

# Development of Anger Regulation Scale for Adolescents (ARS-A): Validity and Reliability Studies

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## ABSTRACT

Development of Anger Regulation Scale for Adolescents (ARS-A): validity and reliability studies

**Objective:** The purpose of this study is to develop an Anger Regulation Scale for Adolescents (ARS-A), and investigate its validity, and reliability for Turkish adolescents.

**Method:** The participants were 630 secondary school students from 6th to 8th grade. Data were collected from four different sample groups attending the school. Exploratory factor analysis and confirmatory factor analysis for ARS-A were employed to examine validity of the scale. In order to check the criterion-related validity of ARS-A, the State-Trait Anger Expression Inventory was used. Convergent and differential reliability of the scale was examined, and parallel analysis was performed to determine number of factors of the scale. To test the reliability of the scale, Composite reliability, Cronbach's alpha coefficient, item-total correlation values and test-retest values were computed.

**Results:** Exploratory factor analysis yielded a three factor solution explaining 50.17% of variance. Moreover, confirmatory factor analysis performed with 18 items of ARS-A supported the three-factor solution and the model had good fit values. Cronbach's alpha values indicating internal dysfunctional anger regulation subdimensions, were determined as 0.77 and as 0.78 for functional anger regulation and 0.76 for external-dysfunctional anger regulation subdimensions. The scale was applied to 97 students with two weeks' interval, and test-retest reliability values were determined as  $r=0.74$  for internal dysfunctional anger regulation,  $r=0.62$  for both external dysfunctional anger regulation and functional anger regulation subdimensions.

**Conclusion:** The present study indicates that the Anger Regulation Scale for Adolescents (ARS-A) is a valid and reliable instrument to assess anger regulation strategies in Turkish adolescents.

**Keywords:** Adolescent, anger regulation, emotion regulation, reliability, validity



## ÖZET

Ergenler için Öfke Düzenleme Ölçeği'nin (EİÖDÖ) geliştirilmesi: Geçerlik ve güvenilirlik çalışması

**Amaç:** Bu çalışmanın amacı ortaokulda öğrenim gören ergenler için öfke düzenleme ölçeği geliştirmek ve geçerlik güvenilirliğini araştırmaktır.

**Yöntem:** Araştırmaya Diyarbakır ili Yenişehir ilçesinde bulunan 5 Nisan ilköğretim Okulu ve Mustafa Kemal ilköğretim Okulu'nda 6. ve 8. sınıflar arasında öğrenim gören 630 ortaokul öğrencisi katılmıştır. Araştırmada geliştirilen ölçeğin geçerlik ve güvenilirlik çalışmaları için ortaokulda öğrenim gören dört farklı örneklem grubundan elde edilen veriler kullanılmıştır. Ergenler için Öfke Düzenleme Ölçeği'nin (EİÖDÖ) yapı geçerliği için açıklayıcı faktör analizi ve doğrulayıcı faktör analizi kullanılmıştır. EİÖDÖ'nün ölçüt bağıntılı geçerliği için Sürekli Öfke ve Öfke İfade Tarzı ölçeği kullanılmıştır. EİÖDÖ'nün yakınsak ve ayırt edici geçerliği incelenmiş, ölçeğin faktör sayısını belirlemek için paralel analiz yapılmıştır. Ölçeğin güvenilirliğini belirlemek için test-tekrar test korelasyonu, madde toplam korelasyonu ile iç tutarlık katsayısı Cronbach alfa ile birleşik güvenilirlik ve çıkarılmış ortalama varyans değerleri hesaplanmıştır.

**Bulgular:** Açıklayıcı faktör analizi sonucunda ölçeğin üç boyutlu olduğu ortaya çıkmıştır. EİÖDÖ'nün 18 maddesi toplam varyansın %50.17'sini açıklamaktadır. Doğrulayıcı faktör analizi sonucunda EİÖDÖ'nün üç faktörlü yapıya sahip olduğu doğrulanmıştır ve modelin uyum değerlerinin yeterli düzeyde olduğu görülmüştür. Ölçeğin iç tutarlılığını gösteren Cronbach alfa katsayısı, içsel işlevsel olmayan öfke düzenleme alt boyutu için 0.77, işlevsel öfke düzenleme alt boyutu için 0.78, dışsal işlevsel olmayan öfke düzenleme alt boyutu için 0.76 olarak bulunmuştur. Ölçeğin iki hafta ara ile 97 öğrenciyeye uygulanması sonucu elde edilen test-tekrar test güvenilirlik katsayısı içsel işlevsel olmayan öfke düzenleme alt boyutu için  $r=0.74$ , dışsal işlevsel olmayan öfke düzenleme alt boyutu için  $r=0.62$  ve işlevsel öfke düzenleme alt boyutu için  $r=0.62$  olarak bulunmuştur.

