Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Validation of the Attentional Control Scale in the Spanish-Speaking Population and Creation and Adaptation of Its State Version

Óliver Jiménez
Universidad Alfonso X el Sabio
Natalia Ramos
nsramos@uma.es
Universidad de Málaga
Jol Chirinos
Universidad de Málaga

Research Article

Keywords: attentional control, validity, reliability, factor analysis, instrument adaptation, state version, trait version

Posted Date: September 23rd, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10608383/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Attentional control is a central component of cognitive and emotional self-regulation. However, few studies have validated instruments for its assessment in Spanish-speaking populations, particularly state-based measures. The present work comprises two independent studies. Study 1 aimed to validate the trait version of the Attentional Control Scale (ACS-Trait) in a Peruvian sample of 306 participants (M = 20.38 years, SD = 2.78; 70.79% women). Study 2 focused on the development and validation of a state version (ACS-State) in an independent sample of 648 participants (M = 24.80 years, SD = 6.12; 62.3% women). The results showed that the ACS-Trait exhibited a two-factor structure (distraction control and attentional flexibility), with adequate model fit indices (CFI = .93, RMSEA = .06), satisfactory internal consistency (α = .89, ω = .90), and evidence of convergent and discriminant validity. Likewise, the ACS-State demonstrated a two-factor structure that explained 77.2% of the total variance, excellent internal consistency indices (α = .97, ω = .97), and adequate indicators of convergent and discriminant validity. It is concluded that both versions of the scale exhibit robust psychometric properties for the assessment of attentional control in Spanish-speaking populations.

Introduction

Attentional control constitutes a fundamental component of executive functions, as it enables the voluntary regulation of attentional focus in the presence of relevant and irrelevant stimuli [12, 23, 34]. Traditionally, it has been conceptualized in two main dimensions: the ability to inhibit distractors and the flexibility to shift attentional focus, facilitating adaptation to changing cognitive demands [10, 16, 47]. Recent studies have confirmed the validity of this bifactorial structure across different populations, demonstrating its stability and relevance in everyday cognitive functioning [23, 28, 32].

In recent years, research has further explored the relationship between attentional control and emotion regulation, highlighting its role in vulnerability to psychological disorders. Several studies have found that deficits in attentional control are significantly associated with higher levels of anxiety, depression, and stress, suggesting that this construct acts as a protective factor against dysfunctional cognitive processes [10, 5]. In this regard, attentional control has also been linked to the ability to modulate emotional responses to negative stimuli, reinforcing its importance in explanatory models of psychopathology [4, 6, 9, 19, 24, 31].

Likewise, recent research has indicated that attentional control plays a mediating role in the relationship between cognitive and emotional variables. For example, it has been shown that low attentional control capacity strengthens the relationship between intolerance of uncertainty and anxiety symptoms, increasing the likelihood of maintaining persistent states of worry [18]. Similarly, Querstret and Cropley (2020) reported that difficulties in attentional regulation promote the emergence of repetitive negative thinking patterns, such as rumination, which is associated with depressive symptoms [43].

From the metacognitive model, it is proposed that difficulties in attentional control promote the persistence of repetitive negative thinking, particularly when individuals hold positive beliefs about the

usefulness of rumination [40]. Within this framework, attentional control constitutes a central process in cognitive and emotional regulation, as it enables individuals to direct and sustain attention toward relevant stimuli while inhibiting internal and external distractors; its study has gained particular interest in the clinical field due to its relationship with dysfunctional processes such as rumination and depressive symptoms [14, 21, 51].

On the other hand, empirical evidence has also shown that attentional control is not a completely stable construct but rather includes dynamic components that are susceptible to modification. Mindfulness-based and cognitive training interventions have demonstrated positive effects on improving trait attentional control, suggesting that it may vary depending on context and experience [9, 20, 26, 27]. Therefore, the assessment of attentional control in situational contexts is particularly relevant, as it allows the capture of variations in cognitive performance according to specific demands [3, 11, 29]. However, most available instruments primarily focus on measuring attentional control as a trait [7, 10, 13, 30, 35, 36, 39, 47], leaving aside its assessment in situational or state terms, in addition to having been developed in Anglo-Saxon contexts.

This limitation is relevant because attentional control may fluctuate depending on contextual demands, stress, or the cognitive load at a given moment [14, 37, 44]. Likewise, some studies have identified limitations in measurement through self-report instruments, showing that scores do not always correlate with behavioral measures of attention, suggesting that these instruments may reflect individuals' subjective perceptions [17, 23, 30, 41, 1, 45].

Therefore, the modification of the Attentional Control Scale (ACS; Salguero et al., 2021) toward a state dimension responds to the need to assess attentional control as a dynamic and situational phenomenon. Based on the above, the present work is organized into two independent studies: (a) Study 1 aims to validate the trait version of the ACS and examine its psychometric properties by analyzing its factorial structure, internal consistency, convergent validity, and discriminant validity; (b) Study 2 focuses on the creation and adaptation of a state version of the ACS (State-ACS) derived from the trait version, exploring its factorial structure, reliability, convergent validity, and discriminant validity.

