AYNA Klinik Psikoloji

Araştırma Makalesi

Attentional Control Scale- Turkish Version: Psychometric Qualities, Factor Structure and its Comparison with Behavioral Measures of Executive Attention

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Makale Bilgisi

Abstract

Attentional control refers to the capacity to voluntarily control attentional resources in a flexible manner. Attentional control was reported to play a fundamental role in self-regulation, emotion regulation, delay of gratification, and psychological distress. The Attentional Control Scale (ACS) was developed to measure perceived attentional control based on shifting and focusing dimensions. The present studies aimed to adapt the Turkish version of ACS and asses its psychometric characteristics. Study 1 aimed to explore the psychometric qualities of the Turkish version with a group of Turkish individuals (N = 428, 306 women) between the ages of 18 and 68 and supported the two-factor model of ACS consisting of 17 items in total. The results supported that shifting, focusing, and total ACS showed adequate internal consistency, test-retest reliability, and convergent validity evidence based on its significant correlations with measures of anxiety, depression, and repetitive negative thinking, signifying its proper psychometric characteristics. In Study 2 (N = 97, 65 women), the association of ACS with behavioral attentional control measures was examined, and non-significant associations between self-report and behavioral measures of attentional control were denoted. These findings signified that rather than indicating the individual's actual attentional control capacity, ACS assessed how the individual perceives their own attention control capacities. Taken together, the results suggest that the Turkish form of ACS is a valid and reliable scale that can be used to asses perceived attentional control capacity based on shifting and focusing domains, particularly in the research setting.

Öz

Dikkat kontrolü, dikkat kaynaklarını esnek bir şekilde gönüllü olarak kontrol etme kapasitesini ifade eder. Dikkat kontrolünün öz-düzenleme, duygu düzenleme ve hazzı erteleme kapasitesinin yanı sıra psikolojik sıkıntı belirtilerinde temel bir rol oynadığı bildirilmiştir. Dikkat Kontrolü Ölçeği (DKÖ), değiştirme ve odaklanma boyutlarına bağlı olarak algılanan dikkat kontrolünü ölçmek üzere geliştirilmiştir. Mevcut çalışma DKÖ'nün Türkçe versiyonunu uyarlamayı ve psikometrik özelliklerini değerlendirmeyi amaçlamaktadır. Çalışma 1, 18 ve 68 yaşları arasındaki bir grup Türk bireyde (N = 428, 306 kadın) DKÖ'nün Türkçe versiyonunun psikometrik özelliklerini keşfetmeyi amaçlamış ve toplam 17 maddeden oluşan DKÖ'nün iki faktörlü yapısını desteklemiştir. Sonuçlar, değiştirme, odaklanma ve toplam DKÖ'nün yeterli iç tutarlılık, test-tekrar test güvenilirliği ve kaygı, depresyon ve tekrarlayıcı olumsuz düşünce ölçekleriyle yakınsak geçerlilik puanları gösterdiğini ve uygun psikometrik özelliklere işaret ettiğini desteklemiştir. Çalışma 2'de (N = 97, 65 kadın), DKÖ'nün davranışsal dikkat kontrolü ölçümleriyle ilişkisi incelenmiştir ve DKÖ'nün öz-bildirim ölçümleri ile davranışsal ölçümleri arasında anlamlı ilişkiler olmadığı görülmüştür. DKÖ, bireyin gerçek dikkat kontrolü kapasitesini göstermekten ziyade bireyin kendi dikkat kontrolü kapasitesini nasıl algıladığının bir göstergesi olma eğilimi göstermektedir. Sonuçlar bir bütün olarak ele alındığında, DKÖ'nün Türkçe formunun, değiştirme ve odaklanma boyutlarına bağlı olarak algılanan dikkat kontrolü kapasitesinin değerlendirilmesinde kullanılabilecek geçerli ve güvenilir bir ölçek olduğunu göstermektedir.

Introduction

Attentional control refers to the capacity to voluntarily control limited resources for attention in a flexible manner and make necessary modifications to allocate those resources depending on the situational requirements (Derryberry & Reed, 2002). The capacity for attentional control plays a fundamental role in the direction and maintenance of attention. It is responsible for individual differences in capacities for self-regulation, emotion regulation, and delay of gratification (O'Bryan et al., 2017; Williams et al., 2017) as well as symptoms of psychological distress (Armstrong et al., 2011; Derryberry & Reed, 2002; Kertz et al., 2017).

Derryberry and Reed (2002) conceptualized attentional control as a construct composed of shifting and focusing dimensions. Focusing refers to the capacity to resist distractors and continue concentrating only on the tasks relevant to the situation, whereas shifting refers to the capacity to direct and move the focus of attention to the relevant stimuli depending on the requirements of the situation. Besides being in line with the theoretical work of Derryberry and Reed (1998), these two dimensions also tapped into the Executive Functions (EF) model that was proposed by Miyake et al. (2000). Miyake et al. (2000) established a widely accepted model, suggesting that EF is composed of three distinct but still highly related dimensions of inhibition, cognitive flexibility, and updating. Reinholdt-Dunne et al. (2013) drew parallels between this model of EF and attentional control by proposing that focusing and shifting dimensions of attentional control correspond to inhibition and shifting (i.e., cognitive flexibility) dimensions of EF, respectively. Although shifting and focusing dimensions were conceptualized as processes controlled by distinct neural networks, based on moderate correlations between shifting and focusing dimensions *(r = .54)*, Derryberry and Reed (2002) suggested the possibility of a higher-order attentional control factor that may be associated with all aspects of attentional control process. This view was later supported through research on executive attention networks (Posner & Rothbart, 2007).

The available research on how these two dimensions of attentional control relate to various psychological traits and mental health outcomes yielded inconsistent results. Notably, Eysenck et al. (2007) emphasized the significant associations of both focusing and shifting with anxiety-related processes, highlighting elevated levels of anxiety to be taxing both shifting and focusing dimensions of attentional control. In contrast, more recent empirical studies revealed inconsistent evidence regarding the specific relationship of shifting and focusing with different forms of psychological distress (Mills et al., 2016). Notably, several researchers reported relatively stronger associations between shifting and depression, besides similar robust connections of focusing with anxiety (Blekic et al., 2018; Judah et al., 2014; Reinhold-Dunne et al., 2013).

Even though the evidence regarding the aforementioned patterns was robust and consistent across different studies, Hsu et al. (2019) documented that in individuals who were diagnosed with anxiety and depression, both dimensions of ACS were strongly correlated with anxiety and depression. Similar results were also reported by DeVito et al. (2019), who also highlighted that focusing, but not shifting, was associated with both anxiety and depression, with the specific association between focusing and depression appearing stronger in younger individuals, even when the level of anxiety, age, and sex were controlled. According to Derryberry and Reed (2002), impaired focusing capacity leaves the individual vulnerable to the impact of the distractors in daily life and, thus, maximizes the chances of psychological distress.

Independent from the minor inconsistencies, all studies that have documented a relationship between AC and different forms of psychological distress have explained these relationships between AC deficits and the intensity of repetitive negative thinking (RNT), which refers to the unpleasant thoughts experienced by the individuals in an uncontrollable and repetitive manner and subsumes various disorder-specific subtypes such as rumination and worry (Ehring & Watkins, 2008). RNT intensity was highlighted as a factor that is influential in various forms of psychopathologies (Watkins & Roberts, 2020) and is responsible for mediating the association of AC with psychological distress (Salguero et al., 2021). Specifically, deficits in flexibly shifting attention away from negative emotions and thoughts were suggested to be associated with more intense levels of RNT, which functions as a vulnerability to depression (DeJong et al., 2019; Salguero et al., 2021; Saulnier et al., 2021).

Available research also indicated a difference between focusing and shifting concerning their links to certain transdiagnostic factors, such as repetitive negative thinking (RNT). Mills et al. (2016) argued that the focusing dimension was more strongly associated with measures of psychopathology and RNT when compared with the shifting dimension. In contrast, De Raedt and Koster (2010) argued that the shifting dimension was associated with the individual's capacity for controlling RNT, and in fact, RNT was the factor that has a mediating role in the relationship between shifting and various psychological disorders, which was further supported by more recent research (Cox et al., 2018; Jessup et al., 2021; Salguero et al., 2021).