**Sonuç:** EİÖDÖ ergenlerde öfke düzenleme yöntemlerini belirlemek için geçerli ve güvenilir bir araçtır.

**Anahtar kelimeler:** Ergen, öfke düzenleme, duyu düzenleme, güvenilirlik, geçerlik

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## INTRODUCTION

Emotions are defined as “processes which compute, sustain or deteriorate between internal and external relationships and the human being” (1). Santrock (2) defined an emotion experienced as a feeling or an affect which was developed under an important condition or interaction especially for well-being of an individual. Emotion is defined by behaviors which reflect satisfaction or dissatisfaction of an individual in the condition he/she is in or has lived in circumstances. In another definition, Scherer (3) defined emotion as a summary of relative responses given at the same time by all organismic subunits or most of of them during evaluation of an external or internal event which carried an important significance (anger, sorrow, happiness, fear, shame, honour, pride and desperation etc.) According to Firjda (4) emotions depend on points or view of people, thier evaluations and personal burdens of meanings. Additionally, emotions are subjective. In another words, each individual may experience different emotions against the same event and condition.

One of the greatest difficulties of life is to regulate emotions successfully (5). Decreasing, increasing or sustaining an emotion are some of the strategies we have carried on to regulate our emotions (6). Emotion regulation defines processes on emotions of each individual, when they had, lived and expressed his/her emotions (7). To protect our mental health and to sustain our well-being, anger regulaton is the leading emotional regulation.

Similar to all of our emotions, anger is a biological and psychological prevention for our survival. Biologically anger is defined as a stress reaction to internal and external demands, threats and pressures. Anger warns us if there is a problem and a potential threat. Besides, it provides us energy to fight against that problem or threat. Thus, it is both an alarming system and a survival mechanism (8,9). According to Spilberger (10), anger includes an emotional condition, intensity of which may increase from a mild annoyance to anger, and is accompanied by the autonomic nervous system stimulation. DiGiuseppe and Tafrate (11) define

anger as a cognitive and physiological stimulating condition related to an internal, mental, and subjective mood. According to Bhave and Saini (12), anger is an emotional condition originated from both internal and external sources. Anger may appear with individual’s or other’s behaviors or certain events accompanied by internal and external events. According to Power and Dalgleish (13), anger is resulted from a frustration or inhibition of an objective or a role by a preceived factor. According to Beck (14), attribution of the meanings to an event or individual’s evaluation of the event result in certain emotions in that person rather than the event itself. Therefore, if the person attributes an unrealistic and exaggerated meaning to an event, he/she will react probably in appropriately and extremely. For example, the most initiating factor for anger starts with evaluation of an attack which is directed to his/her personal area containing his/her personal values, moral codes, and his/her preventive principles. Primarily an initial evaluation in which the person qualifies and defines the harmful stimulus is performed in psychological dynamics of anger. In the secondary evaluation, the person reviews concurrently reaction to harmful effect, neutralization, or repulsion of it. According to Engel (8), anger may appear when the person feels signals that something is geting off the track. Usually, we do not make a complete differentiation about what the problem is, but instead we get angry with anyone or anything around us. Lazarus (15) defined anger as negative emotions which are not consistent with the target. Fehr and Russell (16) defined anger among unpleasant emotions; anger was composed of nervousness and resentments. Power and Dalgleish (13) emphasized that jealousy, envy, and humiliation emotions were derived from the basic emotion of anger. According to Lazarus and Lazarus (17) “anger, jealousy and envy” are the strongest troubling and social emotions. Kratz et al. (9) reported that anger was related to aggressiveness impulse and fighting behaviors.

