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Mapping facets of alexithymia to executive dysfunction in daily life

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ABSTRACT

Alexithymia refers to a cluster of emotion processing weaknesses. Etiological theories suggest frontal lobe impairment, which implicates corresponding executive dysfunction. Although some studies have identified cognitive deficits in alexithymia, no study has systematically investigated executive functioning in this population while simultaneously deconstructing alexithymia and related constructs into empirically-derived dimensions. In this study, 104 adults completed self-report measures of alexithymia, emotional intelligence, and mood awareness as well as an ecologically-sensitive measure of discrete executive functions in daily life. Principal components analysis revealed two latent alexithymia factors: emotional clarity (EC) and emotional monitoring (EM). Analyses revealed that low-EC participants performed worse than high-EC participants across multiple executive function domains, including behavioral initiation/inhibition, set-shifting, self-monitoring, working memory, error recognition, and ability to plan and organize. No relationship was found between EM and patterns of cognitive performance. These data highlight the need to decompose alexithymia into discrete facets and suggest that executive dysfunction is related to lack of emotional clarity specifically rather than alexithymia broadly.

1. Introduction

Emotional regulation and the impact of dysfunctional emotional systems on one's mental and physical health have been of recent interest among researchers. Alexithymia, a personality construct first defined by Sifneos (1973), is used to classify those who have difficulty perceiving and processing emotions. Salient characteristics that define the alexithymic population include difficulty identifying feelings and distinguishing among bodily sensations of arousal, difficulty describing feelings to others, constricted imaginal processes, and a stimulus-bound, externally orientated cognitive style (see Luminet, Bagby, Wagner, Taylor, & Parker, 1999 for a discussion of how alexithymia relates to the Five-Factor Model of personality). With 10% of the general population estimated to be alexithymic (Fukunishi, Berger, Wogan, & Kuboki, 1999; Taylor, Bagby, & Parker, 1997), researchers are finding vulnerability for a variety of somatic syndromes such as hypertension, diabetes, chronic pain, and obesity (Kauhanen, Kaplan, Cohen, Julkunen, & Salonen, 1996) as well as psychiatric disorders (Luminet & Rimé, 2004; Taylor et al., 1997) in alexithymic individuals.

Past research employing neuroscientific techniques has implicated frontal lobe dysfunction in the alexithymia trait. Human brain lesion studies indicate a decrease in emotional expressivity after frontal lobe damage, with more recent neuroimaging studies suggesting particular roles of the anterior cingulate (Lane et al., 1998) and prefrontal cortices (Bermond, Vorst, & Moormann, 2006). Although a model of frontal lobe brain functioning in alexithymia is emerging, it is problematic that most studies to date have largely ignored the *cognitive* deficits concomitant with frontal lobe dysfunction. Cognitive functions of the frontal lobe, the so-called executive functions, include cognitive flexibility, decision making, inhibitory control, planning and organization, self-monitoring, abstract reasoning, sustained and selective attention, and working memory (for review, see Roth, Randolph, Koven, & Isquith, 2006). While some studies reveal neuropsychological indices of executive dysfunction in conjunction with alexithymia in specific clinical populations, such as individuals with traumatic brain injury (Henry, Phillips, Crawford, Theodorou, & Summers, 2006), human immunodeficiency virus (Bogdanova, Díaz-Santos, & Cronin-Golomb, 2010), Parkinson's disease (Costa, Peppe, Carlesimo, Salamone, & Caltragirone, 2007), and heroin addiction (Huang, Zhu, Yao, & Zhou, 2005), very few studies have investigated patterns of cognitive functioning and alexithymia in non-clinical samples. One such study by Xiong-Zhao, Xiao-Yan, and Ying (2006) reported that level of alexithymia was negatively correlated with performance on the Wisconsin Card Sorting Test (WCST).

While these data certainly suggest some executive dysfunction in alexithymia, neuropsychological measures such as the WCST index multiple executive functions simultaneously. It remains unclear which specific aspects of executive function are implicated in alexithymia and whether any performance-based neuropsychological deficits translate beyond the laboratory to self-reported real-life cognitive difficulties. Clinical assessment of executive

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functions has historically been challenging because of their dynamic nature (Stuss & Alexander, 2000). The structured format of the typical assessment context may not place sufficiently high demands on executive functioning (Holmes-Bernstein & Waber, 1990) such that adults may score within normal limits on performance-based measures despite reports of severe executive dysfunction in everyday life (Eslinger & Damasio, 1985; Goldstein, Bernard, Fenwick, Burgess, & McNeil, 1993; Meyers, Berman, Scheibel, & Hayman, 1992). Since current performance-based tests are constructed to assess individual components of executive functions over short periods of time, they may fail to capture the integrated, multidimensional, relativistic, priority-based decision-making that is demanded in real world situations (Goldberg & Podell, 2000; Shallice & Burgess, 1991).