Despite the availability of evidence regarding the association of AC with psychological distress and RNT, there is relatively limited research on the age and sex-related differences in attentional control capacity. Notably, previous studies indicated significant sex differences, particularly in the shifting dimension of AC, with women reporting poorer capacity for shifting attention from one stimulus to another depending on the situational requirements (Solianik et

al., 2016; Zhang et al., 2023). A similar difference was not reported for shifting dimension. Furthermore, age-related differences in AC capacity also received limited attention. Correlational studies so far indicate that total ACS and focusing scores have weak but significant positive correlations with age (Olafsson et al., 2011). In other words, younger age is associated with poorer perceived attentional control capacity.

Attentional Control Scale (ACS; Derryberry & Reed, 2002) is a 20-item self-report scale that was developed based on the view that effortful attentional control is a very critical agent in self-control processes. ACS was conceptualized as a scale that measures attentional control based on two dimensions – shifting and focusing. The ACS is frequently used by researchers to investigate the role of attentional control capacity as a resilience factor (Altan-Atalay, 2018; Williams et al., 2017). Furthermore, understanding and assessing attentional control capacities are crucial due to the impact of attention control deficit as a transdiagnostic risk factor (Hsu et al., 2019). Although ACS was first proposed as a direct measure of AC capacity, recent studies indicated its greater effectiveness in assessing perceived AC capacity, which also plays an important role in understanding vulnerability for psychopathology (Hsu et al., 2019; Leleu et al., 2022).

Although ACS has been used by many researchers over the years, a comprehensive factor analytic study was not conducted until the early 2010s (Fajkowska & Derryberry, 2010; Olafsson et al., 2011). Several studies from the last decade translated and adapted ACS to different languages and examined the factor structure of the scale. Although no full consensus was reached regarding the number of factors (Fajkowska & Derryberry, 2010), most of those studies found a two-factor structure (Blekic et al., 2018; Blekic et al., 2023; Clauss & Bardeen, 2020; Judah et al., 2014; Michalko, 2018; Olafsson et al., 2011; Quigley et al., 2017; Verstraeten et al., 2010); however, the specific items that load on focusing and shifting factors differed across publications (Abasi et al., 2017). More specifically, Blekic et al. (2023) argued that shifting items were problematic since the items seemed to correspond to both divided attention and attentional shifting. Even though there was an increase in the number of studies in this area, there was still a need for studies to clarify the factor structure of ACS (Abasi et al., 2017; Quigley et al., 2017) to allow researchers to use the scale more efficiently.

The present study aimed to examine the psychometric characteristics of the Turkish version of ACS. Examination of the psychometric properties and the factor structure of ACS will allow the Turkish researchers to understand the protective role of individuals' confidence in their abilities to control their attentional resources, which will contribute to a better understanding of the etiology of psychological disorders and understanding how attentional control capacity is predictive of more proximal risk factors that are crucial in the development

of psychopathology. Considering the inconsistent findings regarding the factor structure of ACS, the first aim of the current study was to explore the factor structure of the scale as well as its internal consistency. Like the original form, the Turkish form of ACS was expected to have adequate levels of reliability and show significant correlations with measures of anxiety, depression, and repetitive negative thinking, which are the mental health variables that had been documented to have significant associations with attentional control capacity. Furthermore, age and sex-related changes in the ACS (and subscales) scores will be examined.

Method

Participants

Participants were 428 Turkish-speaking individuals (306 women, 122 men) aged between 18 and 68 (M = 28.73, SD = 9.78). 75% of the participants had at least an undergraduate degree, and 71% were born and raised in big cities in Turkey. Sixty-one participants (44 women, 17 men) from the original sample agreed to participate in the retest phase. They were aged between 19 and 56 (M = 28.31, SD = 8.37), and the majority were living in big cities (71%).

Measures

Attentional Control Scale (ACS, Derryberry & Reed, 2002). It was designed as a self-report measure to assess the individual's capacity for attention regulation. It assesses attentional control based on shifting (e.g., "It is easy for me to alternate between two different tasks.") and focusing (e.g., "When I need to concentrate and solve a problem, I have trouble focusing my attention.") dimensions. The test takers were required to rate each of the 20 items on a 5-point Likert scale, with higher scores for both focusing and shifting, indicating poor attentional control capacity. The original version of the scale has adequate reliability (.84, .87, and .77 for total ACS score, focusing, and shifting scores, respectively) and adequate correlations with measures of emotional distress (Derryberry & Reed, 2002; Reinholdt-Dunne et al., 2013).

Depression, Anxiety, and Stress Scale (DASS, Lovibond & Lovibond, 1995). DASS measures the symptoms of depression, anxiety, and stress experienced during the past month. The scale consists of 42 self-report items in a 4-point Likert-type format. DASS has strong internal consistency (.84, .80, and .91 for anxiety, stress, and depression subscales, respectively) in addition to satisfactory test-retest reliability coefficients (r = .48). The scale also has moderate to high correlations with scores of other scales measuring anxiety and depression (Anthony et al., 1998). DASS was translated into Turkish and standardized by Bilgel

and Bayram (2010) and has reliability coefficients of .89, .82, and .85 for depression, anxiety, and stress, respectively (Bayram & Bilgel, 2008). Only the depression and anxiety scores were used in the current study.

Perseverative Thinking Questionnaire (PTQ; Ehring et al., 2011). It is a self-report measure of trait-based RNT composed of 15 items evaluated on a 4-point Likert-type scale. The original PTQ scale has satisfactory levels of internal consistency (α = .95) and significant correlations with measures of anxiety and depression. The Turkish version of PTQ also showed satisfactory levels of internal consistency (α = .95) and moderate to high correlations with measures of rumination, worry, thought suppression, anxiety, and depression (Altan-Atalay & Sarıtaş-Atalar, 2018).

Procedure

ACS was translated into Turkish by two bilingual translators with a background in psychology. Next, translations were compared with one another, and minor modifications were made on some items. Back translation was performed by a graduate student in psychology who has a double major in both psychology and translation-interpretation departments. Finally, this back-translated version was examined by comparing it with the original version of ACS, and it was concluded that there was no substantial difference between the Turkish and original forms.

Following the IRB approval, participant recruitment was done via invitations posted on different forums, e-mail groups, and social network sites. The participants were invited to fill out the questionnaires on Qualtrics©, an online data collection platform. During the first part of the study, the participants were provided with an informed consent form, followed by the questionnaires. Lastly, all participants were asked to participate in the second stage of the study six weeks later. The ones who agreed to participate provided their e-mails and formed a password that they would not forget. Those participants were contacted about six weeks later through an e-mail inviting them to the second stage, accessible through the link provided in the e-mail, that required them to answer only the items of ACS.

Results

The data were checked for normality, linearity, and outliers prior to the analyses. First, data from 8 participants were deleted since they appeared as outliers (5 univariate and 3 multivariate). Furthermore, the anxiety and depression scores were subjected to logarithmic transformation since they violated the basic assumptions. The remaining of the analyses were performed on 420 individuals.

Factor Structure

A principal components analysis (PCA) with direct oblimin rotation revealed a Kaiser–Meyer–Olkin value of .89 in addition to a Barlett's test of sphericity (χ^2 = 2980.87, *df* = 190, *p* < .01), indicating that the current data set for ACS was appropriate for a factor analysis (George & Mallery, 2010). Direct oblimin rotation was used in the current study since we expect the factors of ACS to be significantly correlated with one another (Tabachnick & Fidell, 2001). Factor structure and the specific items loading on each factor were determined based on the criteria explained and utilized by Claus and Bardeen (2020) and Judah et al. (2014). More specifically, the items that have cross-loadings were deleted based on the recommendations of Matsunaga (2010), and the items with factor loadings below .40 were deleted. The results of the analysis revealed a 4-factor, with those factors explaining 54.73% of the variance. However, an examination of the screeplot and the results of parallel analysis (Horn, 1965; O'Connor, 2000) suggested a two-factor solution. Thus, we tried the two-factor solutions, which was in line with the original factor structure of the scale. Three items from the scale were deleted following a detailed examination of the items (factor loadings, item-total correlations, contribution to internal consistency). Notably, item 9 was deleted due to having low loadings (< .40) on both factors. Item 9 also had a poor item-total correlation (*r* = .12). Furthermore, item 12, "It is difficult to coordinate my attention between writing and listening." and item 8, "I have a hard time concentrating when I am excited about something." had nearly equal loadings to both factors and, thus, was not included in any of the remaining analyses to protect the conceptual clarity of the factors. The factor loadings of items 12 and 8 for both factors are below .50, and the difference between these two loadings is below .10, which are perceived as sufficient criteria for item deletion (Güvendir & Özkan, 2022; Tabachnick & Fidell, 2001). Finally, the deletion of both items led to significant improvements in internal consistency.