According to Engel (8), anger might be a very complicated emotion. Individuals who seem to have no problem with anger may be the ones who may require help the most. Actually if anger damages somebody else, or self-damage, or if you let others to

harm you by their anger, or if you are afraid to express your anger, if you never get angry, you hold your anger back or you are not able to forgive or forget it, then you have a problem with anger. Also, if you spend too much time to deal with your anger, or you are out of control when you get angry, or you have a negative tendency when your family or friends criticize and accuse you of something, if you feel yourself indesperate and weak to express your anger, or if you do not know why you get angry suddenly, or if you direct your anger wrongly or if your anger eats you up, then you have a problem.

Anger is neither a positive nor a negative emotion. What causes anger a positive or negative emotion is the way we handle anger. For example, anger may motivate us to make changes in our non-functional areas in our lives; so it will be a very positive emotion. However, if we hear a gossip about ourselves, and express our anger as hostility or a passive hostility, then it is a negative emotion (8). According to Bhave and Saini (12), anger may motivate us to correct a mistake or to solve a problem. However, the same anger may be damaging, if it is not expressed appropriately. Spielberg (10) conceptualized expression of anger emotion in three dimensions. Firstly, intravert anger (anger-inside) means suppression of anger emotion by the person. Secondly, expression of anger emotion by directing it to surrounding subjects and people (anger-outside). Thirdly (anger-control), it is related to frequency of anger control attempts of a person. According to this conceptualizing, expression of anger emotion as anger-inside and anger-outside are non-functional and disturbing for conformity, whereas it may be said that anger-control dimension has a quality which is more related to functionality and conformity.

Unless you find healthy expression ways for your anger, it may find exhibition ways which are not appropriate, healthy or may end up with opposite outcomes. Unless you take responsibility of your anger, it may cause a great destruction in your life (8). Repetitive anger problems must require clinical interventions. This turbulent emotion during the day is a common characteristic of disorders observed in different conditions by psychiatrists. Emotion of anger

is generally observed in personality, psychosomatic conditions, schizophrenia, bipolar mood disorders, organic cognitive disorders, impulse control disorders, and some conditions originated from trauma. Anger is centralized in the majority of these clinical conditions, and it is observed that such as person cannot regulate this emotion. In other words, it is originated from continuous expression of and inability to control his/her anger emotion (18). Dealing style of anger affects an individual's physical and emotional health, self-esteem, motivation, and self-defence ability (8). Additionally anger state of children affects their self-esteem. Healthy self-esteem is related to well-control of anger emotion of children (19). Children and adolescents who use unhealthy anger management can control their anger less, and they quickly get angry with hostility and aggressiveness reactions. Such children may use their anger to impress other people. Moreover, their judgments/evaluations may be deteriorated leading to chronic anger which ends up in tendency to be angry (20). Anger is really a difficult emotion to understand, and there are many uncertainties at different levels of anger control. As this personalized problem is related to deterioration of interpersonal relationships and of health, it is certain that it is related to harmful effects of various hostile behaviors (18). Anger is also an emotion that many people do not want to change it by themselves. Possibly angry people have less tendency to seek mental healthcare and receive treatment (11).

In the related field literature, it is observed that anger management were related to cardiovascular problems (21), eating problems in adolescents (22), depression (23,24), decision making behavior (25), exceptional behaviors and hostility (26,27), solving a conflict (28), behavioral and emotional problems (29), risk taking behaviors (30), and well-being (31). Additionally, it was observed in another study that anger management was protective against peer bullying among adolescents and that it decreased hostile behaviors (32).

As it has been observed in the related field literature, inability to manage anger emotion caused mental problems and troubles or were related to them.

Therefore, it is believed that preventive and protective studies for these groups in adolescence are important to manage anger emotions, and measuring tools are required for this reason. Thus, the aim of the present study was to develop an anger scale and to perform reliability and validity studies for adolescents.

## METHOD

Validity and reliability studies of ARS-A have been performed in four different study groups. For this reason, each step of the study was performed in a different group, so that precautions for generalization were taken. Such a precaution might be expressed as the strongest property of the study. Study groups of the present study were composed of students who attended 5 Nisan Primary School and Mustafa Kemal Primary School in Yenisehir District of Diyarbakır Province during the academic year of 2011 and 2012. The first sample group of the study was constituted of 267 students; 130 (48.7%) were females and 137 (51.3%) were males. The mean age of students was 12.75 years with degree freedom (df) of 0.98. The second study group was constituted of a total of 363 students who were attending 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> grades, and between ages of 11 and 16 years; 181 (49.9%) were females, and 182 (50.1%) were males. The mean age of students was 12.99 years with the df of 0.96. The third study group had 128 students, and validity study was performed on them. The fourth study group contained 97 students, and test-retest study was performed in this group.