Methods

Study 1: Validation of the Trait Version of the ACS

Participants

The sample consisted of 306 participants from the general Spanish-speaking population. The mean age was 20.38 years (SD = 2.78; M = 20.38 years). The gender distribution showed a predominance of female participants (70.79%) compared with male participants (29.21%).

Instruments

The Spanish adaptation of the Attentional Control Scale [46] in its trait version was used. The instrument consists of 12 items rated on a 4-point Likert scale (1 = "almost never" to 4 = "always"). It assesses two dimensions: distractor control (7 items) and attentional flexibility (5 items). The semantic content of the items was not modified.

Procedure

The study was approved by the Ethics Committee of the Universidad Católica de Santa María. Participants were recruited through convenience sampling in the university setting. All participants provided written informed consent. The questionnaires were administered online during face-to-face group sessions lasting approximately 15 minutes. Anonymity and confidentiality of responses were guaranteed.

Data Analysis

The analyses were conducted using Jamovi software version 2.7.24. Descriptive statistics were calculated. Internal consistency was estimated using Cronbach's alpha (α) and McDonald's omega (ω) coefficients. To examine the internal structure, an exploratory factor analysis (EFA) was performed using the maximum likelihood method with oblique (promax) rotation. Subsequently, a confirmatory factor analysis (CFA) was conducted. Model fit was evaluated using χ^2/df, CFI, TLI, RMSEA, and SRMR. Average variance extracted (AVE) and composite reliability (CR) were calculated for each dimension, and discriminant validity was assessed using the Fornell–Larcker criterion.

Study 2: Development and Validation of the State Version of the ACS

Participants

The sample was independent from that of Study 1 and consisted of 648 participants. The mean age was 24.80 years (SD = 6.12; M = 24.80 years). The gender distribution showed a predominance of female participants (62.3%) compared with male participants (35.7%).

Instruments

A sociodemographic questionnaire recording age and gender was used for data collection, together with the adapted version of the Attentional Control Scale [46] in its state format (State-ACS).

The State-ACS consists of 12 items rated on a 4-point Likert scale (1 = "almost never" to 4 = "always"). The instrument assesses attentional control in its state dimension and is organized into two theoretical dimensions: distractor control (7 items) and attentional flexibility (5 items). The items are designed to assess difficulties in maintaining attention in the presence of distractors, as well as the ability to shift or

regain attentional focus in response to different cognitive demands. The wording of the items was reviewed to ensure their linguistic and semantic appropriateness for the Spanish-speaking context while maintaining conceptual equivalence with the original version.

Procedure

The study was approved by the Institutional Research Ethics Committee of the Universidad Católica de Santa María (Favorable Opinion No. 234–2025 CIEI-UCSM), ensuring compliance with the ethical principles established in the Declaration of Helsinki [52] and the guidelines of the American Psychological Association [2].

The sample was recruited through coordination with the School of Psychology at UCSM. Participants were invited to take part in the study voluntarily after providing informed consent.

Data collection was conducted using self-report questionnaires administered online in controlled sessions, with the complete assessment lasting approximately 20 to 30 minutes. To assess the state dimension, participants first completed a brief 5- to 10-minute reading task involving a simple random text, after which the State-ACS was administered immediately.

Participants' anonymity was guaranteed by not collecting identifying information and by storing the data in coded form. Clear information was provided regarding the objectives of the study, the voluntary nature of participation, and the confidential handling of the data, ensuring compliance with current personal data protection regulations.

Data Analysis

Statistical analyses were performed using Jamovi software version 2.7.24. First, descriptive analyses were conducted to characterize the sample and examine the behavior of the main variables. Subsequently, the internal consistency of the instrument was evaluated using Cronbach's alpha (α) and McDonald's omega (ω) coefficients.

To analyze the internal structure of the instrument, an exploratory factor analysis (EFA) was performed using the maximum likelihood method with oblique (promax) rotation, allowing the identification of the underlying organization of the items while considering the possible correlation between factors. These analyses were complemented with confirmatory procedures (confirmatory factor analysis, CFA) and assessments of convergent and discriminant validity, in accordance with the instrumental approach of the study.

Results

Results of Study 1: Validation of the Trait Version of the ACS

Descriptive Analyses and Reliability

Table 1 presents the mean scores of the Trait ACS in the total sample. The observed values were at moderate levels.

Table 1
Mean Scores of the Trait ACS

Dimension	Mean	SD
Distractor control	19.85	5.01
Attentional flexibility	13.45	3.68
Total scale	33.30	8.10

The internal consistency was assessed using Cronbach's alpha and McDonald's omega coefficients (Table 2). The total scale showed excellent reliability (α = .89, ω = .90), as did its two dimensions.

Table 2
Reliability Indices of the Trait ACS

Dimension	α	ω
Distractor control	.86	.87
Attentional flexibility	.83	.84
Total scale	.89	.90

The corrected item–total correlations are presented in Table 3. All values exceeded .50, indicating adequate item homogeneity.

