

## ORIGINAL RESEARCH

# Reliability and Validity Study of the Turkish Version of the Acceptance and Action Questionnaire for University Students

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## Abstract

**Objective:** There is increasing evidence that psychological inflexibility can be defined as the transdiagnostic concept of psychopathology. The aim of this study is to examine the reliability and validity of the Turkish version of the Acceptance and Action Questionnaire for University Students (AAQ-US) over a sample of university students.

**Methods:** The study group consists of 189 students who study in different departments at a state university. A socio-demographic form, AAQ-US, Acceptance-Action Questionnaire-II (AAQ-II), Test Anxiety Inventory (TAI), Freiburg Mindfulness Inventory (FMI), and Depression-Anxiety-Stress-21 Scale (DASS-21) were applied.

**Results:** The single factor and 12 item structure of the scale was confirmed. Results show the goodness-of-fit values ( $\chi^2 = 72.802$ ,  $df = 54$ ,  $\chi^2 / df = 1.35$ ;  $RMSEA = 0.043$ ;  $CFI = 0.95$ ;  $TLI = 0.93$ ;  $NNFI = 0.993$ ,  $NFI = 0.980$ ;  $SRMR = 0.071$ ). The Cronbach's alpha coefficient for the scale was 0.932. Test-retest reliability coefficient was 0.75. The item-total correlations were between 0.584 and 0.785. AAQ-US shows a positively significant relationship with AAQ-II, DASS-21, TAI (and subscales), and a negatively significant relationship with FMI.

**Conclusion:** The results of this study reveal that AAQ-US can be used as a reliable and valid scale for measuring psychological inflexibility in university students.

**Keywords:** Acceptance and Commitment Therapy, Acceptance, Validity, Reliability, Students

## INTRODUCTION

The university period has its own unique sources of stress. During the university period, students face a number of challenges such as the pressure to succeed academically, attending a new environment, moving away from family, and financial difficulties (1). The frequency of anxiety and depression among university students was reported to be 19.7% and 17.3%, respectively. In the same study 39.4% of the students were reported to have sleep disorders for at least one month due to anxiety and depression (2). 12-46% of university students experience psychiatric problems in any one year of university life

(3). Psychiatric problems are also associated with low self-esteem, social withdrawal, giving up on having an expected economic level, and dropping out of school (4).

Acceptance and commitment therapy (ACT) is a novel behavioral therapy approach based on the relational framework theory and functional contextualism. ACT is based on the framework of psychological flexibility, which is defined as having a stable and broad repertoire of behaviors in line with the values in touch with the present moment. The purpose of ACT is to improve psychological flexibility (5). Psychological inflexibility is not an unchanging, rigid process. ACT theorists have stated psychological inflexibility to be able to vary in different contexts. Psychological inflexibility is able to vary in different situations due to the context-dependent variability of awareness levels and the strength of one's respective values in a given context (6).

In studies with university students, psychological inflexibility has been shown to have a relationship with anxiety, depression, substance abuse, academic stress, and procrastination (7)(8).

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It was reported that psychological inflexibility uniquely explained the variance in somatization, depression, and anxiety in non-clinical university students (7). In another regression analysis, it was found that experiential avoidance, which is the main component of psychological inflexibility, significantly predicted alcohol-related problems in university students even after gender and psychological distress were controlled. (9). A recent study showed that psychological inflexibility mediates the relationship between depression, anxiety, stress, and procrastination (10).

The effectiveness of ACT in different problem areas among university students has also been demonstrated (11)(12).

The Acceptance and Action Questionnaire (AAQ) is the measurement tool most used worldwide for assessing psychological inflexibility and experiential avoidance. Due to the AAQ's unstable factor structure, low alpha values for internal consistency, and poor psychometric properties, a second version was developed, the AAQ-II (13).

Randomized controlled studies have found changes in generic AAQ scores to mediate the effect of ACT on mental health outcomes (14)(15). However, certain problems arise in the case of specific particular problems, when generic AAQ is used to measure the change processes. A recent review reported area-specific scales to better predict the treatment outcome of ACT interventions for specific areas compared to the generic AAQ (16). For example, the area-specific scale was determined to be related to treatment outcomes for cigarette addiction, while the generic AAQ was not (17). Studies have reported area-specific psychological inflexibility measurements to be more sensitive and feasible when focusing on a specific and unique problem area (18). For these reasons, AAQ variants have been developed with context-specific changes in generic AAQ expressions for different populations such as stigma and weight problems (19) (20). Similar problems have also arisen among university students when using the generic AAQ measure change in ACT interventions. In studies conducted among university students, using the generic AAQ was insufficient for determining their changes, while ACT treatment revealed significant clinical results (11) (21). Two of these developed scales have been adapted to Turkish. The Turkish validity and reliability study of the Acceptance and Action Diabetes Questionnaire was conducted by Karadere et al., and the Turkish validity and reliability study of the Acceptance and Action Questionnaire-Substance Abuse was conducted by Uygur et al. (22)(23).

