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WEIGHING THOUGHTS AND BEHAVIORS IN EATING PATHOLOGY: A CANONICAL CORRELATION BETWEEN THE EDE-Q AND EPSI SUBSCALES

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Abstract

Nearly one-third of Canadians reported having thoughts and behaviours that are associated with eating disorders (Mental Health Research Canada, 2025). Although the best population level assessment of the prevalence of eating disorders are wide-scale national studies, Raffoul et al. (2025) critiqued national census procedures in Canada for their inconsistency and lack of appropriate assessment of eating disorders, leading to large gaps in understanding prevalence in Canada. Researchers interested in attitudes, thoughts and behaviours associated with disordered eating typically use the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) and the Eating Pathology Symptoms Inventory (EPSI; Forbush et al., 2013), which are established reliable and valid measures used to assess eating disorder pathology. Although these scales vary in their uses, the EDE-Q has been used as an indicator of the presence and severity of an eating disorder (Levinson et al., 2023; Velkoff et al., 2023). The EPSI focuses on different aspects of disordered eating and may be a better indicator of eating disorder symptoms and behaviours associated with different aspects of disordered eating. Further, the EPSI is more general and suitable for more diverse populations, including male samples (Levinson et al., 2023). Although both scales have strong convergent validity (Coniglio et al., 2018; Forbush et al., 2013), a more in-depth examination of the subscale relationships has yet to be done. Thus, the purpose of this study was to examine the linear relationships between the EDE-Q (Fairburn & Beglin, 1994) and EPSI (Forbush et al., 2013) using canonical correlation analyses. The EPSI subscales (Body Dissatisfaction, Cognitive Restraint, Binge Eating, Excessive Exercise, Purging, Restraint, Negative Attitudes Towards Obesity, and Muscle Building) were entered as the dependent variables and the EDE-Q subscales (Restriction, Eating Concern, Shape Concern, and Weight Concern) were entered as covariates to determine how disordered eating cognitions and concerns related to eating disorder symptoms. In total, 646 cases were used in this analysis, and the relationship between the sets of variables was statistically significant ($p<.001$) The first function accounted for approximately 79.3% of the explained variance and was associated with greater shape, weight, and eating concerns, and restrictions. The first dependent function was associated with greater body dissatisfaction, cognitive restriction, and binge-eating. Taken together, the first function indicated that greater concern over appearance was predictive of more compensatory behaviors. These results indicate that both scales represent general eating disorder pathology and is supported by the Transdiagnostic Cognitive Behavioural Model of Eating Disorders (Fairburn et al., 2004).

Keywords: *Disordered eating, canonical correlation, body dissatisfaction, scale assessment.*

1. Introduction

Disordered eating is a prevalent issue in Canada affecting one-third of the population (Mental Health Research Canada, 2025). At present, there are minimal tools used to assess eating disorder prevalence nation-wide beyond self-identification tools. As a result, these inconsistencies could impact understanding the true prevalence of eating disorders in Canada (Raffoul et al., 2025). The reliance on a formal diagnosis, rather than the use of validated and reliable measures to assess risk and prevalence could lead to policymakers underestimating the need for care access, resulting in fewer program opportunities to help identify and treat those who are at risk of developing an eating disorder.

There are several validated and reliable self-report measures to assess disordered eating behaviours. Researchers interested in attitudes, thoughts and behaviours associated with disordered eating typically use the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) and the Eating Pathology Symptoms Inventory (EPSI; Forbush et al., 2013). Both scales have been used to

distinguish patients with eating disorders from non-eating disorder controls and among various eating disorder diagnoses (Forbush et al., 2013; Velkoff et al., 2023). The EDE-Q is a commonly used tool for diagnosis, screening, and to assess eating disorder severity in treatment and research settings (Ayala et al., 2022; Mond et al., 2004). A cut-off of 2.8 in the EDE-Q was established by Velkoff et al. (2023) to indicate the likelihood of clinically elevated *symptoms*. Comparatively, the EPSI (Forbush et al., 2013) was designed to minimize gender and weight-related bias (Forbush et al., 2013; Levinson et al., 2023). The EPSI has been used to assess cognitions, attitudes, and behaviours associated with eating disorders and includes subscales to indicate a broader range of symptoms of associated with disordered eating *behaviours*. For example, although the EDE-Q (Fairburn & Beglin, 1994) has a restriction subscale, the EPSI (Forbush et al., 2013) sub-divides restriction into two subscales: cognitive restraint (i.e., the mental effort to restrict food intake) and physical restraint (i.e., limiting food intake).