### Study to Develop Anger Regulation Scale for Adolescents (ARS-A)

During the development of ARS-A, a total of 60 students who were attending the 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> grades were asked open ended questions such as "What do you do to overcome or deal with it, when you get angry?", and they were requested to write a composition in one lecture hour. The compositions were analyzed for the context, and additionally emotions, emotion regulation, and literature related to

anger emotion was reviewed. Then opinions from 3 specialists working in Psychological Consultancy and Guidance field were provided to develop item pool, and an application form with 54 items was composed. Consequitely, validity and reliability studies of ARS-A were performed in four separate groups.

## Measures

**State-Trait Anger Expression Inventory:** The adaptation study of the State-Trait Anger Expression Inventory (STAXI) to Turkish was performed by Ozer (33). The inventory has two basic scales such as 'Continuous Anger' and 'Expression Style of Anger', and the scale is composed of 34 items. Continuous Anger is made up of 10 items, whereas Expression Style of Anger is composed of three subscales of 24 items which are anger-inside, anger-outside, and anger-control. While anger-inside and anger-outside dimensions reflect negative anger styles by the individual, anger-control sub-dimension reflects a positive style. In the validity study of the scale, scale related validity was evaluated by Continuous Anxiety Inventory, List of Depressive Adjectives, and Anger Inventory. While correlation coefficients of scale after validity study were 0.40 for anxiety, 0.33 for depression, and 0.53 for anger; Cronbach's alpha internal consistency coefficients were 0.67 and 0.92 for reliability of the scale. Tekinsav et al. (34) studied psychometric characteristics of State-Trait Anger Expression Inventory among children and adolescents, and it was determined that the reliability which were calculated for Cronbach's alpha for ARS-A subscales and two half coefficients were at the acceptable level.

There were statistically significant correlations between ARS-A and Novaco ARS-A short form in validity study. Children who were defined as angry/hostile by their peers, had significantly higher scores in three subscales of ARS-A, and lower score in anger-control subscale of ARS-A when compared with the other group. The internal consistency coefficients in the present study were 0.64 for anger-inside, 0.80 for anger-outside, and 0.80 for anger-control subscales whereas 0.76 for the scale totally.

**Personal Information Form:** Variables in personal information form were determined as characteristics such as gender, age, class etc.

### Statistical Analysis

Data analysis was performed by using IBM SPSS 22.0, LISREL 8.88 and Monte Carlo PCA Parallel Analysis package programs. Exploratory and confirmatory factor analysis was performed to determine exploratory and confirmatory factor analysis to determine construct validity of the scale. In addition to validity of similar scales to ARS-A, convergent and differential validities were evaluated. To determine the reliability of scale test-retest correlation, item-total correlation, internal consistency coefficient, Cronbach's alpha coefficients, and Composite reliability (CR) and Average Variance Extracted (AVE) values were also calculated. Scree plot graph, total variance table and parallel analysis were used to determine number of factors of the scale. The level of significance was defined as  $p < 0.05$ .

## RESULTS

### Study I

The first study group was composed of 267 students of whom 130 (48.7%) were females, and 137 (51.3%) were males. The mean age was  $12.75 \pm 0.98$  years. In the first study group, exploratory factor analysis (EFA) method was used to determine construct validity of obtained data. In the study, principle component analysis (PCA) and direct oblique rotation technique were used as the factoring technique. Basically, factors with eigenvalues higher than 1 were taken into the analyses (35). For final decision about factor numbers, scree plot graph and parallel analysis technique were used concurrently with eigenvalue (Kaiser Criteria) numbers (36). During factor analysis study, the factor load was based on at least 0.40 to decide whether any item was suitable for a factor (37). If an item was present in more than one factor, then it was cared about whether the substance load between factors should be at least 0.10.