Due to the lack of area-specific measurement tools for university students, Levin et al. developed the AAQ-US (24). The aim of this study is to evaluate the validity and reliability of the AAQ-US and to find out if it is an appropriate tool for evaluating psychological flexibility in the case of Turkish university students.

## METHODS

Study procedures were carried out in accordance with the Helsinki Declaration. The study protocol was approved by the Alanya Alaaddin Keykubat University Clinical Research Ethical Committee (Date: 26.09.2019 No:10/3). Written informed consents were obtained from the participants.

### Procedure

Approval was first obtained by e-mail from the researchers who developed the original scale. The English form of the scale was translated into Turkish separately by 3 psychiatrists, 1 psychologist who work in the field and who speak English. These translations were then reviewed. The Turkish version of the scale, which was prepared after the revisions and corrections, was re-translated into English by two out-of-field translators whose native language is English and who speak Turkish. The resulting text was compared with the original scale and applied to 20 students for the pilot study after the corrections. After the pilot study, the collected data were examined and the scale was finalized.

The participants were asked to fill out a sociodemographic form and the AAQ-II, AAQ-US, TAI, FMI, and DASS-21. For the test-retest analysis, 30 participants filled out the AAQ-US Scale three weeks later.

### Participants

Voluntary students between the ages of 18-26 studying at various departments in a public university were included in the study. The 189 students who were informed about the study, volunteered to participate, and completely filled out the scales form the study group. 123 of the students are female (65%) and 66 of them are male (35%); 105 (55%) were in the first grade, 49 (26%) were in the second grade, 26 (14%) were in the third grade, and 9 (5%) were in the last grade. The ages of the participants ranged from 18 to 26 (Mean = 20.17, SD = 2.01). The non-random convenience sampling method has been adopted in selecting the study group.

## Psychometric measurements

**Acceptance and Action Questionnaire II (AAQ-II):** The original version of the scale was developed by Bond et al (13). The Cronbach alpha coefficient of internal consistency is average at 0.84. Higher total scores obtained from the scale indicate experiential avoidance, and psychological inflexibility. The scale was previously adapted to Turkish by Yavuz et al (25).

**Test Anxiety Inventory (TAI):** The TAI, one of the most used scales in Turkey and abroad for determining test anxiety, was developed by Spielberger (1980) and adapted to Turkish by Öner. (26)(27). The scale has the sub-dimensions of worry and emotionality and, consisting of a total of 20 items. In the TAI adaptation study, the Cronbach alpha value was calculated as 0.87 for the entire test; 0.74 for the dimension of worry dimension, and 0.79 for the dimension of emotionality.

**Freiburg Mindfulness Inventory (FMI):** The scale, whose original version was developed by Walach and et al., was adapted to Turkish university students by Karetepe and Yavuz (28) (29). The scale is a 14-item Likert-type scale. While the Cronbach alpha of internal consistency, calculated to determine the reliability of the scale, was found as 0.82, the correlation value of scale was found as 0.89.

**Depression-Anxiety-Stress-21 Scale (DASS-21):** This was developed by Ng et al and adapted to Turkish by Sarıçam(30) (31). In the reliability analysis, the Cronbach alpha for determining internal consistency has been calculated as 0.85 for depression, 0.80 for anxiety, and 0.77 for stress. According to the study's findings, the scale also gives different results for the non-clinical and clinical groups.

**Acceptance and Action Questionnaire for University Students (AAQ-US):** This scale was developed by Levin et al. for use in measuring a group of university students' psychological flexibility and consists of 12 items with a single dimension (24). Total item scores range from 12 to 84. Higher total item scores indicate lower acceptance and higher levels of psychological inflexibility. The Cronbach alpha of internal consistency is found as 0.91.

## Data Analysis

The scale's adaptation study uses confirmatory factor analysis (CFA) during the data analysis to test the construct validity and determine the reliability of Cronbach's alpha of internal consistency and the test-retest method. Our scale has a specific number of factors, and which observed variables are related to which factor is evident from previous studies. As the scale is one-dimensional, meeting the condition of identifying which factors are related to one another is unnecessary. CFA is used here for determining whether one or more of the factor structure/structures obtained by previous studies show the same psychometric properties in different samples with different characteristics (32).

In the scale's adaptation, statistical processes have been carried out using the packages developed for the R (2018) statistics program. The lavaan package was used for the CFA, the psych package was used to calculate the internal consistency coefficient (33) (34)(35).

## RESULTS

In the scale's adaptation study, descriptive statistics for the scale items were calculated first, as well as their means and standard deviations. The calculated values are given in Table 1.

