



Development and validation of the Detail and Flexibility Questionnaire (DFlex) in eating disorders

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ABSTRACT

Whilst neuropsychological testing provides the most accurate profile of cognitive functioning, the time consuming nature of individual assessment deems it impossible for many research and clinical settings. This paper presents the development and validation of the Detail and Flexibility Questionnaire (DFlex), a 24-item self-report scale measuring two aspects of neurocognitive functioning: cognitive rigidity (difficulty with set-shifting/flexibility) and attention to detail (weak coherence). Exploratory factor analysis extracted two subscales, further confirmed and refined by item response analysis. Both subscales showed high internal reliability, construct validity (as compared to relevant subscales of the Autistic-Spectrum Quotient) and strong discriminant validity with large effect sizes found between both lifetime eating disorder and healthy control groups, and between current and recovered anorexia nervosa. We suggest using the cognitive rigidity and attention to detail subscales independently to give a rough approximation of these two aspects of cognitive style as they manifest in the context of everyday life.

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1. Introduction

New models to explain anorexia nervosa (AN) have focussed on underlying mechanisms that cover vulnerability in addition to maintaining factors. The Maudsley Maintenance Model of AN (Schmidt & Treasure, 2006) details four domains that contribute to the maintenance of AN, the first of which is obsessive–compulsive personality traits. It has long been known that obsessive–compulsive traits are common in the eating disorders (Halmi et al., 2005; Kaye, Weltzin, & George Hsu, 1993) and impact on recovery (Crane, Roberts, & Treasure, 2007), however assessment has largely focussed on the behavioural and diagnostic aspects of obsessive–compulsive disorder such as ordering and cleaning behaviours. Over the last few years, focus has started to shift from visible behaviours of those with an eating disorder to underlying cognition by investigating neurocognitive profile (Treasure, 2007; Treasure, Lopez, & Roberts, 2007). This paper will focus on two cognitive styles identified through neuropsychological assessment that may fall under the obsessive–compulsive umbrella.

Cognitive flexibility or set-shifting, the ability to be flexible with one's mindset in adapting to new task demands or changes in situations, is a key aspect of executive function. A meta-analytic review identified 15 studies in the literature assessing set-shifting in the eating disorders,

with consistent difficulties seen across AN, bulimia nervosa (BN) and recovered AN groups using neuropsychological tasks such as the Wisconsin Card Sorting Test, Trail Making Task, and the Brixton Test (Roberts, Tchanturia, Stahl, Southgate, & Treasure, 2007; Tchanturia, Campbell, Morris, & Treasure, 2005). Set-shifting has been implicated as an endophenotype of eating disorders (Holliday, Tchanturia, Landau, Collier, & Treasure, 2005; Roberts, Tchanturia, & Treasure, 2010; Treasure et al., 2007), and proposed as part of a cognitive neuroscience hypothesis of AN (Steinglass & Walsh, 2006). This trait can manifest both in aspects of the patients' everyday life (e.g. rigid housekeeping routines) and in terms of illness symptomology (e.g. rules around food preparation/choice of food).

More recently, the concept of weak coherence (formally referred to as “weak central coherence”, see Happe & Booth, 2008) has been explored in the eating disorders. In the main this tendency to focus on intricate detail rather than the general tendency to integrate parts in their global context has been extensively studied in the autism literature (Happe, 2005). Research evidence suggests that this inherent bias toward detail is also present in the eating disorder population, as measured by tasks such as the Embedded Figures Task, Matching Familiar Figures Task, and the Rey-Osterrieth Complex Figure (Lopez, Tchanturia, Stahl, Happe, et al., 2008; Lopez, Tchanturia, Stahl, & Treasure, 2008a, 2008b; Oldershaw, Treasure, Hambrook, Tchanturia, & Schmidt, 2011; Roberts, Tchanturia, & Treasure, submitted for publication; Southgate, Tchanturia, & Treasure, 2008; Tokley & Kemps, 2007). A focus on detail is exemplified by the obsessive attention to precise calorie content of food items in AN.

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It is of clinical interest to examine how these neurocognitive styles may shape behaviours. This has been a focus of interest in the literature on autism. Baron-Cohen, Wheelwright, Skinner, Martin, and Clubley (2001) developed the Autism-Spectrum Quotient (AQ) which incorporates domains that represent both social cognition and information processing biases seen in autism. Two of the domains represented in the AQ approximate cognitive flexibility (attentional shifting subscale) and weak coherence (attention to detail subscale), where people with autism report elevated scores on both subscales (Baron-Cohen et al., 2001). Pilot research suggested that whilst the attentional shifting subscale of the AQ discriminated between AN patients and controls, the attention to detail subscale did not (Hambrook, Tchanturia, Schmidt, Russell, & Treasure, 2008). On further investigation, it is likely that the detail subscale of the AQ is conceptually insensitive in what is a majority female clinical group, for example a large number of items are biased toward masculine traits (e.g. “I usually notice car number plates, or similar strings of information”). Therefore the aim of the present study is to design and validate a self-report measure of behaviours possibly linked to poor set-shifting and weak coherence relevant to the eating disorder population. It is hypothesised that scores on this measure will be reliably higher amongst eating disorder patients compared to controls.