Table 3

Corrected Item–Total Correlations of the Trait ACS

Item	Correlation
1	.62
2	.65
3	.70
4	.60
5	.68
6	.58
7	.51
8	.64
9	.55
10	.63
11	.61
12	.59

Factor Structure

The sampling adequacy test showed a KMO index of .87 and a significant Bartlett's test of sphericity ($\chi^2 = 1876.54$, $df = 66$, $p < .00$), indicating that the data were suitable for factor analysis.

The exploratory factor analysis (EFA) extracted two factors with eigenvalues > 1, which together explained 59.2% of the total variance. The rotated factor loading matrix (promax rotation) is presented in Table 4. Items 1 to 7 loaded on the distractor control factor (loadings ranging from .52 to .78), whereas Items 8 to 12 loaded on the attentional flexibility factor (loadings ranging from .51 to .74). No relevant cross-loadings were observed.

Table 4

Rotated Factor Loading Matrix of the Trait ACS

Item	Distractor Control	Attentional Flexibility
1	.72	—
2	.75	—
3	.78	—
4	.68	—
5	.74	—
6	.62	—
7	.52	—
8	—	.65
9	—	.62
10	—	.74
11	—	.68
12	—	.51

Factor Structure (Confirmatory Factor Analysis)

The confirmatory factor analysis (CFA) of the two-factor model showed an adequate fit to the data: $\chi^2/df = 2.41$, CFI = .93, TLI = .91, RMSEA = .06 (90% CI [.05, .07]), SRMR = .05. The standardized factor loadings (Table 5) were significant ($p < .001$) and ranged from .54 to .77. The correlation between the two factors was $r = .48$, indicating a moderate relationship consistent with the literature.

Table 5

Standardized Factor Loadings of the Confirmatory Factor Analysis (CFA) Model

Item	Factor	Standardized λ
1	Distraction control	.68
2		.72
3		.77
4		.65
5		.70
6		.60
7		.54
8	Attentional flexibility	.62
9		.58
10		.71
11		.64
12		.55

Convergent and discriminant validity

Convergent validity was assessed through the average variance extracted (AVE) and composite reliability (CR). As shown in Table 6, both dimensions exceeded the recommended AVE criterion of ≥ .50 (Fornell & Larcker, 1981), and the CR was higher than .70.

Table 6

Convergent validity indices of the Trait ACS

Dimension	AVE	CR
Distraction control	.53	.87
Attentional flexibility	.50	.85

Discriminant validity was examined using the Fornell and Larcker criterion (Table 7). The square root of the AVE (values on the diagonal) was higher than the correlation between factors (r = .48), confirming that both dimensions are empirically distinguishable.

Table 7

Discriminant validity according to the Fornell–Larcker criterion

Dimension	Distraction control	Attentional flexibility
Distraction control	.73	—
Attentional flexibility	.48	.71

Equivalence with the Spanish version (factorial invariance)

To assess whether the factorial structure of the Trait ACS remains invariant between the Peruvian sample and the original version reported by Salguero et al. (2021), multigroup factorial invariance analyses were conducted following Byrne's (2010) hierarchical approach. Three models were sequentially tested: configural, metric, and scalar. The fit indices and changes in CFI and RMSEA are presented in Table 8. All changes were below the recommended thresholds (ΔCFI ≤ .01, ΔRMSEA ≤ .015), suggesting that the instrument functions equivalently in both contexts.

Table 8

Fit indices and factorial invariance of the Trait ACS

Model	χ^2	gl	CFI	RMSEA [IC 90%]	SRMR	ΔCFI	ΔRMSEA
Configural	356.21	98	.94	.058 [.050-.066]	.048	—	—
Metric	372.45	108	.93	.059 [.051-.067]	.052	.01	.00
Scalar	391.08	118	.92	.060 [.052-.068]	.055	.01	.00

Results of Study 2: Development and validation of the State ACS

Internal consistency

The first analysis was aimed at determining the degree of internal homogeneity of the State ACS. The scale achieved a Cronbach's alpha coefficient of .97, indicating excellent internal consistency.

The corrected item-total correlations (Table 9) ranged between .78 and .86, with no weak items or items showing anomalous functioning identified.

Table 9
Corrected item-total correlations of the State ACS

Item	Correlation
1	.81
2	.84
3	.86
4	.83
5	.85
6	.80
7	.78
8	.82
9	.79
10	.84
11	.83
12	.81

To complement Cronbach's alpha, McDonald's omega coefficient was also estimated. The results were equally high for both the total scale and each dimension: distraction control reached α = .96 and ω = .96; attentional flexibility obtained α = .95 and ω = .95; the total scale reached ω = .97. The convergence between both indices strengthens the reliability evidence of the State ACS.

