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On the Validity of Self-Report Assessment of Cognitive Abilities: Attentional Control Scale Associations With Cognitive Performance, Emotional Adjustment, and Personality

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Individual differences in attentional control involve the ability to voluntarily direct, shift, and sustain attention. In studies of the role of attentional control in emotional adjustment, social relationships, and vulnerability to the effects of stress, self-report questionnaires are commonly used to measure this construct. Yet, convincing evidence of the association between self-report scales and actual cognitive performance has not been demonstrated. Across 2 independent samples, we examined associations between self-reported attentional control (Attentional Control Scale; ACS), self-reported emotional adjustment, Five-Factor Model personality traits (NEO Personality Inventory—Revised) and performance measures of attentional control. Study 1 examined behavioral performance on the Attention Network Test (ANT; Fan, McCandliss, Sommer, Raz, & Posner, 2002) and the Modified Switching Task (MST; Suchy & Kosson, 2006) in a large sample ($n = 315$) of healthy young adults. Study 2 ($n = 78$) examined behavioral performance on standardized neuropsychological tests of attention, including Conner's Continuous Performance Test-II and subtests from the Wechsler Adult Intelligence Scales, Third Edition (WAIS-III; Psychological Corporation, 1997) and Delis-Kaplan Executive Function System (D-KEFS; Delis, Kaplan, & Kramer, 2001). Results indicated that the ACS was largely unrelated to behavioral performance measures of attentional control but was significantly associated with emotional adjustment, neuroticism, and conscientiousness. These findings suggest that although self-reported attentional control may be a useful construct, researchers using the ACS should exercise caution in interpreting it as a proxy for actual cognitive ability or performance.

Keywords: attentional control, executive functioning, personality

Individual differences in attentional control and related aspects of executive functioning play a central role in emerging models of emotional adaptation, social functioning, health, and well-being. Executive functioning is a multifaceted construct comprising a number of basic neurocognitive processes and abilities, including working memory, cognitive flexibility, response selection, inhibition, initiation, set formation, and set maintenance (Suchy, 2009, 2015). Attentional control—the ability to voluntarily direct, shift, and maintain attention—is among a growing list of psychological constructs, including self-regulation, self-control, emotion regulation, and delay of gratification, that rely on—or are part of—executive functioning. Whereas *automatic* attention occurs spontaneously in response to stimuli and is present even among primitive species, *directed* attention, or attentional *control*, is considered an executive functioning skill (Posner & Dehaene, 1994). As an individual difference, low levels of attentional control characterize Attention Deficit Disorder (Seidman, 2006), whereas high levels of attentional control have been implicated in various forms of resilience (Mischel & Ayduk, 2004).

Attentional control is conceptualized as an individual difference in cognitive ability (Posner & Dehaene, 1994; Suchy, 2009); as such, it is most directly assessed by performance-based cognitive tasks (for reviews, see Chan, Shum, Toulopoulou, & Chen, 2008; Suchy, 2009). However, studies of the role of attentional control in emotional adjustment, adaption to stress, and interpersonal behavior often assess attentional control with self-report scales. In evaluating empirical support for models of attentional control and adaptive functioning, the extent to which self-reports reflect the construct of interest is a critical concern. Poor construct validity of self-reported attentional control would raise alternative interpretations (Strauss & Smith, 2009). The literature contains numerous examples of research examining the correspondence between self-reported cognitive abilities and objective indicators. For example, a recent meta-analysis found a modest, although significant, association between memory self-efficacy and performance on tests of memory (Beaudoin & Desrichard, 2011). Importantly, however, researchers do not tend to use self-reports of memory ability or memory complaints as proxy for actual memory ability. There is also a prior literature on the association between self-reported impulsivity and behavioral performance that, similarly, suggests a very small, but statistically significant, association, with the conclusion being that self-reports and laboratory tasks do not have

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much conceptual overlap (Cyders & Coskunpinar, 2011). Given the recent trends in the use of self-report measures of attentional control in prominent segments of the literature, the current research seeks to add clarity on the distinction between perception of attentional control and behavioral performance.

The present study examines the convergence of the most widely used self-report measure of attentional control—the ACS (Derryberry & Reed, 2002)—with an extensive set of well-validated performance-based measures of attentional control in two independent samples, as well as the association between the ACS and a range of competing constructs, including symptoms of emotional distress (e.g., depression, anxiety, worry) and the traits of the Five Factor Model (FFM) of personality (Costa & McCrae, 1992; Digman, 1990).

The Attentional Control Scale

Scores on the ACS (Derryberry & Reed, 2002) have been characterized as reflecting "voluntary capacities of the anterior attentional system . . ." (p. 9), or the "ability to voluntarily control attention . . ." (Gyurak & Ayduk, 2007, p. 888). This 20-item self-report scale includes items such as, "When I need to concentrate and solve a problem, I have trouble focusing my attention" (reverse scored), and "After being interrupted or distracted, I can easily shift my attention back to what I was doing before." A total score is calculated, but factor analyses suggest two components (Judah, Grant, Mills, & Lechner, 2014; Olafsson et al., 2011; Reinholdt-Dunne, Mogg, & Bradley, 2013). A *focusing* dimension reflects focusing attention in the presence of distractors (e.g., "When trying to focus my attention on something, I have difficulty blocking out distracting thoughts." reverse scored). A *shifting* dimension reflects the ability to switch attentional focus (e.g., "It is easy for me to alternate between two different tasks.").

The ACS has been widely used in research on conceptual models in which individual differences in the capacity to control attention function as a source of vulnerability or resilience. In these models, attentional control moderates the effect of stress or related factors on emotional, behavioral, or neurophysiologic outcomes. In other models, this cognitive ability is described as a mediator of associations linking other vulnerability factors with adaptive outcomes.

Two functional neuroimaging studies examined self-reported attentional control as a moderator. Mathews, Yiend, and Lawrence (2004) manipulated emotional (vs. nonemotional) encoding of fear-related stimuli, and found that higher scores on the ACS (i.e., better self-reported attentional control) were associated with greater activation in the rostral anterior cingulate cortex (rACC). This region is differentially activated when emotional stimuli are ignored (Bush, Luu, & Posner, 2000) and when individuals selectively attend to their own emotional reactions (Gusnard, Akbudak, Shulman, & Raichle, 2001), suggesting that high scores on the ACS were associated with greater exercise of emotion regulation in response to fear. Gyurak and colleagues (2012) found that the association between low self-esteem and activation of the rACC in response to experimentally manipulated exposure to scenes of social rejection (vs. nonrejection, negative scenes) was greater among individuals reporting better attentional control. Furthermore, low self-esteem was associated with rating rejection imagery as less arousing and involving less severe rejection among individuals reporting better attentional control. Gyurak and colleagues (2012) suggested that for low self-esteem individuals confronting the stress of rejection, the rACC underlies the buffering effects of attentional control.