### Results of Exploratory Factor Analysis (EFA):

Before factor analysis, Kaiser-Meyer-Olkin (KMO) indicating data coherence was determined as 0.87, and Bartlett test was determined significant ( $\chi^2 = 1467.126$ ,  $df = 153$ ,  $p < 0.001$ ). It was recommended that KMO value should be 0.60 at minimum to perform factor analysis on data (35). These results showed that factor analysis could be performed with obtained data.

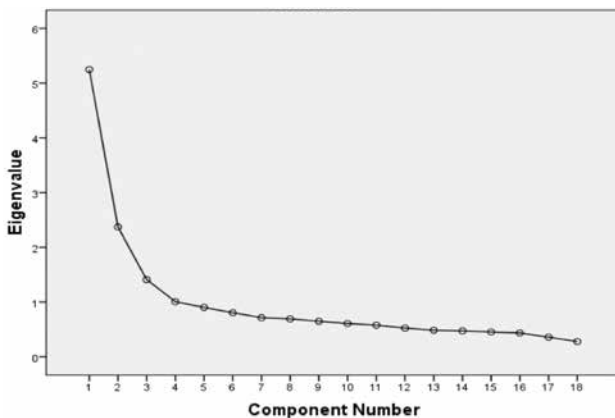
According to EFA results, 36 items which were present under factor load value of 0.40, and under more than one factor, were eliminated, so final 18-item form of ARS-A was obtained. As it is shown in Table 1, ARS-A composed of 18 items were in a construct with three factors. For example, the first factor was determined as internal-dysfunctional anger regulation (i.e. "I cannot prevent remembering the event which has caused my anger"); the second factor was determined as functional anger regulation (i.e. "I think about how to get rid of my anger"); and the third factor was determined as external-dysfunctional anger regulation (i.e. "I discharge my anger on somebody else"). Internal-dysfunctional anger regulation subdimensions had a total of 6 items. The factor loads of items varied between 0.60 and 0.72, and they explained 29.15% of the variance. Functional anger regulation subscale had a total of 7 items. Factor loads of items varied between 0.49 and 0.73, and they explained 13.18% of the variance. External dysfunctional anger regulation subscale had a total of 5 items. Factor loads of items varied between 0.55 and 0.82, and they explained 7.84% of the variance. Eighteen items of ARS-A explained 50.17% of total variance. As it is seen in Table 1, the mean factor variance value to ARS-A items varied between 0.31 and 0.66. Additionally, correlation values between total score of each subscale and total correlation value varied between 0.38 and 0.69 for each item.

Exploratory factor analysis results after direct oblique rotation of ARS-A are presented in Table 1.

To determine factor numbers of ARS-A, scree plot graph was examined primarily with total variance table. In total variance table, it was observed that there was a construct with four dimensions and had  $>1$  value.

**Table 1: Factor load values, common factor variance, and item total correlation values obtained from exploratory factor analysis of Anger Regulation Scale for Adolescents (ARS-A)**

Item Pool No	Scale Item No	F1	F2	F3	Common Factor Variance	Item Total Correlations
49	3	0.72			0.50	0.53
42	5	0.71			0.46	0.48
43	2	0.70			0.50	0.53
33	12	0.67			0.50	0.57
28	16	0.64		0.17	0.54	0.60
36	8	0.60		0.23	0.54	0.60
39	13	0.10	0.73		0.56	0.58
7	17		0.72		0.50	0.52
3	9		0.63		0.37	0.41
52	11	-0.21	0.57		0.36	0.41
22	14		0.57		0.31	0.38
2	6	-0.14	0.56	-0.19	0.47	0.50
29	10	0.10	0.49	-0.30	0.40	0.45
18	1			0.82	0.65	0.67
19	7			0.78	0.66	0.69
12	18			0.78	0.57	0.60
24	15		-0.13	0.73	0.62	0.62
20	4	0.29		0.55	0.50	0.56
<b>Eigenvalue:</b>		5.25	2.37	1.41		
<b>Explained Variance:</b>		29.15%	13.18%	7.84%		
<b>(Total:50.17%)</b>						

**Figure 1: Scree plot graph related to anger regulation scale for adolescents (ARS-A)**

When scree plot graph was examined, it was observed that breaking of the graph was occurred after the third dimension (Figure 1).