Descriptive analyses

The observed means place the sample at an intermediate level of attentional control. The distraction control dimension reached a mean of 19.28 (SD = 4.96), while attentional flexibility obtained a mean of 12.86 (SD = 3.41). The total score of the State ACS was 33.14 (SD = 7.85), with an observed range between 12 and 48 points (Table 10).

Table 10
Descriptive statistics by dimensions of the State ACS

Dimension	Mean	DE	Min	Max
Distraction control	19.28	4.96	7	28
Attentional flexibility	12.86	3.41	5	20
Total State ACS	33.14	7.85	12	48

To further specify the behavior of the construct, scores were classified by levels. In distraction control, 54.0% of participants were located at the medium level, 20.8% at the low level, and 25.2% at the high level. In attentional flexibility, 52.8% were situated at the medium level, 22.8% at the low level, and 24.4% at the high level. This pattern confirms that the instrument adequately discriminates between differentiated levels of the construct.

Factor structure (exploratory analysis)

The appropriateness of the exploratory factor analysis was confirmed with a KMO index of .96 and a significant Bartlett's test of sphericity, $\chi^2(66) = 8456.32$, $p < .001$. Two factors with eigenvalues > 1 were extracted, explaining 77.2% of the total variance (Factor 1: 66.0%, Factor 2: 11.2%).

The rotated factor loading matrix (Table 11) shows that items 1, 2, 3, 4, 5, 6, and 8 loaded on the distraction control factor (loadings between .82 and .89), whereas items 7, 9, 10, 11, and 12 loaded on the attentional flexibility factor (loadings between .79 and .85). No relevant cross-loadings were observed.

Table 11
Rotated factor loading matrix of the State ACS

Item	Distraction control	Attentional flexibility
1	.84	—
2	.87	—
3	.89	—
4	.85	—
5	.88	—
6	.82	—
8	.86	—
7	—	.79
9	—	.81
10	—	.85
11	—	.83
12	—	.80

Factor structure (confirmatory analysis)

The bifactorial model was subjected to confirmatory factor analysis (CFA). The fit indices were adequate: $\chi^2/df = 2.47$, CFI = .96, TLI = .95, RMSEA = .05 (90% CI = [.04, .06]), SRMR = .04. The standardized factor loadings ranged between .65 and .81. The estimated correlation between both factors was r = − .04, indicating that, in the situational context assessed, the two dimensions operate as practically independent (Table 12).

Table 12
Standardized factor loadings of the confirmatory model

Item	Factor	Standardized λ
1	Distraction control	.68
2		.80
3		.81
4		.74
5		.77
6		.68
8		.79
7	Attentional flexibility	.65
9		.69
10		.76
11		.78
12		.76

Figure 1

Factorial structure of the bifactorial model of the Attentional Control Scale State (State ACS)

The correlation between both factors is low (r = − .04), suggesting that, although they belong to the same attentional control domain, they constitute empirically differentiated dimensions (Fig. 1).

Convergent and discriminant validity

Convergent validity was robust: distraction control presented an AVE of .64 and a CR of .94, whereas attentional flexibility showed an AVE of .61 and a CR of .92.

Discriminant validity, assessed through the Fornell–Larcker criterion, was established, as the square root of the AVE (.80 and .78) was higher than the squared correlation between factors ((-.04)² = .00). Therefore, the dimensions are empirically distinguishable.

Analysis of differences according to sociodemographic variables

It was examined whether attentional control presented variations according to gender and age. Using Student's t-test for independent samples, no significant differences were found in the total State ACS score between men and women ($p > .05$). No differences were observed in the specific dimensions either. Pearson's correlation between age and State ACS scores was not significant ($p > .05$), indicating that, within the age range considered, the attentional functioning assessed by the instrument does not vary linearly with age. These results support the applicability of the instrument in young adults without relevant demographic biases.

Discussion

The present study had two main objectives. Regarding the first objective—the validation of the Trait ACS in a Spanish-speaking population—the results of Study 1 confirm that the instrument presents solid psychometric properties comparable to those reported for the original Spanish version [46]. The bifactorial structure composed of distraction control and attentional flexibility was successfully replicated in the Peruvian sample, showing adequate fit indices (CFI = .93, RMSEA = .06) and robust internal consistency (α = .89, ω = .90). Likewise, evidence of convergent validity (AVE ≥ .50) and discriminant validity (Fornell–Larcker criterion fulfilled), together with the factorial invariance achieved with respect to the Spanish sample, supports its usefulness for the measurement of dispositional attentional control in clinical and research contexts.

Regarding the second objective—the development and validation of a state version—the State ACS has also demonstrated excellent psychometric performance. Its bifactorial structure explains 77.2% of the total variance, with high factor loadings and outstanding reliability indices (α = .97, ω = .97). Convergent validity (AVE > .60) and discriminant validity tests confirm that the two underlying dimensions are empirically distinguishable, supporting its use as a situational measure of attentional control immediately after task performance.