In studies of protective effects of attentional control, ACS scores have been found to moderate a variety of influences on adaptive outcomes, including the association of fear of public speaking with speech performance (Jones, Fazio, & Vasey, 2012); the association of chronic rumination with symptoms of anxiety and depression (Fergus, Bardeen, & Orcutt, 2012); and the association of negative emotionality with insomnia (Mitchell, Mogg, & Bradly, 2012). In mediational studies, ACS scores at least partially account for the inverse association between social anxiety and positive affect (Morrison & Heimberg, 2013), and the positive association between retrospective reports of adverse events during childhood (e.g., harsh discipline, physical abuse, low levels of parental involvement and concern) with individuals' own levels of high risk (i.e., hostile or abusive) parenting in adulthood (Crouch et al., 2012). Thus, in these studies of factors linking emotional adjustment or early stress to (mal)adaptive functioning, self-reported attentional control as measured by the ACS appears to be an important mechanism.

Convergent and Discriminant Validity of the ACS

Although this research demonstrates the predictive utility of the ACS, the meaning of this evidence hinges on the extent to which self-reported attentional control reflects performance-based attentional control. The studies described previously provide only indirect evidence of the construct validity of the ACS. More direct demonstrations would be indicated by convergent associations between ACS scores and performance-based measures of the ability to focus and shift attention, as well as smaller discriminant associations with conceptually distinct constructs (e.g., emotional adjustment, personality; Campbell & Fiske, 1959; Strauss & Smith, 2009).

To date, research on the convergent and discriminant validity of the ACS is a source of concern. Initial evidence of validity was inferred from the finding that ACS scores moderated the degree of distractibility and punishment-related threat bias in trait anxious individuals, although strong associations with trait negative affectivity were also reported in the original study ($r = -.55$; Derryberry & Reed, 2002). Importantly, a recent study of over 200 nonclinical children found that the child version of the ACS correlated only modestly ($r = .24$) with a structured neuropsychological performance-based measure of attentional control, and was more closely associated with measures of anxiety and depression ($rs = -.51$ and $-.54$, respectively; Muris, van der Pennen, Sigmond, & Mayer, 2008), suggesting that ACS scores might reflect emotional adjustment, as opposed to attentional control abilities, per se.

Recent studies of adults have raised additional concerns. Reinholdt-Dunne and colleagues (2013) examined correlations of the ACS *focusing* and *shifting* scales with behavioral performance reflecting the executive control (or "conflict"), alerting, and orienting attention networks on the ANT in 190 undergraduates. Of these six correlations, only the association between ACS *focusing* and ANT Executive Control performance was significant ($r = .16$). Each of the associations of the ACS scales with self-reported anxiety and depression was significant (range of $r = -.24$ to $-.39$). Thus, in the largest convergent association, the ACS was very modestly associated with a behavioral measure of attentional control, whereas the discriminant associations were on average three times larger.

In two studies, Judah and colleagues (2014) reported similar results. In undergraduates, correlations of scores on the Letter-Number Sequencing (LNS) subtest of the Wechsler Adult Intelligence Scales, Third Edition (WAIS-III; Psychological Corporation, 1997) with the 20-item ACS scale scores, a shortened 12-item score, and its *focusing* and *shifting* subscales ranged from $r = .08$ to .34. The ACS scales were more closely and consistently associated with self-reported cognitive difficulties (range of $r = -.68$ to $-.37$) and social anxiety (range of $r = -.39$ to $-.50$). Although the LNS task is a measure of working memory rather than attentional control, per se (Crowe, 2000), controlled focusing of attention is nevertheless needed for performance of working memory tasks. Thus, the ACS might be expected to correlate more closely with this component of executive cognitive functioning than with self-reported cognitive difficulties or social anxiety.

In a second study of undergraduates, Judah and colleagues (2014) examined associations of the same four ACS scales with eye tracking measures of attentional control. Predicted convergent associations ranged from $r = -.04$ to .34 (median $r = .25$), whereas associations of the ACS scales with self-reports of depression and anxiety ranged from $r = -.43$ to $-.13$ (median $r = -.36$). Thus, although these three studies provide some evidence of convergent validity with performance measures of the construct, associations with conceptually less closely related constructs (e.g., emotional adjustment) were generally stronger and more consistent.

Given the role of method variance, significant associations of ACS scores with self-reports of emotional adjustment are perhaps expected, as are smaller cross-method associations with performance-based measures of attentional control. However, in research on models of attentional control as a risk or resilience factor, typically all of the systematic variance in ACS scores that contributes to expected associations is interpreted as reflecting this cognitive ability, as opposed to a combination of the cognitive ability (i.e., construct of interest) *and* the method of assessment. Hence, the issue of convergent and discriminant validity (Campbell & Fiske, 1959; Strauss & Smith, 2009) is central in the interpretation of such research. Poor discriminant validity of the ACS relative to measures of negative emotionality is particularly worrisome, as confounding of a hypothesized influence on emotional adjustment with measures of the outcome creates the potential for spurious supportive evidence in tests of related models. Reflecting a similar concern, related studies suggest that self-reports of the broader construct of executive functioning are much more closely correlated with the personality traits of conscientiousness and neuroticism than with performance-based measures of executive functioning (Buchanan, 2016).

The Present Study

The present study sought to replicate and extend prior research on the convergent and discriminant validity of the ACS (Judah et al., 2014; Reinholdt-Dunne et al., 2013). In the first sample of 315 undergraduates, we replicated analyses of predicted convergent associations of the ACS with a widely used performance-based measure of attentional control—the ANT (Fan et al., 2002)—also used by Reinholdt-Dunne and colleagues (2013), as well as the expected discriminant associations of the ACS with self-reported symptoms of depression and anxiety. In extending these analyses, we examined expected convergent associations with a second performance-based measure of attentional control, the MST, and additional divergent associations with the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) and the Whiteley-7 health anxiety scale (Fink et al., 1999; Pilowsky, 1967). Finally, in further novel analysis of discriminant associations, we examined associations of the ACS with the broad trait domains of the FFM of personality, as well as specific components or facets within those traits (Costa & McCrae, 1992). The FFM framework provides a valuable nomological net in comparing, contrasting, and ultimately integrating a wide variety of individual difference measures related to health and adaptive functioning (Smith & Williams, 1992). The prior evidence of associations of the ACS with anxiety and depression suggest that it is inversely correlated with neuroticism and its facets. Given the item content reflecting competent performance and related research on self-reports of general executive functioning (Buchanan, 2015), the ACS may also be associated with conscientiousness and its facets.

