

# The Context Sensitivity Index (CSI): Measuring the Ability to Identify the Presence and Absence of Stressor Context Cues

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George A. Bonanno<sup>1</sup>, Fiona Maccallum<sup>2</sup>, Matteo Malgaroli<sup>3</sup>,  
and Wai Kai Hou<sup>4</sup>

## Abstract

The ability to accurately perceive cues to contextual demands across different situations has been identified as a crucial component of successful self-regulation. However, previous attempts to measure context sensitivity have suffered from serious methodological limitations, most notably the possibility that respondents may not possess sufficient knowledge of their own abilities, the confounding of perception of context with response to context, the use of only one or two contextual variations, and the failure to consider the abilities to both accurately detect contextual cues and accurately determine cue absence. This article reports a new, easy-to-administer scenario-based questionnaire measure, the Context Sensitivity Index (CSI), that addressed each of these limitations. The 20-item CSI was iteratively developed and normed using data from five studies to create separate indices to capture sensitivity to the presence of contextual cues (Cue Presence index) and to the relative absence of cues (Cue Absence index). We validated these indices against measures of flexibility, psychopathology, and other scales. Results are discussed in terms of the CSI's implications, limitations, and future applications.

## Keywords

context, regulation, emotion, stress, sensitivity

A considerable body of research has amassed over the past several decades documenting the important role that coping and emotion regulation play in psychological adjustment. The theory behind this research had been solidly grounded in a person-situationist perspective that highlights the necessity of adapting to continually changing situational challenges (e.g., Cole, Michel, & Teti, 1994; Folkman & Lazarus, 1985; Gross, 1998, 1999; Lazarus & Folkman, 1984; Mischel, 1973). Ironically, despite the dynamic nature of theory in this area, much of the research on coping and emotion regulation has used relatively static paradigms that tended to emphasize the supremacy of certain strategies over others. More recently, however, a growing number of investigators have revisited the interactionist approach and demonstrated that the efficacy of specific strategies varies markedly across situations and individuals (Birk & Bonanno, 2016; Bonanno, Papa, Lalande, Westphal, & Coifman, 2004; Bonanno, Pat-Horenczyk, & Noll, 2011; Sheppes et al., 2014; Tamir & Ford, 2012; Troy, Shallcross, & Mauss, 2013; Troy, Wilhelm, Shallcross, & Mauss, 2010; Westphal, Seivert, & Bonanno, 2010).

In response to these more varied findings, recent models of coping and emotion regulation have shifted away from the emphasis on specific strategies and toward a greater appreciation of flexibility in strategy use and, in particular, the moderating role of situational context (for reviews, see Aldao, 2013; Aldao, Sheppes, & Gross, 2015; Bonanno & Burton, 2013; Cheng, 2001; Cheng et al., 2012; Folkman & Moskowitz, 2004; Kashdan & Rottenberg, 2010). Simply put, the ultimate success or failure of a given regulatory strategy, these models suggest, depends to a large extent on how well that strategy meets the demands and opportunities

<sup>1</sup>Columbia University, Teachers College, New York, NY, USA

<sup>2</sup>University of Queensland, Brisbane, Queensland, Australia

<sup>3</sup>New York University School of Medicine, New York, NY, USA

<sup>4</sup>The Education University of Hong Kong, New Territories, Hong Kong SAR

## Corresponding Author:

George A. Bonanno, Department of Counseling and Clinical Psychology,  
Columbia University, Teachers College, 525 West 120th Street, Box  
218, New York, NY 10027, USA.

Email: gab38@columbia.edu

presented by the situational context. By extension, then, the first and arguably most crucial step in self-regulation involves the ability to read and decode contextual cues that signal the impinging demands and opportunities inherent in the situation (for reviews, see Aldao, 2013; Bonanno & Burton, 2013). One reason that contextual cues are so important is that this information guides downstream selection of the most appropriate strategies for subsequent regulation. A growing body of literature has shown, for example, that features of the stressor context (e.g., controllability of the situation) moderate the effectiveness of specific coping and emotion regulation strategies (Cheng et al., 2012; Troy et al., 2013). Thus, the degree to which a given stressor is in fact controllable or not is likely to be associated with more appropriate use of coping and emotion regulation strategies, and better outcomes over time. In contrast, the inflexible application of regulatory strategies, irrespective of the contextual demands is generally associated with poor mental health outcomes (Kashdan & Rottenberg, 2010; Levin et al., 2014).

The available research suggests marked individual differences in the ability to read contextual cues (e.g., Cheng, Chiu, Hong, & Cheung, 2001; Coifman & Bonanno, 2010; Rottenberg, Kasch, Gross, & Gotlib, 2002; Rottenberg, Gross, & Gotlib, 2005). Bonanno and Burton (2013) referred to this ability as *context sensitivity*. Crucially, however, despite the growing acknowledgment of the important role of situational context in regulatory success, there is not yet a simple, easy-to-administer measure of individual differences for this factor. In the current investigation, we sought to address this deficit. Specifically, we report five studies on the development and validation of a new questionnaire measure of individual differences in context sensitivity, the Context Sensitivity Index.

## Existing Measures of Context Sensitivity

Existing methods for measuring context sensitivity have greatly advanced research in this area. However, these measures are also limited in important ways. Experimental approaches to context, for example, typically focus on only one or two contextual features, such as collaboration versus confrontation (Tamir & Ford, 2012). More varied experimental approaches to context have also been developed using, for example, emotion-evoking films (Coifman & Bonanno, 2009, 2010; Rottenberg et al., 2002; Rottenberg et al., 2005) or context-specific interview tasks (Diminich & Bonanno, 2014). Other researchers have developed questionnaire measures to capture sensitivity to varied contexts. However, as we detail below, these approaches also suffer from crucial limitations.