In order to decide factor number of ARS-A completely, parallel analysis was also performed in addition to evaluation of total variance table and scree plot graph. Pallant (36) emphasized that parallel analysis

should be performed and its results should be reported to decide on factor number in scale studies in education and psychology fields. During parallel analysis process, incidental eigenvalues developed by the program are compared with the actual eigenvalues obtained in the sample group, and each comparison outcome which indicate a higher value for the latter than the former will show dimension number of the scale. According to results obtained from parallel analysis, it was determined that ARS-A had a structure with three factors. Results of parallel analysis are shown in Table 2.

## Study II

The second study group consisted of 363 students who were attending 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> grades, and aged between 11 and 16 years; 181 (49.9%) were females, and 182 (50.1%) were males. The mean age of students was 12.99±0.96 years.

**Results of Confirmatory Factor Analysis (CFA):** CFA was performed on data from a second

**Table 2: Comparison of exploratory factor analysis and parallel analysis eigenvalue of Anger Regulation Scale for Adolescents (ARS-A)**

	Eigenvalue results of exploratory factor analysis	Eigenvalue results of parallel analysis criteria	Decision
Dimension I	5.25	1.48	Accepted
Dimension II	2.37	1.38	Accepted
Dimension III	1.41	1.31	Accepted
Dimension IV	1.01	1.24	Rejected

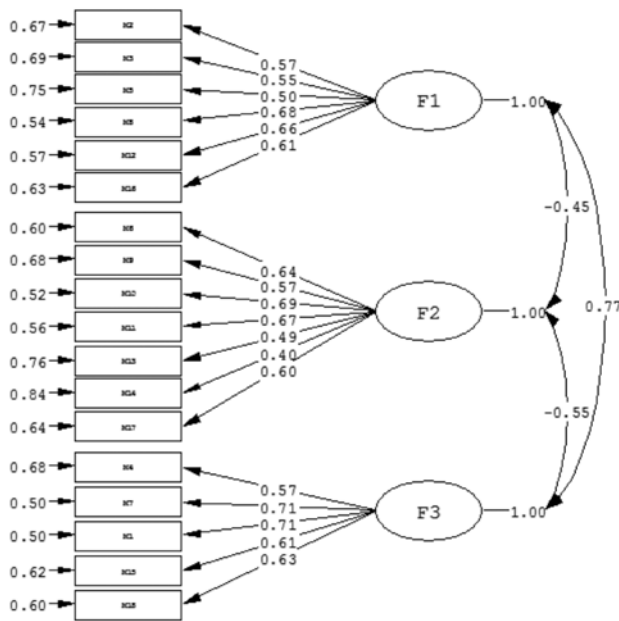
**Table 3: R<sup>2</sup>, t values, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) values for Anger Regulation Scale for Adolescents (ARS-A)**

Dimension	Item No	t*	R <sup>2</sup>	$\alpha$	CR	AVE
Internal Dysfunctional Anger Regulation	2	0.77	0.33	0.77	0.768	0.358 (36%)
	3	10.35	0.31			
	5	9.10	0.25			
	8	13.27	0.46			
	12	12.69	0.43			
Functional Anger Regulation	16	11.55	0.37	0.78	0.783	0.346 (35%)
	6	12.21	0.40			
	9	10.62	0.32			
	10	13.60	0.48			
	11	12.93	0.44			
External Dysfunctional Anger Regulation	13	8.88	0.24	0.76	0.783	0.42 (42%)
	14	7.22	0.16			
	17	11.29	0.36			
	4	10.73	0.32			
	7	14.12	0.50			
1	14.13	0.50				
15	11.86	0.38				
18	12.21	0.40				

\*p<0.01, R<sup>2</sup>: Determination coefficient,  $\alpha$ : Internal consistency coefficient, CR: Composite reliability, AVE: Average variance extracted

study group to confirm whether scale structure obtained by EFA was correct. Compatibility indices of resultant CFA which was performed to test three potential variable method formed by 18 items of ARS-A were examined, and it was observed that obtained  $\chi^2$  value ( $\chi^2=288.17$ , Degree of freedom (df)=132,  $\chi^2/df=2.19$ ,  $p<0.01$ ) was significant. It was deserved that  $\chi^2$  value was insignificant when it was aimed to develop an appropriate model. However,  $\chi^2$  value is affected by the sample size; insignificant differences were reported significantly just because models had large sample size. Therefore, many fit indices have been developed to minimize or remove the effect of sample size in a model (35). At the end of analysis, when obtained conformity values were examined, root mean square error of approximation (RMSEA) was determined as