**Table 1.** Values from the AAQ-US Scale

	M	SD	Item-Total Correlation	Cronbach alpha (if item deleted)	t
1. I put off schoolwork when I feel bad	3.968	1.631	0.584	0.931	-11.584
2. It seems like I'm just "going through the motions" at school	3.243	1.808	0.675	0.927	-14.748
3. I struggle with my thoughts about school	3.630	1.842	0.672	0.928	-13.465
4. I find myself avoiding going to classes when I feel anxious or depressed	3.862	1.851	0.673	0.927	-14.745
5. When I think an assignment is too hard or confusing, I give up	3.037	1.785	0.737	0.925	-13.622
6. It's hard for me to focus on what my professors are saying in classes	3.243	1.863	0.761	0.924	-16.907
7. I get so worried about upcoming exams that I feel paralyzed and can't study	3.169	1.883	0.785	0.924	-19.526
8. Worries get in the way of my success at school	3.392	1.855	0.771	0.924	-19.219
9. My thoughts and feelings get in the way of studying	3.709	1.950	0.742	0.925	-17.473
10. I don't get anything out of a class when I'm having negative thoughts	4.122	2.003	0.691	0.927	-15.960
11. I often believe that I'm not smart enough to be in college or in this major	2.598	1.956	0.602	0.930	-9.610
12. I get so caught up in my worries during tests that I have trouble focusing on the test itself	3.106	1.929	0.753	0.925	-15.663

AAQ-US: Acceptance and Action Questionnaire for University Students; M:mean; SD:Standard Deviation

When analyzing the averages for the scale items, the average scale item for the AAQ-US, which is a Likert-type scale, is seen to be 3.037 with the highest being 4.122. The standard deviations from the scale items

are seen to not be very high. After the descriptive statistics, the relationships among the scale items were calculated. The correlation analysis is given in Table.2.

**Table 2.** Pearson correlation of the Turkish AAQ-US

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11
Item 2	0.546										
Item 3	0.442	0.642									
Item 4	0.636	0.588	0.501								
Item 5	0.509	0.525	0.585	0.612							
Item 6	0.484	0.630	0.524	0.511	0.591						
Item 7	0.373	0.455	0.541	0.498	0.614	0.634					
Item 8	0.386	0.511	0.516	0.516	0.574	0.606	0.754				
Item 9	0.457	0.461	0.498	0.537	0.556	0.607	0.671	0.630			
Item 10	0.480	0.371	0.488	0.502	0.478	0.539	0.578	0.617	0.729		
Item 11	0.313	0.536	0.372	0.347	0.528	0.579	0.554	0.508	0.403	0.380	
Item 12	0.334	0.426	0.535	0.433	0.574	0.610	0.791	0.746	0.605	0.609	0.562

All inter-item Pearson correlations were statistically significant ( $p < 0.001$ )

### Validity studies

In order to adapt the AAQ-US scale to Turkish, a first-level confirmatory factor analysis (CFA) was performed to determine the construct validity. The first-level CFA results related to the scale are given in Table 3.

**Table 3.** CFA Findings Related to the Adaptation of the AAQ-US Scale

Item	Factor Loading	Standard Factor Loading	Std. Error	P	95% Confidence Interval	
					Lower Limit	Upper Limit
Item1	0.981	0.602	0.049	< 0.001	0.885	1.077
Item 2	1.269	0.702	0.055	< 0.001	1.163	1.376
Item 3	1.285	0.698	0.055	< 0.001	1.177	1.394
Item 4	1.294	0.699	0.057	< 0.001	1.182	1.405
Item 5	1.358	0.761	0.058	< 0.001	1.244	1.472
Item 6	1.466	0.787	0.059	< 0.001	1.350	1.582
Item 7	1.536	0.816	0.060	< 0.001	1.419	1.654
Item 8	1.488	0.802	0.057	< 0.001	1.375	1.600
Item 9	1.520	0.780	0.060	< 0.001	1.402	1.639
Item 10	1.448	0.723	0.059	< 0.001	1.333	1.564
Item 11	1.217	0.622	0.064	< 0.001	1.092	1.341
Item 12	1.517	0.786	0.063	< 0.001	1.393	1.640

The confirmatory factor analysis (CFA), the Acceptance and Action Questionnaire for University Students (AAQ-US)

The first-level CFA of the AAQ-US scale is seen to verify the single-factor and 12-item structure of the measurement tool with no need for modification.(Table.3) When examining the fit indices from the analysis, goodness-

of-fit is seen to be provided ( $\chi^2 = 72.802$ ,  $df = 54$ ,  $\chi^2 / df = 1.35$ ;  $RMSEA = 0.043$ ;  $CFI = 0.95$ ;  $TLI = 0.93$ ;  $NNFI = 0.993$ ;  $NFI = 0.980$ ; and  $SRMR = 0.071$ ). In addition, we can see that all factor loading values are meaningful.

In order to adapt the AAQ-US Scale to Turkish, a correlation analysis was conducted by searching the Test Anxiety Inventory, Freiburg Mindfulness Inventory, and the DASS-21 to determine the validity of the criterion connections. The analysis results are given in Table 4.

We can say that the AAQ-US shows a significant relationship with all the criteria taken from the scales according to the criterion validity and that it is a valid scale in terms of criterion validity.