Sample 2 provided a conceptual replication of these expected convergent and discriminant associations, and extended the prior studies through additional performance-based measures of attentional control. The Conners' Continuous Performance Test (CPT-II; Conners, 2000) is a widely used standardized measure of attentional control, particularly attentional vigilance and response inhibition (Ballard, 2001; Riccio, Reynolds, Lowe, & Moore, 2002). Working memory subtests from the WAIS-III provided a measure of the ability to focus attention so as to hold and manipulate information in memory (i.e., in *immediate* short-term memory [STM]). Lastly, subtests from the D-KEFS provided standardized neuropsychological tests of executive functioning, including attentional control (i.e., focusing) and cognitive flexibility (i.e., shifting). We again examined discriminant validity through associations of the ACS with emotional adjustment and personality. Across both samples, the convergent and discriminant validity of the ACS would be demonstrated by significant associations of the ACS with behavioral performance measures of attentional control, which are larger than its associations with competing constructs, including emotional adjustment and personality. Poor discriminant validity would be evident in equal-sized or larger associations of the ACS with this latter group of measures, relative to its associations with the performance-based measures of attentional control (Campbell & Fiske, 1959; Strauss & Smith, 2009).

It is possible that ACS scores contain two components of systematic variance, one reflecting the intended construct and one involving the tendency to experience or report competence and (low) emotional distress. To address this possibility we also created residualized ACS scores removing the variance associated with emotional distress and personality, and examined their association with performance-based measures of attentional control.

Method

Participants

Participants in Sample 1 were 315 college students (50% female) who received course credit for their participation. Mean age was 20.8 ($SD = 2.7$). Because cognitive performance was indexed via response latencies, individuals older than 30 were excluded in order to reduce the effect of age on processing speed (Schretlen et al., 2000). The racial composition of the sample was 88.6% Caucasian, 4.4% Asian, 0.7% African American, 0.3% Pacific Islander, and 5.4% other; 7.3% of the sample identified their ethnicity as Latino/Latina. Sample 2 participants were 78 healthy adults (32% male; mean age = 27 years, $SD = 6.5$) recruited from undergraduate psychology courses and the community. The racial composition of the sample was 91% Caucasian, 5% Asian Pacific, 4% other. Again, to limit effects of age on processing speed, individuals older than 45 were excluded. Exclusion criteria for both studies were assessed by self-report: (a) English as a second language, (b) left-handedness, (c) physical or sensory impairment that would preclude test performance, and (d) use of medications that could influence cognitive functioning (e.g., neuroleptic or hypnotic medications).

Measures

Attentional Control Scale (ACS). The 20 Likert-item ACS was administered in both samples (Derryberry & Reed, 2002), with item responses from 1 (*almost never*) to 4 (*always*). As in prior research (Judah et al., 2014), four scores were calculated: the original 20-item total score (α Sample 1 = .84; α Sample 2 = .82), a 7-item *focusing attention* subscale score (α Sample 1 = .81; α Sample 2 = .81) and a 5-item *shifting attention* subscale (α Sample 1 = .71; α Sample 2 = .66) identified through factor analysis, and finally a 12-item total of the *focusing* and *shifting* scales (α Sample 1 = .82; α Sample 2 = .80). Total scores reflect general abilities controlling attention. The *focusing* subscale reflects focusing attention in the presence of distractors (e.g., *When I need to concentrate and solve a problem, I have difficulty focusing my attention*—reverse scored), and the *shifting* subscale reflects ability to switch attentional focus (e.g., *It is easy for me to alternate between different tasks*).

Performance measures of attentional control. Tasks were selected to provide assessments of overall attentional control, as well as specific components purportedly measured with the ACS subscales (i.e., focusing despite distraction, shifting from one task to another).

ANT—Sample 1. The ANT is a computer-based task designed to assess the efficiencies of three attentional networks: Alerting, Orienting, and Executive Control, with the latter network/variable being closely related to conceptual models of attentional control. All trials begin with the presentation of a cue, followed by a 400 ms delay interval, and end with the target presented either above or below a central fixation point. Each target includes a central arrow sometimes accompanied by congruent (same direction arrows) or incongruent (opposite direction arrows) flankers (i.e., one third of the trials consisted of neutral, nondirectional, flankers). Participants indicate the direction of a central arrow via input buttons on a mouse. Response times (RTs) are recorded and used to calculated the efficiency of the three networks, with smaller values indicating greater efficiency.

The Alerting variable measures how well attention is maintained across two potential target locations, and is calculated by subtracting the mean RT of the double-cue conditions from the mean RT of the no-cue conditions. The Orienting variable measures how well attention is relegated to the appropriate location, and is calculated by subtracting the mean RT of the spatial-cue conditions from the mean RT of the center-cue conditions. The Executive Control (EC) variable, which measures the ability to quickly select the correct response among competing, incongruent stimuli, is calculated by subtracting the mean RT of all *congruent* flanking conditions from the mean of all *incongruent* flanking conditions. Performance on trials associated with the EC network is associated with activation of the anterior cingulate cortex and regions of the prefrontal cortex (Fan, McCandliss, Fossella, Flombaum, & Posner, 2005), known to play a role in the cognitive construct of attentional control (Bush et al., 1999).

MST—Sample 1. Participants' abilities to form, switch, and maintain mental sets were tested with a modified switching task, a computer-based paradigm used to examine profiles of executive functioning (*see* Rau, Suchy, Butner, & Williams, 2015; Suchy & Kosson, 2006). Stimuli for this task consisted of letters, presented individually in various locations on the computer screen. Participants were required to classify the stimuli according to their semantic features (the "verbal task"; VT) or spatial location (the "spatial task"; ST).