The two factors explained 42.06% of the variance, with 10 items loading on Factor 1 and 7 items loading on Factor 2 (See Table 1). In line with the original version of ACS, the first factor was named as "shifting" since the items were tapping on the capacity to shift attention from one stimulus to another based on the requirement of the situation. An examination of the items loading on each factor indicated that Factor 2 can be named as "focusing" since the items were related to the capacity for not being distracted by external factors and remaining focused on the task at hand. Elevated scores were indicative of greater problems in attentional control processes on both focusing and shifting dimensions.

Table 1.

Item loadings

Item no	Factor 1	Factor 2	h²
1	.02	**.73**	.55
2	.07	**.74**	.59
3	-.05	**.84**	.68
4	.14	**.61**	.48
5	-.01	**.66**	.43
6	.02	**.74**	.56
7	.16	**.57**	.42
8	.22	-.37	.25
9	-.09	-.31	.08
10	**.75**	.09	.51
11	**.53**	-.12	.34
12	.31	-.29	.25
13	**.69**	-.10	.50
14	**.54**	-.10	.35
15	**.52**	-.02	.28
16	**.63**	.12	.35
17	**.61**	-.22	.52
18	**.59**	-.16	.45
19	**.79**	.02	.61
20	**.48**	.06	.21
Eigenvalue	6.41	2.00	
Variance Explained	32.05	10.00	

Note. Items 4, 5, 9, 10, 13, 14, 17, 18, and 19 are reversed coded.

Reliability

Internal consistency scores for the ACS total, focusing, and shifting appeared to be .88, .83, and .85, respectively. Sixty-one participants (44 women, 17 men) from the original study participated in the retest phase and filled out the questionnaire once again about six weeks later. Their scores were matched using a password that they provided at both time points. Results indicated adequate test-retest reliability levels with a 6-week time interval for both the total ACS and factors (.77, .69, and .74 for ACS, focusing, and shifting, respectively).

Convergent Validity

Correlation analyses were conducted with the purpose of providing convergent validity evidence for the Turkish version of ACS. In line with our expectations, all the attentional control variables had positive significant correlations with measures of RNT, anxiety, and depression, which means that poorer attentional control was associated with higher RNT, anxiety, and depression. Those findings supported the convergent validity of ACS (see Table 2). An examination of the individual relationship of shifting and focusing dimensions of ACS with other variables also yielded positive significant results, as we expected.

Table 2.

Correlations, means, standard deviations, and internal consistency of study variables

	Sex	Age	ACS	ACS-S	ACS-F	PTQ	D	A
Age	.08	--						
ACS	-.10**	-.13**	--					
ACS-S	-.11*	-.12*	.90**	--				
ACS-F	-.06	-.10*	.84**	.52**	--			
PTQ	-.03	-.16**	.46**	.40**	.40**	--		
D	-.03	-.09	.35**	.32**	.28**	.65**	--	
A	-.03*	-.14**	.33**	.30**	.28**	.62**	.72**	--
M		28.85	47.15	28.63	18.53	41.50	26.63	23.50
SD		9.89	8.59	5.42	4.42	12.06	10.54	8.41
α			.85	.84	.81	.95	.95	.92

Note. ACS = Attentional Control Scale; ACS-S = ACS shifting subscale; ACS-F = ACS focusing subscale; PTQ = Perseverative Thinking Questionnaire; D = Depression; A = Anxiety. * $p < .05$; ** $p < .01$.

Differential associations of ACS dimensions with anxiety and depression

Lastly, two additional hierarchical regression analyses were performed with the purpose of differential examination of shifting and focusing dimensions of ACS with respect to their associations with anxiety and depression (to identify the variance explained by attentional control filtering out the overlap between anxiety and depression). In both analyses, demographic variables such as sex and age were included in the first step, followed by ACS subscales (shifting and focusing) entered in the second step. In the third step, either depression or anxiety was entered depending on the outcome variable.

As presented in Table 3, among the ACS dimensions, only shifting had a significant association with depression when anxiety is controlled, with ACS dimensions explaining 12%

of the variance in depression. More specifically, higher scores in depression were associated with more difficulties in shifting attention from one task to the other. On the contrary, neither shifting nor focusing was associated with anxiety when the variance explained by depression was controlled (Shifting and focusing explaining 11% of the variance in anxiety.).

Table 3.

Hierarchical regression analyses of focusing and shifting dimensions to predict anxiety and depression

	Depression			
	R	R^2_{Change}	β	t
Step 1	.01			
Age			-.09	-1.76
Sex			.04	.89
Step 2	.13**	.12**		
Shifting			.25**	4.23
Focusing			.16**	2.92
Step 3	.54**	.42**		
Shifting			.09*	2.17
Focusing			.06	1.48
Anxiety			.69	18.46
	Anxiety			
	R	R^2_{Change}	β	t
Step 1	.02*			
Age			-.14*	-2.85
Sex			-.01	-.11
Step 2	.13**	.11**		
Shifting			.23**	4.09
Focusing			.15*	2.68
Step 3	.54**	.41**		
Shifting			.06	1.43
Focusing			.04	.92
Depression			.69	18.64

Differential associations of ACS dimensions with RNT

The final hierarchical regression analysis was conducted to examine the association between the shifting and focusing dimensions of ACS with RNT while controlling for the variance explained by anxiety and depression. The demographic variables (age and sex) were entered in the first step, followed by shifting and focusing in the second step, explaining an additional 19% of the variance. Anxiety and depression were included in the analyses in the third step. As can be seen in Table 4, RNT was significantly positively associated with difficulties in both shifting and focusing even when the levels of anxiety and depression were controlled, indicating that both dimensions of ACS are able to explain the variance in RNT over and above the variance explained by anxiety and depression.

Table 4.

Hierarchical regression analyses results with PTQ scores predicted by the dimensions of shifting, focusing, anxiety, and depression

			PTQ	
	R	R^2_{Change}	β	t
Step 1	.03			
Sex			-.17**	-3.20
Age			-.01	-.16
Step 2	.22	.19		
Shifting			.24**	4.52
Focusing			.27**	5.22
Step 3	.52	.30		
Shifting			.09*	2.01
Focusing			.17**	4.17
Depression			.37**	7.14
Anxiety			.27**	5.20

Note. PTQ= Perseverative Thinking Questionnaire.
* $p < .05$, ** $p < .01$

Sex differences

The ACS and the subscale scores were also examined based on sex differences via a series of -t-tests. However, due to gender imbalance, a comparable number of male (N= 91) and female (N= 109) participants were randomly selected from the sample prior to the

analysis. This random sample comprised individuals between the ages of 18- 65 (*M* = 33.01, *SD* = 10.17). The results of the t-tests did not reveal significant sex differences in either the total ACS score (*t* = .460, *p* = .646, *d*= 8.56) or the subscale scores (shifting *t* = .474, *p* = .636, *d*= 5.55 and focusing, *t* = .303, *p* = .762, *d*= 4.31).

Age differences

Prior to the analysis, the participants were divided into two groups, with 25 set as the cut-off score. 25 was selected as the cut-off based on Arnett's (2011) proposed age range for emerging adulthood. Three different t-tests were conducted to examine the age differences in total and subscale ACS scores. Results revealed no difference between the two groups on focusing capacity, *t* = .821, *p* = .412, *d*= 4.42. However, on shifting performance, emerging adults (*M* = 29.29, *SD* = 5.27) scored significantly higher than the rest of the group (*M* = 27.86, *SD* = 5.54), *t* =2.726, *p* = .007, *d* = 5.39. Similarly, the emerging adults (*M* = 47.99, *SD* = 8.39) had significantly higher total ACS scores when compared with the rest of the group (*M* = 46.29, *SD* = 8.74), *t* =2.141, *p* = .033, *d* = 8.56. Overall, the findings indicated that emerging adults perceive their shifting and general attentional control capacities as poorer than the relatively older individuals.

