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Measures of emotion reactivity and emotion regulation: Convergent and discriminant validity☆

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ABSTRACT

Emotion reactivity and emotion regulation are salient constructs in theories of emotion and emotion disorders; however, little is known about the convergent and discriminant validity of instruments used to measure them. The current paper examines the validity of four emotion-regulation and three emotion-reactivity instruments (with a total of 27 subscales) across three independent samples of university students (total $N = 715$). Eight subscales from a coping instrument were also examined. Confirmatory factor analysis failed to show the expected patterns of convergent and discriminant validity; however, exploratory factor analysis revealed three different factors, reflecting out-of-control negative emotion, emotion awareness and expression, and cognitive strategies for emotion regulation. Results have implications for both basic emotions research and clinical science.

For decades, researchers have tried to distinguish characteristics of an emotion response and its regulation (e.g., Cole, Martin, & Dennis, 2004; Gross, 1998a; Gross, 2013; Gross & Barrett, 2011; Sheppes, Suri, & Gross, 2015; Thompson, 1994). This distinction is important for both clinicians and researchers. Emotion regulation and reactivity are salient constructs in theories of psychopathology and as treatment targets. Although psychophysiological, neurological, and behavioral measures are being developed, self-report measures remain the norm (Robinson & Clore, 2002). Many self-report measures of emotion regulation (EReg) and emotion reactivity (EReact) exist; however, no study has systematically examined their convergent or discriminant validity. The current paper reports results from three studies examining the psychometric properties of multiple measures of emotion reactivity and emotion regulation and tests hypotheses about their convergent and discriminant validity.

EReact refers to how readily one experiences an emotion, with what intensity, and for what duration (Davidson, 1998). Researchers have used various methods to infer emotion reactivity, ranging from psychophysiological indicators to having individuals self-report affect before and after a stimulus (e.g., Suls, Green, & Hillis, 1998). Early self-report measures, such as the Affect Intensity Measure (AIM; Larsen & Diener, 1987) and the Emotion Intensity Scale (EIS; Bachorowski & Braaten, 1994) focused on the intensity component. More recently, Nock, Wedig, Holmberg, and Hooley (2008) developed the Emotion Reactivity Scale (ERS) to measure all three components of emotion reactivity. Although the ERS generates three separate subscales, factor analyses revealed that a single underlying factor best explained the items (Claes, Smits, & Bijttebier, 2014; Lannoy et al., 2014; Nock et al., 2008).

Definitions of EReg vary by theory. Two popular conceptions include that of Gross (1998a, 1998b) and Gratz and Roemer (2004). In Gross (1998a, 1998b) process-oriented model, emotion regulation is defined as "processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions" (p. 275). This definition distinguishes processes in play before an individual experiences the emotional response (antecedent-focused regulation) from processes directly modulating the emotional response (response-focused regulation). The widely-used Emotion Regulation Questionnaire (ERQ) was based on this model (Gross & John, 2003).

Gratz and Roemer (2004) developed a competency-focused model, defining EReg as "the (a) awareness and understanding of emotions, (b) acceptance of emotions, (c) ability to control impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions, and (d) ability to use situationally appropriate emotion regulation strategies flexibly to modulate

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emotional responses as desired in order to meet individual goals and situational demands" (pp. 42–43). Their Difficulties in Emotion Regulation Scale (DERS) assesses people's self-reported efficacy in each of the four domains of emotion regulation.

The current research addressed three questions. The first focused on whether diverse self-report measures of EReact show convergent validity by loading onto the same underlying factor(s). Preliminary evidence of convergent validity exists. Gohm and Clore's (2000) hierarchical cluster analysis on several scales, including the EIS and the AIM revealed strong convergence between the EIS and AIM but a smaller degree of convergence between the intensity measures and a mood reactivity measure. Initial validation studies of the EIS showed medium to medium-large correlations between EIS subscales and the AIM (Bachorowski & Braaten, 1994). Gohm, Corser, and Dalsky (2005) found a large correlation between the AIM and EIS in a sample of university students. Jones, Leen-Feldner, Olatunji, Reardon, and Hawks (2009) reported moderate correlations between an adolescent version of the AIM and affect-change following mood induction.

Our second question focused on whether measures reflecting a process-oriented conception of emotion regulation (e.g., ERQ) and those reflecting an emotional competency model (i.e., DERS) would converge on the same underlying factor(s). Modest evidence of convergent validity can be found in small-to-medium correlations between aspects of the DERS and both the antecedent- and response-focused dimensions of the ERQ (i.e., cognitive reappraisal and suppression; Bardeen & Fergus, 2014; Burns, Roberts, Egan, & Kane, 2015; Desrosiers, Vine, Klemanski, & Nolen-Hoeksema, 2013; Ehring & Quack, 2010; Salsman & Linehan, 2012). Our goal was to use factor analytic methods to examine the convergence of not only the ERQ and DERS, but other selected measures of specific regulation strategies.