0.057 (90% CI;0.048-0.066), root mean square residuals (RMR) as 0.061, standardized root mean square residual (SRMR) as 0.056, goodness of fit index (FI) as 0.92, adjusted goodness of fit index (AGFI) as 0.89, comparative fit index (CFI) as 0.96, normed fit index (NFI) as 0.93, and non-normed fit index (NNFI) as 0.95. It was observed that conformity existed between the model and observed data, and the recommended model showed conformity at an expected level (35,38-43). For these fit values, it was realized that there was a conformity between the model and observed data, and the recommended model confirmed as an expected level. Moreover, standardized factor load values of ARS-A were between  $\lambda=0.40$  and  $\lambda=0.71$  (Figure 1), and t values of all items were determined significant at  $p<0.01$  ( $t>2.576$ ) (Table 3).



**Figure 2: Path diagram related to anger regulation scale for adolescents (ARS-A)**

Path diagram of ARS-A is shown in Figure 1 (F1=internal-dysfunctional anger regulation, F2=Functional anger regulation, F3=External dysfunctional anger regulation) (Figure 2).

Coefficient of determination of Anger Regulation Scale for Adolescents ( $R^2$ ), t values, Cronbach's Alpha ( $\alpha$ ), composite reliability (CR) and average variance extracted (AVE) are shown in Table 3. Obtained values were significant at  $p < 0.01$ .

### Convergent and Discriminant Validity

In addition to conformity values, composite reliability (CR) value was calculated to test structure

reliability of the scale. According to Raykov (44), CR was a coefficient and reliability index which was calculated specifically for structural equation modeling, and showed reliability of congeneric measures. Calculation of structural equation modeling without error rates was the most important preferred cause for this reliability coefficient (45). It was also required to determine AVE values which was a summary of convergence between certain items representing the potential structure. CR and AVE values were used at the same time to determine convergent validity of a scale. Convergent validity was evaluation of degree of relationship between two similar concepts which were measured (39). Hair et al. (39) reported that values between 0.60 and 0.70 were acceptable, whereas values at 0.70 and over were well-accepted values for CR. It was recommended that AVE value should be at or over 0.50 (46). The obtained CR values of ARS-A were observed at good levels in all three subscales. It was observed that AVE values were slightly lower than acceptable levels in all three subscales.

Conceptually, discriminant validity is the degree of differences between two similar structures. AVE value is compared between two structures by correlation square. If AVE value is greater than this correlation square, then evidence for discriminant validity is provided (39). Discriminant validities between three subscales of ARS-A have been provided in discriminant validity examination between subscales of ARS-A.

### Study III

Correlation values between each subscale of ARS-A and State-Trait Anger Expression Inventory which

**Table 4: Pearson coefficient values between subscales of Anger Regulation Scale for Adolescents (ARS-A) and subscales of State-Trait Anger Expression Inventory**

Factors	1	2	3	4	5	6	7
1. Internal dysfunctional anger regulation	---						
2. External dysfunctional anger regulation	0.54**	---					
3. Functional anger regulation	-0.33	-0.37**	---				
4. Continuous anger	0.70**	0.61**	-0.36**	---			
5. Anger inside	0.59**	0.38**	-0.16**	0.58**	---		
6. Anger outside	0.61**	0.67**	-0.36**	0.72**	0.56**	---	
7. Anger control	-0.50**	-0.43**	0.62**	-0.51**	-0.27**	-0.49**	---

n=128, \*\*p<0.01



were obtained as the result of analysis performed on 128 students to define similar scale validity for ARS-A, are presented in Table 4.

As it is shown in Table 4, while there are favorable significant relationships between internal-dysfunctional anger regulation and external-dysfunctional anger regulation, continuous anger, anger inside, anger outside; there is an unfavorable significant relationship between functional anger regulation and anger control. While there are favorable significant relationships between external dysfunctional anger regulation and continuous anger, anger inside, anger outside; there is an unfavorable significant relationship between functional anger and anger control. While there were unfavorable significant relationships between functional anger regulation and continuous anger, anger inside, anger outside; there was a favorable highly significant relationship with anger control.

