



The eACS: Attentional control in the presence of emotion

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ABSTRACT

We present a questionnaire – The Emotional Attentional Control Scale (eACS) – An adaptation of the original Attentional Control Scale (ACS) that assesses the voluntary control of attention. A low score on the ACS has been associated with high levels of anxiety and depression. As the ACS items are affectively neutral, some people scoring high on the ACS may still show low levels of attentional control (AC) in more emotionally-demanding situations. We propose that the eACS, which focuses on the emotional modulation of AC, may explain additional variance in AC deficits associated with psychopathology.

The eACS showed one general factor for emotional AC. Both the ACS and eACS showed a negative correlation with trait anxiety (STAI-T) and depressive symptoms scores (BDI-II). In regression analyses, when accounting for the shared variance between the STAI-T and BDI-II, both the eACS and ACS explained independent variance in STAI-T scores ($\beta = -.23$, and $\beta = -.15$, $p < .001$, respectively).

The eACS has clear benefit in measuring AC deficits that are associated with psychopathology. Individual differences in AC in emotionally-demanding situations could be an important, and as yet underappreciated, aspect of psychopathology. Recommendations for future research are given.

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1. Introduction

Resource constraints in the attentional system limit the ability to process all environmental information at once. Instead, people must selectively attend to information that is relevant to their current goals (Eysenck, Derakshan, Santos, & Calvo, 2007). In the presence of threat, people often selectively attend to the sources of the threat at the expense of attending to other things (Berggren & Derakshan, 2013). This selectivity is typically more pronounced in high- versus low-anxious people (Massar, Mol, Kenemans, & Baas, 2011). High-anxious people show deficits in attentional control (AC) with enhanced orienting towards the sources of threat, which in turn disrupts directing attention elsewhere (Derryberry & Reed, 2002). Sources of threat can be physical or social (Garner, Mogg, & Bradley, 2006), so AC might be an important transdiagnostic mechanism underlying psychopathology including anxiety and depression (Ólafsson, Smári, Guðmundsdóttir, Ólafsdóttir, Harðardóttir, & Einarsson (2011)).

A widely-used self-report assessment of AC is the Attentional Control Scale (ACS; Derryberry & Reed, 2002). It uses affectively

neutral items relating to mundane tasks and emotionally insignificant distractions. These items assess individual differences in the ability to focus attention and shift it between tasks. Research exists in support of the relationship between AC deficits and depression and anxiety (see Ólafsson et al., 2011), but Derryberry and Reed (2002) showed evidence of a subgroup of high trait anxious people who also exhibit good AC as assessed by the ACS. Not all people who exhibit anxiety or depression also show deficits in AC in affectively neutral tasks (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van IJzendoorn, 2007). In certain situations, some people with high trait anxiety can exhibit compensatory control allowing them to inhibit their dominant attentional tendencies and to perform comparably to their low-anxiety counterparts (Berggren & Derakshan, 2013). For example, relative to non-anxious controls, anxious people have shown heightened activation of the brain's fronto-parietal attentional system in tasks such as the Stroop. This is thought to reflect increased attempts to inhibit task-irrelevant information (Basten, Stelzel, & Fiebach, 2011).

However, there are limits to the compensatory mechanisms used by high anxious people (Eysenck et al., 2007). When resources are further constrained, as in stressful or emotionally provocative situations, some trait-anxious people may have difficulty controlling their attention and preventing distraction. Performance in a demanding, emotional task such as the emotional Stroop task may then reflect that of someone low in AC even if they have a high score on the affectively-neutral ACS (Reinholdt-Dunne, Mogg, & Bradley, 2009).

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High trait-anxious/high ACS scorers who show low AC in emotional situations may be as vulnerable to developing attentional biases and anxious and depressive disorders as their high trait-anxious/low ACS scoring counterparts. However, perhaps for high trait-anxious/high ACS scorers, deficits in AC may be less apparent in mundane tasks than they are for low ACS scorers because of their use of compensatory neural mechanisms (Reinholdt-Dunne et al., 2009). The ACS might be inadequate in explaining much of the variance in performance of trait-anxious people in emotionally-demanding situations. Indeed, the relationship between trait anxiety and attentional effects in an affective task remained significant even when statistically controlling for ACS scores (Massar et al., 2011). If differences in AC explained a large portion of the variance in performance this would not be the case. There is value, therefore, in developing an assessment of attention in emotional situations.