### Emotion-Evoking Tasks

Emotion-evoking tasks are premised on the assumption that accurate processing of contextual cues is crucial for

matching the functional benefits of specific emotions with contextual demands (Lazarus, 1991, 2006; Smith & Lazarus, 1993). For example, the emotion of anger would provide the greatest functional benefit in situations where the perceived threat clearly results from the unjust actions of another, while sadness would be most functionally adaptive in situations of irrevocable loss where blame is not relevant (Lazarus, 1991, 2003; Smith & Lazarus, 1993). Context-sensitive responses to these cues are thus indexed by the presence of situation congruent emotional responses (e.g., self-report or facial expressions of emotion). This approach has produced compelling findings. Emotion context sensitivity has consistently been associated with positive mental health, for example, whereas context insensitivity has been associated with greater likelihood of emotional disorders, such as depression, anxiety, and complicated grief (Coifman & Bonanno, 2010; Coifman, Flynn, & Pinto, 2016; Diminich & Bonanno, 2014; Gehricke & Shapiro, 2000; Harvey, Coifman, Ross, Kleinert, & Giardino, 2014; Larson, Nitschke, & Davidson, 2007; Rottenberg et al., 2002; Rottenberg et al., 2005; Rottenberg & Gotlib, 2004; for reviews, see Bylsma, Morris, & Rottenberg, 2008; Coifman & Bonanno, 2009; Rottenberg, 2005).

The fundamental limitation of the emotion-evoking film and interview tasks is that they confound perception of context with response to context (Bonanno & Burton, 2013). Some people may accurately perceive the contextual nuances of a situation, for example, but are unable to respond in a situation-congruent manner. Because perception and context are confounded, however, it is impossible to untangle these possibilities. Contextual congruence may also vary across different modes of responses. For example, in a study of bereaved individuals, those suffering from grief-related psychopathology failed to show situation-congruent behavior in an emotion-evoking interview task, but only for expressive behavior and not self-reported emotion or emotion word use (Diminich & Bonanno, 2014). Finally, experimental and interview measures of context sensitivity are cumbersome and time-consuming, and thus, have limited utility for studies using longitudinal designs and large sample sizes.

### Questionnaires and Scenario-Based Indices

In response to this need, investigators have also attempted to capture contextual sensitivity using more easily administered questionnaires. One potentially serious limitation of using a self-report scale for this purpose, however, is that some or possibly most individuals may not possess accurate knowledge of their own sensitivity to contextual features. A related approach that avoids this problem is to index contextual perceptions in response to hypothetical scenarios (e.g., “turbulence on an airplane”). This method is essentially a hybrid of experimental and survey methods, with

the advantage of high external validity and generalizability to real-world situations (Atzmüller & Steiner, 2010). Because hypothetical scenarios can be standardized, they minimize the type of recall bias that normally results from questionnaires (Schwartz, Neale, Marco, Shiffman, & Stone, 1999). In addition, the use of hypothetical scenarios does not require that participants possess accurate knowledge of their own ability. Rather, they are simply required to respond to or evaluate the individual scenarios with which they are presented.

Cheng and colleagues used the scenario approach to capture contextually relevant coping strategies, which they referred to as discriminative facility (Cheng, 2003; Cheng et al., 2001; Cheng, Hui, & Lam, 2000; Chiu, Hong, Mischel, & Shoda, 1995). Although not specifically a measure of context sensitivity, discriminative facility assessed the frequency that participants' perceptions of the best coping responses to hypothetical stressful situations matched those that had been determined a priori by consensus from an independent set of raters (Chiu et al., 1995). When originally norming these situations, Chiu et al. (1995) presented a group of 10 raters a small set of potentially stressful scenarios and asked them to identify the best coping strategy from a set of strategies that involved either engagement (monitoring), such as observing other people for cues to appropriate behavior, or disengagement (blunting), such as distraction. Cheng et al. (2001) later expanded this measure to include more scenarios and provided evidence of the index's convergent validity (e.g., positive correlations with cognitive complexity and flexible coping (Cheng, 2003; Cheng & Cheung, 2005; Cheng et al., 2000; Cheng et al., 2001).

Although the discriminative facility measure made a significant advance, it was limited in several ways. First, as was the case for the emotion-evoking tasks, this measure confounds contextual appraisals with responses to context. Second, the possible responses to contextual stressors were always restricted to the same two opposing coping categories: monitoring and blunting. Additionally, the norming of the "appropriate" response for each scenario was based either on data from a small number of judges or inferred indirectly from previous research (e.g., a response was considered inappropriate if it had been associated with a poor outcome in a real-life situation; Cheng et al., 2001). Third, the discriminative facility measure only assessed perceptions of the optimal strategy but did not examine the converse, the ability to determine inappropriate strategies for a given scenario. As we elaborate below, there is reason to believe that the ability to detect the presence or relative absence of cues may be orthogonal.

## The Current Investigation

In the current investigation, we attempted to advance research on contextual sensitivity beyond the limitations of

previous measures by developing and validating a new scenario-based measure, the Context Sensitivity Index (CSI). In creating a new scenario-based index, we considered that such indices are predicated on two unique assumptions. The first assumption, shared by most questionnaire measurement scales, is that the latent construct cannot be measured directly but rather is inferred from other measurable variables. The second assumption however deviates from that which typically informs questionnaire scales. For questionnaire scales, each item is conventionally assumed to reflect the underlying latent construct. In other words, the construct defines the items (i.e., the items are *effect indicators*) and each item represents a version of the same underlying construct (Bollen & Lennox, 1991). Scales using effect indicators are typically developed through factor analytic procedures and tested for internal consistency using measures such as Cronbach's alpha. However, this approach has limited application to the measure of context sensitivity because it presumes that respondents have accurate, a priori knowledge of their own sensitivity to contextual features.

In contrast, in a scenario-based index, each item represents a unique aspect of the latent construct. In other words, the latent construct is dependent on and thus defined by the items (i.e., the items are *causal indicators*) (Bollen & Lennox, 1991; Edwards, 2011; Streiner, 2003). Using this approach to measure context sensitivity, we would expect that people who are more context sensitive would be those who more consistently and accurately perceived contextual cues across a greater number of independent situations (scenarios). However, because there are no constraints on the covariances among causal indicators (Bollen & Ting, 2000), they cannot be evaluated using conventional procedures, such as factor analysis or internal consistency (Bollen, 2002; Bollen, Lennox, & Dahly, 2009). Accordingly, to create the CSI, and to avoid problems inherent in previous measures of context sensitivity, we isolated perceptions of context from subsequent behavioral responses, and assessed a comprehensive set of contextual appraisal dimensions across a range of situations, including both highly demanding and less demanding situations. We then refined these items using normative responses obtained through an iterative process involving hundreds of raters.