**Table 4.** Correlations of scale scores

		Pearson's r	p	Lower 95% CI	Upper 95% CI
AAQ-US	TAI-Worry	0.636	< 0.001	0.542	0.714
AAQ-US	TAI-Emotionality	0.583	< 0.001	0.481	0.670
AAQ-US	TAI-Total	0.639	< 0.001	0.546	0.716
AAQ-US	FMI	-0.513	< 0.001	-0.611	-0.400
AAQ-US	DASS-Depression	0.534	< 0.001	0.424	0.629
AAQ-US	DASS-Anxiety	0.476	< 0.001	0.358	0.580
AAQ-US	DASS-Stress	0.447	< 0.001	0.325	0.555
AAQ-US	AAQ-II	0.702	< 0.001	0.621	0.768

\*\*\* $p < .001$ , the Acceptance-Action Questionnaire-II (AAQ-II), the Acceptance and Action Questionnaire for University Students (AAQ-US), Test Anxiety Inventory (TAI), the Freiburg Mindfulness Inventory (FMI), and Depression-Anxiety-Stress-21 Scale (DAS-21). CI (Confidence Interval), Pearson correlation coefficient. (Pearson's r)

### Reliability Study

Data was collected again after three weeks from 30 people whose data had previously been collected for the adaptation study. The correlation coefficient between both applications is seen as 0.75 ( $p < 0.05$ ). We can say that the scale has been adapted according to the correlation coefficient calculated for the AAQ-US and that the scale is valid and consistent.

As a result of the calculation, the Cronbach alpha of internal consistency was found as 0.932. The scale can be said to have high reliability when comparing the internal consistency coefficient.

According to the results from the reliability analysis of scale, the item-total correlations range between 0.584 and 0.785. According to the analysis results, we can say that the items moderately to highly correlate with the total score from the scale. The values related to the analysis have been given in Table 1.

The last analysis has been conducted to determine the reliability of the measurement tool by compare all scale items using the *t*-test from the upper 27th and lower 27th percentile groups with respect to their total scores obtained from the scale. Regarding this result, the AAQ-US scale shows that it can distinguish between those with low scores and those with high scores. The *t*-test values for the analysis are given in Table 1.

### DISCUSSION

In our study, we have aimed to test the validity and reliability of the AAQ-US, developed for university students as a specific group with specific psychological difficulties, on a sample of Turkish university students.

In order to analyze the construct validity of the scale, the primary recommendation is to have the number of individuals be more than the number of variables, with at least 5-10 people per variable when calculating the sample size (36). Therefore, 189 people were reached for the 12-item AAQ-US, and thus this condition is considered to have been met. CFA was applied to test whether the AAQ-US has a single-factor structure like the original version. The fit indices show the goodness-of-fit values to be meaningful. When examining the test-retest correlations the scale is found to not show a significant change over time.

The Turkish version had a Cronbach's alpha of 0.93 and for the original version it was 0.91. An internal consistency coefficient above 0.81 for the Cronbach alpha shows excellent reliability (36). When the item-

total correlations of the scale are examined, we can say that all items have a positive relationship with one another and that all items relate to the total AAQ-US, and psychological inflexibility. In order to determine the scale's criterion validity, its correlation was examined with the general mental health and psychological inflexibility/flexibility scales related to the period of being a student. Similar to other studies in the literature there was a significant positive correlation between the anxiety, stress, depression, test anxiety and psychological inflexibility in our study (7) (24). As expected, AAQ-US shows a positive relationship with AAQ-II and a negative relationship with FMI.

The AAQ-US has features suitable for the aim of evaluating different areas of psychological inflexibility such as: how internal experiences interfere with actions in terms of values ("Anxiety hinders my success at school." or "I find myself skipping classes when I feel anxious or depressed"), cognitive fusion with school-related thoughts ("I struggle with my thoughts about school" and "Often I believe I am not smart enough to be at a university or this department"), and breaking the link between school-related actions and values ("I seem to be this way at school") (24).

Previous studies have also shown that area-specific modified AAQ scales may be more sensitive than the generic AAQ (17). Considering the context-dependent structure of psychological flexibility, the AAQ-US can show more sensitive results, especially related to academic results and predicting treatment results better. Further studies on samples of university students are needed in order to test these predictions.

As a result, our research shows the Turkish version of the Acceptance and Action Questionnaire for University Students to have psychometrically sufficient features.

Overall, the results of this study reveal the AAQ-US to be able to be used as a reliable and valid scale, especially for researchers and practitioners who want to assess psychological inflexibility among university students in the context of the academic setting.

Some limitations in our study need to be mentioned. First, our sample consists of students studying at a single university. This indicates a relatively homogeneous structure. In this case, our results require caution against making generalizations to all universities in Turkey. We did not include all problem areas specific to the academic field in our study (academic procrastination, academic success, etc.).