Herein we present the development and analysis of an adaptation of the original ACS. Whereas the original ACS was concerned with assessing voluntary attentional processes in neutral situations (Derryberry, 2002), the Emotional Attentional Control Scale (eACS) is concerned with attention in the presence of emotion. We used multiple regression analyses to determine the associations of emotional AC with anxiety and depression. Given the well-known association between depression and anxiety, it is important to consider how their shared and unshared variances overlap with AC. To explore the unique variance in trait anxiety and depression that is explained by AC, the regression analyses accounted for the shared variance between anxiety and depression (Ólafsson et al., 2011). We expected the eACS to have one general factor related to the overall effect of emotion on AC and for this general factor to correlate with the original ACS. However, although the ACS should explain significant variance in trait anxiety and depressive symptoms, we expected that the eACS would explain additional, independent, variance, as well as correlate strongly with anxiety and depression even for those who scored highly on the original ACS.

2. Method

2.1. Participants

Four hundred and twenty-four University of Leuven first-year Psychology students completed a battery of questionnaires, in person, during one of two single collective sessions in order to gain course credit. Three hundred and twenty-seven participants had completed 80% or more of the ACS and eACS and so were included in the factor analysis of the eACS. Mplus (Muthén & Muthén, 1998–2012) provided maximum likelihood estimates for parameters with missing data. Thirty-six participants did not provide demographic information and a further 76 completed fewer than 80% of all items. All remaining data from 312 participants was included in the correlational analysis. These participants were 48 males and 264 females with a mean age of 18.2 (SD: 1.0).

2.2. Measures

2.2.1. Attentional control Scale (ACS)

The ACS is a 20-item questionnaire measuring the voluntary control of attention, including two subscales that are concerned with the ability to focus and shift attention (Derryberry & Reed, 2002). Cronbach's alpha was .85 in the present study.

2.2.2. Emotional Attentional Control Scale (eACS)

The eACS is a 14-item questionnaire that was created based on pilot testing of an original 18-item prototype. It focuses on the

internal and external modulation of AC by emotions. As with the ACS, participants respond on a 4-point Likert-scale from 0 (*almost never*) to 4 (*always*). See Table 1 for a list of the items.

2.2.3. State-Trait Anxiety Inventory – Trait version (STAI-T)

The 20-item trait subscale of the STAI (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) is a questionnaire that assesses the chronic experience of anxious symptoms where participants respond on a 4-point Likert-scale from 0 (*almost never*) to 4 (*almost always*). In this study, Cronbach's alpha was .91.

2.2.4. Beck Depression Inventory – second edition (BDI-II)

The BDI-II is a 21-item self-report assessment of depression (Beck, Steer, & Brown, 1996) on which participants rate on a 4-point Likert-scale, from 0 to 3, the degree of severity for each of the 21 symptoms included. In this study, Cronbach's alpha was .84.

2.3. Analytical procedure

Parallel analysis (Hayton, Allen, & Scarpello, 2004) guided the number of factors to be extracted from the exploratory factor analysis (EFA). Parallel analysis allows one to compare empirically-observed eigenvalues to those that would arise if all variables were uncorrelated in the population and were randomly sampled. Randomisation was replicated 1000 times providing a distribution of eigenvalues across all iterations. We then selected factors from the raw data with eigenvalues greater than those of the randomly-generated data.

From this, using Mplus, version 6.12, we conducted EFA with a robust weighted least squares estimator (WLSMV) and GEOMIN oblique factor rotation. Within the factor analysis the frequency distributions of responses for each item were considered as well as the factor loadings and correlations between items. This informed the inclusion and exclusion of items for subsequent analyses. A confirmatory factor analysis (CFA) using the same sample was performed as a preliminary test of the fit of the model expressed by the EFA. To assess model fit, we used the Comparative Fit Index (CFI; Hu & Bentler, 1999), Tucker–Lewis Index (TLI; McDonald & Marsh, 1990) and the root mean square error of approximation (RMSEA; Browne & Cudeck, 1993). Next, we assessed the reliability of scores on the eACS with the remaining items.

We compared scores on the eACS with scores from the original ACS in order to explore the relationship between neutral AC and AC when the object of attention or the cause of distraction, is emotional. We then made comparisons between the eACS and ACS and measures of anxiety and depression, first assessing the extent to which they correlate and then the extent to which our AC measures predicted scores on the STAI-T and BDI-II. Two hierarchical regression analyses were performed whereby gender and age were entered as predictors in the first step. In accordance with the procedure of Ólafsson et al. (2011) at the second step, the shared variance between the BDI-II and STAI-T was accounted for by entering BDI-II score when STAI-T score was the dependent variable (DV) and STAI-T score when BDI-II score was the DV. ACS scores were input at the third step, eACS was input at the fourth step, and their interaction was input at the fifth step.

3. Results

3.1. Exploratory factor analysis

Parallel analysis on the eACS showed three factors with eigenvalues of 6.14, 2.50 and 1.31, exceeding the eigenvalues of the raw data, which were 1.43, 1.35 and 1.28, respectively. From this,

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