Crucially, we also considered that individual differences in context sensitivity are likely to manifest not only in the ability to detect contextual cues but also in the orthogonal ability to detect their absence. Many types of dysfunction are characterized by insensitivity to cue absence. Depression, for example, has been associated with overgeneralization of negative cognition and a failure to modulate perceptions and reactions when negative cues are absent (Carver & Ganellen, 1983; Coifman & Bonanno, 2010; Rottenberg et al., 2005). Similarly, anxiety disorders have been associated with the inability to accurately differentiate threat from nonthreat cues and consequently with the overgeneralization of threat

reactions to nonthreatening situations (Levy-Gigi, Richter-Levin, Okon-Singer, Kéri, & Bonanno, 2016; Lissek, 2012; Lohr, Olatunji, & Sawchuk, 2007; Olatunji, Ciesielski, Armstrong, Zhao, & Zald, 2011). To capture this phenomenon, and to render the CSI a more sensitive predictor of psychopathology, we included appraisal-scenario combinations where the appraisal features were consensually perceived as highly present in the scenario (Cue Presence) and appraisal-scenario combinations where the appraisal features were consensually perceived as relatively absent in a scenario (Cue Absence). Finally, using these items, we created a Cue Presence index and a Cue Absence index and validated these indices against external measures. We hypothesized that accurate Cue Presence responses would be associated with other measures of context perception and flexibility, whereas accurate Cue Absence responses would be inversely associated with measures of stress and psychopathology.

In our first study, we presented a large group of participants with numerous scenarios and asked them to rate each scenario along various appraisal dimensions. Only scenarios that evidenced clear consensus for the presence or for the absence of key appraisal features were selected for further examination. In Study 2, we augmented the selected scenarios from Study 1 with several new scenarios and asked a new group of participants to rate their appraisal features. We then identified scenarios that had multiple appraisal dimensions with generally consensual ratings. Accordingly, we derived a set of 20 items based on six scenarios, such that each of five appraisal features had been rated as relatively highly present in at least two scenarios and rated as relatively minimal or absent in at least two scenarios. We included 10 filler items to ensure that each scenario was followed by the same number of appraisal dimensions. In Study 3, we established the reliability for the 30-item CSI (20 target items and 10 filler items) by asking another new group of participants to rate the same appraisal dimensions for each scenario. Additionally, we provided evidence for convergent and discriminant validity of the CSI Cue Presence and Cue Absence indices against other relevant questionnaire measures. In a fourth study, we provided additional evidence for the CSI's reliability and validity by comparing Cue Presence and Cue Absence scores with performance on an experimental task that captured sensitivity to contextual cues. Finally, in a fifth study, we examined whether the CSI would produce similar reliability and validity data without the filler items. Accordingly, we created a 20-item CSI with filler items removed, and again demonstrated the reliability and validity of the Cue Presence and Cue Absence indices against an additional set of questionnaire measures.

## Study 1: Item Identification

Our initial goal was to identify a set of hypothetical scenarios with not only identifiable appraisal features but also

sufficient variability to capture individual differences. It stands to reason that even the most context-sensitive person will only be able to perceive and understand the demands of a situation to the extent that such information is cued by the situational context (Bonanno & Burton, 2013). Therefore, we attempted to create a set of situational contexts with readily perceptible features that most people could agree were relevant to understanding the situational demands.

We began by obtaining normative ratings from several hundred respondents ( $N = 203$ ) using a large number of scenarios ( $N = 17$ ) and possible contextual appraisals ( $N = 6$ ). Our primary aim in this initial study was to identify scenario-appraisal combinations that showed high levels of consensus. We began with six appraisal dimensions (control by self, control by others, urgency, need for cooperation, uncertainty, and threat) that had been measured successfully in previous research (e.g., Cheng et al., 2012; Lazarus, 1991, 2006; Troy et al., 2013). However, we were agnostic in regard to which scenario-appraisal combinations might show the strongest consensus. To capture the ability to detect both the presence and absence of contextual cues, and to render the CSI a more sensitive predictor of psychopathology, we sought to identify appraisal-scenario combinations with the constraint that approximately half were on average perceived as highly present in the scenario (presence cues) and half were on average perceived as relatively absent in a scenario (absence cues).

## Method

**Participants and Procedure.** The study was conducted using Amazon's Mechanical Turk (Mturk) Service. Mturk facilitates high-quality data collection from a large pool of diverse participants. Recent studies have shown that Mturk participants performed similarly to participants recruited offline (e.g., Paolacci, Chandler, & Ipeirotis, 2010) and showed high test-retest reliability (Casler, Bickel, & Hackett, 2013). The questionnaire session was advertised on Mturk as a "Life Events Survey" and consisted of demographic items, the initial items from the CSI, and two attention check items that directed participants to respond in particular ways to ensure that they were paying attention and responding appropriately. Participants who failed to answer the attention check questions correctly were excluded from data analysis. Two hundred and three participants (107 males, 96 females) on average 33.3 years of age ( $SD = 9.98$ ) completed the measures and were paid \$2 for their participation.

The initial questionnaire consisted of 102 items, parsed into 17 brief, hypothetical scenarios, each followed by six appraisal dimensions. Each scenario was described in one or two sentences (e.g., "You are stuck in an elevator by yourself," "You have made a mistake on the job that shouldn't have happened. You now have to talk with your

boss about the mistake,” “You come home from vacation to find that your house has been robbed while you were away.”). Participants were asked to read each scenario and rate the scenario on six dimensions (control by self over what happens next, control by others over what happens next, urgency required, need for cooperation, uncertainty, and threat). Ratings were made on a 1 (*None/Not at all*) to 7 (*Very much/Extremely*) scale.