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## ORIGINAL RESEARCH

# Reliability and Validity Study of the Turkish Version of the Acceptance and Action Questionnaire for University Students

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## Abstract

**Objective:** There is increasing evidence that psychological inflexibility can be defined as the transdiagnostic concept of psychopathology. The aim of this study is to examine the reliability and validity of the Turkish version of the Acceptance and Action Questionnaire for University Students (AAQ-US) over a sample of university students.

**Methods:** The study group consists of 189 students who study in different departments at a state university. A socio-demographic form, AAQ-US, Acceptance-Action Questionnaire-II (AAQ-II), Test Anxiety Inventory (TAI), Freiburg Mindfulness Inventory (FMI), and Depression-Anxiety-Stress-21 Scale (DASS-21) were applied.

**Results:** The single factor and 12 item structure of the scale was confirmed. Results show the goodness-of-fit values ( $\chi^2 = 72.802$ ,  $df = 54$ ,  $\chi^2 / df = 1.35$ ;  $RMSEA = 0.043$ ;  $CFI = 0.95$ ;  $TLI = 0.93$ ;  $NNFI = 0.993$ ,  $NFI = 0.980$ ;  $SRMR = 0.071$ ). The Cronbach's alpha coefficient for the scale was 0.932. Test-retest reliability coefficient was 0.75. The item-total correlations were between 0.584 and 0.785. AAQ-US shows a positively significant relationship with AAQ-II, DASS-21, TAI (and subscales), and a negatively significant relationship with FMI.

**Conclusion:** The results of this study reveal that AAQ-US can be used as a reliable and valid scale for measuring psychological inflexibility in university students.

**Keywords:** Acceptance and Commitment Therapy, Acceptance, Validity, Reliability, Students

## INTRODUCTION

The university period has its own unique sources of stress. During the university period, students face a number of challenges such as the pressure to succeed academically, attending a new environment, moving away from family, and financial difficulties (1). The frequency of anxiety and depression among university students was reported to be 19.7% and 17.3%, respectively. In the same study 39.4% of the students were reported to have sleep disorders for at least one month due to anxiety and depression (2). 12-46% of university students experience psychiatric problems in any one year of university life

(3). Psychiatric problems are also associated with low self-esteem, social withdrawal, giving up on having an expected economic level, and dropping out of school (4).

Acceptance and commitment therapy (ACT) is a novel behavioral therapy approach based on the relational framework theory and functional contextualism. ACT is based on the framework of psychological flexibility, which is defined as having a stable and broad repertoire of behaviors in line with the values in touch with the present moment. The purpose of ACT is to improve psychological flexibility (5). Psychological inflexibility is not an unchanging, rigid process. ACT theorists have stated psychological inflexibility to be able to vary in different contexts. Psychological inflexibility is able to vary in different situations due to the context-dependent variability of awareness levels and the strength of one's respective values in a given context (6).

In studies with university students, psychological inflexibility has been shown to have a relationship with anxiety, depression, substance abuse, academic stress, and procrastination (7)(8).

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It was reported that psychological inflexibility uniquely explained the variance in somatization, depression, and anxiety in non-clinical university students (7). In another regression analysis, it was found that experiential avoidance, which is the main component of psychological inflexibility, significantly predicted alcohol-related problems in university students even after gender and psychological distress were controlled. (9). A recent study showed that psychological inflexibility mediates the relationship between depression, anxiety, stress, and procrastination (10).

The effectiveness of ACT in different problem areas among university students has also been demonstrated (11)(12).

The Acceptance and Action Questionnaire (AAQ) is the measurement tool most used worldwide for assessing psychological inflexibility and experiential avoidance. Due to the AAQ's unstable factor structure, low alpha values for internal consistency, and poor psychometric properties, a second version was developed, the AAQ-II (13).

Randomized controlled studies have found changes in generic AAQ scores to mediate the effect of ACT on mental health outcomes (14)(15). However, certain problems arise in the case of specific particular problems, when generic AAQ is used to measure the change processes. A recent review reported area-specific scales to better predict the treatment outcome of ACT interventions for specific areas compared to the generic AAQ (16). For example, the area-specific scale was determined to be related to treatment outcomes for cigarette addiction, while the generic AAQ was not (17). Studies have reported area-specific psychological inflexibility measurements to be more sensitive and feasible when focusing on a specific and unique problem area (18). For these reasons, AAQ variants have been developed with context-specific changes in generic AAQ expressions for different populations such as stigma and weight problems (19) (20). Similar problems have also arisen among university students when using the generic AAQ measure change in ACT interventions. In studies conducted among university students, using the generic AAQ was insufficient for determining their changes, while ACT treatment revealed significant clinical results (11) (21). Two of these developed scales have been adapted to Turkish. The Turkish validity and reliability study of the Acceptance and Action Diabetes Questionnaire was conducted by Karadere et al., and the Turkish validity and reliability study of the Acceptance and Action Questionnaire-Substance Abuse was conducted by Uygur et al. (22)(23).