However, the most relevant and novel finding emerges when comparing both versions. Whereas in the Trait ACS the correlation between the factors distraction control and attentional flexibility was moderate (r = .48), in the State ACS it was practically zero (r = − .04). This marked structural divergence constitutes empirical evidence that attentional control, when assessed as a situational process, is organized differently from when it is evaluated as a stable disposition. Traditionally, cognitive-behavioral therapy models and psychological assessments have placed considerable emphasis on trait variables [22, 39, 45].

This finding has clinical and theoretical implications. Traditionally, cognitive-behavioral therapy models and psychological assessments have placed considerable emphasis on outcome variables such as well-being and symptomatology, as well as trait variables such as general emotional regulation and dispositional attentional control. It is implicitly assumed that the presence of a protective trait—such as emotional strength or attentional control—guarantees its manifestation during task performance or in a specific stressful situation [25, 33, 49].

The psychometric strength found in Study 1—characterized by robust factorial fit (CFI = .93, RMSEA = .06), internal consistency above .89 (α = .89, ω = .90), evidence of convergent validity (AVE ≥ .50), and confirmation of invariance with the Spanish version (ΔCFI ≤ .01)—consolidates the usefulness of the Trait ACS for the dispositional assessment of attentional control.

In turn, the results of Study 2—which reveal a bifactorial structure explaining 77.2% of the total variance, excellent reliability (α = .97, ω = .97), robust convergent validity (AVE > .60), optimal confirmatory fit (CFI = .96, RMSEA = .05), and empirical independence between its dimensions (r = − .04)—support the idea that the State ACS represents a pioneering tool that fills the existing gap in the assessment of process variables in situational contexts.

The brevity of both formats (12 items), together with the exceptional internal consistency achieved by the state version, makes them especially useful instruments for both population screening and experimental and clinical research, where rapid and reliable measurements of attentional functioning during task performance are required.

Limitations and future lines of research

First, the samples from both studies are predominantly young and highly educated (university population). This limits the generalizability of the findings to older populations, individuals with lower educational levels, or clinical contexts. Future research should replicate these analyses in more diverse samples, including older adults, individuals with lower educational attainment, and patients with anxiety or depressive disorders, where attentional control plays a relevant role.

A particular limitation of Study 1 is that the factorial invariance analysis was limited to comparison with the Spanish version [46], but invariance analyses between sexes or age groups were not conducted due to sample size. Although the sample size is adequate for CFA, it may not be sufficient for multigroup analyses with multiple categories. Future research with larger and more diverse samples could address this issue and confirm whether the Trait ACS measures the same construct equivalently in men and women, as well as across different age ranges.

In Study 2, the inducing task used (reading a random text for 5–10 minutes) may not have generated a sufficiently specific or intense attentional demand to fully activate the construct in its state dimension. Future studies could employ more demanding tasks (e.g., sustained attention tasks, cognitive

performance tests with time constraints) or experimentally manipulate different conditions (e.g., stress, fatigue, cognitive load) to examine the sensitivity of the State ACS to situational variations.

Second, neither study included external measures of related constructs (e.g., anxiety, depression, rumination, intolerance of uncertainty). However, the State ACS data challenge this assumption. Just as we do not assume that a person with low trait anxiety cannot experience state anxiety at a specific moment, we should not assume that a person with high trait attentional control will necessarily deploy that control in the here and now of an intervention.

Therapy addresses the training of cognitive flexibility and attentional control as process tools; however, it is rarely assessed whether the patient is able to mobilize these tools during task performance. This state scale fills that gap, offering clinicians the possibility of measuring not only what the patient has (trait), but what they are doing with it during the task.

Finally, the application of the State ACS requires contextual adaptation of certain items depending on the specific activity or task developed during the intervention. In particular, item 8 assesses the person's ability to distribute attention simultaneously among different relevant focuses of the task. Because these focuses may vary according to the application context, its wording should be modified to reflect the attentional demands of each activity, while maintaining the construct being measured unchanged: the capacity for shared or simultaneous attention during task performance. This adaptation should be carefully documented in each study to ensure the semantic and psychometric equivalence of the item.

Conclusions

In conclusion, the validated Trait ACS and the State ACS developed in this study are instruments with solid psychometric properties, although each presents differential characteristics that should be considered in their application.

The Trait ACS showed a bifactorial structure consistent with the original Spanish version [46], with adequate fit indices, satisfactory reliability ($\alpha = .89$, $\omega = .90$), and evidence of convergent and discriminant validity. Its equivalence with the Spanish version, confirmed through factorial invariance analyses, makes it a useful instrument for measuring dispositional attentional control in Spanish-speaking populations and for conducting cross-cultural comparative studies.

The State ACS, in turn, is a pioneering instrument in Spanish for assessing attentional control in its situational dimension. It shows excellent reliability ($\alpha = .97$, $\omega = .97$), a clear bifactorial structure, and strong evidence of convergent and discriminant validity. Its brief format and immediate administration after a specific task make it a promising tool for experimental and applied studies requiring the capture of fluctuations in attentional control within specific contexts.