## Results

We aimed to identify scenarios for which specific appraisal dimensions were rated consistently high (Cue Presence) or consistently low (Cue Absence) and also evidenced sufficient variation to capture individual differences. Based on examination of box plots from individual items, we identified seven scenarios. These scenarios included Cue Presence and Cue Absence items for the appraisal dimensions of control by self, control by others, urgency, need for cooperation, and threat. In none of the scenarios, did ratings for uncertainty appraisals meet the criteria described above.

## Study 2: Further Item Identification and Refinement

To further refine the index, we added 5 new scenarios to the 7 scenarios retained from Study 1, for a total of 12 scenarios, and repeated the same procedures described in Study 1. Our goal in Study 2 was to identify the smallest possible set of scenarios such that each appraisal dimension was consistently rated as highly present (Cue Presence) in two scenarios and consistently rated low (Cue Absence) in two scenarios.

## Method

**Participants and Procedure.** The second version of the CSI consisted of 72 items, parsed into 12 hypothetical scenarios, again with each followed by six appraisal dimensions. The questionnaire was posted on Mturk using procedures identical to Study 1, and was completed by 202 participants (117 males, 85 females) on average 33.03 years of age ( $SD = 9.88$ ). Participants were paid \$1.50. Those who completed the first version of the questionnaire were ineligible for this study.

## Results

Using the criteria described in Study 1, we identified 20 appraisal items rated in different scenarios with the constraint that each appraisal dimension was consistently rated as highly present in two different scenarios and consistently rated as relatively absent in two different scenarios. To satisfy this constraint, a total of six scenarios were needed. Because

each scenario was rated for five appraisal dimensions (control by self, control by others, urgency to respond, need for cooperation from others, and level of threat), we retained the additional 10 appraisal ratings that were not used for the index as filler items. As in Study 1, the appraisal dimension of uncertainty failed to show consensus in participants' ratings. Accordingly, uncertainty was dropped from the index.

We used these data to create two indices: The *Cue Presence* index was composed of the 10 appraisal ratings that were evaluated as relatively highly present in the scenarios; the *Cue Absence* index was composed of the 10 items that were evaluated as relatively absent from the scenarios. The Cue Absence items were reverse-coded so that high scores reflected sensitivity to the absence of a contextual cue. The Cue Presence and Absence indices showed only minimal correlation,  $r = .15, p < .05$ . We also tested for the difference in products of random covariance pairings of four-item sets (the vanishing tetrads test; Bollen & Ting, 2000) separately for the Cue Presence and Cue Absence indices. These analyses consistently produced nonzero results, which supports the designation of the items as causal indicators. Descriptive data for the final 20 items (five appraisal dimensions rated across six scenarios) as well as the 10 filler items are presented for this study and subsequent studies in Table 1.

## Study 3: Reliability and Validity

In the third study, we administered and further tested the 20-item version of the CSI to a new group of participants. One goal of Study 3 was to establish the reliability of the 20-item CSI by comparing the means and standard deviations for the appraisal ratings in the current study with the previous study (i.e., comparing samples from Study 2 and Study 3). A second goal was to examine the validity and predictive utility of the Cue Presence and Cue Absence indices in relation to other relevant questionnaire measures.

As indicated earlier, we anticipated that the Cue Presence and Cue Absence indices of the CSI would show different patterns of association with other relevant measures. Context sensitivity has been conceptualized as one of the three sequential components of regulatory flexibility, along with strategy repertoire and feedback monitoring and adjustment (Bonanno & Burton, 2013). Because the detection of contextual cues is a crucial first step in flexible self-regulation, we predicted that the Cue Presence index would be meaningfully positive associated with measures of these other components of regulatory flexibility. In a related vein, because context sensitivity has been viewed as a key element of psychological adjustment, we also examined correlations of the CSI indices with measures of distress and psychopathology, specifically anxiety, depression, and stress. The most straightforward predictions were derived from previous research and theory, reviewed above,