Due to the lack of area-specific measurement tools for university students, Levin et al. developed the AAQ-US (24). The aim of this study is to evaluate the validity and reliability of the AAQ-US and to find out if it is an appropriate tool for evaluating psychological flexibility in the case of Turkish university students.

## METHODS

Study procedures were carried out in accordance with the Helsinki Declaration. The study protocol was approved by the Alanya Alaaddin Keykubat University Clinical Research Ethical Committee (Date: 26.09.2019 No:10/3). Written informed consents were obtained from the participants.

### Procedure

Approval was first obtained by e-mail from the researchers who developed the original scale. The English form of the scale was translated into Turkish separately by 3 psychiatrists, 1 psychologist who work in the field and who speak English. These translations were then reviewed. The Turkish version of the scale, which was prepared after the revisions and corrections, was re-translated into English by two out-of-field translators whose native language is English and who speak Turkish. The resulting text was compared with the original scale and applied to 20 students for the pilot study after the corrections. After the pilot study, the collected data were examined and the scale was finalized.

The participants were asked to fill out a sociodemographic form and the AAQ-II, AAQ-US, TAI, FMI, and DASS-21. For the test-retest analysis, 30 participants filled out the AAQ-US Scale three weeks later.

### Participants

Voluntary students between the ages of 18-26 studying at various departments in a public university were included in the study. The 189 students who were informed about the study, volunteered to participate, and completely filled out the scales form the study group. 123 of the students are female (65%) and 66 of them are male (35%); 105 (55%) were in the first grade, 49 (26%) were in the second grade, 26 (14%) were in the third grade, and 9 (5%) were in the last grade. The ages of the participants ranged from 18 to 26 (Mean = 20.17, SD = 2.01). The non-random convenience sampling method has been adopted in selecting the study group.

## Psychometric measurements

**Acceptance and Action Questionnaire II (AAQ-II):** The original version of the scale was developed by Bond et al (13). The Cronbach alpha coefficient of internal consistency is average at 0.84. Higher total scores obtained from the scale indicate experiential avoidance, and psychological inflexibility. The scale was previously adapted to Turkish by Yavuz et al (25).

**Test Anxiety Inventory (TAI):** The TAI, one of the most used scales in Turkey and abroad for determining test anxiety, was developed by Spielberger (1980) and adapted to Turkish by Öner. (26)(27). The scale has the sub-dimensions of worry and emotionality and, consisting of a total of 20 items. In the TAI adaptation study, the Cronbach alpha value was calculated as 0.87 for the entire test; 0.74 for the dimension of worry dimension, and 0.79 for the dimension of emotionality.

**Freiburg Mindfulness Inventory (FMI):** The scale, whose original version was developed by Walach and et al., was adapted to Turkish university students by Karetepe and Yavuz (28) (29). The scale is a 14-item Likert-type scale. While the Cronbach alpha of internal consistency, calculated to determine the reliability of the scale, was found as 0.82, the correlation value of scale was found as 0.89.

**Depression-Anxiety-Stress-21 Scale (DASS-21):** This was developed by Ng et al and adapted to Turkish by Sarıçam(30) (31). In the reliability analysis, the Cronbach alpha for determining internal consistency has been calculated as 0.85 for depression, 0.80 for anxiety, and 0.77 for stress. According to the study's findings, the scale also gives different results for the non-clinical and clinical groups.

**Acceptance and Action Questionnaire for University Students (AAQ-US):** This scale was developed by Levin et al. for use in measuring a group of university students' psychological flexibility and consists of 12 items with a single dimension (24). Total item scores range from 12 to 84. Higher total item scores indicate lower acceptance and higher levels of psychological inflexibility. The Cronbach alpha of internal consistency is found as 0.91.

## Data Analysis

The scale's adaptation study uses confirmatory factor analysis (CFA) during the data analysis to test the construct validity and determine the reliability of Cronbach's alpha of internal consistency and the test-retest method. Our scale has a specific number of factors, and which observed variables are related to which factor is evident from previous studies. As the scale is one-dimensional, meeting the condition of identifying which factors are related to one another is unnecessary. CFA is used here for determining whether one or more of the factor structure/structures obtained by previous studies show the same psychometric properties in different samples with different characteristics (32).

In the scale's adaptation, statistical processes have been carried out using the packages developed for the R (2018) statistics program. The lavaan package was used for the CFA, the psych package was used to calculate the internal consistency coefficient (33) (34)(35).

## RESULTS

In the scale's adaptation study, descriptive statistics for the scale items were calculated first, as well as their means and standard deviations. The calculated values are given in Table 1.