Both instruments, developed independently and with differentiated samples, contribute to filling a significant gap in the assessment of attentional control in Spanish-speaking populations. The Trait ACS

provides a stable and generalizable measure of the construct, whereas the State ACS allows an approach to its dynamic and context-sensitive nature. Together, they open new lines of research on the relationship between dispositional and situational attentional control, its role in emotional and cognitive regulation, and its potential as a target for psychological interventions.

Future research should deepen the external validity of both instruments, explore their usefulness in clinical populations, and examine the sensitivity of the State ACS to change following cognitive training or mindfulness interventions. Likewise, it would be relevant to investigate the causes of the structural divergence between both versions, to determine whether it reflects genuine differences in the organization of the construct according to the level of measurement or methodological artifacts.

Declarations

Funding Declaration

This research was funded by the University of Málaga, Spain.

Ethical approval

The study was approved by the Institutional Research Ethics Committee of the Universidad Católica de Santa María. For Study 2, approval was granted under Favorable Opinion No. 234–2025 CIEI-UCSM. The study was conducted in accordance with the ethical principles established in the Declaration of Helsinki and the guidelines of the American Psychological Association.

Consent to participate

All participants provided informed consent prior to participation in the study. Participants were informed about the objectives of the study, the voluntary nature of their participation, and the confidential handling of their data. For Study 1, participants provided written informed consent before completing the questionnaires.

Consent to publish

Consent to publish was obtained from all participants for the publication of the study findings in an online open-access publication.

Author Contribution

All authors contributed equally to the conception and design of the study, methodology, data collection, data analysis, interpretation of results, and preparation of the manuscript. All authors contributed to the drafting, critical revision, and final approval of the manuscript and agreed to be accountable for all aspects of the work.

Data Availability

Data were generated specifically for this study through the administration of self-report questionnaires to participants in two independent samples. The generated data were used to examine the psychometric properties of the Trait Attentional Control Scale and to develop and validate its State version.

References

1. Abasi I, Mohammadkhani P, Pourshahbaz A, Dolatshahi B. The psychometric properties of the Attentional Control Scale and its relationship with symptoms of anxiety and depression: A study on the Iranian population. Iran J Psychiatry. 2017;12(2):109–18. https://pmc.ncbi.nlm.nih.gov/articles/PMC5483236/.
2. American Psychological Association. (2017). *Ethical principles of psychologists and code of conduct*. Retrieved June 3, 2026, from https://www.apa.org/ethics/code
3. Anderson BA. An adaptive view of attentional control. Am Psychol. 2021;76(9):1410–22. https://doi.org/10.1037/amp0000917.
4. Andries M, Robert AJA, Lyons AL, Rawliuk TRD, Li J, Greening SG. Attention control mediates the relationship between mental imagery vividness and emotion regulation. Conscious Cogn. 2024;125:103766. https://doi.org/10.1016/j.concog.2024.103766.
5. Bardeen JR, Fergus TA. The interactive effect of attentional control and intolerance of uncertainty on anxiety-related symptoms. J Affect Disord. 2020;276:100–7.
6. Bardeen JR, Tull MT, Dixon-Gordon KL, Stevens EN, Gratz KL. Attentional control as a moderator of the relationship between difficulties accessing effective emotion regulation strategies and distress tolerance. J Psychopathol Behav Assess. 2015;37(1):79–84. https://doi.org/10.1007/s10862-014-9433-2.
7. Burgoyne AP, Tsukahara JS, Mashburn CA, Engle RW. Nature and measurement of attention control. Jason Tsukahara; 2023.
8. Burgoyne AP, Tsukahara JS, Mashburn CA, Pak R, Engle RW. Nature and measurement of attention control. PsyArXiv. 2022. https://doi.org/10.31234/osf.io/7y5fp.
9. Chin B, Lindsay EK, Greco CM, Brown KW, Smyth JM, Wright AGC, Creswell JD. Mindfulness interventions improve momentary and trait measures of attentional control: Evidence from a randomized controlled trial. J Exp Psychol Gen. 2021;150(4):686–99. https://doi.org/10.1037/xge0000969.
10. Derryberry D, Reed MA. Anxiety-related attentional biases and their regulation by attentional control. J Abnorm Psychol. 2002;111(2):225–36. https://doi.org/10.1037/0021-843X.111.2.225.
11. Di Pompeo I, Marcaccio M, Migliore S, Curcio G. Assessing the attentional demand: Improvements to the experimental protocol and possible learning effects. Front Psychol. 2025;16:1640286. https://doi.org/10.3389/fpsyg.2025.1640286.