Executive trials assessed the abilities to switch, form, and maintain mental sets. Increases in executive demands were accomplished by (a) presenting cues indicating the classification principle to be used in the subsequent block of trials, based on the classic switching task paradigm (Allport, Styles, & Hsieh, 1994; Jersild, 1927), and (b) arranging the sequence in which the trials occurred, based loosely on the Wisconsin Card Sorting Test (Heaton, Chelune, Talley, Kay, & Curtiss, 1993) and various continuous performance tasks (e.g., Connors, 2000). When a cue indicated a change, participants needed to switch to the new principle on the immediately following trial; these trials were referred to as "Switch" trials. When a cue did *not* indicate a change, participants simply needed to "reconsider" (Gopher, Armony, & Greenshpan, 2000) their current response set, ascertaining that their set and the cue matched and that no switching was required on the subsequent trials; these trials were referred to as "Form" trials. To increase set-maintenance demands, trial sequences were manipulated such that, some of the time, a series of *congruent* trials (i.e., only one possible correct response regardless of the current classification rule) was followed by an *incongruent* trial (i.e., two potentially correct responses, depending on classification rule). Thus, to perform correctly, participants need to *self-cue* to maintain mental set and to avoid allowing the congruent nature of these trials to lull them into inattentiveness; these trials were referred to as "Maintenance" trials.

Comparison trials served as a baseline of comparison for calculating costs associated with the extra demands of the *executive* trials, as is typically done in the switching task paradigm (Allport et al., 1994; Jersild, 1927). *Comparison* trials (i.e., trials that placed fewer demands on executive systems) were comparable to *Executive* trials but were *not* preceded by a cue and were *not* preceded by a series of congruent trials.

Order effects. Although task conditions (i.e., classifications based on semantic features vs. spatial location) were counterbalanced, an order effect was identified such that participants who began with the ST condition performed significantly more poorly on the ST trials relative to participants who began with the VT condition. To minimize this effect, we controlled for task order before calculating composite scores. This was done by performing a series of linear regressions, in which task order was used to predict the variable of interest (e.g., VT comparison trials) and unstandardized residuals were saved to reflect order-controlled values. We then used these order-controlled values when calculating the composite scores, described below.

Form, switch, and comparison scores. We first computed the median response latency and the percentage of errors for each participant separately for VT and ST, and separately for *Form, Switch*, and *Comparison* trials. Next, we subtracted the *Comparison* trial values from the corresponding *Form* and *Switch* values (separately for percent errors and response latencies) to generate the *Form* and *Switch* cost variables for VT and ST. Last, because both speed and accuracy are indices of forming and switching mental set, composite scores were created by generating principal component scores from each corresponding set of latency and error values. This resulted in a total of six scores (i.e., VT-Comparison, VT-Form, VT-Switch, ST-Comparison, ST-Form, ST-Switch). We then averaged across VT and ST conditions, resulting in three composite scores that were used in the final analysis.

Set maintenance scores. Consistent with prior use of this task (Rau et al., 2015; Suchy & Kosson, 2006), only accuracy data were used to compute *Maintenance* scores. We first computed the percentage of errors for (a) the strings of nine consecutive congruent trials, and (b) the immediately following incongruent trials, separately for VT and ST. These percentage scores were then entered into principal component analysis, producing one score for each condition (i.e., VT-Maintain, ST-Maintain). These resulting scores were averaged, producing a single composite score for use in the final analysis.

CPT-II—Sample 2. The CPT-II is a computerized task measuring attentional vigilance and response inhibition. Participants are instructed to respond as quickly as possible to target letters presented on a screen, and to abstain from responding to nontarget letters. Reaction time, accuracy, and response characteristics are recorded and used to index performance. In this study, summary measure *T* scores were averaged by attention domain to create three composite scores: (a) *Inattention,* reflecting slow, inaccurate, or inconsistent responding (i.e., percent omission errors, hit RT, hit RT standard error, variability, detectability, hit RT interstimulus interval change, and hit standard error interstimulus interval change); (b) *Impulsivity,* reflecting overly fast or inaccurate responding (i.e., percent commission errors, hit RT *reverse scored*); and (c) *Vigilance,* reflecting response consistency (i.e., hit RT block change, hit standard error block change). To index the degree to which each participant's performance pattern matched clinical profiles associated with Attention Deficit Hyperactivity Disorder (ADHD), we used the CPT-II Clinical Confidence Index score.

D-KEFS—Sample 2. Assessment of executive cognitive functioning involved standard administration and scoring of four subtests from the D-KEFS. From these subtests, conditions that reflect components of executive attentional control were selected: Trail Making (Number Letter Sequencing completion time), Color-Word Interference (Inhibition and Inhibition/Switching completion times), Verbal Fluency (Letter and Category correct responses), and Design Fluency (number of correct responses across three conditions). An executive function (EF) composite score was calculated by averaging the age-corrected scaled scores across the eight conditions, with higher scores indicating better performance.

Given the hierarchical organization of cognitive functions (Stuss, Picton, & Alexander, 2001), we controlled for lower-order processes that inherently confound assessment of EF. First, conditions that reflect lower-order processes (i.e., psychomotor speed, scanning and sequencing abilities, naming and reading abilities) were selected, including four conditions from the Trail Making Test (Visual Scanning, Number Sequencing, Letter Sequencing, Motor Speed) and two conditions from the Color-Word Interference Test (Color Naming, Word Reading). Next, a nonexecutive composite score was calculated by averaging the age-corrected scaled scores across the six component process conditions. We then removed the lower-order process variance from the EF composite by saving unstandardized residuals for the EF composite after controlling for the nonexecutive composite. This residual was used as the final measure in analyses.

Because of procedural modifications early in the study, the D-KEFS Trail Making Test was not included in the initial study protocol. Consequently, 12 participants received all D-KEFS measures except the Trail Making Test. We therefore imputed missing values by using scores obtained on the nine other test conditions included in the executive and nonexecutive composites, together with demographic variables (i.e., age, education, and gender), to predict the missing values. Cronbach's alphas were .75 for the executive composite and .81 for the nonexecutive composite.

Working memory composite—Sample 2. The ability to hold and manipulate verbally presented information (i.e., in *immediate* STM) was measured using two subtests from the WAIS-III. Scaled scores (i.e., age-corrected) from the Digit Span and Letter-Number Sequencing subtests were averaged together, creating a single composite score ($\alpha = .671$).

Emotional Adjustment and Personality

The Patient Health Questionnaire Depression Scale (PHQ-9) - Sample 1 (Kroenke, Spitzer, & Williams, 2001). The PHQ-9 is a well-validated measure of depression. The nine items are scored on a 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*).

Beck Depression Inventory-II (BDI-II)—Samples 1 & 2 (Beck, Steer, & Brown, 1996). The BDI-II is a 21-item self-report measure of depressive symptoms. Participants rate symptoms experienced during the past two weeks on a scale from 0 to 3, with higher scores indicating greater severity. The BDI-II evidences high internal consistency (Beck, Steer, Ball, & Ranieri, 1996) and test–retest reliability (Beck et al., 1996). Each participant's total BDI-II score was used in analyses.

