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Eating Behaviors

Validity and reliability of the Behavior Rating Inventory of Executive Function — Adult Version in a clinical sample with eating disorders

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ABSTRACT

This study is a preliminary investigation of the reliability and validity of the Behavior Rating Inventory of Executive Function — Adult Version (BRIEF-A) in a clinical sample of patients with eating disorders (ED). Participants were 252 adult females who were referred to a centre for the treatment of EDs, as well as 31 individuals who completed the informant version of the BRIEF-A. Patients completed the BRIEF-A and other psychological measures on one occasion during their initial clinic visit, and informants nominated by patients completed the informant version at home. Reliability analyses revealed high internal consistency (Cronbach's alpha) of the two indices (Metacognition Index and Behavioral Regulation Index), and for the Global Executive Composite (GEC) of the BRIEF-A ($\alpha = .96$). Convergent validity was shown by a high positive relationship between the self-report and informant-report versions of the BRIEF-A, and between the GEC and the Anxiety and Depression scales. Construct validity was assessed by an exploratory and confirmatory factor analysis. The BRIEF-A may be a reliable and valid tool for measuring executive functioning (EF) in an ED population, and may serve as an initial screening tool of EF for clinicians and researchers.

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1. Introduction

Recent research has begun to investigate neuropsychological functioning in patients with eating disorders. Beyond eating disorder symptoms (i.e., binge-eating, food restriction, and purging), patients with eating disorders may demonstrate cognitive styles characterized by poor set shifting (i.e., difficulty switching between thinking about two different concepts), poor decision making, and a weak central coherence (i.e., a limited ability to understand context) (Danner et al., 2012b). Contemporary models of eating disorders (i.e., Schmidt & Treasure, 2006) suggest the role of cognitive deficits in the maintenance of these disorders (Harrison, Tchanturia, Naumann, & Treasure, 2012). One broad neuropsychological concept characterizing cognitive deficits is executive functioning (EF), which encompasses higher-order cognitive functions that monitor and conduct other cognitive processes (Luria, 1966), and allow for goal-oriented behaviour (Morgan & Lilienfeld, 2000). EF is involved in the "selection, initiation, and monitoring of cognition, emotion and behaviour, as well as other aspects of other motor and sensory functioning" (Roth, Isquith, & Gioia, 2005, p. 1). Deficits in decision-making, set shifting, and central coherence, which are noted in patients with eating disorders, can be understood within a framework of EF.

EF is often assessed using performance-based tasks, such as the Iowa Gambling Task to measure decision-making, or the Wisconsin Card Sorting Task to measure cognitive flexibility and perseverance (Tchanturia et al., 2012). However, the administration of these performance-based procedures is time consuming and labour intensive. Given the recent interest in EF in eating disorder populations, a short and easy-to-administer self-report questionnaire which measures EF would be useful as an initial screening tool for eating disorder treatment and research. The Behavior Rating Inventory of Executive Function — Adult Version (BRIEF-A; Roth et al., 2005) is a self-report questionnaire that was developed to measure an adult's perception of his or her own EF in real life activities. To our knowledge, the BRIEF-A has not been assessed for psychometric reliability or validity in an eating disorder population. The purpose of the current study is to perform a preliminary examination of the psychometric properties of the BRIEF-A in a clinical population of patients with an eating disorder seeking treatment.

1.1. Executive functioning in eating disorders

Decision-making ability may be impaired in patients with Anorexia Nervosa (AN; Cavedini et al., 2004; Tenconi et al., 2010), when measured by the Iowa Gambling Task (Danner et al., 2012b; Tchanturia et al., 2007). Poor decision-making abilities are reflected in the eating

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behaviours exhibited by AN patients in which the avoidance of caloric intake results in the immediate reward of anxiety relief, while ignoring the long term physical consequences (Cavedini et al., 2004). Impaired decision-making has also been demonstrated in patients with Bulimia Nervosa (BN; Liao et al., 2009) and patients with Binge Eating Disorder (BED; Danner, Ouwehand, Haastert, Hornsveld, & de Ridder, 2012a; Svaldi, Brand, & Tuschen-Caffier, 2010). However, the research remains inconclusive as other researchers did not find impaired decision-making ability in women with AN and BN (Guillaume et al., 2010).

Investigations of set shifting – the ability to shift back and forth between tasks and mental sets (Miyake et al., 2000) – suggest that patients with eating disorders have poorer set shifting abilities than healthy controls (Danner et al., 2012b; Roberts, Tchanturia, & Treasure, 2010; Tchanturia et al., 2004; Tchanturia et al., 2012). However, this relationship is demonstrated less consistently for patients with BN (Tchanturia et al., 2011). In patients with AN, difficulties with set shifting appear to persist post-treatment (Tchanturia et al., 2004), and were identified as a risk and maintenance factor of the disorder (Roberts et al., 2010). Further, poor set shifting ability was associated with heightened anxiety and depression, a longer duration of illness, lower self-esteem, and more severe eating disorder behaviours (Roberts et al., 2010).