**Table 1.** Values from the AAQ-US Scale

	M	SD	Item-Total Correlation	Cronbach alpha (if item deleted)	t
1. I put off schoolwork when I feel bad	3.968	1.631	0.584	0.931	-11.584
2. It seems like I'm just "going through the motions" at school	3.243	1.808	0.675	0.927	-14.748
3. I struggle with my thoughts about school	3.630	1.842	0.672	0.928	-13.465
4. I find myself avoiding going to classes when I feel anxious or depressed	3.862	1.851	0.673	0.927	-14.745
5. When I think an assignment is too hard or confusing, I give up	3.037	1.785	0.737	0.925	-13.622
6. It's hard for me to focus on what my professors are saying in classes	3.243	1.863	0.761	0.924	-16.907
7. I get so worried about upcoming exams that I feel paralyzed and can't study	3.169	1.883	0.785	0.924	-19.526
8. Worries get in the way of my success at school	3.392	1.855	0.771	0.924	-19.219
9. My thoughts and feelings get in the way of studying	3.709	1.950	0.742	0.925	-17.473
10. I don't get anything out of a class when I'm having negative thoughts	4.122	2.003	0.691	0.927	-15.960
11. I often believe that I'm not smart enough to be in college or in this major	2.598	1.956	0.602	0.930	-9.610
12. I get so caught up in my worries during tests that I have trouble focusing on the test itself	3.106	1.929	0.753	0.925	-15.663

AAQ-US: Acceptance and Action Questionnaire for University Students; M:mean; SD:Standard Deviation

When analyzing the averages for the scale items, the average scale item for the AAQ-US, which is a Likert-type scale, is seen to be 3.037 with the highest being 4.122. The standard deviations from the scale items

are seen to not be very high. After the descriptive statistics, the relationships among the scale items were calculated. The correlation analysis is given in Table.2.

**Table 2.** Pearson correlation of the Turkish AAQ-US

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7	Item 8	Item 9	Item 10	Item 11
Item 2	0.546										
Item 3	0.442	0.642									
Item 4	0.636	0.588	0.501								
Item 5	0.509	0.525	0.585	0.612							
Item 6	0.484	0.630	0.524	0.511	0.591						
Item 7	0.373	0.455	0.541	0.498	0.614	0.634					
Item 8	0.386	0.511	0.516	0.516	0.574	0.606	0.754				
Item 9	0.457	0.461	0.498	0.537	0.556	0.607	0.671	0.630			
Item 10	0.480	0.371	0.488	0.502	0.478	0.539	0.578	0.617	0.729		
Item 11	0.313	0.536	0.372	0.347	0.528	0.579	0.554	0.508	0.403	0.380	
Item 12	0.334	0.426	0.535	0.433	0.574	0.610	0.791	0.746	0.605	0.609	0.562

All inter-item Pearson correlations were statistically significant ( $p < 0.001$ )

### Validity studies

In order to adapt the AAQ-US scale to Turkish, a first-level confirmatory factor analysis (CFA) was performed to determine the construct validity. The first-level CFA results related to the scale are given in Table 3.

**Table 3.** CFA Findings Related to the Adaptation of the AAQ-US Scale

Item	Factor Loading	Standard Factor Loading	Std. Error	P	95% Confidence Interval	
					Lower Limit	Upper Limit
Item1	0.981	0.602	0.049	< 0.001	0.885	1.077
Item 2	1.269	0.702	0.055	< 0.001	1.163	1.376
Item 3	1.285	0.698	0.055	< 0.001	1.177	1.394
Item 4	1.294	0.699	0.057	< 0.001	1.182	1.405
Item 5	1.358	0.761	0.058	< 0.001	1.244	1.472
Item 6	1.466	0.787	0.059	< 0.001	1.350	1.582
Item 7	1.536	0.816	0.060	< 0.001	1.419	1.654
Item 8	1.488	0.802	0.057	< 0.001	1.375	1.600
Item 9	1.520	0.780	0.060	< 0.001	1.402	1.639
Item 10	1.448	0.723	0.059	< 0.001	1.333	1.564
Item 11	1.217	0.622	0.064	< 0.001	1.092	1.341
Item 12	1.517	0.786	0.063	< 0.001	1.393	1.640

The confirmatory factor analysis (CFA), the Acceptance and Action Questionnaire for University Students (AAQ-US)

The first-level CFA of the AAQ-US scale is seen to verify the single-factor and 12-item structure of the measurement tool with no need for modification.(Table.3) When examining the fit indices from the analysis, goodness-

of-fit is seen to be provided ( $\chi^2 = 72.802$ ,  $df = 54$ ,  $\chi^2 / df = 1.35$ ;  $RMSEA = 0.043$ ;  $CFI = 0.95$ ;  $TLI = 0.93$ ;  $NNFI = 0.993$ ;  $NFI = 0.980$ ; and  $SRMR = 0.071$ ). In addition, we can see that all factor loading values are meaningful.

In order to adapt the AAQ-US Scale to Turkish, a correlation analysis was conducted by searching the Test Anxiety Inventory, Freiburg Mindfulness Inventory, and the DASS-21 to determine the validity of the criterion connections. The analysis results are given in Table 4.