Using our current knowledge of neuropsychological correlates of executive functioning, further research is needed to explore executive functioning in alexithymic individuals in non-clinical samples. However, the multidimensionality of the alexithymia construct can make data interpretation complicated, and it has been noted that there is considerable overlap of alexithymia with the related constructs of emotional intelligence and mood awareness (Coffey, Berenbaum, & Kerns, 2003). Indeed, past factor analytic research has suggested that different facets of alexithymia have unique cognitive and emotion processing correlates (Coffey et al., 2003). However, no study to date has examined the relationships between specific facets of alexithymia and patterns of everyday executive functioning. To address this gap, this study uses empirically-derived facets of alexithymia and an ecologically-sensitive, broadband measure of executive dysfunction in a non-clinical sample of young adults. Given the finding by Xiong-Zhao and colleagues (2006) of diminished performance by alexithymic individuals on the WCST, it is expected that individuals who score higher on dimensions of alexithymia will report difficulty in daily life with executive functions needed for this task, including set-shifting, behavioral inhibition, error monitoring, and working memory.

2. Method

2.1. Participants

One hundred nineteen unselected, right-handed undergraduate students (71 women) at a liberal arts college participated in the study for partial course credit. Written informed consent was obtained per participant, and the experimental protocol was approved by the local Institutional Review Board. Rule-out criteria for participation included English as a second language ($n = 2$), presence of a diagnosed psychiatric illness and/or history of psychiatric treatment ($n = 11$), history of significant neurological illness or brain injury ($n = 1$), and elevated negativity scores on the Behavior Rating Inventory of Executive Functions-Adult Version ($n = 1$). Considering the above exclusion criteria, valid data for 104 valid participants (64 women) with a mean age of 19.6 ± 1.4 years and mean education of 13.3 ± 1.3 years were available for statistical analysis.

2.2. Procedure

Participants were asked to complete self-report questionnaires designed to assess alexithymia and executive functioning. Alexithymia-related surveys included the Toronto Alexithymia Scale (TAS-20; Taylor et al., 1997), the Trait Meta-Mood Scale (TMMS; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995), and the Mood Awareness Scale (MAS; Swinkles & Giuliano, 1995). Participants also completed the Behavior Rating Inventory of Executive Function-Adult Version (BRIEF-A; Roth, Isquith, & Gioia, 2005), to obtain a comprehensive self-assessment of executive functioning.

2.3. Measures

The TAS-20 is a 20-item scale that consists of three subscales: Difficulty Identifying Feelings (e.g., "I am often confused about what emotion I am feeling"), Difficulty Describing Feelings (e.g., "I am able to describe my feelings easily"), and Concrete Thinking (e.g., "I find examinations of my feelings useful in solving personal problems"). Each factor has shown adequate internal consistency, with alpha coefficients of .78, .75, and .66, respectively. Test–retest reliability for the full scale is .77 (Bagby, Taylor, & Parker, 1994). Although some have argued that the TAS-20 assesses a general psychological distress factor (Leising, Grande, & Faber, 2009), additional research indicates that the TAS-20 captures an individual difference in emotional experience and behavior that corresponds to a complex combination of personality traits (Luminet et al., 1999).

The TMMS is a 30-item scale that consists of three subscales: Attention to Feelings (e.g., "I pay a lot of attention to how I feel"), Clarity of Feelings (e.g., "I am usually very clear about my feelings"), and Mood Repair (e.g., "When I become upset, I remind myself of all the pleasures in life"). The TMMS has shown adequate internal consistency (full scale alpha coefficient = .82), and internal reliabilities (.86, .87, and .82, respectively) (Salovey et al., 1995).

The MAS is a 10-item scale that consists of two subscales: Mood Monitoring (e.g., "I find myself thinking about my mood during the day") and Mood Labeling (e.g., "Right now I know what kind of mood I'm in"). Both the Mood Monitoring and Mood Labeling subscales have respectively shown adequate internal consistency (.88 and .77) and test–retest reliability (.94 and .76) (Harris, 2000).

The BRIEF-A was designed to assess the broader, molar aspects of complex problem-solving demands (Roth et al., 2005). Its 75 items comprise nine subscales that measure everyday behavioral manifestations of executive functioning including Inhibition (e.g., "I make decisions that get me into trouble"), Set-shifting (e.g., "I am disturbed by unexpected changes in routine"), Emotional Control (e.g., "I have emotional outbursts for little reason"), Self-monitoring (e.g., "I notice when I cause others to feel bad"), Task Initiation (e.g., "I have trouble getting started on tasks"), Working Memory (e.g., "I have trouble with tasks that involve more than one step"), Planning/Organization (e.g., "I plan ahead for future activities"), Task Monitoring (e.g., "I make careless errors when completing tasks"), and Organization of Materials (e.g., "I lose things"). Subscale data are standardized to produce *T*-scores according to age and gender norms (Roth et al., 2005). In addition to serving as a broadband index of executive functioning, the BRIEF-A is known for its ecological validity (Vriezen & Piggot, 2002) and verisimilitude between test items and daily, real-life pressures (Taylor, 2004).

3. Results

3.1. Principal component analysis of alexithymia measures

Given lack of consensus in the literature regarding the number and nature of alexithymia dimensions, principal component analysis (PCA) was performed to identify the latent factors among the TAS-20, TMMS, and MAS subscales. The number of factors retained was determined by visual inspection of the Scree plot. After Varimax rotation, two factors emerged, which together accounted for 67.4% of the total variance. Based on the pattern of salient loadings (Table 1), the first factor was renamed Emotional Clarity (EC), and the second factor was renamed emotional monitoring (EM). Repeat