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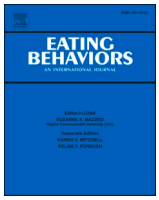

Weak central coherence, cognitive rigidity and disordered eating in a community sample

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ABSTRACT

Recent evidence has highlighted that a moderate degree of disordered eating has become the norm among the general population. While previous research has demonstrated that individuals with eating disorders exhibit heightened weak central coherence (i.e., attention to detail) and cognitive rigidity, and this plays a key role in the development and maintenance of the disorders, less is known about the relationship between disordered eating and these cognitive styles in subclinical community samples. A community sample of females completed self-report measures of weak central coherence, cognitive rigidity and eating disorder pathology. Unlike previous studies in the area, we first excluded participants with a diagnosis of eating disorder and then confined the analyses to those without clinically significant disordered eating. In line with the clinical literature, we found both cognitive rigidity and weak central coherence to correlate with severity and frequency of disordered eating behaviours and cognitions, suggesting the relationship also exists in subclinical samples. If replicated and expanded upon, these findings may bear important implications for the prevention and early identification of disordered eating in the community.

1. Introduction

Disordered eating (DE) can be defined as the full spectrum of problematic eating behaviours, weight and shape concerns; it covers mild manifestations, (e.g., occasional binge eating or purging) as well as clinically diagnosable eating disorders (American Psychiatric Association, 2022). Recent research suggests that a moderate degree of DE has become normative among the general population (e.g., Simone et al., 2021), with estimates as high as 16 % of the population (Lifestyles Team and NHS Digital, 2020). This is concerning as DE has been shown to predict onset and type of eating disorders (e.g., Hilbert & Brauhardt, 2014; Stice & Desjardins, 2018; Tanofsky-Kraff et al., 2011), while also being associated with higher levels of anxiety and depression (McBride et al., 2013), difficulties in weight management (Jalali-Farahani et al., 2015), suicide rates and mortality (Crow et al., 2009). Considering the prevalence of DE among the general population, and its implications for eating disorders, it is imperative to identify contributing factors for DE to better inform prevention, early detection, and ultimately intervention.

Weak central coherence (WCC) and strong cognitive rigidity (CR) are cognitive inefficiencies across eating disorders subtypes (e.g., Keegan et al., 2021; Lang et al., 2014; Roberts et al., 2007). WCC is characterised by heightened attention to detail and reduced global information processing (Frith, 2003). CR is defined as difficulties in shifting perspective or attention in response to environmental stimuli (Lezak, 1995). Both constructs have been implicated in eating disorders (Smith et al., 2018), particularly as tools of control over avoidance of negative emotions (Fairburn et al., 2003; Schmidt & Treasure, 2006; Treasure et al., 2020). Evidence points towards WCC and CR as cognitive endophenotypes for eating disorders, thus preceding, and contributing to the development of, the illness. WCC has been proposed to fuel perfectionism (e.g., Schmidt & Treasure, 2006), specific disorder-related rituals, such as body checking and calorie counting (Wang et al., 2021), and self-evaluations that are excessively based on body weight and shape rather than broader concepts of self-identity (Fairburn et al., 2003; Lopez et al., 2008; Treasure et al., 2020). CR is thought to facilitate obstinance in dietary restriction and control of appetite, as evident in symptomatic thoughts (e.g., categorising food as good or bad; Lang et al., 2014), behaviours (e.g., adherence to strict dietary rules, rigid exercise routine, etc.; Roberts et al., 2011; Fuglset, 2019), and difficulties in exploring alternative ways to deal with a problem (Sternheim et al., 2022) or adjusting maladaptive routines during treatment (Wang et al., 2021). While there is ample evidence for the association between WCC/CR and DE in clinical samples (e.g., Keegan et al., 2021; Smith

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et al., 2018; Wu et al., 2014), limited research has explored this association in the non-clinical population. This is however necessary to establish whether WCC/CR may contribute to DE in the community, with obvious implications for prevention and early recognition.

We found a total of ten studies linking WCC and/or CR to DE in the community. Three studies found no link between WCC and DE (Carton & Smith, 2014; Griffiths et al., 2013; Naor-Ziv & Glicksohn, 2016) while one study (Shepherd et al., 2022) found associations between WCC (but not CR) and levels of restrained eating, weight, and shape concerns in a sample of female undergraduate students. Two studies found higher CR in adults who engage in binge eating compared to healthy controls (Kelly et al., 2013; Manasse et al., 2014), and two studies found associations between CR and DE in male undergraduate students (Griffiths et al., 2013) and adolescents (Naor-Ziv & Glicksohn, 2016). While different factors may account for the observed inconsistencies, a common feature of this research is the use of neurocognitive tasks to measure WCC and CR. These have been criticised for lacking ecological validity and thus failing to represent how these cognitive constructs influence individuals in daily life (Maria et al., 2020).