**Table 1.** Item Means (Standard Deviations) for the CSI Individual Items and Cue Presence and Cue Absence Indices.

	Study 2 (n = 202)	Study 3 (n = 200)	Study 4 (n = 59)	Study 5 (n = 249)
CSI Cue Presence	55.9 (7.04)	56.0 (7.58)	54.2 (6.60)	52.8 (7.13)
CSI Cue Absence	53.6 (8.81)	56.1 (7.17)	51.0 (7.71)	55.4 (7.88)
1. A friend calls and asks you to do a favor for their partner, whom you don't like				
Control-self	6.12 (1.14)	6.16 (1.09)	5.44 (1.34)	5.83 (1.24)
Control-others R	3.30 (1.79)	2.94 (1.64)	3.35 (1.58)	3.11 (1.75)
Urgency (filler item)	3.47 (1.49)	3.52 (1.37)	3.92 (1.49)	—
Cooperation R	3.50 (1.81)	3.26 (1.67)	3.76 (1.70)	3.29 (1.89)
Threat R	2.14 (1.33)	1.94 (1.70)	2.22 (1.16)	2.16 (1.39)
2. Your partner is at risk for diabetes and has been told by his/her doctor to go on a diet. He/she is refusing				
Control-self R	3.00 (1.42)	2.88 (1.40)	3.51 (1.61)	2.57 (1.65)
Control-others	5.49 (1.75)	5.65 (1.80)	4.91 (1.87)	5.12 (1.95)
Urgency (filler item)	5.00 (1.46)	5.18 (1.50)	5.48 (1.35)	—
Cooperation	6.11 (1.32)	6.11 (1.42)	5.59 (1.64)	5.54 (1.75)
Threat	5.40 (1.17)	5.35 (1.40)	5.27 (1.46)	5.03 (1.58)
3. You are walking alone down a street when you see a person slip and fall. They hit their head when they land				
Control-self	4.89 (1.56)	4.89 (1.70)	5.12 (1.59)	4.47 (1.84)
Control-others (filler item)	4.06 (1.73)	4.26 (1.70)	4.44 (1.64)	—
Urgency	6.40 (1.00)	6.26 (1.12)	6.42 (1.03)	6.40 (0.91)
Cooperation	4.93 (1.80)	4.95 (1.65)	5.31 (1.22)	4.80 (1.79)
Threat (filler item)	5.22 (1.66)	5.24 (1.55)	5.93 (1.44)	—
4. You take a medicine and it makes you nauseous. Your doctor tells you that it is not serious and that you just have to "wait it out"				
Control-self (filler item)	3.06 (1.87)	3.01 (1.85)	3.77 (1.84)	—
Control-others R	2.84 (1.76)	2.36 (1.47)	2.66 (1.42)	2.77 (1.95)
Urgency R	3.26 (1.61)	2.91 (1.49)	2.89 (1.34)	3.02 (1.65)
Cooperation R	2.89 (1.88)	2.41 (1.53)	3.66 (1.85)	2.62 (1.68)
Threat (filler item)	3.10 (1.49)	2.77 (1.34)	3.61 (1.66)	—
5. You are reading a book while you wait for a flight. When the plane begins to take off you realize you have left the book in the waiting area				
Control-self R	1.76 (1.30)	1.77 (1.47)	2.67 (1.91)	1.71 (1.40)
Control-others (filler item)	3.22 (2.09)	3.52 (2.38)	3.59 (2.19)	—
Urgency R	2.23 (1.62)	2.11 (1.62)	2.61 (1.89)	1.84 (1.49)
Cooperation (filler item)	3.80 (2.28)	3.66 (2.40)	3.95 (2.25)	—
Threat R	1.45 (0.86)	1.36 (0.92)	1.67 (1.18)	1.50 (1.09)
6. You see somebody on a street suddenly punch another person. They turn to you angrily saying "What are you looking at?"				
Control-self (filler item)	4.80 (1.75)	4.79 (1.61)	4.97 (1.58)	—
Control-others	5.20 (1.53)	5.16 (1.46)	4.97 (1.47)	4.60 (1.76)
Urgency	5.46 (1.46)	5.56 (1.51)	5.37 (1.48)	5.19 (1.67)
Cooperation (filler item)	4.87 (1.69)	4.64 (1.87)	4.79 (1.57)	—
Threat	5.92 (1.21)	5.95 (1.14)	5.74 (1.10)	5.88 (1.19)

Note. CSI = Context Sensitivity Index. R indicates reverse coding.

indicating that people with elevated symptoms of distress and psychopathology tend to have difficulties determining the *absence* of contextual cues. Thus, we predicted that the Cue Absence index would be inversely associated with continuous measures of anxiety, depression, and stress. In addition, to further probe this question, we tested a compatible prediction that Cue Absence scores would be lower among individuals with clinically significant levels of psychopathology using the clinical cut-score for each psychopathology measure. We also included a measure of external locus of control. A person with a high external locus of control

tends to assume that chance, luck, or external factors drive behavior, and thus, tends to ignore contextual variation (Craig, Franklin, & Andrews, 1984; Davis, 2013). Although we anticipated that both the Cue Presence and Cue Absence indices might correlate inversely with this measure, because of the association of external locus of control with distress and psychopathology (Davis, 2013), we predicted that the inverse association would be stronger for the Cue Absence index. Finally, because the CSI uses a self-report format, we included a measure of response bias, the Marlowe–Crowne Social Desirability Scale (MCSDS) to examine the extent

that participants' responses might reflect their perceptions of the correct or desirable response. Because the CSI was developed as a scenario-based index that requires minimal self-knowledge about past behavior, we expected that scores on both the Cue Presence and Cue Absence indices would be relatively free of deliberate self-presentation bias and, thus, uncorrelated with the MCSDS.

## Method

**Participants and Procedure.** A set of questionnaires, including the 20-item version of the CSI developed in Study 2, was posted on Mturk using procedures described for the previous studies, and completed by 200 participants (115 males, 85 females) of mean age 34.19 years ( $SD = 9.54$ ).

The repertoire component of regulatory flexibility was measured using the Flexible Regulation of Emotional Expression Scale (FREE; Burton & Bonanno, 2016). The FREE produces two subscales, measuring the ability to enhance emotional expression and suppress emotional expression, as well as overall expressive flexibility. The feedback component of regulatory flexibility was measured using the Coping Flexibility Scale (CFS, Kato, 2012). The CFS produces two subscales measuring the ability to perceive and discontinue an ineffective coping strategy (evaluation coping) and the ability to produce and implement an alternative coping strategy (adaptive coping). We expected that the former would show the strongest relation to the CSI. External locus of control was measured using the total score from the Locus of Control of Behavior Scale (LCB; Craig et al., 1984), while response bias was measured using a short version of the MCSDS (Reynolds, 1982). Finally, we measured depression, anxiety, and perceived stress using both continuous and categorical (severe) scores from the Depression, Anxiety, Stress Scales (DASS, Lovibond & Lovibond, 1995).

## Results

Comparison of item means and standard deviations and index scores for the CSI from Study 3 with those from the previous study (Study 2), suggested good reliability (see Table 1). Similar to the previous study, the Cue Presence and Cue Absence indices were mildly correlated,  $r = .19$ ,  $p < .01$ . The validity of the CSI was also supported by the predicted pattern of correlations between Cue Presence and Cue Absence and other measures (see Table 2). Importantly, and consistent with our hypotheses, the Cue Presence and Cue Absence indices evidenced unique patterns of correlation with other measures. More broadly, these findings support the supposing that the ability to detect the presence of specific contextual cues depends on different skills than those used to ascertain the relative absence of specific contextual cues.