12. Diamond A. Executive functions. Ann Rev Psychol. 2013;64(1):135–68. https://doi.org/10.1146/annurev-psych-113011-143750.
13. Draheim CD, Tsukahara JS, Engle RW. (2023). Replication and extension of the toolbox approach to measuring attention control.
14. Draheim C, Pak R, Draheim AA, Engle RW. The role of attention control in complex real-world tasks. Psychon Bull Rev. 2022;29(4):1143–97. https://doi.org/10.3758/s13423-021-02052-2.
15. Draheim C, Tsukahara JS, Martin JD, Mashburn CA, Engle RW. (2021). A toolbox approach to improving the measurement of attention control.
16. Eysenck MW, Derakshan N, Santos R, Calvo MG. Anxiety and cognitive performance: Attentional control theory. Emotion. 2007;7(2):336–53. https://doi.org/10.1037/1528-3542.7.2.336.
17. Fajkowska M, Derryberry D. Psychometric properties of the Attentional Control Scale: A preliminary study on a Polish sample. Pol Psychol Bull. 2010;41(1):1–7.
18. Fergus TA, Bardeen JR, Orcutt HK. (2021). Attentional control as a moderator of the relationship between intolerance of uncertainty and anxiety. J Anxiety Disord, *79*, Article 102110.
19. Feutren T, Fabre L. (2026). How emotions influence cognitive control: A within-subject investigation. Behav Sci, *16*(1), Article 89.
20. Gkintoni E, Vassilopoulos SP, Nikolaou G. (2025). Mindfulness-based cognitive therapy in clinical practice: A systematic review of neurocognitive outcomes and applications for mental health and well-being. J Clin Med, *14*(5), Article 1703.
21. Hartikainen KM. (2021). Emotion-attention interaction in the right hemisphere. Brain Sci, *11*(8), Article 1006.
22. Hayes SC, Hofmann SG. Third-wave cognitive and behavioral therapies and the emergence of a process-based approach to intervention in psychiatry. World Psychiatry. 2021;20(3):363–75.
23. Hopfinger JB, Slotnick SD. Attentional control and executive function. Cogn Neurosci. 2019;11(1–2):1–4.
24. Hu B, Rao J, Li X, Cao T, Li J, Majoe D, Gutknecht J. (2017). Emotion regulating attentional control abnormalities in major depressive disorder: An event-related potential study. Sci Rep, *7*(1).
25. Hu T, Zhang D, Wang J. A meta-analysis of trait resilience and mental health. Pers Indiv Differ. 2015;76:18–27.
26. Hughes Z, Ball LJ, Richardson C, Judge J. A meta-analytical review of the impact of mindfulness on creativity. Psychon Bull Rev. 2023;30(6):2155–86.
27. Jha AP, Morrison AB, Parker SC, Stanley EA. Practice is protective: Mindfulness training promotes cognitive resilience in high-stress contexts. Mindfulness. 2021;12(1):1–15.
28. Judah MR, Grant DM, Mills AC, Lechner WV. Factor structure and validity of the Attentional Control Scale in nonclinical populations. Psychol Assess. 2021;33(2):123–35.
29. Kamran M, Hacker CD, Allen MG, Mitchell TJ, Leuthardt EC, Snyder AZ, Shimony JS. Resting-state blood oxygen level-dependent functional magnetic resonance imaging for presurgical planning.

Neuroimaging Clin N Am. 2014;24(4):655–69.

30. Khodami MA, Battaglini L, Jansarvatan M, Kireeva S, Bagheri S. Comparing self-report versus performance measures of attentional control and efficiency. NeuroSci. 2024;5(2):114–27.
31. Ladouceur CD, Conway A, Dahl RE. Attentional control moderates relations between negative affect and neural correlates of action monitoring in adolescence. Dev Neuropsychol. 2010;35(2):194–211.
32. Lee Y, Engle RW. (2026). Beyond working memory capacity: Attention control as the underlying mechanism of cognitive abilities. *Journal of Intelligence, 14*(2), Article 22.
33. Li Y, Zheng P. (2025). Trait resilience protects against social anxiety in college students through emotion regulation and coping strategies. Sci Rep, *15*(1).
34. Lowe CJ, Manocchio F, Safati AB, Hall PA. The effects of theta burst stimulation targeting the prefrontal cortex on executive functioning. Neuropsychologia. 2018;111:344–59.
35. Martin JD, Tsukahara JS, Draheim C, Shipstead Z, Mashburn CA, Edward VK, Engle RW. The visual arrays task. Visual storage capacity or attention control?; 2021.
36. Mashburn CA, Tsukahara JS, Engle RW. Individual differences in attention control. Implications for the relationship between working memory capacity and fluid intelligence; 2020.
37. Minnick MR, Pérez-Edgar KE, Soto JA. (2020). A disruption in the balance of attentional systems plays a role in trait anxiety. Brain Sci, *10*(10), Article 761.
38. National Institutes of Health. (2004). *Patient-reported outcomes measurement information system (PROMIS): Depression domain*.
39. Ólafsson RP, Smári J, Guðmundsdóttir F, Ólafsdóttir G, Harðardóttir HL, Einarsson SM. Self-reported attentional control with the Attentional Control Scale. J Anxiety Disord. 2011;25(6):777–82.
40. Papageorgiou C, Wells A. Positive beliefs about depressive rumination. Behav Ther. 2001;32(1):13–26.
41. Parmentier FBR, García-Toro M, Andrés P. The role of attentional control in cognitive performance. Cogn Process. 2020;21(3):345–56.
42. Psychological S, Instruments Database. &. (2025). Attention control: Improve focus & concentration.
43. Querstret D, Cropley M. Exploring the relationship between work-related rumination, sleep quality, and attentional control. J Occup Health Psychol. 2020;25(3):210–23.
44. Rojas-Thomas F et al. (2023). Impact of acute psychosocial stress on attentional control in humans. Neurobiol Stress, *25*, Article 100551.
45. Ryum T, Kazantzis NN. (2024). Elucidating the process-based emphasis in cognitive behavioral therapy. J Context Behav Sci, *33*, Article 100819.
46. Salguero JM, et al. Testing the impaired disengagement hypothesis: The role of attentional control and positive metacognitive beliefs in depression. Behav Res Ther. 2021;146:103961.
47. Townshend K, Bornschlegl M. (2024). Attention control scale (ACS). *Handbook of assessment in mindfulness research*.

