki tüm umudumu kaybettim.					
SIKKINLIK	21	Beden eğitimi dersi çok sıkıcı olduğu için dersten çıkmak istiyorum.					
	22	Beden eğitimi dersi esnasında sıkılıyorum.					
	23	Beden eğitimi dersi beni bunaltıyor.					
	24	Beden eğitimi dersini oldukça sıkıcı buluyorum.					