**Table 2.** Convergent and Discriminate Validity Measures.

	Cue Presence	Cue Absence
Study 3 ( $n = 202$ )		
FREE enhance	.19**	-.01
FREE suppress	.19**	.05
FREE flexibility	.16*	.01
CFS evaluation	.33***	.15*
CFS adaptive	.15*	.01
External locus control	-.10	-.25***
MCSDS (response bias)	.02	-.04
DASS stress	-.04	-.22**
DASS anxiety	-.21**	-.31***
DASS depression	-.10	-.19**
Study 4 ( $n = 59$ )		
WAIS picture arrangement	.41***	.02
Study 5 ( $n = 370$ )		
STAI state anxiety	-.07	-.19**
PHQ9 depression	-.02	-.21***
PACT forward focus	.06	-.04
PACT trauma focus	.35***	.04
PACT flexibility	.20***	-.01

Note. CSI = Context Sensitivity Index; DASS = Depression Anxiety Stress Scales; FREE = Flexible Regulation of Emotion Expression; CFS = Coping Flexibility Scale; MCSDS = Marlowe–Crowne Social Desirability; WAIS = Wechsler Adult Intelligence Scale. STAI = State-Trait Anxiety Inventory; PHQ9 = Patient Health Questionnaire; SWL = Subjective Well-Being; PACT = Perceived Ability to Cope with Trauma.  
\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

As predicted, the Cue Presence index correlated positively with measures of regulatory flexibility: the FREE and CFS. In other words, people who were sensitive to the presence of contextual cues were also more able to flexibly modulate expressive behavior (FREE) and to monitor and adjust coping behavior (CFS). In contrast, the ability to accurately judge the *absence* of specific contextual cues (Cue Absence index) was significantly inversely associated with depression, anxiety, stress, and external locus of control. In other words, in accord with our predictions extending previous research on psychopathology, people with high levels of symptoms and stress were less able to accurately determine the absence of contextual cues. Finally, we predicted that because the CSI does not ask respondents to evaluate or summarize their current or past behavior, it would be relatively free of response bias. Consistent with this prediction, neither Cue Presence nor Cue Absence was meaningfully correlated with socially desirable responding, measured by the MCSDS.

In an additional set of analyses, we further examined the inverse association between Cue Absence and psychopathology by creating categorical scores for clinically significant or “severe” depression, anxiety, and stress using recommended cutoffs on the DASS (Lovibond & Lovibond, 1995). Consistent with our predictions, Cue Absence scores

were significantly lower for participants reporting severe depression ( $n = 28$ ,  $M = 52.8$ ,  $SD = 7.5$ ) compared with others ( $n = 172$ ,  $M = 56.6$ ,  $SD = 7.0$ ),  $t(198) = 2.60$ ,  $p = .01$ , significantly lower for participants reporting severe anxiety ( $n = 30$ ,  $M = 50.5$ ,  $SD = 7.9$ ) compared with ( $n = 170$ ,  $M = 57.1$ ,  $SD = 6.6$ ),  $t(198) = 4.88$ ,  $p < .001$ , and significantly lower for participants reporting severe stress ( $n = 22$ ,  $M = 52.4$ ,  $SD = 6.4$ ) compared with others ( $n = 178$ ,  $M = 56.5$ ,  $SD = 7.1$ ),  $t(198) = 2.55$ ,  $p < .05$ . In contrast, the Cue Presence scores were not significantly different for participants with severe depression ( $n = 28$ ,  $M = 55.4$ ,  $SD = 8.9$ ) versus lower depression ( $n = 172$ ,  $M = 56.1$ ,  $SD = 7.4$ ),  $t(198) = 0.43$ ,  $p = .66$ , or severe stress ( $n = 22$ ,  $M = 56.3$ ,  $SD = 8.4$ ) versus lower stress ( $n = 178$ ,  $M = 56.0$ ,  $SD = 7.5$ ),  $t(198) = -0.18$ ,  $p = .86$ . However, Cue Presence scores were marginally lower for participants with severe anxiety ( $n = 30$ ,  $M = 52.8$ ,  $SD = 9.8$ ) compared with participants with lower anxiety ( $n = 170$ ,  $M = 56.6$ ,  $SD = 7.0$ ),  $t(34.3) = 1.99$ ,  $p < .10$ . For the latter, a  $t$  test for unequal variances was required.

#### Study 4: Validation With a Behavioral Task

Because the items comprising the CSI are causal indicators, a crucial form of validity for this type of measure is to demonstrate its ability to predict performance on an external, behavioral task that could be reasonably assumed to be caused, implicitly or explicitly, by the latent dimension (Bollen & Lennox, 1991; Edwards, 2011). By extension, we could reasonably expect that the CSI would predict behavior of relevance to context sensitivity. To interrogate this question in the fourth study, we examined associations between the CSI Cue Presence and Cue Absence indices and the picture arrangement (PA) test from the Wechsler Intelligence Scale (WAIS-III; Wechsler, 1997). The PA consists of sets of picture cards similar to a wordless comic strip. Each card set is presented to participants in the incorrect order so that the narrative story suggested by the cards does not appear to make sense. Respondents must reorganize the cards in each set into the correct order so that they tell a simple narrative story. Correct performance on this task requires that respondents perceive and understand context cues in each picture and determine how these cues relate to a broader story narrative (Katz, Goldstein, & Beers, 2000). Given that performance on the PA test is predicated on identifying relevant cues in each picture that inform the sequence of events, we predicted that meaningful correlations with the CSI would be evident for the Cue Presence index but not the Cue Absence index.

#### Method

**Participants and Procedure.** Participants ( $N = 59$ ) were recruited through an online notification service (Craigslist)

and through flyers posted in the area of Columbia University, and invited to visit our laboratory for a single brief session. The sample was a majority (59%) female with a mean age of 31 years ( $SD = 8.9$ ). All participants had completed high school, and most (72%) had received an undergraduate degree or higher. On arriving at the laboratory, participants completed an informed consent, the CSI, and then the PA task in that order. Participants also subsequently completed an unrelated experimental task for an independent study to be reported elsewhere.

#### Results

Correlations of the CSI indices with performance on the WAIS picture arrangement test are described below and presented in Table 2. As predicted, and in further support of the validity of the CSI as a measure of sensitivity to contextual cues, performance on the WAIS picture arrangement test, was significantly correlated to moderate degree for the CSI items measuring sensitivity to the presence of contextual cues (Cue Presence index),  $r = .41$ ,  $p < .001$ . In contrast, the CSI items measuring the ability to determine when a cue is not present (Cue Absence index) were not meaningfully correlated with picture arrangement performance,  $r = .06$ .