#### Study IV

Test-retest reliability coefficients which were obtained by application of the scale on 97 patients with two weeks' interval, were determined as  $r=0.74$  for internal dysfunctional anger regulation subscale,  $r=0.62$  for external dysfunctional anger regulation subscale, and  $r=0.62$  for functional anger regulation subscale.

#### Scoring of ARS-A

Responding style for ARS-A was designed in four-stage structure as "(1) Never, (2) Sometimes, (3) Usually, and (4) Always". Three different scores were obtained from the scale after summation of 6 items (Items 2, 3, 5, 8, 12, 16) as internal dysfunctional anger regulation score; summation of 7 items (Items 6, 9, 10, 11, 13, 14, 17) as functional anger regulation score; and summation of 5 items (Items 1, 4, 7, 15, 18) as external dysfunctional anger regulation score. Therefore, anger regulation methods used by adolescents were determined according to subdimension(s) with high adolescent scores.

## DISCUSSION

In the present study, an anger regulation scale for adolescents (ARS-A) was developed using the data gathered from adolescents attending the secondary school, and psychometric characteristics of the scale were examined. Validity and reliability studies of ARS-A were performed on obtained data from four different study groups. For this reason, exploratory and confirmatory factor analysis were performed, and measurement related validity of the scale was tested. According to the results of exploratory factor analysis, it was defined that the scale had a three-factor structure. Results of parallel analysis which was performed to determine factor number of ARS-A confirmed the results of factor analysis. Also, convergent and discriminant validity of the scale was examined. On the other hand, CFA was used to confirm whether structure obtained by EFA was confirmed. It was observed that AGFI value was close enough to acceptable level, and some other conformity values were acceptable, and some indicated a good structure. Sizes of item loads obtained by EFA and CFA were satisfactory. In the validity study, there were significant correlations between ARS-A and continuous anger, and its expression style. Internal conformity coefficients, composite reliability values, common factor variance values, and test-retest results indicated that ARS-A was a reliable tool.

According to Gross (7) emotion regulation styles might be divided as "internal" and "external", if required. For example, if somebody helps an individual to manage his/her anger, this is "external emotion regulation, whereas if the person him-/herself manages his/her anger then this is "internal emotion regulation". These theoretical explanations have been considered during naming of subscales of ARS-A (7).

Expression style and management of anger of an individual is one of the most important issues in forming an idea about the individual. This may affect your personality, quality of your relationship, your health, and even it may affect your value system. Unfortunately, majority of people do not realize how their lives are formed and affected by their anger, and

what a strong emotion anger is. Anger may stimulate you to make changes in your life and others' lives or it may make you ill physically and emotionally. Anger may strengthen you, and it may add excitement into your life or poison your relationships and consume your energy (8). On the other hand, one of the primary developmental duties of a child is to overcome his/her emotions which are forcing him/her and to build up an effective regulation system to calm him-/herself down (19). When it is considered from this point of view, anger regulation has important contributions into well-being of an individual. It is believed that ARS-A which has been developed according to our culture to determine how especially adolescents regulate their anger during the study, may serve as a valid and reliable tool for this objective.

In future studies, validity and reliability of ARS-A can be examined on children at the primary school, and also on adolescents attending high school, so that it will be checked whether ARS-A is also an appropriate measurement tool. Similar to all studies, the present study has some limitations, which may be listed as the sample group has been an easily available one; adolescents with clinical characteristics have not been represented in the study groups; data have been collected only from one province. Therefore, it will be more useful to examine psychometric characteristics of ARS-A by data collection from different providences, regions, and schools during an academic year. Additionally, it may be recommended that the

characteristics should be examined on adolescents with clinical pictures. Another limitation of the study may be considered that the scale may be affected by diagnoses of participants, if any, because those diagnoses have been unknown. On the other hand, investigators, who will use ARS-A in the future, should consider that AVE values of ARS-A are slightly under the acceptable limits.

In conclusion, when general outcomes of psychometric characteristics of ARS-A which are examined in the present study are considered, it is believed that ARS-A is a valid and reliable tool for the early adolescent period.

Contribution Categories	Name of Author
Development of study idea	M.A.Y.
Methodological design of the study	M.A.Y.
Data acquisition and process	M.A.Y.
Data analysis and interpretation	M.A.Y.
Literature review	M.A.Y.
Manuscript writing	M.A.Y.
Manuscript review and revision	M.A.Y.

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