Only three studies (Arlt et al., 2016; Clarke & Kiropoulos, 2021; Kesby et al., 2019) used self-reports (i.e., Detail and Flexibility Questionnaire; Roberts et al., 2011) to explore these constructs in non-clinical samples. While they have found positive associations between DE and CR, they have not investigated WCC and have not excluded people with a diagnosis of eating disorder. In fact, they have often either actively recruited people with high levels of DE (Kesby et al., 2019) or had a high percentage of diagnosed individuals (Clarke & Kiropoulos, 2021). This is problematic when attempting to gain insight into the contribution of WCC/CR to subclinical DE, as previous associations may have been driven by the inclusion of participants with a diagnosis. The present study aims to address these shortcomings by relying on a self-reported measure of both CR and WCC. Furthermore, we set to investigate these constructs in people without an eating disorders diagnosis, thus drawing up a dimensional view of the associations between DE, CR and WCC in the community. Our main hypothesis was that CR and WCC would be associated with severity and frequency of DE behaviours and cognitions in people without a diagnosis of eating disorders.

2. Method

2.1. Participants

One-hundred and fifty-nine female participants (age: $M = 25.22$; $SD = 8.37$) were recruited via a university's research participation scheme ($N = 105$), social media including Facebook, Twitter, Instagram, and Reddit ($N = 26$), and word of mouth ($N = 28$). Participants were included if they were females aged between 18 and 55 and excluded if ever diagnosed with an eating disorder, taking medications or supplements affecting eating habits, diagnosed with a medical or physical condition affecting eating habits, and had undergone any type of nutrition counselling or therapy.

2.2. Procedure

The study was approved by the university ethics committee review board. Potential participants were invited to respond to the online questionnaire on Qualtrics. After providing informed consent, participants were asked to complete the demographic questionnaire, the Detail and Flexibility Questionnaire (DFlex; Roberts et al., 2011) and the Eating Disorder Questionnaire 6.0 (EDE-Q 6.0; Fairburn & Cooper, 1993).

2.3. Measures

2.3.1. Weak central coherence and cognitive rigidity

The Detail and Flexibility Questionnaire (DFlex; Roberts et al., 2011), a 24-item self-report questionnaire, assessing general (i.e., not related to disordered eating) WCC and CR with two subscales, each containing 12 items. Participants are asked to rate how much they agree or disagree with a list of statements (example item for CR: "When others suggest a new way of doing things, I get upset or unsettled"; example item for WCC: "I can get hung up on details when reading rather than understanding the gist') on a 6-point Likert scale, from 'Strongly Disagree' to 'Strongly Agree'. Scores for each scale are summed up, higher scores indicate greater CR and WCC. This measure has high internal reliability, and strong construct and discriminant validity (Roberts et al., 2011). In this study, the DFlex showed good internal consistency, Cronbach's α: CR = 0.85 and WCC = 0.84.

2.3.2. Disordered eating severity

The Eating Disorder Questionnaire 6.0 (EDE-Q 6.0; Fairburn & Cooper, 1993) is a 28 items questionnaire assessing disordered eating in clinical and non-clinical samples. It yields a Global score, alongside a score for each of the four subscales: Restraint, Eating, Shape Concern and Weight Concern. All the questions included in the subscales used a 7-point Likert scale (no days to every day). Items 13 to 18 were not included in any subscales and were used to assess the frequency of disordered eating behaviour – overeating, loss of control eating, days of overeating, self-induced vomiting, use of laxatives and excessive exercising to control weight and shape. Participants were asked to provide the exact number of times (or days) they displayed such behaviours during the past 28 days. The EDE-Q is deemed to have high test-retest reliability, good internal consistency (Rose et al., 2013) and high convergent validity (Accurso & Waller, 2021), In this study, internal consistency was high for all scales, Cronbach's α: Global = 0.96, Restraint = 0.9, Eating Concern = 0.85, Shape Concern = 0.93 and Weight Concern = 0.86.