Beck Anxiety Inventory (BAI) – Samples 1 & 2 (Beck, Epstein, Brown, & Steer, 1988). The BAI is a 21-item self-report inventory, in which respondents rate anxiety symptoms experienced during the past week on a scale from 0 (*not at all*) to 3 (*severely*). The BAI shows high internal consistency and discriminant validity and adequate test–retest reliability (Beck et al., 1988; Creamer, Foran, & Bell, 1995). The total BAI score was used in the analyses.

PSWQ—Samples 1 & 2. The PSWQ is a 16-item self-report measure of trait worry. Participants rate each item on a Likert scale ranging from 1 (*not at all typical of me*) to 5 (*very typical of me*). The PSWQ shows high internal consistency, good test–retest reliability, and strong discriminant validity in both clinical and nonclinical samples (Brown, Antony, & Barlow, 1992; Meyer et al., 1990).

Whiteley-7—Sample 1. The seven-item Whiteley Index (Pilowsky, 1967) is a measure of illness anxiety. Items are rated on a binary scale (i.e., yes or no), yielding a score ranging from 0 to 7. Previous research provides evidence of internal consistency and construct validity (Conradt, Cavanagh, Franklin, & Rief, 2006; Fink et al., 1999).

NEO PI-R Form S—Samples 1 & 2. The NEO PI-R (Costa & McCrae, 1992) is a 240-item self-report measure of the five major personality domains of Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness, each with six lower-order facets. Items utilize a 5-point Likert scale ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). The higher-order factors and the facet scales have demonstrated high internal consistency, test–retest reliability, and convergent and discriminate validity (Costa & McCrae, 1992).

Procedure

Eligible participants underwent IRB-approved informed consent procedures prior to completing the measures. Prior to beginning each cognitive performance task, participants were provided written and verbal instructions, a series of practice trials, and the opportunity to repeat practice trials if they felt they did not fully understand how to perform the task.

Results

Convergent and Discriminant Associations

Sample 1. As seen in Table 1, the four ACS scores were not significantly associated with performance on any of the ANT measures, including Executive Control. Similarly, of the 12 correlations between the ACS scores and the MST, only the correlation between ACS Shifting and MST Forming was significant ($r = .13$). In contrast, ACS scores were consistently and significantly negatively associated with depression, anxiety, worry, and health anxiety.

Sample 2. As seen in Table 2, none of the 32 correlations between the ACS scores and the CPT-II, Working Memory composite, or Executive Functioning composite was significant. In contrast, 4 of 12 associations between the ACS scores and measures of depression, anxiety, and worry were significant. Although this is a smaller proportion of significant associations than seen in Sample 1, the correlations are similar in magnitude across these samples, suggesting that the difference in sample size accounts for fewer significant associations.

Associations of ACS Scores With FFM Trait Domains and Facet Scores

ACS scores were negatively associated with Neuroticism, and positively associated with Conscientiousness, and to a lesser extent Extraversion and Openness (see Table 3). The associations with Neuroticism and Conscientiousness were generally larger than the associations of ACS scores with performance measures of attentional control. For example, in Sample 1 ACS-12 scores were more closely correlated with Neuroticism and Conscientiousness than with ANT-EC scores, both $ts(279) > 3.0$, $ps < .01$ (t test for

Table 1
Correlations Among Attentional Control Scale (ACS) Scores, Performance Measures of Attentional Control, and Emotional Distress in Sample 1

Measures	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Attentional control scale															
1. ACS 20 Total															
2. ACS 12 Total	**.96*****														
3. ACS Focus	**.85*****	**.90*****													
4. ACS Shift	**.76*****	**.77*****	**.42*****												
Attentional control behavioral measures															
5. ANT Executive Control	−.08	−.10	−.10	−.06											
6. ANT Alerting	.02	.00	.01	−.01	**.14***										
7. ANT Orienting	−.05	−.05	−.09	.03	−.00	.06									
8. MST Comparison	−.09	−.09	−.06	−.11	**.22*****	.08	−.03								
9. MST Switch	.05	.06	.02	.09	−.07	.06	**.14***	−.08							
10. MST Form	.09	.08	.03	**.13***	−.08	.04	.05	.03	**.33*****						
11. MST Maintain	−.04	−.04	.00	−.09	.03	.05	.08	**.49*****	.03	.04					
Emotional adjustment															
12. PHQ-9	**−.28*****	**−.31*****	**−.32*****	**−.18****	.03	.09	.08	−.01	−.04	−.01	.09				
13. BDI-II	**−.27*****	**−.30*****	**−.31*****	**−.18****	.04	**.11***	−.02	−.01	−.01	.01	.06	**.76*****			
14. BAI	**−.15****	**−.18****	**−.18****	−.11	.03	.10	−.02	.02	.07	**.14***	−.04	**.53*****	**.61*****		
15. PSWQ	**−.33*****	**−.32*****	**−.32*****	**−.21*****	.11	.06	−.01	**.14***	.03	−.04	.10	**.45*****	**.54*****	**.41*****	
16. WI-7	**−.28*****	**−.29*****	**−.28*****	**−.19*****	.04	.05	.08	.03	.02	.06	.01	**.36*****	**.34*****	**.37*****	**.37*****

Note. ANT = Attention Network test; MST = Modified Switching Test; PHQ-9 = Nine item depression scale of the Patient Health Questionnaire; BDI-II = Beck Depression Inventory 2; BAI = Beck Anxiety Inventory; PSWQ = Penn State Worry Questionnaire; WI-7 = Whiteley-7 Scale of Hypochondriasis. Significant correlations ($p < .05$) in bold.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2
Pearson Correlations Among Attentional Control Scale (ACS) Scores, Performance Measures of Attentional Control, and Symptoms of Emotional Distress in Sample 2

Measures	1	2	3	4	5	6	7	8	9	10	11	12
Attentional control scale												
1. ACS 20 Total												
2. ACS 12 Total	**.87*****											
3. ACS Focus	**.71*****	**.90*****										
4. ACS Switch	**.77*****	**.73*****	**.36*****									
Attentional control behavioral measures												
5. CPT-II Inattention	−.02	.01	−.02	.04								
6. CPT-II Impulsivity	−.04	.05	.08	−.01	−.15							
7. CPT-II Vigilance	−.01	.11	.06	.15	**.48*****	.01						
8. CPT-II Clinical CI	−.03	.02	.04	−.02	**.64*****	−.10	**.50*****					
9. WAIS-III Working Memory	−.20	−.14	−.14	−.10	−.06	**−.23***	−.00	−.15				
10. D-KEFS EF Composite	−.12	−.16	−.12	−.16	−.13	.06	.07	**−.30****	**.31****			
Emotional adjustment												
11. BDI-II	**−.25***	**−.27***	**−.32****	−.08	.07	.13	.10	−.04	.05	.01		
12. BAI	−.20	−.21	**−.25***	−.05	−.04	.17	−.03	−.08	.10	−.00	**.61*****	
13. PSWQ	−.20	−.15	−.16	−.07	−.09	−.12	−.06	−.07	.01	−.09	**.48*****	**.59*****