Discussion

The objective of the first study was to test the psychometric characteristics of the Turkish version of ACS. Factor structure, reliability, and construct-related validity were examined with the purpose of understanding the psychometric qualities and determining whether ACS was appropriate for use in Turkish populations. The current results revealed a two-factor structure of ACS, which was in line with the previous studies testing the factor structure of ACS in other cultures. Notably, the items that loaded to "focusing" were about the individual's capacities for blocking the stimuli that are irrelevant to the tasks that the individuals are currently focusing on. On the contrary, the items of the "shifting" factor were directed at the individual's capacity for moving the attentional focus between different stimuli in a flexible manner, depending on the requirements of the situation. However, distinct from the results of previous studies examining the factor structure of ACS (Judah et al., 2014; Leleu et al., 2022; Olafson et al., 2011), the Turkish version of ACS was composed of 17 items. A detailed examination of the content of the deleted items (items 8, 9, and 12) indicated that they were more associated with multitasking abilities (doing two things at the same time) or having to focus attention on the presence of strong emotions or biological needs. Thus, they cannot be totally related to either focusing or shifting. In fact, the deletion of especially item 9, "When

concentrating, I ignore feelings of hunger or thirst," was consistent with the results of previous studies that have also suggested the use of shorter versions of ACS (Judah et al., 2014).

Next, internal consistency and test-retest reliability methods (6-week interval) that were used to check the reliability of the Turkish version of ACS indicated that the scale and the subscales had satisfactory levels of reliability. Likewise, the convergent validity of ACS was also supported through the correlation analyses, indicating both dimensions of ACS had moderate correlations with anxiety and depression symptoms, in addition to disorder non-specific RNT severity. Also, shifting and focusing dimensions of ACS were also significantly correlated, which was a finding suggested by other researchers as well (Derryberry & Reed, 2002; Judah et al., 2014; Melendez et al., 2017; Quigley et al., 2017).

Lastly, the concurrent validity of ACS was tested through hierarchical regression analyses. In line with the previous studies (DeJong et al., 2019; Judah et al., 2014; Olaffson et al., 2011; du Rocher & Pickering, 2022), the current results indicated shifting as the ACS dimension that had a more exclusive relationship with depression. However, focusing did not have a significant association with either depression or anxiety when the levels of anxiety and depression were controlled, respectively. The findings indicated that people who reported more severe depressive symptoms during the past month also reported having difficulties in shifting their attentional focus from one domain to another in a conscious manner. In fact, the role of shifting deficits in the development and maintenance of depression had previously been highlighted by Koster et al. (2011), who argued that individuals with shifting difficulties are at greater risk for depression since it is difficult for them to disengage their attention from the depressogenic stimuli to focus on more pleasant or neutral stimuli. Koster et al. (2011) also highlighted the role of RNT as a mediator in this relationship. Even though the current study did not involve the testing of the mediation relationship, the current results demonstrated that the focusing dimension of attentional control was associated with RNT intensity over and above the variance explained by depression and anxiety, revealing that having difficulties in focusing attention was associated with a tendency to experience more intense negative thoughts in a repetitive and uncontrollable manner. The absence of such specific relationships with anxiety can be related to the significant overlap between anxiety and depression ($r = .72$) due to the self-report measures used in the present study.

Finally, the current results indicated significant associations between ACS scores (shifting in particular) and demographic variables such as age and sex. Many previous studies utilizing behavioral measures of AC documented a significant decline in executive attention with increasing age (Zhou et al., 2011). However, the current results, which can be perceived as a replication of Olafsson et al.'s (2011) findings, indicated the exact opposite by showing that

emerging adults had lower shifting and attentional control abilities as measured by the ACS. Such inconsistencies may stem from differences in measurement methods. In other words, the ACS items, rather than directly assessing AC capacity, may also be influenced by the strategies that the individuals have been effectively using (sometimes for many long years) to deal with cognitively challenging situations. Thus, the availability of such strategies may lead to the perception of the self as more competent in controlling the attentional processes. The current results reveal significant sex differences in total ACS and the subscale scores, which is in contradiction with the results of some recent studies.

Study 2

A second study was conducted with the purpose of addressing the inconsistent results obtained from the studies focusing on the association between self-report and behavioral measures of attentional control. Some of the previous studies assessing the association between self-report and behavioral measures of attentional control indicated weak but significant associations (Reinholdt-Dunne et al., 2013). On the other hand, a comparable number of studies reported the lack of significant correlations between two different forms of assessment, raising concerns regarding the validity of self-report measures such as ACS to assess attentional control capacity (Leleu et al., 2022; Todd et al., 2022; Williams et al., 2017). Williams et al. (2017) explained such findings through differences between what self-report and behavioral measures of attentional control assess. It was argued that although behavioral measures assess actual attentional control ability, self-report tools are more sensitive to individuals' beliefs about their attentional capacity rather than actual attentional control. Thus, they do not yield significant correlations with behavioral measures of attentional control.

In sum, the primary aim of Study 2 was to examine the correlations between ACS and behavioral measures of attentional control. More specifically, the Attention Network Test (ANT) was utilized to obtain a behavioral measure of attentional control (Reinholdt-Dunne et al., 2013). Secondly, as a continuation of Study 1, the association of ACS with measures of disorder-specific measures of RNT (rumination and worry) was also explored to further assess the convergent validity of ACS. In Study 1, we utilized PTQ, which assesses the transdiagnostic characteristics of RNT. However, available studies indicated that the dimensions of attentional control also have associations with more disorder-specific forms of RNT, such as rumination and worry (Ehring & Watkins, 2008). Worry refers to negative and uncontrollable thoughts and images related to potentially dangerous situations the individual is likely to encounter (Beck et al., 1987). However, rumination is associated with a significant and perseverative focus on the current depressed mood state and the adverse life events that have probably led

to the emergence of those negative emotions (Watkins & Roberts, 2020). We expected individuals who experience deficits in attentional control also to report elevated levels of worry and rumination since deficits in shifting capacity are believed to be responsible for the difficulties in disengaging the attentional focus from disturbing or irrelevant aspects of the environment and directing the attentional focus to more crucial stimuli. Overall, Study 2 hypothesized that ACS scores (both shifting and focusing dimensions) would be associated with measures of disorder-specific RNT types (rumination and worry) and psychological distress. Next, significant associations were expected between ACS and behavioral measures of shifting and focusing.

Method

Participants

The original sample was composed of 108 participants (70 women). The data from 11 participants were not included in the analyses due to the use of certain medications that are likely to interfere with the performance on the tasks used for data collection. Thus, the remaining participants included in the analyses were 97 university students (65 women, 32 men) between the ages of 18 and 30 (*M* = 20.54, *SD* = 1.78). The participants were recruited through the subject pool of Koç University Psychology Department and received course credit for participating in the study.

Instruments

The participants were administered the ACS (used in Study 1) in addition to the Penn State Worry Questionnaire (PSWQ) and Ruminative Responses Scale – Short Form (RRS-SF). The Attentional Network Test (ANT) from Psychology Experiment Building Language 2 (PEBL2; Mueller & Piper, 2014) was delivered on an iMac (mid 2010, 21.5-inch LED-backlit display, 3.06GHz Intel Core i3 4MB processor), and responses were collected with a mechanical keyboard.

Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990). It is a 16-item questionnaire used to assess subjectively experienced worry on a 5-point Likert scale. The original scale displays strong reliability (α = .91) and validity as indicated by high correlations with scales assessing depressive symptoms as well as state and trait anxiety (*r*'s ranging between .40 and .74; Molina & Borkovec, 1994). Turkish adaptation of PSWQ was conducted by Yılmaz et al. (2008). The internal consistency of the Turkish version is .91, and the test-retest reliability score is .88. Like the original version, the Turkish version of PSWQ has high

correlations with depression symptoms (r = .46), obsessive-compulsive disorder (r = .49), trait anxiety (r = .67), and metacognition (r = .58).

Ruminative Response Scale – Short Form (RRS-SF; Nolen–Holeksema & Morrow, 1991). RRS-SF measures individuals' use of rumination as a coping mechanism. It has two dimensions: brooding and reflective pondering. The original RRS is composed of 22 self-report items rated on a scale from 1 to 4, with higher scores indicating elevations in trait rumination. The present study used a 10-item shortened version, which has been developed due to the overlap between RRS and depression scales (Treynor et al., 2003). The original scale displays adequate internal consistencies for total RSS score (α = .85), brooding (α = .72), and reflective pondering (α = .77). Turkish adaptation was performed by Erdur-Baker and Bugay (2010), which also has satisfactory levels of reliability (.85, .77 and .75, respectively) and validity.