#### Study 5: Short Version of CSI Without Filler Items

The 20-item version of the CSI used in Studies 2 through 4 included 10 filler items consisting of appraisal ratings that did not meet criteria for inclusion as described above or were redundant with the included items. We had included filler items to ensure that the number of possible responses to each scenario was equivocal. However, because filler items are time-consuming, we next tested whether the CSI would perform adequately without them. Specifically, we administered a shortened 20-item CSI that did not include filler items (see Supplementary Material available in the online version of the article) and tested whether this shortened version would produce the same results as the previous version. We then compared item means and totals of the shortened CSI with previous versions of the CSI. Additionally, as in Study 3, we examined the validity of the shortened version against measures of depression, anxiety, and flexibility. However, to further expand the validity data for the CSI, we used measures of depression, anxiety, and flexibility different from those used in Study 3.

#### Method

**Participants and Procedure.** The shortened 20-item version of the CSI was posted on Mturk along with several other questionnaires using procedures described for Studies 1 to 3. The study was completed by 249 participants (137 males,



112 females) of mean age 36.3 years ( $SD = 11.0$ ). In addition to the CSI, current levels of anxiety were measured continuously and categorically using the State Anxiety subscale from the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1993) short form (Marteau & Bekker, 1992), depressive symptoms were measured continuously and categorically using the Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001), and coping flexibility in the face of aversive events was measured by the Perceived Ability to Cope with Trauma scale (PACT; Bonanno, Pat-Horenczyk, & Noll, 2011). The PACT produces two subscales, to measure Forward Focus and Trauma Focus, and also an overall Coping Flexibility score (Bonanno et al., 2011).

## Results

Examination of item means and standard deviations, subscales, and total score for the shortened version of the CSI were highly similar to the previous versions (20 items plus filler items) used in Studies 2 to 4 (see Table 1). As in previous studies, the correlation of the Cue Presence and Cue Absence indices was minimal. However, whereas the correlation was still significant in the previous studies, when filler items were removed the indices were no longer significantly correlated,  $r = .02, ns$ .

Correlations of the CSI indices with other measures were highly consistent with the pattern of correlations observed in Study 3. The Cue Absence index was significantly inversely correlated with Depression and Anxiety but unrelated to the Coping Flexibility scales. In contrast, the Cue Presence index was not meaningfully correlated with either Depression or Anxiety but significantly correlated with Trauma Focused Coping and Coping Flexibility.

Similar to Study 3, we also examined severe or clinically significant depression and anxiety using recommended cut-offs for the PHQ-9 (Kroenke et al., 2001) and the STAI (e.g., Knight, Waal-Manning, & Spears, 1983, adapted for the short form Marteau & Bekker, 1992). Cue Absence scores were significantly lower for participants reporting severe depression ( $n = 35, M = 50.5, SD = 8.1$ ) compared with other participants ( $n = 215, M = 56.2, SD = 7.6$ ),  $t(248) = 4.07, p < .001$ , and significantly lower for participants reporting clinically significant state anxiety ( $n = 63, M = 53.1, SD = 8.3$ ) compared with other participants ( $n = 187, M = 56.2, SD = 7.6$ ),  $t(248) = 2.73, p < .01$ . In contrast, Cue Presence scores were not significantly different for participants with severe ( $n = 35, M = 51.1, SD = 7.9$ ) versus less severe depression ( $n = 214, M = 53.1, SD = 6.9$ ),  $t(247) = 1.56, p = .12$ , and were not significantly different for participants with clinically significant ( $n = 63, M = 52.4, SD = 7.3$ ) versus lower state anxiety ( $n = 186, M = 52.9, SD = 7.1$ ),  $t(247) = 0.60, p = .55$ .

## Discussion

The ability to accurately and sensitively perceive cues to contextual demands across different situations is a seminal component of successful self-regulation. However, previous attempts to measure context sensitivity have suffered a number of methodological limitations, most notably, the requirement that respondents possess accurate knowledge of their own abilities, the confounding of perception of context with response to context, the use of only one or two contextual variations, and the failure to consider the perception of both cue presence and cue absence. We developed the CSI as an easy-to-administer questionnaire measure of context sensitivity that addressed each of these limitations. Specifically, rather than asking respondents to evaluate their own sensitivity to contextual cues, the CSI presents respondents with potentially stressful scenarios and asks them to appraise the presence/absence of various context cues. To identify contextually sensitive responses, we normed Cue Presence/Absence ratings on larger groups of respondents across multiple studies. The final version of the CSI includes a range of stressor scenarios for which some contextual cues were highly present (Cue Presence index) and some contextual cues were relatively absent (Cue Absence index). Finally, to validate the Cue Presence and Cue Absence indices, we compared scores on these measures against a range of variables, including measures of flexibility and psychopathology.

One of the key advantages of the CSI as a measure of context sensitivity is that it does not require of respondents that they possess accurate knowledge of their own ability to read contextual cues. There are at present no systematic data from which to evaluate whether most or even some individuals may possess this type of self-knowledge. However, given that contextual appraisals appear to be a relatively automated skill, it is reasonable to doubt that such self-knowledge would be common. Moreover, comparisons of self-report measures that presume self-knowledge with behavioral measures of the same phenomena often reveal striking discrepancies. This has been the case, for example, for self-perceptions of coping behavior (Schwartz et al., 1999) and posttraumatic growth (Frazier et al., 2009). The CSI avoids this problem because it does not ask participants to evaluate their own behavior or abilities. Rather, the CSI captures participants' sensitivity to context directly by measuring their ability to detect the presence/absence of consensually identified cues.

A further significant advance, unique to the CSI, is that it captures both the ability to accurately perceive the *presence* of contextual cues and the ability to determine the relative *absence* of contextual cues. We found crucial behavioral validation for the Cue Presence index in its correlation with the scores on the PA test. Behavioral validation is especially important for the CSI because, as noted

earlier, we conceptualized the CSI items as causal indicators and therefore they predict performance on external behavior that could reasonably be assumed to be a consequence of context sensitivity (Bollen & Lennox, 1991; Edwards, 2011). The PA test was ideal to test for this kind of validity. To successfully complete the PA test, respondents must arrange various sets of pictures in correct narrative sequences. However, to accomplish this task, they must first perceive and understand the context cues in each picture (Katz et al., 2000). Consistent with this reasoning, participants who scored higher on the Cue Presence index, and thus, showed greater ability to detect the presence of contextual cues, were also better able to successfully order the picture sequences on the PA test.