2. Material and methods

2.1. Item pool generation

A group of experienced clinicians and researchers working at the Institute of Psychiatry at the Maudsley Hospital in London generated items targeting inflexible and detail focussed behaviours. Items were drawn from clinical observation and experience, and from comments, feedback or letters from patients themselves regarding aspects of their cognitive style. Additionally, items of relevance from the AQ (Baron-Cohen et al., 2001) were included, with the authors' permission. This list was then circulated to additional colleagues within the unit, with a request to add any further items that were thought relevant. Face and content validity were considered as items were included. In total, 54 items were generated for the pilot scale. A 6-point Likert scale was used, with anchors strongly agree, and strongly disagree.

2.2. Measures

In addition to the DFlex, this study employed the AQ and the Eating Disorder Diagnostic Scale (EDDS). The AQ is a 50-item questionnaire measured on a 4-point Likert scale, from strongly agree to strongly disagree. Ten questions each measure 5 different domains; social skills, attention switching, attention to detail, communication, and imagination. The AQ shows good test-retest and inter-rater reliability (Baron-Cohen et al., 2001). The EDDS is a 22 item self-report measure structured around the DSM-IV criteria for an eating disorder. Items are measured in a variety of formats as determined by the nature of the question including a 6-point Likert scale (e.g. “Have you had a definite fear that you might become fat or gain weight”), yes/no response (e.g. “...did you eat until you were uncomfortably full”) and frequency

ratings (e.g. “how many times on average.... made yourself sick”). The scale shows good reliability, validity and internal consistency in addition to discriminant validity compared to clinical interview (Stice, Telch, & Rizvi, 2000).

2.3. Participants and procedure

The 54-item pilot questionnaire was sent out to approximately 500 members of the Maudsley eating disorder unit volunteer database. This database is made up of volunteers with either current or past eating disorder, who have an ongoing willingness to help with research. The majority of volunteers are women with current or past AN. The pilot questionnaire was sent to volunteers as part of a small pack of questionnaires, along with a bi-annual newsletter (research update) and flyers recruiting for ongoing projects within the unit. A pre-paid addressed envelope was provided.

Data were also collected from healthy controls who were recruited from a range of places such as student campuses, general practitioner waiting rooms, flyers in the community (e.g. libraries and café's) and the Institute of Psychiatry's healthy volunteer database (MindSearch). All healthy controls were screened for eating behaviour based on responses to the EDDS (Stice et al., 2000).

The study was approved by the local research ethics committee.

3. Results

3.1. Participant demographics

The first group of participants (and those used for the psychometric analyses) consisted of 202 volunteers, all with a lifetime diagnosis of a DSM-IV eating disorder as measured by the EDDS (AN = 68.6%; BN = 16.2%; EDNOS = 15.1%). Mean age was 36.56 (SD = 12.11). Mean body mass index (current) was 19.21 (SD = 5.15) with a lowest BMI ever of 16.65 (SD = 6.59). All but four of the samples were female, with 97.8% being of White British ethnicity. Just over half (53.8%) had a university qualification. Just under half (47.6%) were in paid employment, with 14.1% currently studying, 9.7% unemployed, and 6.5% retired. See Table 1 for scale and subscale scores.

The second group participants were 188 healthy volunteers, with a mean age of 24.97 (SD 11.22) and mean body mass index of 22.21 (SD 3.35). In contrast to the clinical sample, the vast majority of participants were students (73%), and again were predominantly female (85%) and of White British ethnicity (81%). Only 22% were in paid employment, with four people being unemployed and one retired.

3.2. Exploratory factor analysis

An exploratory factor analysis was conducted first to identify the number of factors explained by the scale and also to reduce the number of items required. Only participants with a lifetime eating disorder diagnosis were included in this analysis. Nine participants with missing diagnostic details were excluded. All 54 original items were subject to a principal axis factoring analysis (PFA) using Varimax rotation in SPSS 15.0. Initially, factors with eigenvalues greater than 1

Table 1

DFlex total scale and subscale scores for lifetime eating disorder and healthy control groups.

	Lifetime ED (n = 202)	Healthy Control (n = 188)	t-test	p	Effect size (Cohen's d)
DFlex total	87.50 (21.74)	66.85 (16.08)	10.29	<0.001**	1.08
Factor 1: Cognitive Rigidity	47.28 (12.42)	34.08 (9.31)	11.52	<0.001**	1.20
Factor 2: Attention to Detail	40.31 (10.99)	32.80 (7.96)	7.46	<0.001**	0.78
Relevant AQ Subscales					
Attentional Switching	6.21 (2.24)	4.14 (2.31)	8.79	<0.001**	0.91
Attention to Detail	5.66 (2.28)	5.07 (2.30)	2.47	0.01*	0.26

DFlex Detail and Flexibility Questionnaire; AQ Autistic Spectrum Quotient; ED eating disorder.

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