Attentional Network Task (ANT; Fan et al., 2002). The stimuli of the task consisted of a row of five horizontal black arrows that point rightward or leftward on a white background. The participants were expected to select the direction of the target arrow at the center by pressing the key associated with that direction (right or left shift key, respectively). The two stimuli presented on both sides of the central arrow (the flankers) either point in the same direction as the central arrow (congruent trials), point in the opposite direction (incongruent trials), or appear as lines instead of arrows (neutral trials). The task consisted of 24 practice trials, including accuracy feedback, and 288 experimental trials not followed by feedback. Each trial lasted a total amount of 4000 msec and comprised five phases. The first phase was the fixation phase, which requires the participants to fixate on a cross located at the center of the screen for 400-1600 msec (drawn randomly from a uniform distribution). Next, a warning cue was presented for 100 msec. After the warning cue, there was a fixed 400 msec fixation period, followed by the row of stimuli composed of the target and the flankers. The stimuli stay on the screen until the participant presses a key or until 1700 msec elapse, whichever comes first. After the row of stimuli disappeared, there was again a fixation period for the duration that remained from the total 4000 msec (depending on the varying response time and the random fixation time). A fixation cross remained at the center of the screen throughout the trial, and the row of stimuli was seen in one of the two locations, 3 centimeters above or below the cross. For the second phase of the trials, four warning cue conditions were used to measure the alerting and orienting ability of the participants. In the no-cue condition, there was no alerting or spatial cue, and the participants kept seeing only the fixation cross for

the cue duration. In the center-cue condition, an asterisk was shown on top of the fixation cross, alerting the participant that the stimulus was coming up. In the double-cue condition, two asterisks appeared both above and below the fixation cross at the two possible target positions. This also alerted the participant but with a larger attentional field compared to the central cue condition. The spatial cue condition involved the presentation of the cue only at the target position, orienting the participant to the location at which the stimulus would appear, in addition to alerting them as in the other conditions. The whole procedure lasted around 12 minutes. Alerting, orienting, and executive attention scores that were derived from ANT were used as outcomes in the present study.

Procedure

The participants were tested individually. Each participant read and signed the informed consent form upon arrival, followed by the administration of the questionnaire booklet that included ACS, PSWQ, and RRS, followed by the ANT. The whole process took around 50 minutes, and the participants earned course credit for their participation.

Results

Statistical power for the correlational analyses was determined a priori with G*Power 3.1 software (Faul et al., 2007). Based on the results of Judah et al. (2014), a correlation of $r = .30$ was assumed, and the two-tailed alpha level was set at .05. It was found that a sample size of 82 would be required for a power level of 80% to find these moderate correlations; thus, the sample size of 85 participants of this study was enough to detect these correlations.

Descriptive statistics and results of zero-order correlation analyses are presented in Table 5. The total ACS score appeared to be significantly positively correlated with worry, brooding, and reflective pondering. In other words, deficits in attentional control were linked to increases in all three forms of RNT. The shifting dimension yielded significant positive associations with worry and only the brooding dimension of RRS. Focusing, on the other hand, had significant positive associations with both forms of rumination. In other words, difficulty in the capacity for deliberately focusing attention was associated with experiencing more intense ruminative thoughts. The present study also explored the correlations between ACS and ANT, which did not reveal any significant associations.

Table 5.

Correlations, means, standard deviations, and internal consistency of study variables

	M	*SD*	*α*	ACS	ACS-S	ACS-F
ACS	42.58	8.32	.85			
ACS-S	23.63	4.89	.78	.88**	--	
ACS-F	17.95	4.44	.82	.86**	.50**	--
PSWQ	49.23	12.04	.93	.38**	.45**	.20
RRS-B	11.34	3.64	.72	.31**	.26*	.29**
RRS-R	11.90	3.12	.69	.23*	.15	.25*
Orienting	.06	.03		.03	-.05	.10
Alerting	.05	.03		.01	.01	.02
Executive Attention	-.11	.05		-.15	-.11	-.16
Age	20.53	1.78		-.01	.05	-.06
Sex	32.99	.47		-.32**	-.31**	-.25*

Note. ACS = Attentional Control Scale; ACS-S = ACS shifting subscale; ACS-F = ACS focusing subscale; RRS-B= Brooding; RRS-R= Reflection; PSWQ= Penn State Worry Questionnaire. * $p < .05$; ** $p < .01$.

Discussion

In line with the expectations, the findings of Study 2 revealed that the participants who reported more significant problems in controlling their attention also reported a greater tendency to experience worry and rumination. Although the correlations between the shifting dimension of ACS and the reflective pondering dimension of rumination and between the focusing dimension of ACS and worry were not significant, the other significant associations between the dimensions and the significant correlations of total ACS scores with worry and rumination supported the convergent validity of ACS.

Furthermore, significant associations were not observed between self-report and behavioral measures of attentional control. Neither the dimensions of ACS nor the total ACS scores correlated significantly with any of the dimensions of ANT, which were alerting, orienting, and executive attention. Confirming the findings of previous studies, findings indicated that self-report and behavioral measures of attentional control may not be measuring the same constructs (Leleu et al., 2022; Williams et al., 2017) and ACS, rather than assessing the individual's actual attentional control capacity, shows a tendency to be indicative of how the individual perceives own attention control capacities. In other words, when compared with ANT or other behavioral measures of attentional control, ACS is more sensitive to the detection of individual differences in the individuals' beliefs in the efficacy of their attentional control skills.

General Discussion

Attentional control is a construct that has been gaining considerable popularity in recent years due to its link with psychological distress (Judah et al., 2014). The aim of the present study was to evaluate the psychometric qualities of the Turkish version of ACS. The first study aimed to assess the factor structure and psychometric qualities of ACS, which yielded satisfactory levels of reliability, in addition to significant correlations with measures of related variables. Such findings provided the first set of evidence for the reliability and construct-related validity of the Turkish version of ACS.

The second study aimed to provide further evidence of the validity of ACS. In addition to the self-report measures, the second study assessed attentional control also through performance-based measures to differentiate or draw parallels between different conceptualizations of this capacity, which is an issue that has been frequently addressed in attentional control research (De Jong et al., 2019; Reinhold-Dunne et al., 2013; Williams et al., 2017). The absence of significant associations between self-report and performance-based measures of attentional control had been highlighted previously (Williams et al., 2017), which was interpreted as a sign indicating ACS's tendency to assess perceived attentional control capacity, which may not be closely related to the cool (emotion-free) attentional control capacity measured via the behavioral tasks such as ANT or Continuous Performance Test (Conners et al., 2003). This finding was also able to explain the lack of a robust relationship between psychological distress and behavioral measures of attentional control (Snyder et al., 2015). As also highlighted by Snyder et al. (2015), the behavioral measures of attentional control tend to have relatively low ecological validity since they assess such capacities in unrealistic (cool/emotion-free in this case) conditions, which do not really represent the tasks that individuals have to perform in their daily lives. Thus, it is reasonable to see that perceived attentional control (covering attentional performance in both emotional and non-emotional situations) yielded more significant associations with measures of psychological distress.

Despite the results providing evidence regarding sound psychometric qualities of ACS, the present two studies were not free from significant limitations. First, for Study 2, data were collected from a student sample that was not exactly representative of the Turkish population, which may jeopardize the generalizability of the results. Furthermore, information regarding the presence or absence of any psychiatric diagnosis, medication use, as well as past and current psychotherapy experience, were not examined, which indicates that the psychometric properties of the Turkish version of ACS need to be tested in other populations as well.

Considering such limitations, future studies may be conducted on clinical populations to further explore criterion-related validity of ACS, with a specific focus on ACS's sensitivity

for discriminating between healthy participants from groups that are diagnosed with certain psychological disorders (i.e., affective disorders, insomnia, or attention deficit disorder) that are related to attentional control. Next, to test AC skills in daily life more efficiently, future studies may use hot attentional control tasks (involving emotional cues) in further exploring the construct validity of ACS to eliminate ecological validity issues (Snyder et al., 2015), which interfere with the assessment of AC capacity especially when cool tasks such as ANT. Furthermore, based on the discussion on the possible role of self-efficacy judgments, future studies may examine the connection of attentional control with self-efficacy judgments with a specific focus on the distinction between different dimensions of self-efficacy (social, academic, and emotional) in terms of how they relate to attentional control by utilizing longitudinal designs. Finally, the participants of Studies 1 and 2 were not comparable in terms of age and other characteristics since the assessment of executive attention through behavioral tasks was done in the laboratory and thus relied on a student sample.