We can say that the AAQ-US shows a significant relationship with all the criteria taken from the scales according to the criterion validity and that it is a valid scale in terms of criterion validity.

**Table 4.** Correlations of scale scores

		Pearson's r	p	Lower 95% CI	Upper 95% CI
AAQ-US	TAI-Worry	0.636	< 0.001	0.542	0.714
AAQ-US	TAI-Emotionality	0.583	< 0.001	0.481	0.670
AAQ-US	TAI-Total	0.639	< 0.001	0.546	0.716
AAQ-US	FMI	-0.513	< 0.001	-0.611	-0.400
AAQ-US	DASS-Depression	0.534	< 0.001	0.424	0.629
AAQ-US	DASS-Anxiety	0.476	< 0.001	0.358	0.580
AAQ-US	DASS-Stress	0.447	< 0.001	0.325	0.555
AAQ-US	AAQ-II	0.702	< 0.001	0.621	0.768

\*\*\* $p < .001$ , the Acceptance-Action Questionnaire-II (AAQ-II), the Acceptance and Action Questionnaire for University Students (AAQ-US), Test Anxiety Inventory (TAI), the Freiburg Mindfulness Inventory (FMI), and Depression-Anxiety-Stress-21 Scale (DAS-21). CI (Confidence Interval), Pearson correlation coefficient. (Pearson's r)

### Reliability Study

Data was collected again after three weeks from 30 people whose data had previously been collected for the adaptation study. The correlation coefficient between both applications is seen as 0.75 ( $p < 0.05$ ). We can say that the scale has been adapted according to the correlation coefficient calculated for the AAQ-US and that the scale is valid and consistent.

As a result of the calculation, the Cronbach alpha of internal consistency was found as 0.932. The scale can be said to have high reliability when comparing the internal consistency coefficient.

According to the results from the reliability analysis of scale, the item-total correlations range between 0.584 and 0.785. According to the analysis results, we can say that the items moderately to highly correlate with the total score from the scale. The values related to the analysis have been given in Table 1.

The last analysis has been conducted to determine the reliability of the measurement tool by compare all scale items using the *t*-test from the upper 27th and lower 27th percentile groups with respect to their total scores obtained from the scale. Regarding this result, the AAQ-US scale shows that it can distinguish between those with low scores and those with high scores. The *t*-test values for the analysis are given in Table 1.

### DISCUSSION

In our study, we have aimed to test the validity and reliability of the AAQ-US, developed for university students as a specific group with specific psychological difficulties, on a sample of Turkish university students.

In order to analyze the construct validity of the scale, the primary recommendation is to have the number of individuals be more than the number of variables, with at least 5-10 people per variable when calculating the sample size (36). Therefore, 189 people were reached for the 12-item AAQ-US, and thus this condition is considered to have been met. CFA was applied to test whether the AAQ-US has a single-factor structure like the original version. The fit indices show the goodness-of-fit values to be meaningful. When examining the test-retest correlations the scale is found to not show a significant change over time.

The Turkish version had a Cronbach's alpha of 0.93 and for the original version it was 0.91. An internal consistency coefficient above 0.81 for the Cronbach alpha shows excellent reliability (36). When the item-

total correlations of the scale are examined, we can say that all items have a positive relationship with one another and that all items relate to the total AAQ-US, and psychological inflexibility. In order to determine the scale's criterion validity, its correlation was examined with the general mental health and psychological inflexibility/flexibility scales related to the period of being a student. Similar to other studies in the literature there was a significant positive correlation between the anxiety, stress, depression, test anxiety and psychological inflexibility in our study (7) (24). As expected, AAQ-US shows a positive relationship with AAQ-II and a negative relationship with FMI.

The AAQ-US has features suitable for the aim of evaluating different areas of psychological inflexibility such as: how internal experiences interfere with actions in terms of values ("Anxiety hinders my success at school." or "I find myself skipping classes when I feel anxious or depressed"), cognitive fusion with school-related thoughts ("I struggle with my thoughts about school" and "Often I believe I am not smart enough to be at a university or this department"), and breaking the link between school-related actions and values ("I seem to be this way at school") (24).

Previous studies have also shown that area-specific modified AAQ scales may be more sensitive than the generic AAQ (17). Considering the context-dependent structure of psychological flexibility, the AAQ-US can show more sensitive results, especially related to academic results and predicting treatment results better. Further studies on samples of university students are needed in order to test these predictions.

As a result, our research shows the Turkish version of the Acceptance and Action Questionnaire for University Students to have psychometrically sufficient features.

Overall, the results of this study reveal the AAQ-US to be able to be used as a reliable and valid scale, especially for researchers and practitioners who want to assess psychological inflexibility among university students in the context of the academic setting.

Some limitations in our study need to be mentioned. First, our sample consists of students studying at a single university. This indicates a relatively homogeneous structure. In this case, our results require caution against making generalizations to all universities in Turkey. We did not include all problem areas specific to the academic field in our study (academic procrastination, academic success, etc.).

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