Danner et al. (2012b) suggest that rigid thinking, characterized by poor set shifting and a weak central coherence, may be a characteristic of some patients with AN. Individuals with AN may have a weak central coherence, which is characterized by attention to detail and an inability to integrate these details into a more global comprehensive picture (Lopez, Tchanturia, Stahl, & Treasure, 2008; Lopez, Tchanturia, Stahl, & Treasure, 2009; Tenconi et al., 2010). A systematic review conducted by Lopez et al. (2008) notes that patients with BN have superior performance on the Matching Familiar Figures Test which suggests an increased attention to detail. Lopez et al. (2008) suggest that certain cognitive traits (i.e., perfectionism, fear of mistakes and resistance to change) found in patients with eating disorders may be related to a weak central coherence. In addition, recovery from an eating disorder may be more difficult when a combination of weak central coherence and difficulties with set shifting is present (Lopez et al., 2009). A systematic review performed by Van den Eynde et al. (2011) found that patients with BN tend to score lower than healthy controls on tasks measuring central coherence, suggesting bias toward detail and local processing.

The research to date suggests that patients presenting with an eating disorder may have deficits in EF including: decision-making (Cavedini et al., 2006; Van den Eynde et al., 2011), set shifting (Tchanturia et al., 2004; Tchanturia et al., 2011; Tchanturia et al., 2012), and central coherence (Lopez et al., 2008; Lopez et al., 2009). However, these cognitive styles may not be representative of all individuals with an eating disorder diagnosis (Tchanturia et al., 2011). An easy to administer, reliable, and valid measurement of EF in an eating disorder population could be an important tool in screening for EF deficits in patients with eating disorders (Tchanturia et al., 2012). With such immediate information about EF a clinician may be able to tailor treatments to increase their effectiveness, or pursue a targeted performance-based assessment. Recently, the BRIEF (described below; Gioia, Isquith, Guy, & Kenworthy, 2000) has been used in an adolescent population of eating disorder patients with AN (Dahlgren, Lask, Landrø, & Rø, 2014). Thus, the BRIEF-A may serve as an initial screening tool to aid clinicians in understanding an adults' EF in their everyday environment (Roth et al., 2005). According to Roth et al. (2005), "the BRIEF-A has demonstrated reliability, validity, and clinical utility for ecological assessment of [EF] in individuals with a range of conditions across the adult age spectrum" (Roth et al., 2005, p.1). However, psychometric properties of the BRIEF-A have never been evaluated in a sample of patients with eating disorders.

1.2. The BRIEF-A (Roth et al., 2005)

The BRIEF-A was developed as an extension of the original BRIEF questionnaire (designed for assessment of EF in school-aged children; Gioia et al., 2000), in order to provide a self-reported assessment tool of EF for adults. The BRIEF-A was constructed using items from the BRIEF, modifying the wording of items where the behaviour described was not appropriate for an adult respondent. The final item pool consisted of approximately 160 items including items that had been added to reflect more general statements as well as behaviour-specific statements. Using item-total correlations and principle factor analysis the total item pool was reduced, and standardization of the BRIEF-A was performed using 78 items.

The final version of the BRIEF-A is composed of 75 questions yielding nine clinical scales that form two higher-order indices, the Behavioral-Regulation Index (BRI; including the Inhibit, Shift, Emotional Control, and Self-Monitor scales), and the Metacognition Index (MCI; including the Initiate, Working Memory, Plan/Organize, Task Monitor, and Organization of Materials scales). The combination of the nine clinical scales forms one summary score called the Global Executive Composite (GEC) that provides an overall picture of the individual's perception of their EF. The measure includes three validity scales: Inconsistency, Negativity and Infrequency. The self-report scale is accompanied by an informant-report, which can be completed by someone who can comment on the individual's behaviour in his or her everyday environment.

The Behavioral-Regulation Index (BRI) measures a respondent's ability to regulate their behaviour and emotional responses. The Inhibit scale measures a respondent's inhibitory control and ability to inhibit their behaviour when appropriate. An example of an item on the Inhibit subscale is "I have problems waiting my turn". The Shift scale measures the ability of the adult to switch between situations as needed, and includes the item "I get disturbed by unexpected changes in my daily routine". The Emotional Control scale measures the extent to which the individual is able to mediate emotional responses. "I get upset quickly or easily over little things" is an example of an item on the Emotional Control scale. The Self-Monitor scale measures the extent to which an individual can keep track of his or her behaviour, and the extent to which they are aware of the effect of their behaviour on others. An example of an item on the Self-Monitor scale is "I don't think about consequences before doing something".

The Metacognition Index (MCI) measures an adult's ability to solve problems in a systematic way by using skills involving planning, organization and holding information in working memory. The MCI is composed of Initiate, Working Memory, Plan/Organize, Task Monitor, and Organization of Materials scales. The Initiate scale contains items pertaining to beginning a task or activity and the behaviour associated with this (i.e. generating ideas); for example, "I need to be reminded to begin a task even when I am willing". The Working Memory scale measures the respondent's ability to hold information in their mind and manipulate this information to achieve task completion; for example, "I have trouble with jobs or tasks that have more than one step". An adult's ability to manage current and future demands is measured by the Plan/Organize scale. The Task Monitor scale measures the extent to which the individual keeps track of his or her own successes and failures. An item on the Task Monitor scale is "I misjudge how difficult or easy tasks will be". The Organization of Materials scale measures the individual's organization within their environment and extends to the state of their work, living, and storage spaces. An example of an item on the Organization of Materials scale is "I leave my room or home a mess".

The BRIEF-A is designed to be used with adults between the ages of 18 and 90 years old and has been validated in a variety of populations compared to non-clinical controls. For example, those with attention deficit disorders had greatest difficulty in inhibitory control and working memory, those with multiple sclerosis showed significant problems in shifting and working memory, and those with traumatic brain injury reported prominent difficulties in the Task Monitor scale as well as other domains (Roth et al., 2005).