In sum, based on the results obtained from the two studies, it can be concluded that the Turkish version of ACS is a reliable and valid scale that can be used to assess perceived attentional control capacity. The present study has important implications for mainly clinical psychology, but due to the nature of attentional control as a variable linked to various aspects of human experience (O'Bryan et al., 2017), it is reasonable to expect ACS to be involved in studies focusing on other areas of psychology such as health psychology, cognitive psychology, as well as industrial, work, and organizational psychology.

References

Abasi, I., Mohammadkhani, P., Pourshahbaz, A., & Dolatshahi, B. (2017). The psychometric properties of Attentional Control Scale and its relationship with symptoms of anxiety and depression: A study on Iranian population. *Iranian Journal of Psychiatry, 12*(2), 109–117.

Altan-Atalay A. (2018). Moderator Role of Looming Cognitive Style (LCS) in the Relationship Between Attentional Control and Anxiety: Difference Between Shifting and Focusing Dimensions. *The Journal of psychology*, *152*(7), 445–455. https://doi.org/10.1080/00223980.2018.1466775

Altan-Atalay, A., & Sarıtaş-Atalar, D. (2018). Psychometric qualities of Turkish version of Perseverative Thinking Questionnaire (PTQ). *Journal of Rational-Emotive and Cognitive-Behavior Therapy, 36*(3), 252-266. https://doi.org/10.1007/s10942-018-0285-7

Anthony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment, 10*(2), 176-181. https://doi.org/10.1037/1040-3590.10.2.176

Armstrong, T., Zald, D. H., & Olatunji, B. O. (2011). Attentional control in OCD and GAD: Specificity and associations with core cognitive symptoms. *Behaviour Research and Therapy, 49*(11), 756–762. https://doi.org/10.1016/j.brat.2011.08.003

Arnett, J. J. (2011). Emerging adulthood(s): The cultural psychology of a new life stage. In L. A. Jensen (Ed.), Bridging cultural and developmental approaches to psychology: New syntheses in theory, research, and policy (p. 255–275). Oxford University Press

Bayram, N., & Bilgel, N. (2008). The prevalence and socio-demographic correlations of depression, anxiety and stress among a group of university students. *Social Psychiatry and Psychiatric Epidemiology, 43*(8), 667-672. https://doi.org/10.1007/s00127-008-0345-x

Beck, A. T., Brown, G., Steer, R. A., Eidelson, J. I., & Riskind, J. H. (1987). Differentiating anxiety and depression: A test of the cognitive content-specificity hypothesis. *Journal of Abnormal Psychology*, *96*(3), 179–183. https://doi.org/10.1037/0021-843X.96.3.179

Bilgel, N., & Bayram, N. (2010). Turkish version of the Depression Anxiety Stress Scale (DASS-42): Psychometric properties. *Archives of Neuropsychiatry, 47*, 118-126. https://doi.org/10.4274/npa.5344

Blekić, W., Bellaert, N., Rossignol, M., & Schultebraucks, K. (2023). Validation and Adaptation of the Attentional Control Scale Among a French-Speaking Population Through Factor and Network Analysis. *Journal of Psychopathology and Behavioral Assessment*, *45*(3) 1-12. https://doi.org/10.1007/s10862-023-10050-y

Blekic, W., Wauthia, E., Simoes Loureiro, I., Kandana Arachchige, K. G., Lefebvre, L., & Rossignol, M. (2018). *French validation of the Attentional Control Scale: Factor structure and relationships with symptoms of anxiety and depression* [Conference Presentation Abstract]. Ninth Biennial Belgian Brain Congress 2018, Leige, Belgium. https://doi.org/10.3389/conf.fnins.2018.95.00050

Clauss, K., & Bardeen, J. R. (2020). Addressing psychometric limitations of the Attentional Control Scale via bifactor modeling and item modification. *Journal of Personality Assessment*, *102*(3), 415-427. https://doi.org/10.1080/00223891.2018.1521417

Conners, C. K., Epstein, J. N., Angold, A., & Klaric, J. (2003). Continuous performance test performance in a normative epidemiological sample. *Journal of Abnormal Child Psychology*, *31*(5), 555-562. https://doi.org/10.1023/A:1025457300409

Cox, R. C., Cole, D. A., Kramer, E. L., & Olatunji, B. O. (2018). Prospective associations between sleep disturbance and repetitive negative thinking: The mediating roles of focusing and shifting attentional control. *Behavior Therapy*, *49*(1), 21-31. https://doi.org/10.1016/j.beth.2017.08.007

DeJong, H., Fox, E., & Stein, A. (2019). Does rumination mediate the relationship between attentional control and symptoms of depression? *Journal of Behavior Therapy and Experimental Psychiatry*, *63*, 28-35. https://doi.org/10.1016/j.jbtep.2018.12.007

De Raedt, R., & Koster, E. H. (2010). Understanding vulnerability for depression from a cognitive neuroscience perspective: A reappraisal of attentional factors and a new conceptual framework. *Cognitive, Affective, & Behavioral Neuroscience*, *10*(1), 50-70. https://doi.org/10.3758/CABN.10.1.50

Derryberry, D., & Reed, M. A. (1998). Anxiety and attentional focusing: Trait, state and hemispheric influences. *Personality and Individual Differences, 25*(4), 745-761. https://doi.org/10.1016/S0191-8869(98)00117-2.

Derryberry, D., & Reed, M. (2002). Anxiety-related attentional biases and their regulation by attentional control. *Journal of Abnormal Psychology, 111*(2), 225-236. https://doi.org/10.1037/0021-843X.111.2.225

DeVito, A. N., Calamia, M., Roye, S., Bernstein, J. P., & Castagna, P. (2019). Factor structure of the attentional control scale in younger and older adults: Relationships with anxiety and depression. *Journal of Psychopathology and Behavioral Assessment*, *41*(1), 60-68. https://doi.org/10.1007/s10862-018-9705-3

du Rocher, A. R., & Pickering, A. D. (2022). STAI-anxiety and STAI-depression revisited: Differential relationships with affective traits and attentional control. *Journal of Individual Differences*, *43*(4), 206–215. https://doi.org/10.1027/1614-0001/a000373

Ehring, T., & Watkins, E. R. (2008). Repetitive negative thinking as a transdiagnostic process. *International Journal of Cognitive Therapy*, *1*(3), 192-205. https://doi.org/10.1521/ijct.2008.1.3.192

Ehring, T., Zetsche, U., Weidacker, K., Wahl, K., Schönfeld, S., & Ehlers, A. (2011). The Perseverative Thinking Questionnaire (PTQ): Validation of a content-independent measure of repetitive negative thinking. *Journal of Behavior Therapy and Experimental Psychiatry, 42*(2), 225-232. https://doi.org/10.1016/j.jbtep.2010.12.003

Erdur-Baker, Ö., & Bugay, A. (2010). The short version of Ruminative Response Scale: Reliability, validity and its relation to psychological symptoms. *Procedia-Social and Behavioral Sciences, 5*, 2178-2181. https://doi.org/10.1016/j.sbspro.2010.07.433

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: attentional control theory. *Emotion*, *7*(2), 336-353. https://doi.org/10.1037/1528-3542.7.2.336

Fajkowska, M., & Derryberry, D. (2010). Psychometric properties of Attentional Control Scale: The preliminary study on a Polish sample. *Polish Psychological Bulletin, 41*(1), 1-7. https://doi.org/10.2478/s10059-010-0001-7

Fan, J., McCandliss, B. D., Sommer, T., Raz, A., & Posner, M. I. (2002). Testing the efficiency and independence of attentional networks. *Journal of Cognitive Neuroscience*, *14*(3), 340-347. https://doi.org/10.1162/089892902317361886

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175-191. https://doi.org/10.3758/BF03193146

George, D., & Mallery, M. (2010). *SPSS for Windows step by step: A simple guide and reference* (10th ed.). Pearson.

Güvendir, M. A., & Özkan, Y. Ö. (2022). Item removal strategies conducted in exploratory factor analysis: A comparative study, *International Journal of Assessment Tools in Education, 9*(1), 165-180. https://doi.org/10.21449/ijate.827950

Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika*, *30*(2), 179-185. https://doi.org/10.1007/BF02289447.