Note. CPT-II = Continuous Performance Test—Second Edition; WAIS-III = Wechsler Adult Intelligence Scale; D-KEFS = Delis-Kaplan Executive Function System; EF = executive function; BDI-II = Beck Depression Inventory 2; BAI = Beck Anxiety Inventory; PSWQ = Penn State Worry Questionnaire. Significant correlations ($p < .05$) in bold.
* $p < .05$. ** $p < .01$. *** $p < .001$.

difference between dependent correlations, comparing the absolute values of correlations; Blalock, 1960). Similarly, in Sample 2 ACS-12 scores were more closely correlated with Neuroticism and Conscientiousness than with D-KEFS composite scores, both $ts(78) > 2.0$, $ps < .05$.

In both samples, facet-level analyses of Neuroticism and Conscientiousness—the two FFM traits most closely associated with ACS scores—indicated that the ACS was significantly negatively associated with all Neuroticism facets and all facets of Conscientiousness except Order, with the strongest associations with Competence and Self-Discipline (see Table 4).

Analysis of Residualized ACS Scores

Using data from both samples, the four ACS scores were regressed on depression, anxiety, worry, and neuroticism, computing residual scores representing the variance in ACS scores that is independent of these indicators of emotional distress. We then correlated these residuals with each of the performance-based measures of attentional control. None of these correlations was significant ($ps > .05$). This pattern was the same when Conscientiousness was added to the set of predictors in the regressions generating the residual ACS scores. Hence, there was no evidence that a component of variance in ACS scores reflecting actual attentional control abilities would be revealed after removal of variance shared with emotional distress or perceptions of competence.

Summary

Overall, the results suggest several interrelated conclusions. First, scores on the ACS are not closely related to performance measures of attentional control specifically, or executive functioning more broadly, and hence should not be interpreted as reflecting individual differences in this aspect of cognitive functioning. Second, the individual performance measures do not reflect a single, overall dimension of attentional control or executive functioning. Hence, scores on a given behavioral measure of this domain should not be interpreted as necessarily reflecting other aspects of this clearly multifaceted domain (Suchy, 2009). Third, in no case did the ACS scores correlate more closely with an aspect of attentional control or executive functioning measured through behavioral performance than with measures of emotional adjustment or personality. Instead, ACS scores were more consistently related to overall (low) psychological distress and aspects of personality, specifically low neuroticism and high conscientiousness.[1]

[1] The larger size of Sample 1 provided the opportunity to test this general interpretation through exploratory factor analysis. An analysis of ACS Focus and Shift scales, BDI, BAI, PHQ, PSWQ, Whiteley Index, NEO-Neuroticism and Conscientiousness factor scores, ANT Alerting, Orienting, and Executive scores, and the MST Comparison, Form, Switch, and Maintain scores revealed five factors with eigenvalues greater than 1.0 (range = 3.15 to 1.05, next largest = 0.99), accounting for 68.8% of the total variance. Following oblique rotation, the first factor had high loadings for the BDI (.88), BAI (.76), PHQ (.82), PSWQ (.75), NEO-Neuroticism (.75), and the Whiteley Index (.53). The second factor had high loadings for the ACS Focus (.78) and Shift (.79) scales, and NEO-Conscientiousness (.56), and a substantial secondary loading for NEO-Neuroticism (−.48). The remaining three factors reflected pairs of behavioral performance measures: MST Comparison (.83) and Maintain (.80) scores; ANT Orienting (−.73) and Executive (.64) scores; and the MST Form (.78) and Switch (.78) scores. The largest loading for ANT Alerting (.27) was on the MST Comparison and Maintain factor. ACS factor scores were significantly associated with the first factor (i.e., emotional adjustment), $r(275) = -.25$, $p < .001$, and the MST Form and Switch factor, $r(275) = .13$, $p = .036$. The three cognitive performance factors were not significantly correlated. Hence, although there was some evidence that ACS scores had a small positive association with some behavioral performance measures of better attentional control, the ACS shared more variance with conscientiousness and general emotional adjustment.

Table 3
Pearson Correlations of Attentional Control Scale Scores With NEO-PI-R Trait Domain Scores in Sample 1 (S1) and Sample 2 (S2)

Trait domain	ACS 20 total		ACS 12 total		ACS Focusing		ACS Shifting	
	S1	S2	S1	S2	S1	S2	S1	S2
Neuroticism	**−.46*****	**−.51*****	**−.46*****	**−.49*****	**−.44*****	**−.48*****	**−.31*****	**−.31****
Extraversion	**.25*****	**.32****	**.22*****	**.27****	**.15****	.22	**.23*****	**.26***
Openness	**.20*****	−.06	**.17****	.03	**.12***	.09	**.18****	.08
Agreeableness	−.01	.04	−.01	.07	.01	.07	−.03	.03
Conscientiousness	**.30*****	**.42*****	**.33*****	**.43*****	**.30*****	**.37****	**.27*****	**.33****

Note. Sample 1 (S1) $n = 307$; Sample 2 (S2) $n = 78$. Significant correlations ($p < .05$) in bold.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Discussion

The ACS is increasingly used as a self-report measure of individual differences in the ability to voluntarily direct, shift, and sustain attention. This individual difference can be assessed more directly with a variety of performance-based behavioral measures (Suchy, 2009). In the present study of two young adult samples, ACS total scores, as well as the *focusing* and *shifting* attention subscales, were largely unrelated to well-validated performance-based measures. That is, there was little or no evidence of convergent validity in terms of associations with performance-based measures of attentional control.

Furthermore, replicating prior research (Judah et al., 2014; Reinholdt-Dunne et al., 2013), the ACS total scale and the *focusing* attention and *shifting* attention subscales were inversely related to measures of emotional distress, including depressive symptoms, worry, and to a lesser extent general anxiety and health-related anxiety. In an extension of prior research on discriminant validity, within the FFM of personality the ACS total scales and subscales were significantly negatively related to neuroticism, and consistently positively associated with conscientiousness, and to a lesser extent extraversion and openness to experience. Importantly, these associations of the ACS scales with emotional distress, neuroticism, and conscientiousness were not only more consistent than the expected but largely nonsignificant convergent associations with performance-based measures of attentional control, they were significantly larger.

