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The Situational Test of Emotional Management – Brief (STEM-B): Development and validation using item response theory and latent class analysis ☆

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ABSTRACT

This study uses a 3-Parameter Logistic item response theory (IRT) model to develop an 18-item short-form of the Situational Test of Emotion Management (STEM). In a sample of 900 people, the short form showed acceptable reliability (reliability index = .87; Cronbach's alpha = .84) and a meaningful correlation with another indicator of emotional intelligence (i.e., $r = .30$ with the Situational Test of Emotional Understanding). Latent class analysis of the short-form detected two classes. For all items, participants in Class 2 had a higher probability of selecting the best option than Class 1. When response options were coded to represent different emotion regulation strategies, Class 2 had a higher probability of endorsing "situation modification" and Class 1 had a higher probability of endorsing "no regulation". These results provide validity evidence for the STEM-B as an assessment of emotion regulation.

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1. Introduction

Emotional management is the fourth branch of the Mayer and Salovey (1997) conceptual model of emotional intelligence (EI), and involves the regulation of negative emotions and the enhancement of positive ones (MacCann & Roberts, 2008; Mayer, Roberts, & Barsade, 2008). There are two primary theoretical models of EI. The first is an ability-based model, where EI is the capacity to process, comprehend, and manipulate emotion-related information and is usually assessed by items not unlike those found in traditional cognitive tests. The second is a mixed-model approach, where EI is considered a combination of character traits, motivation, and ability constructs and is usually assessed by self- or observer-report rating scales (e.g., Mayer et al., 2008). The current research concerns the ability-based conceptualization of emotion management. We report the development of a new short-form of emotional management based on MacCann and Roberts (2008) Situational Test of Emotional Management (STEM). A 3-Parameter Logistic (3-PL) item response theory (IRT) analysis is used to select items for the purpose of developing a brief instrument (i.e., the STEM-B). This study also examines whether the STEM-B assesses emotion regulation by comparing how frequently different latent classes endorse response options representing different strategies for emotion regulation.

1.1. Emotion management and emotion regulation

The emotion management branch of the Mayer–Salovey model of EI is conceptually linked to Gross' (1998) process model of emotion regulation (e.g., Joseph & Newman, 2010). The process model outlines several different techniques or strategies that can be used to regulate emotions at different time points across the emotion experience. These include: (a) situation selection (approaching or avoiding particular people, places, or objects); (b) situation modification (active efforts made to address the situation at hand; similar to problem-solving or task-focused coping); (c) attentional deployment (a shift in focus through distraction, concentration, or rumination); (d) cognitive change (modifying one's evaluation of the situation, including cognitive reframing and reappraisal); and (e) response modulation (directly influencing the physiological impact of emotions through the use of, for example, drugs, exercise, and

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relaxation techniques) (Gross, 1998). Individual differences in emotion management may correspond to differences in the type of emotion regulation strategies used. The current study tests this conceptual link by classifying options on the STEM-B as representing one of these five emotion regulation strategies (or no regulation at all). We then examine whether two latent classes (determined from STEM-B responses) show different scores on the STEM-B, and also show different rates of endorsing the various types of emotion regulation strategies.

1.2. Measuring EI: the Situational Test of Emotion Management (STEM)

Most of the research on ability-based EI uses the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT; Mayer, Salovey, & Caruso, 2002) or its predecessor, the Multifactor Emotional Intelligence Scale (MEIS; Mayer, Caruso, & Salovey, 1999). MacCann and Roberts (2008) developed alternative assessments of the higher two branches of the four-branch model: (a) the Situational Test of Emotional Understanding (STEU); and (b) the Situational Test of Emotion Management (STEM).

The STEM consists of 44 multiple-choice items that are available in the American Psychological Association PsycTESTS database and as Supplementary material to MacCann and Roberts (2008) (see http://dx.doi.org/10.1037/a0012746.supp). Estimates of Cronbach's alpha were .68 and .85 in a sample of 207 Australian undergraduates and 850 Belgian medical students respectively (Libbrecht & Lievens, 2012; MacCann & Roberts, 2008). The STEM also shows some evidence of convergent and discriminant validity. STEM scores correlate at .30 with MSCEIT management scores and are also associated with other branches of EI such as emotion understanding and emotion perception (Austin, 2010; Libbrecht & Lievens, 2012; MacCann & Roberts, 2008).