Additional validation for the Cue Presence index was evidenced in its positive association with measures of flexible coping and emotion regulation. An emerging consensus among theories of flexible self-regulation is that contextual decoding is a crucial, prerequisite stage for all subsequent regulatory efforts (Aldao, 2013; Aldao et al., 2015; Bonanno & Burton, 2013). Thus, the ability to accurately detect contextual cues should predict subsequent regulatory flexibility. Consonant with this logic, the Cue Presence index correlated with measures of flexible emotional expression and flexible coping, and also with a measure of the ability to monitor and modify coping strategies after they had already been enacted.

We also found the predicted pattern of validation for the Cue Absence index. The Cue Absence index captures the ability to determine when a cue is *not* present, that is, to accurately identify when there is negligible threat in a situation, where “the self” appears to have little control over events, when responding is not urgent, and so on. Accordingly, we considered that this ability would be relatively less clearly related to cue utilization and flexibility, which depend largely on the detection of the presence of cues rather than their absence, and inversely related to psychopathology and external locus of control. The latter prediction was predicated on literatures linking psychopathological states, such as depression and anxiety, with cue insensitivity (e.g., the inability to accurately differentiate threat from non-threat cues or the failure to modulate perceptions and reactions when negative cues are absent) (Carver & Ganellen, 1983; Coifman & Bonanno, 2010; Levy-Gigi et al., 2016; Lissek, 2012; Lohr et al., 2007; Olatunji et al., 2011; Rottenberg et al., 2005). We also explored similar prediction with constructs associated with psychopathology, such as stress and external locus of control (Davis, 2013). In each case, the Cue Absence index showed the predicted pattern of associations. Specifically, Cue Absence was uncorrelated with PA scores and flexibility, and consistently inversely associated with measures of anxiety and depression, stress and external locus of control. Extending these results, we also found that Cue Presence scores were significantly

lower in participants with clinically significant or categorically severe levels of depression, anxiety, and stress.

In developing the CSI, we assumed that the ability to detect the presence of cues was psychometrically separable from, and conceptually orthogonal to, the ability to detect the relative absence of cues. Consistent with this supposition, the Cue Presence and Cue Absence indices showed only minimal correlation ( $r$ s ranged from .02 to .19). The divergent patterns of association we observed between the Cue Presence and Cue Absence indices in relation to other measures further supports their conceptualization as orthogonal abilities. Of particular interest in this vein was the finding that only the Cue Absence index, and for the most part not the Cue Presence index, was inversely associated with psychopathology. This pattern of results suggests the intriguing possibility that the dysfunction of psychopathology is not so much about failure to read the obvious contextual cues in a situation, as it is an inability to read when key contextual cues are not present. To state this differently, these findings suggest that failure to regulate in psychopathology may be less about not knowing what to do in a specific situation, as not knowing what *not* to do in a specific situation.

It will be worth exploring in future research whether the ability to detect contextual cues and the ability to detect the absence of cues might combine in some way to inform a larger or overarching form of context sensitivity. We explored combining these measures into an overall context sensitivity score in the current study, but this score was highly redundant with the individual scales and provided no further predictive utility. Still, it will be worth considering in future research whether there might be other ways to conceptualize and combine these different facets.

It is important to note that although the CSI addressed key limitations in previous measures related to context sensitivity, our approach in the current study may nonetheless suffer other limitations. One possible limitation, of relevance to the findings on psychopathology, is that both the studies that examined psychopathology were drawn from community samples. These samples were however large enough to generate sufficient number of participants above the clinical threshold to permit for categorical analyses of psychopathology versus nonpsychopathology, and these analyses also associated psychopathology with reduced scores on the Cue Absence index. Nonetheless, further research will be needed to replicate this finding and elaborate on its possible implications using more explicitly clinical samples. It will also be important for future research to move beyond cross-sectional analyses of these relations. More specifically, future studies should use prospective and longitudinal designs to illuminate the mechanism by which the inability to detect the absence of cues might inform the development and maintenance of psychopathology.

A related limitation is possible bias in recruitment from use of Mturk. Four of the five studies reported in this investigation were recruited using Mturk. We justified this approach based on studies showing that participants recruited through Mturk performed similarly to participants recruited offline and also evidenced high test–retest reliability (e.g., Casler et al., 2013; Paolacci et al., 2010). It is also worth noting that Mturk samples hold an advantage of being diverse racially, ethnically, in terms of employment category, and place of residence, and have shown similarities in these demographics when compared with samples recruited for national survey studies (Huff & Tingley, 2015). Additionally, the one study from the current investigation (Study 4) that used alternative sampling (online advertisements and locally posted flyers) showed comparable CSI data as the Mturk studies. Nonetheless, because Mturk is an automated data collection system, it will be worth considering further examination of the CSI in future research.

Finally, another potentially limitation, and also a major strength of the CSI, is the scenario-based format of the measure. As we noted, scenario-based measures hold an advantage over direct questions because they do not require that participants have accurate knowledge of their own abilities. Additionally, scenario-based measures tend to be less easily influenced by deliberate response biases; in the current investigation the CSI indices were uncorrelated with socially desirable responding. Nonetheless, a potentially important limitation of this approach is that individual scenarios may not be equally relevant to all respondents. We attempted to minimize this problem by selecting scenario–item combinations through an iterative process and by norming responses across multiple samples. Importantly, however, the scenario approach carries the risk that the scenario–item combinations may not translate well across cultures. Previous research with similar scenario-based approaches showed good cross-validation across cultures (e.g., Chen, Chen, & Bonanno, 2018; Cheng & Cheung, 2005). Nonetheless, this and other concerns with the CSI are warranted and would benefit from future research with the measure.

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### Supplemental Material

Supplemental material for this article is available online.

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