It is important to note that prior studies of the ACS and individual differences in emotional distress may have underestimated the problem with discriminant validity. In the present study, the strongest correlation between a measure of emotional distress and the ACS was for depressive symptoms ($r = -.27$). In contrast, ACS scale association with neuroticism was substantially stronger ($r = -.51$). Thus, the association of ACS scores with constructs outside the conceptual definition of attentional control was even greater in the case of neuroticism than the previously documented associations with symptoms of depression and other forms of emotional distress. Among the more specific facets within the broader FFM domains, higher ACS scores were most closely associated with lower reports of vulnerability to stress, self-consciousness, and propensity to depressive symptoms, and higher reports of perceived competence and self-discipline. These findings illustrate the value of the FFM as a trait taxonomy or nomological net in construct validation for individual difference measures (e.g., Smith & Williams, 1992).

Table 4
Pearson Correlations of Attentional Control Scale (ACS) Scores With NEO-PI-R Neuroticism and Conscientiousness Facet Scale Score in Sample 1 (S1) and Sample 2 (S2)

Trait domain	ACS 20 total		ACS 12 total		ACS Focusing		ACS Shifting	
	S1	S2	S1	S2	S1	S2	S1	S2
Neuroticism facets								
Anxiety	**−.34*****	**−.50*****	**−.32*****	**−.42*****	**−.31*****	**−.40*****	**−.21*****	**−.27***
Angry Hostility	**−.29*****	−.15	**−.30*****	**−.27***	**−.31*****	**−.33****	**−.17****	−.06
Depression	**−.36*****	**−.36****	**−.38*****	**−.38****	**−.36*****	**−.39****	**−.26*****	−.21
Self-Consciousness	**−.35*****	**−.44*****	**−.33*****	**−.41*****	**−.33*****	**−.41*****	**−.20*****	**−.24***
Impulsiveness	**−.27*****	**−.39****	**−.27*****	**−.37****	**−.28*****	**−.34****	**−.15***	**−.26***
Vulnerability	**−.43*****	**−.45*****	**−.42*****	**−.38****	**−.34*****	**−.28***	**−.38*****	**−.39****
Conscientiousness facets								
Competence	**.37*****	**.51*****	**.41*****	**.45*****	**.35*****	**.33****	**.34*****	**.45*****
Order	.06	.18	.09	.22	.06	**.24***	.10	.08
Dutifulness	**.18****	**.31****	**.21*****	**.30****	**.20*****	**.28***	**.15*****	.22
Achievement Striving	**.26*****	**.25***	**.29*****	**.24***	**.25*****	.18	**.24*****	**.23***
Self-Discipline	**.37*****	**.43*****	**.38*****	**.48*****	**.35*****	**.45*****	**.28*****	**.33****
Deliberation	**.13***	**.29***	**.16****	**.30***	**.13***	**.25***	**.16****	**.26***

Note. Sample 1 (S1) $n = 307$; Sample 2 (S2) $n = 78$. Significant correlations ($p < .05$) in bold.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

The association between neuroticism and self-reported attentional control is reminiscent of prior research on other self-assessed characteristics. For example, neuroticism also has strong associations with self-assessed health (e.g., physical symptom reports; e.g., Larsen, 1992; Watson & Pennebaker, 1989). Similar to the issues outlined in the current article, several pointed critiques in the literature (e.g., Watson & Pennebaker, 1989) suggested that self-reported symptoms are an inadequate proxy for actual health, given their subjective nature and strong associations with personality. Yet subsequent research made the case that self-assessed health should be considered an important construct in its own right (e.g., Williams, Wasserman, & Lotto, 2003), in part because of its relevance to health-related self-regulation. Analogously, self-assessed attentional control may ultimately emerge as a meaningful individual difference factor, but it should not be characterized as a veridical index of cognitive abilities.

In sum, the ACS appears to be more appropriately interpreted as a measure of *subjective* or *perceived* levels of attentional control, with the important caveat that there is no evidence that these subjective reports reflect *actual* cognitive performance. Instead, the ACS might be better seen as related to—if not simply reflecting—generally positive self-perceptions of competence or self-efficacy in cognitive and emotional domains. Furthermore, this subjective assessment is inversely related to negative emotionality and positively associated with conscientiousness.

As a result, prior research using the ACS to test models of attentional control and adaptation should be interpreted with caution. The construct found to be related to emotional adjustment, social functioning, self-regulation, and neural activation in research using the ACS is more accurately characterized as perceived competence or (low) negative emotionality rather than actual cognitive underpinnings of self-regulation. Thus, as has been suggested by others, it is important to replicate findings linking this scale with adaptive outcomes (e.g., emotional adjustment, interpersonal functioning), using behavioral measures of attentional control (cf. Gyurak & Ayduk, 2007, p. 891).

The problematic evidence regarding the construct validity of the ACS in the present study and prior research (Judah et al., 2014; Reinholdt-Dunne et al., 2013) suggests caution when interpreting associations with scores on the ACS. The scale label should not be implicitly used as grounds for equating scores on the scale with the construct of attentional control. Equating a scale name and the construct assessed in the absence of appropriate evidence has been termed the "jingle fallacy" (Block, 1995)—the scale "sounds like" it should measure a specific trait, and this implied convergence is implicitly accepted. Until more compelling associations of the ACS with behavioral performance measures of attentional control emerges in future research, it is important to refer to the construct assessed by the ACS as *self-reported* attentional control rather than attentional control, per se.

Limitations

The largely Caucasian, young adult samples in the present study suggest caution in generalizing the findings, and the need for replication with more diverse groups. Also, it will be important to replicate the current findings with samples including individuals with a greater range and potentially more problematic levels of attentional control. Perhaps the ACS would demonstrate better construct validity in such contexts (Delis, Jacobson, Bondi, Hamilton, & Salmon, 2003). It is the case, however, that the present samples are similar to those used in several studies of attentional control and adaptation using the ACS.

It is also important to note that correlations among the various behavioral performance measures of attentional control were not consistent or large, although more so for the behavioral measures used in Sample 2 than in Sample 1. From the perspective of traditional convergent–discriminant validity analyses (Campbell & Fiske, 1959; Strauss & Smith, 2009), this complicates the interpretation of results to some extent. Greater convergence among this set of measures would have provided a stronger point of comparison for the associations of behavioral with self-report measures of attentional control.