1.3. Analysis of the STEM using item response theory

Typically, classical test theory approaches are used to assess the psychometric properties of EI assessments. However, item response theory (IRT) has some advantages over classical test methods, and emerging research has begun to use this measurement paradigm in EI research (Allen et al., 2014; Anguiano-Carrasco, MacCann, Geiger, Seybert, & Roberts, 2014). Recently, we successfully used IRT analysis to develop a short-form of emotional understanding (the STEU-B; Allen, Weissman, Hellwig, MacCann, & Roberts, 2014), and the current study uses a similar approach to developing the STEM-B.

Assumptions such as unidimensionality must be met when employing most IRT models. Before undertaking IRT analysis, we test the unidimensionality of the STEM by calculating the ratio of the first to second eigenvalue in a one-factor exploratory factor analysis (EFA) of STEM items (Morizot, Ainsworth, & Reise, 2007).

1.4. Analysis of the STEM using latent class analysis

Latent class modeling is another useful tool used to examine the psychometric properties of assessments. Latent class models classify respondents into classes or categories based on their pattern of responses and provide probabilities of class assignment for each respondent (Skrondal & Rabe-Hesketh, 2004). Latent class analysis can provide validity evidence in that if item responses are fit to a two-class solution, the classes may show different types of pre-defined responses. For example, one class may more frequently select the best option. In the current study, we investigate whether different latent classes show: (a) high versus low scores on the STEM-B; and (b) different endorsement rates for different types of emotion regulation strategies.

1.5. Validity evidence for the short version of the STEM

To provide further validity evidence, we report correlations of the STEM-B with another EI test (Situational Test of Emotion Understanding, STEU). Emotion understanding and management are conceptually related branches of EI in the four-branch model of EI, together forming the strategic area of EI (Mayer et al., 2008). A recent meta-analysis reported the correlation between constructs to be .55 (Joseph & Newman, 2010). We thus expect significant correlations between STEM and STEU scores. Furthermore, we expect STEM and the STEM-B will show a similar magnitude of relationship with the STEU, demonstrating that the short form has similar validity evidence to the long form.

1.6. Aims and rationale of the present study

The primary goal of this study was to develop a short form of the STEM using IRT analysis. We consider evidence for both the reliability and validity of STEM-B scores. Validity evidence is based on: (a) correlations with the STEU; (b) the use of latent classes to validate the scoring key (i.e., predict high versus low scorers); and (c) the use of latent classes to predict endorsement of qualitatively different forms of emotion management (e.g., situation selection versus situation modification).

2. Method

2.1. Participants

Data was drawn from four samples where the 44-item STEM was administered as part of the study protocol: (a) MacCann and Roberts (2008) Study 1 ($n = 112$ Australian psychology undergraduates; 77 female; mean age = 21.30 years; $SD = 6.31$); (b) Aldao, Nolen-Hoeksema, and Schweizer (2010) ($n = 152$ Australian psychology undergraduates; 89 female; mean age = 20.64 years, $SD = 4.25$); (c) a sample of white-collar workers in the United States ($n = 507$; 247 female; mean age = 36.40 years, $SD = 13.27$); and (d) a sample of USA undergraduates ($n = 129$; 80 female; mean age = 21.08 years; $SD = 4.38$). That is, the total sample size was 900 (55.9% female; mean age = 26.32 years, $SD = 11.48$), and was a mix of university students and white collar workers from the United States and Australia.

2.2. Measure

2.2.1. Situational Test of Emotional Management (STEM; MacCann & Roberts, 2008)

The complete set of items comprising the STEM may be found in the APA PSYCTests database at http://dx.doi.org/10.1037/a0012746.supp and in Supplementary material for MacCann and Roberts (2008). In all analyses in the current paper, item numbers correspond to these documents. The STEM ordinarily uses partial scoring, with scoring weights determined by the proportion of experts who select each option as the best answer. In the current study, dichotomous scoring is used in order to conduct 3-PL IRT analyses, with the best option scored as "1" and the other options as "0".

2.2.2. Data analysis

The unidimensionality assumption of the data was tested by comparing the ratio of the first to second eigenvalue in a one-factor EFA conducted in SPSS 18.0. Bilog-MG (Zimowski, Muraki, Mislevy, & Bock, 1999) was used to fit a 3-PL IRT model to the scored data of the STEM long form (44 items) in order to estimate item parameters. The item characteristic curves were then used to create a

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