2.4. Analytic approach

The data were imported into JASP (Version 0.12.2; JASP Team, 2020) statistical software for analyses. Independent samples *t*-tests were used to compare means and standard deviations for key study variables with clinical and non-clinical samples. Spearman's rank-order correlations were conducted to examine associations between disordered eating severity, WCC and CR. A p value of 0.05 is assumed for significance.

3. Results

Sample characteristics and descriptive statistics of study variables are presented in Table 1. Scores on the EDE-Q were comparable to those obtained in non-clinical UK samples (M = 1.63, SD = 1.25, $t(1232) = 1.46$, $p = .145$ Carey et al., 2019), suggesting the sample used was representative of a non-clinical population. Scores on the DFlex were below those obtained by Roberts et al. (2011) in people with a current diagnosis of Anorexia Nervosa for CR (M = 52.73, SD = 10.78; $t(225) = 8.29$, $p < .001$) and WCC (M = 43.60, SD = 9.76; $t(225) = 4.49$, $p < .001$) and comparable to those who recovered from Anorexia Nervosa for CR (M = 40.56, SD = 10.38; $t(209) = 0.21$, $p = .834$) and WCC (M = 36.50, SD = 10.11; $t(209) = 0.46$, $p = .645$), but higher than those previously found in healthy controls screened out for eating disorders (Roberts et al., 2011) for CR (M = 34.08, SD = 9.31; $t(345) = 5.83$, $p < .001$) and WCC (M = 32.80, SD = 7.96, $t(345) = 4.65$, $p < .001$).

3.1. Disordered eating and WCC/CR across the sample

The present study postulated a positive association between CR, WCC and DE. An inspection of histograms suggested that the normality assumption was violated for all study variables. Spearman's rank-order correlations were run to examine the relationships between the variables. CR was associated with the EDE-Q global score ($rs(159) = 0.24$, p

Table 1
Overall study sample characteristics and descriptive statistics for study variables.

	Total (n = 159)	
	Mean (SD)/%	Range
Age (years)	25.22 (8.37)	18–55
BMI (kg/m^2)	23.71 (5.88)	12.96–50
Race/ethnicity		
English, Irish or other white background	47.84 %	
African, Caribbean or any other black, African or Caribbean background	13.8 %	
Indian, Pakistani, Bangladeshi, Arab, Chinese or any other Asian background	30.82 %	
Any Mixed or Multiple ethnic background	7.54 %	
Past or current mental health history	20.76 %	
EDE-Q		
Restraint	1.70 (1.80)	0–6
Eating concern	1.16 (1.38)	0–6
Shape concern	2.25 (1.77)	0–6
Weight concern	2.03 (1.74)	0–6
Global score	1.79 (1.54)	0–5.95
DFlex		
Cognitive rigidity	40.21 (10.27)	12–66
Weak central coherence	37.23 (9.8)	12–62
Disordered eating episodes		
Overeating	2.69 (4.46)	0–20
Loss of control eating	2.02 (4.27)	0–28
Days of overeating	2.29 (4.33)	0–20
Self-induced vomiting	0.47 (2.56)	0–28
Laxative misuse	0.37 (1.85)	0–20
Excessive exercising	2.56 (5.37)	0–28

Note. SD: standard deviation; Kg: kilograms; BMI: body mass index; ED: eating disorder; EDEQ: Eating Disorder Examination Questionnaire; Dflex: Detail and Flexibility Questionnaire.

= .003), eating concern ($rs(159) = 0.30$, $p < .001$), shape concern ($rs(159) = 0.29$, $p < .001$) and weight concern ($rs(159) = 0.26$, $p < .001$), but not with dietary restraint ($rs(159) = 0.10$, $p = .215$). WCC was associated with EDE-Q global score ($rs(159) = 0.20$, $p = .010$), eating concern ($rs(159) = 0.29$, $p < .001$), shape concern ($rs(159) = 0.23$, $p = .004$) and weight concern ($rs(159) = 0.23$, $p = .004$). CR was positively correlated with frequency of excessive exercising ($rs(159) = 0.19$, $p = .019$), while WCC was positively correlated with binge eating ($rs(159) = 0.25$, $p = .002$) and loss of control eating ($rs(159) = 0.26$, $p < .001$).