Hsu, K. J., Forgeard, M., Stein, A. T., Beard, C., & Björgvinsson, T. (2019). Examining differential relationships among self-reported attentional control, depression, and anxiety in a transdiagnostic clinical sample. *Journal of Affective Disorders*, *248*, 29-33. https://doi.org/10.1016/j.jad.2019.01.017

Jessup, S. C., Cox, R. C., & Olatunji, B. O. (2021). Differential effects of attentional control domains on the association between rumination and PTSD symptoms in trauma exposed veterans. *Personality and Individual Differences*, *178,* 110886. https://doi.org/10.1016/j.paid.2021.110886

Judah, M. R., Grant, D. M., Mills, A. C., & Lechner, W. V. (2014). Factor structure and validation of the Attentional Control Scale. *Cognition and Emotion, 28*(3), 433-451. https://doi.org/10.1080/02699931.2013.835254

Kertz, S. J., Stevens, K. T., & Klein, K. P. (2017). The association between attentional control, anxiety, and depression: The indirect effects of repetitive negative thinking and mood recovery. *Anxiety, Stress and Coping, 30*(4), 456-468. https://doi.org/10.1080/10615806.2016.1260120

Koster, E. H. W., Lissnyder, E. D., Derakshan, N., & Raedt, R. D. (2011). Understanding depressive rumination from a cognitive science perspective: The Impair Disengagement Hypothesis. *Clinical Psychology Review, 31*(1), 138-145. https://doi.org/10.1016/j.cpr.2010.08.005

Leleu, V., Rusinek, S., & Douilliez, C. (2022). French adaptation of the Attentional Control Scale: Confirmatory factor analyses and relationship with trait anxiety and efficiency of orienting, alerting, and executive control attentional networks. *European Review of Applied Psychology*, *72*(2), 1-10. https://doi.org/10.1016/j.erap.2021.100712

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with The Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy, 33*(3), 33-343. https://doi.org/10.1016/0005-7967(94)00075-U

Matsunaga, M. (2010). How to factor-analyze your data right: Do's, dont's, and how-to's. *International Journal of Psychological Research, 3*(1), 97–110. http://doi.org/10.21500.20112084.854

Melendez, R., Bechor, M., Rey, Y., Pettit, J. W., & Silverman, W. K. (2017). Attentional Control Scale for children: Factor structure and concurrent validity among children and adolescents referred for anxiety disorders. *Journal of Clinical Psychology*, *73*(4), 489-499. https://doi.org/10.1002/jclp.22346

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy, 28*(6), 487-495. https://doi.org/10.1016/0005-7967(90)90135-6

Michalko, D. (2018). Factor structure of Slovak adaptation of Attentional Control Scale. *Studia Psychologica*, *60*(1), 57-70. https://doi.org/10.21909/sp.2018.01.752

Mills, A. C., Grant, D. M., Judah, M. R., White, E. J., Taylor, D. L., & Frosio, K. E. (2016). Trait attentional control influences the relationship between repetitive negative thinking and

psychopathology symptoms. *Psychiatry Research, 238,* 277-283. https://doi.org/10.1016/j.psychres.2016.02.055

Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. *Cognitive Psychology*, *41*(1), 49-100. https://doi.org/10.1006/cogp.1999.0734

Molina, S., & Borkovec, T. D. (1994). The Penn State Worry Questionnaire: Psychometric properties and associated characteristics. In G. C. L. Davey & F. Tallis (Eds.), *Worrying: Perspectives on theory, assessment and treatment* (pp. 265–283). John Wiley & Sons.

Mueller, S. T., & Piper, B. J. (2014). The psychology experiment building language (PEBL) and PEBL test battery. *Journal of Neuroscience Methods*, *222*, 250-259. https://doi.org/10.1016/j.jneumeth.2013.10.024

Nolen-Hoeksema, S., & Morrow, J. (1991). A prospective study of depression and posttraumatic stress symptoms after a natural disaster: The 1989 Loma Prieta earthquake. *Journal of Personality and Social Psychology, 61*(1), 115-121. https://doi.org/10.1037/0022-3514.61.1.115

O'Bryan, E. M., Kraemer, K. M., Johnson, A. L., McLeish, A. C., & McLaughlin, L. E. (2017). Examining the role of attentional control in terms of specific emotion regulation difficulties. *Personality and Individual Differences, 108*, 158–163. https://doi.org/10.1016/j.paid.2016.12.015

O'Connor, B. P. (2000). SPSS and SAS programs for determining the number of components using parallel analysis and Velicer's MAP test. *Behavior Research Methods, Instruments, & Computers*, *32*(3), 396-402. https://doi.org/10.3758/BF03200807

Olafsson, R. P., Smari, J., Gudmundsdottir, F., Olifsdottir, G., Hardardottir, H. L., & Einarsson, S. M. (2011). Self-reported attentional control with the Attentional Control Scale: Factor structure and relationship with symptoms of anxiety and depression. *Journal of Anxiety Disorders, 25*(6), 777-782. https://doi.org/10.1016/j.janxdis.2011.03.013

Quigley, L., Wright, C. A., Dobson, K. S., & Sears, C. R. (2017). Measuring attentional control ability or beliefs? Evaluation of the factor structure and convergent validity of the Attentional Control Scale. *Journal of Psychopathology and Behavioral Assessment*, *39*(4) 742-754. https://doi.org/10.1007/s10862-017-9617-7

Posner, M. I., & Rothbart, M. K. (2007). Research on attention networks as a model for the integration of psychological science. *Annual Review of Psychology, 58*(1), 1-23. https://doi.org/10.1146/annurev.psych.58.110405.085516

Reinholdt-Dunne, M. L., Mogg, K., & Bradley, B. P. (2013). Attention control: Relationships between self-report and behavioral measures, and symptoms of anxiety and depression. *Cognition and Emotion*, *27*(3), 430-440. https://doi.org/10.1080/02699931.2012.715081

Salguero, J. M., Ramos-Cejudo, J., García-Sancho, E., Arbulu, I., Zaccagnini, J. L., Bjureberg, J., & Gross, J. J. (2021). Testing the impaired disengagement hypothesis: The role of attentional control and positive metacognitive beliefs in depression. *Behaviour Research and Therapy*, *146*, 103961. https://doi.org/10.1016/j.brat.2021.103961

Saulnier, K. G., Allan, N. P., Judah, M. R., Koscinski, B., Hager, N. M., Albanese, B., Knapp, A. A., & Schmidt, N. B. (2021). Attentional control moderates the relations between intolerance of uncertainty and generalized anxiety disorder and symptoms. *Cognitive Therapy and Research*, *45(6)*, 1193-1201. https://doi.org/10.1007/s10608-021-10223-7

Snyder, H. R., Miyake, A., & Hankin, B. L. (2015). Advancing understanding of executive function impairments and psychopathology: bridging the gap between clinical and cognitive approaches. *Frontiers in Psychology*, *6*, 328. https://doi.org/10.3389/fpsyg.2015.00328

Solianik, R., Brazaitis, M., & Skurvydas, A. (2016). Sex-related differences in attention and memory. *Medicina*, *52*(6), 372-377. https://doi.org/10.1016/j.medici.2016.11.007

Tabachnick, B. G., & Fidell, L. S. (2001). *Using Multivariate Statistics* (4th ed.). Allyn and Bacon.