However, it is important to note that the significant associations among the behavioral performance measures were more frequent than correlations of the ACS scores with these measures. Furthermore, high levels of association among these behavioral performance measures are not typical, given the multifaceted nature of this construct and prior findings (Duckworth & Kern, 2011). Indeed, these findings suggest that studies examining individual differences in attentional control, as well as executive functioning more broadly, exercise caution when using single measures to capture the construct, particularly experimental laboratory tasks. Overall, although the various behavioral measures of attentional control were not as closely related as might be expected in the case of a single-dimensional construct, the limited convergent validity of the ACS scales was demonstrated using a broad range of well-validated measures of this multifaceted cognitive domain.

Conclusions, Implications, and Future Directions

In research on adaptive outcomes associated with individual differences in self-regulatory processes, the use of self-report scales to measure such ability constructs is not limited to attentional control. For example, the closely related construct of *effortful control* is defined as the ability to exercise inhibitory control over otherwise automatic or impulsive responses, to activate desirable behavior even under difficult or low motivational conditions, and to exercise effortful attention; the latter ability is similar to the attentional control concept (Cain, DePanfilis, Meehan, & Clarkin, 2013). Self-reported effortful control predicts a variety of outcomes, such as interpersonal functioning (Cain et al., 2013; De Panfilis, Meehan, Cain, & Clarkin, 2013), but it is unclear if the association involves the actual ability or capacity to exercise effortful control. In a recent study of the association of self-reported effortful control with neuropsychological measures of attentional control and other components of executive function, self-reported effortful control was significantly correlated with behavioral measures in only 2 of 18 effects tested, and the absolute value of those significant correlations (rs = .19, .20) was significantly smaller than associations of self-reported effortful control with neuroticism (rs = −.38, −.41, −.47) (Bridgett, Oddi, Laake, Murdock, & Bachmann, 2013; Study 3). As noted previously, self-reports of the broader construct of executive functioning are minimally related to performance measures of these cognitive abilities but consistently associated with neuroticism and conscientiousness (Buchanan, 2016).

A related construct—*self-control*—involves the ability to inhibit and initiate behavior, persist in the face of difficulty, and control thoughts, emotions, and impulses. Self-reports of these regulatory abilities predict a wide variety of adaptive outcomes (Tangney, Baumeister, & Boone, 2004), but again it is unclear if these associations reflect the hypothesized underlying behavioral abilities. The common practice of using self-reports to measure behavioral or performance ability constructs in this general research area is analogous to testing correlates of the ability to delay gratification with simple self-report estimates of restraint as opposed to actual behavioral indicators, such as the widely known "marshmallow test" (Casey et al., 2011; Mischel, 2014). Endorsing statements such as, "Yes, I can wait; I can resist eating the marshmallow now" and the actual behavioral evidence supporting that claim are obviously two very different types of evidence regarding delay of gratification and self-control. The validity of self-reports of social–affective–cognitive abilities is also a concern in the measurement of emotional intelligence (Mayer, Salovey, & Caruso, 2008) and impulsivity (Cyders & Coskunpinar, 2011). Similarly, memory complaints are sometimes found to be more closely related to personality traits—especially components of neuroticism and conscientiousness—than performance on actual cognitive tests (Pearman & Storandt, 2005).

There are almost certainly key moderators of the association between perceived attentional control and behavioral indicators. Prior related literature suggests that specificity of self-report measurement in relation to the comparison performance task moderates the association. For example, self-assessments of ability on a *particular* memory task (vs. global memory self-efficacy) more strongly correlate with performance on that task (Beaudoin & Desrichard, 2011). Moreover, as in the memory literature, the ecological validity of attentional tasks may influence the strength of association with self-appraisals. In particular, computerized tasks may bear little resemblance to the types of behavioral indicators that individuals consider when making judgments about their own abilities.

The degree to which self-reports of attentional control correspond to behavioral performance will also be moderated by individual differences in *accuracy* of self-assessments. Although it is beyond the scope of the current paper to fully articulate this issue, this is clearly an important focus for future research. Notably, one manifestation of better executive functioning may be a more accurate sense about one's own cognitive ability and, hence, better self-regulation, broadly speaking. In a related example and literature, "overclaiming"—self-enhancement in rating one's own knowledge (Paulhus, Harms, Bruce, & Lysy, 2003)—is related to lower IQ scores (Paulhus & Harms, 2004). In other words, the individuals who are most likely to engage in self-enhancement of self-reported ability are also the people most likely to have objectively lower cognitive abilities. In another related example, personality factors predict the accuracy of self-assessment of functioning in instrumental activities of daily living (IADL) in relation to behavioral performance of such activities in older adults. Specifically, conscientiousness predicts underreporting of difficulties, whereas neuroticism and extraversion predict overreporting of problems (Suchy, Williams, Kraybill, Franchow, & Butner, 2010). This is noteworthy because the tasks in IADL testing have high ecological validity (e.g., making change, reading instructions on a medicine container). Accuracy of self-assessed cognitive ability is important because it is likely to influence self-regulatory behavior—individuals who overestimate their abilities may not devote sufficient planning, time, and organization to complex tasks. Furthermore, overestimation of abilities in older adults may result in poor decision making with respect to instituting environmental supports (compensatory strategies; e.g., assistance with medical regimen adherence).

It is important to note again that self-reports of attentional control, effortful control, and self-control have considerable evidence of predictive utility; these measures predict a wide variety of important outcomes. Yet it is unclear what construct(s) predicts those outcomes. If the goal of a given study is not simply to predict adaptive outcomes but to also test a theory about the role of individual differences in attentional or self-regulatory ability in those outcomes, then self-reports contain a worrisome ambiguity, as evident in studies of their convergent and discriminant validity. Direct performance-based measures can reduce that ambiguity.

Social and personality psychology research has been criticized for overreliance on self-reports of the outcomes of interest (Baumeister, Vohs, & Funder, 2007). The present results and those of other studies reviewed here suggest that an overreliance on self-reports of performance-based abilities that are the predictors of outcomes is also cause for concern. Fortunately, performance based measures are readily available in most cases (Suchy, 2009). Given the increasingly recognized role of these individual differences in cognitive aspects of self-regulation in many aspects of health and well-being (Williams & Thayer, 2009), self-report measures such as the ACS should perhaps be supplemented with—if not replaced by—performance-based measures in future research until additional evidence is available to establish the validity of these measures.

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