3.2. Disordered eating and WCC/CR within below ED threshold

To assess whether the relationship between WCC/CR and DE remained below clinical threshold for DE, we removed participants who had EDE-Q global score > 4; (20 participants; Meule, 2021). CR remained associated with eating concern ($rs(139) = 0.22$, $p = .009$) and shape concern ($rs(139) = 0.18$, $p = .037$). WCC remained scorrelated with eating concern ($rs(139) = 0.26$, $p = .002$), shape concern ($rs(139) = 0.17$, $p = .04$), and weight concern ($rs(139) = 0.17$, $p = .045$). WCC remained positively correlated with loss of control eating ($rs(139) = 0.19$, $p = .029$).

4. Discussion

The current study examined the relationships between WCC, CR and severity of DE in a community sample of females. In line with our main hypothesis, we found positive associations between WCC/CR and severity and frequency of DE cognitions and behaviours. These findings mirror the body of research in clinical populations (e.g., Wu et al., 2014). Previous studies investigating WCC/CR and DE in the general population yielded mixed findings. While several factors may contribute to such picture, one possibility is that inconsistent findings may be attributable to differential DE severity across studies, with significant associations between DE and WCC/CR found in samples typically displaying higher DE levels, such as undergraduate students (Griffiths et al., 2013; Shepherd et al., 2022), adolescents (Naor-Ziv & Glicksohn, 2016), and people who binge eat (Kelly et al., 2013; Manasse et al., 2014). To our knowledge, this is the first study investigating this question by excluding participants with an eating disorder diagnosis and confining the analyses to those below the clinical threshold of DE. Furthermore, this is the first study to explore the relationship between DE and both CR and WCC in a community sample of women using ecological measures of CR and WCC. This bears important implications for our understanding of the relationship between CR/WCC and DE in subclinical samples.

WCC and CR are assumed to contribute to DE in a number of ways, including by enabling fixation on the size and shape of specific body parts, preference for rigid routines and behaviours and employment of inflexible thought processes. It is therefore unsurprising that WCC was found to correlate with global eating disorder, eating concern, shape concern, weight concern, binge eating and loss of control eating. After excluding cases that displayed clinically significant DE, WCC remained significantly correlated with eating concern, shape concern, weight concern and loss of control eating. Similarly, CR was associated with global eating disorder, eating concern, shape concern and weight concern, and excessive exercising. When confining the analyses to below-threshold levels, CR remained associated with eating concern and shape concern. We also found a link between WCC and frequency of loss of control and binge eating episodes. This echoed the findings of Becker et al. (2017), where over-attention to detail is associated with binge eating but not compensatory behaviours. A possible theory that draws upon such findings is that a bias in detail processing may retract information from the bigger picture when processing information, preventing individuals from considering the consequences of overeating and contributing to the loss of control and binge eating. This may also explain the lack of a relationship between compensatory behaviours and WCC in our study.

Future research should clarify the link between WCC/CR and specific disordered eating behaviours (e.g., MacNeil & Leung, 2022; Tamiya et al., 2018). As recent clinical research highlights a role for CR and WCC in anxiety, low mood, life satisfaction (MacNeil & Leung, 2022), social and executive functioning (Dann et al., 2021), it would be important to assess whether such cognitive styles contributed to these features in community samples also.

Our findings should be considered in light of some limitations. First, the findings rely on self-reports of CR,WCC and DE which require a certain degree of insight and may be prone to bias (Roberts et al., 2011). Future studies should incorporate multiple measures, combining self-reports and behavioural assessments, to provide a more composite picture of the phenomena investigated. Second, the study was cross-sectional in nature and thus limited in the conclusions that can be drawn. Future studies would benefit from using longitudinal designs to assess the predictive role of CR/WCC in DE. Third, our exclusion of participants with an eating disorder was based on self-reports. Future studies could ask for evidence of diagnosis. Fourth, the sample included females only, which limits generalisability of findings. Fifth, we failed to introduce specific strategies to account for bots infiltration. Strengths of the study include its ethnically diverse sample, with over 50 % of the participants being non-White. Furthermore, unlike previous literature, this is the first study to investigate the topic in those without a diagnosis of eating disorders or clinically significant levels of DE. This is also the first study to use a self-report measure of WCC in the community, thus drawing a direct line between WCC manifestations in daily life and DE.

Authors statement

We confirm that all procedures were performed in compliance with relevant laws and institutional guidelines and have been approved by

Kingston University research ethics committee. Informed consent was obtained prior to data collection.

CRediT authorship contribution statement

Ka Ka Chong: Writing – original draft, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Cristina Martinelli:** Writing – review & editing, Supervision, Formal analysis, Conceptualization.

Declaration of competing interest

None.

Data availability

The authors do not have permission to share data.

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