Todd, J., Notebaert, L., & Clarke, P. J. (2022). The association between self-report and behavioural measure of attentional control: Evidence of no relationship between ACS scores and antisaccade performance. *Personality and Individual Differences*, *184*, 111168. https://doi.org/10.1016/j.paid.2021.111168

Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: a psychometric analysis. *Cognitive Therapy and Research, 27*(3), 247-259. https://doi.org/10.1023/A:1023910315561

Verstraeten, K., Vasey, M. W., Claes, L., & Bijttebier, P. (2010). The assessment effortful control in childhood: Questionnaires and the test of everyday attention for children compared. *Personality and Individual Differences, 48*(1), 59-65. https://doi.org/10.1016/j.paid.2009.08.016

Watkins, E. R., & Roberts, H. (2020). Reflecting on rumination: Consequences, causes, mechanisms and treatment of rumination. *Behaviour Research and Therapy*, *127*, Article 103573. https://doi.org/10.1016/j.brat.2020.103573

Williams, P. G., Rau, H. K., Suchy, Y., Thorgusen, S. R., & Smith, T. W. (2017). On the validity of self-report assessment of cognitive abilities: Attentional Control Scale associations with cognitive performance, emotional adjustment, and personality. *Psychological Assessment*, *29*(5), 519-530. https://doi.org/10.1037/pas0000361

Yılmaz, A. E., Gençöz, T., & Wells, A. (2008). Psychometric characteristics of the Penn State Worry Questionnaire and Metacognitions Questionnaire-30 and metacognitive predictors of worry and obsessive-compulsive symptoms in a Turkish sample. *Clinical Psychology and Psychotherapy, 15*(6), 424-439. https://doi.org/10.1002/cpp.589

Zhang, X., Wang, S., Sun, Y., & Ding, Y. (2023). Gender moderates the association between resting vagally mediated heart rate variability and attentional control. *Frontiers in Psychiatry*, *14*. doi: 10.3389/fpsyt.2023.1165467

Zhou, S. S., Fan, J., Lee, T. M., Wang, C. Q., & Wang, K. (2011). Age-related differences in attentional networks of alerting and executive control in young, middle-aged, and older Chinese adults. *Brain and Cognition*, *75*(2), 205-210. https://doi.org/10.1016/j.bandc.2010.12.003

Dikkat Kontrolü Ölçeği – Türkçe Versiyonu: Psikometrik Özellikleri, Faktör Yapısı ve Yönetici Dikkatin Davranışsal Ölçümleriyle Kıyaslanması

Özet

Dikkat kontrolü, sınırlı kaynakları dikkat için esnek bir şekilde kontrol edebilme ve durumsal gerekliliklere bağlı olarak kaynakların dağıtımında değişiklik yapabilme kapasitesini ifade eder (Derryberry ve Reed, 2002). Öz-düzenleme, duygu düzenleme, hazzı erteleme ve psikolojik sıkıntı belirtilerinde temel bir rol oynadığı bilinen dikkat kontrolü, Derryberry ve Reed (2002) tarafından, değiştirme ve odaklanma boyutlarından oluşacak şekilde kavramsallaştırılmıştır. Dikkat kontrolü ölçeği (DKÖ) de bu iki boyutu ölçmek üzere oluşturulmuş bir öz bildirim ölçeğidir (Derryberry ve Reed, 2002). Dikkat kontrol kapasitesi tanılar üstü bir kavram olması ve bireylerin psikolojik bozukluklara yatkınlıklarını açıklayan bir faktör olması nedeniyle DKÖ yıllar boyunca birçok araştırmacı tarafından kullanılmıştır. Ancak, 2010'ların başlarına kadar bu ölçek için kapsamlı bir faktör analizi çalışması yapılmamış; sonraki yıllarda yapılan çalışmalarda da faktör yapısı ile ilgili farklı sonuçlara ulaşılmıştır. Bu sebeple, ölçeğin faktör yapısının netleştirilmesi için halen çalışmalara ihtiyaç vardır.

Bu çalışma, DKÖ'nün Türkçe versiyonunun psikometrik özelliklerini incelemeyi amaçlamaktadır. Daha spesifik olmak gerekirse, birinci çalışma ölçeğin faktör yapısını ve iç tutarlılığını araştırmayı amaçlamaktadır. İkinci çalışma ise DKÖ ile dikkat kontrolünün davranışsal ölçümleri arasındaki korelasyonu incelemeyi amaçlamaktadır.

İlk çalışmaya 428 (306 kadın, 122 erkek) kişi katılmış; bu katılımcıların 66'sı test-tekrar test güvenirliğini ölçmek için 6 hafta sonra ölçekleri yeniden doldurmuşlardır. Ölçeklerin Türkçe'ye çevirileri tamamlandıktan sonra katılımcılara DKÖ, Depresyon Anksiyete ve Stres Ölçeği (DASÖ), ve Perseveratif Düşünce Ölçeği (PDÖ) verilmiştir. Ölçeğin faktör analizi için temel bileşen analizi kullanılmıştır. Sonuçlar 8., 9. ve 12. maddelerin çıkartılmasıyla ölçeğin iki faktörlü yapısını desteklemiş ve bu iki faktör %42.06'lık bir varyans açıklamıştır. Tüm ölçeğin ve değiştirme ve odaklanma alt ölçeklerinin iç güvenirlikleri sırasıyla .88, .85 ve .83; test-tekrar test sonuçları da .77, .74 ve .69 olarak bulunmuştur. Ölçek, perseveratif düşünme, depresyon ve anksiyete ölçekleri ile anlamlı koresyonlar göstermiştir; böylece ölçeğin uyum geçerliliği desteklenmiştir. Değiştirme ve odaklanma alt boyutlarının anksiyete ve depresyon ile farklılaşan ilişkilerini test etmek için hiyerarşik regresyon analizi yapılmıştır. Sonuçlara göre, anksiyete kontrol edildiğinde değiştirme boyutu depresyon ile anlamlı korelasyon göstermektedir, ancak odaklanma göstermemektedir. Depresyon kontrol edildiğine değiştirme ya da odaklanma alt boyutları anksiyete ile anlamlı korelasyon göstermemektedir. Son olarak,

değiştirme ve odaklanmanın, anksiyete ve depresyon kontrol edildiğinde perseveratif düşünme ile olan ilişkisi yine hiyerarşik regresyon ile test edilmiş ve perseveratif düşünme her iki boyut ile anlamlı ilişki göstermiştir. Ek olarak, hem tüm ölçek skorlarının hem de değiştirme ve odaklanma boyutlarının, cinsiyet ve yaşa bağlı olarak anlamlı bir farklılık gösterip göstermediği test edilmiştir. Cinsiyet farkını test etmek amacıyla, örneklemde kadın ve erkek oranı farklı olduğundan, kadın ve erkeklerden rastgele seçilen 210 kişiyle bir örneklem oluşturulmuş (91 erkek ve 109 kadın) ve bu iki grubun fark gösterip göstermediği test edilmiştir. Sonuçlar toplam DKÖ ve alt ölçeklerinde kadın ve erkekler arasında anlamlı bir farka işaret etmemektedir. Yaşın olası etkisini test etmek amacıyla örneklem 25 yaş altı ve 25 yaş üstü olarak iki gruba ayrılmış ve iki grup arasındaki fark test edilmiştir. Sonuçlara göre, odaklanma kapasitesinde iki grup arasında fark bulunmamış ancak değiştirme kapasitesi (t =2.726, p = .007, d = 5) ve toplam DKÖ kapasitesi skorlarında (t =2.141, p = .033, d = 8.56) 25 yaş altı olan grup anlamlı oranda daha yüksek bulunmuştur. Özetle, bu grubun değiştirme ve toplam DKÖ kapasitelerini 25 yaş üstü gruptan daha kötü olarak algıladıkları bulunmuştur.

İkinci çalışma, DKÖ'nün davranışsal ölçümlerle olan ilişkisini test etmeyi amaçlamıştır. Ayrıca, uyum geçerliğinin ikinci bir ölçümü olarak DKÖ'nün ruminasyon ve endişe ile olan ilişkileri de test edilmiştir. Bu amaçla, çalışmaya 97 (65 kadın, 32 erkek) üniversite öğrencisi katılmıştır. Katılımcılar DKÖ, Penn Eyalet Endişe Ölçeği (PEEÖ) ve Ruminatif Tepkiler Ölçeği'ni (RTÖ) doldurduktan sonra dikkat kontrolünün davranışsal bir ölçüm aracı olan Dikkat Ağ Testi'ne (DAT) katılmışlardır. Sonuçlara göre tüm DKÖ, endişe ve ruminasyonun her iki boyutu olan saplantılı düşünme (brooding) ve derin düşünme (reflective pondering) ile anlamlı seviyede pozitif ilişkiler göstermiştir. Dikkat kontrolünün değiştirme alt boyutu endişe ve yalnızca ruminasyonun saplantılı düşünme alt boyutu ile, odaklanma boyutu ise hem endişe hem de ruminasyonun her iki alt boyu ile anlamlı pozitif korelasyonlar göstermiştir. Ancak tüm DKÖ ve ölçeğin her iki alt boyutu Dikkat Ağ Testi (DAT) ile anlamlı korelasyonlar göstermemiştir. Bu sonuç, DK kapasitesini ölçmekte kullanılan davranışsal ölçümlerin ve öz-bildirime bağlı skalaların farklı kavramlar ölçüyor olabileceklerine işaret etmektedir. DKÖ'nün kişinin gerçek dikkat kontrolünden ziyade kişinin kendi dikkat kontrolüne dair algısını ölçtüğü fikrini desteklemiştir.