Our third question was whether measures of EReg and measures of EReact demonstrate discriminant validity. The degree of discriminant validity expected between measures of different constructs depends upon the degree of theoretical overlap between them (Cronbach & Meehl, 1955). The conceptual distinction between EReact and EReg depends on one's theory of emotion. Gross and Barrett (2011) put these theories into four clusters and detailed the degree to which they distinguish between EReact and EReg. Basic emotion and appraisal theories regard EReact and EReg as highly distinct constructs; psychological construction and social construction theories regard them as virtually inseparable (Gross & Barrett, 2011). Empirical evidence of discriminant validity between EReg and EReact measures is mixed. For example, Salsman and Linehan (2012) administered the AIM along with the ERQ and DERS to undergraduates. Correlations between EReg and EReact subscales ranged from small and nonsignificant to large and significant. Veilleux, Skinner, Reese, and Shaver (2014) also obtained highly variable correlations between measures of EReact and DERS subscales. Claes et al. (2014) administered the ERS and a measure designed to assess strategies for coping with (i.e., regulating) highly emotional issues to a sample of Belgian high schoolers. Correlations ranged from small to medium, depending on the subscales. Researchers have reported *positive* associations between heightened EReact and measures of some EReg strategies (e.g., rumination, self-blame) but *negative* associations between EReact and other EReg strategies (e.g., emotional suppression, positive reappraisal; Aldinger et al., 2013; Cheavens & Heiy, 2011; Lannoy et al., 2014; Rubin, Hoyle, & Leary, 2012; Tortella-Feliu, Balle, & Sesé, 2010). The discriminant validity of EReg and EReact measures requires a more systematic investigation.

For the current research, we selected four measures of emotion regulation and three measures of reactivity (27 subscales in all), based on their widespread use in the clinical literature. Because of conceptual similarities between EReg and coping, we also administered a coping measure (with 8 subscales). Table S1 lists these measures, example items, and the definitions of EReact and EReg articulated by the measures' authors.

1. Methods

1.1. Overview

As parts of larger studies, we administered partially overlapping subsets of EReg, EReact, and coping measures to independent samples of participants all recruited from the research pool at a mid-sized private university (see Table S2). This allowed us to obtain a variety of measures while adhering to time limitations pre-determined by the university's research-credit compensation schedule. We then combined the data sets to maximize the sample size for our analyses.

1.2. Participants

Study 1 participants were 379 undergraduates. Approximately 79.1% were female. Average age was 18.62 years ($SD = 0.88$). The sample was somewhat ethnically diverse: 76.3% Caucasian, 14.0% Asian American, 5.3% Hispanic, and 9.8% African American (race/ethnicity categories were not mutually exclusive).

Study 2 participants were 351 undergraduates recruited across spring and fall 2014. Approximately 73.9% were female. Average age was 19.40 years ($SD = 1.15$). Ethnicities represented: 69.8% Caucasian, 17.1% Asian American, 7.1% Hispanic, and 10% African American.

Participants took part in only one study. All provided informed consent.

1.3. Study 1 measures

In Study 1, measures of EReg were the ERQ, the Regulation of Emotions Questionnaire (REQ; Phillips & Power, 2007), and the DERS. Measures of EReact were the ERS, EIS, and the Affect Intensity and Reactivity Measure for Youth (AIR-Y; Jones et al., 2009). Reliability based on the current data appears in Table 4. We also included the Positive and Negative Affect Scales (PANAS; Watson, Clark, & Tellegen, 1988) to determine the emotional valence of the resulting factors.

The ERQ is a 10-item questionnaire assessing the extent to which respondents use cognitive reappraisal (6 items) or suppression strategies (4 items) to regulate emotions. Factor analysis supported a two-factor structure. Respondents rate their each statement on 1 (strongly disagree) to 7 (strongly agree) Likert scales. In previous research, Cronbach's alphas averaged 0.79 for the reappraisal scale and 0.73 for the suppression scale, and test-retest reliability for each scale was 0.69 (Gross & John, 2003).

The REQ consists of 19 examples of emotion regulation techniques. Items reflect functional and dysfunctional strategies as well as externally versus internally-oriented strategies. Respondents endorse how much they use each technique, using 1 (not at all) to 5 (always) Likert scales. Factor analysis supports four scales: internal-dysfunction regulation strategies, internal-functional regulation strategies, external-dysfunction strategies and external-functional strategies. The REQ has good construct validity insofar as it correlated in the anticipated directions with measures of emotional and behavioral problems. In previous research, Cronbach's alphas for its scales ranged from 0.66 to 0.76 (Phillips & Power, 2007).

The DERS is a 36-item questionnaire assessing deficits in EReg. The instrument was validated in a sample of undergraduates, where it produced six scales: nonacceptance of emotional responses,