48. Trapnell PD, Campbell JD. Private self-consciousness and the five-factor model of personality. J Personal Soc Psychol. 1999;76(2):284–304.
49. Troy AS, Mauss IB. (2011). Resilience in the face of stress: emotion regulation as a protective factor.
50. Wells A. (2009). *Metacognitive therapy for anxiety and depression.*
51. Wetzel N. (2014). Development of control of attention from different perspectives. Front Psychol, *5*.
52. World Medical Association. Declaration of Helsinki: Ethical principles for medical research involving human subjects. JAMA. 2013;310(20):2191–4.

Figures

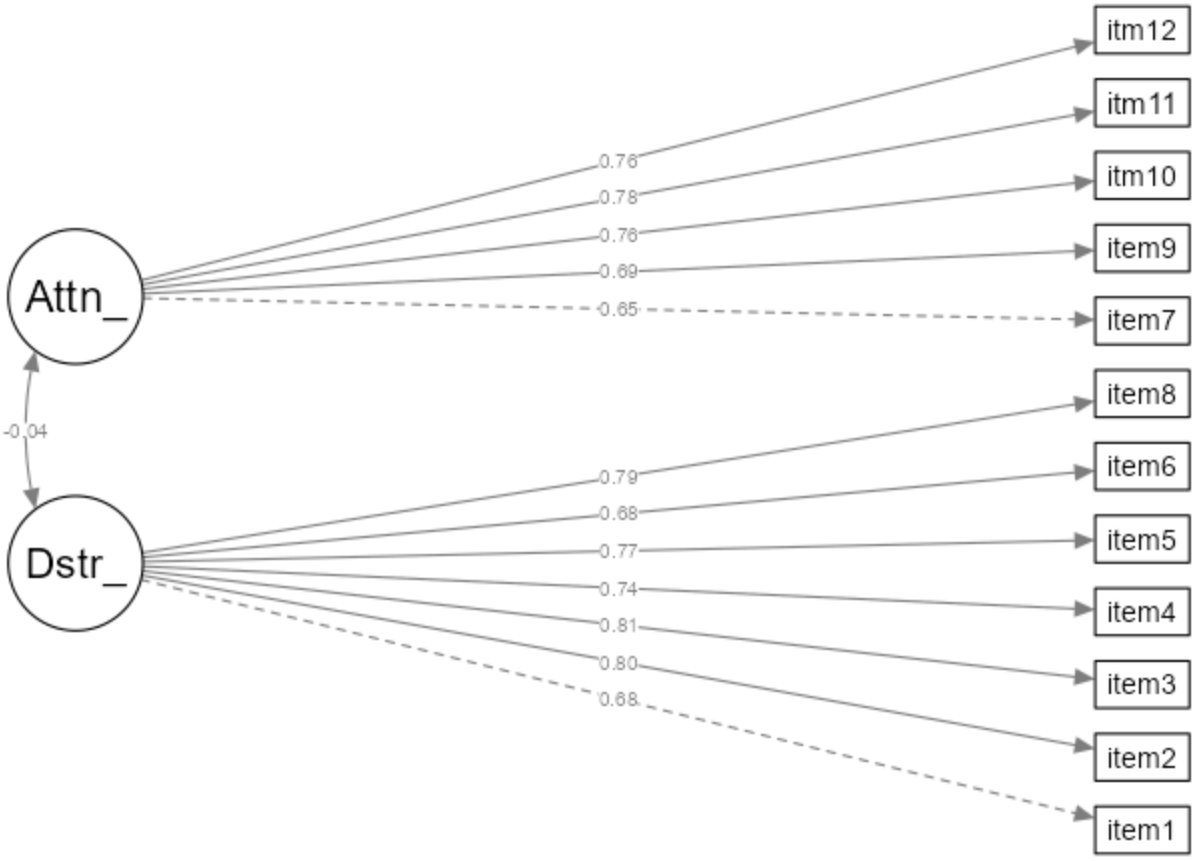


Figure 1

Factorial structure of the bifactorial model of the Attentional Control Scale State (State ACS)