During development, the EDE-Q (Fairburn & Beglin, 1994) was used to establish for convergent validity for the EPSI (Forbush et al., 2013; Birgegård et al., 2024). EPSI scales that represented more traditional eating disorder pathology had moderate to strong correlations with the EDE-Q (Birgegård et al., 2024), with weaker associations between other subscales such as Muscle Building. Birgegård et al. (2024) suggested that the EPSI subscales may be best used in non-clinical samples, particularly those with negative body image. Further, the EPSI accounts for gendered manifestations of eating disorder behaviours such as men exhibiting more Muscle Building and women reporting higher on the Excessive Exercise subscale (Birgegård et al., 2024). Concerns have been raised about the EDE-Q's ability to assess disordered eating in males as it is seemingly biased to eating disorder presentation in women (Schaefer et al., 2018).

1.1. Purpose of the current study

To gain a better understanding of each scale's utility in clinical and research settings, researchers need a better understanding of how these scales relate to one another beyond providing convergent validity. To date no one has comprehensively examined the relationships between the EDE-Q (Fairburn & Beglin, 1994) and the EPSI (Forbush et al., 2013) at a subscale level. Thus, our purpose was to examine the linear relationships between the EDE-Q (Fairburn & Beglin, 1994) and EPSI (Forbush et al., 2013) using canonical correlation analyses.

2. Methods

2.1. Participants and procedure

This research was reviewed by the Research and Ethics Board at the University of New Brunswick, Canada (2024-205). Participants were recruited from undergraduate psychology courses and were offered 1.5 bonus points for their participation. Prior to completing the online questionnaire package, all participants provided informed consent. A demographics questionnaire was always completed first, followed by the questionnaires, presented in randomized order. After completion, participants were presented with debriefing information that explained the full purpose of the study. In total 653 people participated in this study. Participants reported a mean age of 21 years (SD = 5.81). The sample was predominantly women (n = 497; 76%) and men (n = 146; 23.3%), with few participants who identified as another gender (n = 10). Based off Velkoff et al.'s (2023) cut-off for the EDE-Q, one-third of participants reported a clinical level of disordered eating behaviours (n = 206; Men: n = 27; Women: n = 178).

2.2. Measures

The Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) is a 28-item self-report questionnaire based on a pre-existing set of interview questions. It assesses eating disorder behaviours and attitudes using a 7-point Likert scale from 0 (no days) to 6 (every day). It is comprised of an overall score (α = .95) as well as the following subscales: Restraint (α = .87), Eating Concern (α = .82), Shape Concern (α = .92), and Weight Concern (α = .86), all of which demonstrate high internal consistency. Scores were calculated using the mean with higher scores indicate more severe eating disorder pathology. An overall score greater than 2.8 suggests the presence of a clinically significant condition (Velkoff et al., 2023). **The Eating Pathology Symptoms Inventory** (EPSI; Forbush et al., 2013) is a 45-item self-report questionnaire. It assesses eating disorder behaviours and attitudes using a 5-point Likert scale from 0 (rarely) to 4 (very often). It is comprised of eight subscales each demonstrating high internal consistency: Body Dissatisfaction (α = .87), Binge Eating (α = .87), Cognitive Restraint (α = .80), Purging (α = .86), Restricting (α = .85), Excessive Exercise (α = .88), Negative Attitudes Toward Obesity (α = .90), and Muscle Building (α = .81). A global score was also created for the EPSI by the authors using all items and demonstrated high internal reliability (α = .93). Scores were calculated using means, higher scores indicated greater eating disorder pathology.

3. Results

A canonical correlation analysis was used to explore the relationships between sets of eating disorder symptoms as measured by the EDE-Q and EPSI subscales, for the total sample and for men and women The dependent variables were EPSI: Body Dissatisfaction, EPSI: Binge, EPSI: Cognitive Restraint, EPSI: Purge, EPSI: Restrict, EPSI: Excessive Exercise, EPSI: Negative Attitudes Towards Obesity, and EPSI: Muscle Building. The predictor variables were EDE-Q: Restraint, EDE-Q: Eating Concern, EDE-Q: Weight Concern, and EDE-Q: Shape Concern.

In total, 646 cases were used in the analysis, 10 were removed due to missing data. The relationship between the sets of variables was statistically significant overall, Wilks' $\lambda = .17$, $R_c^2 = .83$, $F(32, 2339.67) = 45.20$, $p < .001$, for men, Wilks' $\lambda = .16$, $R_c^2 = .84$, $F(32, 481.01) = 9.59$, $p < .001$, and for women Wilks' $\lambda = .15$, $R_c^2 = .85$, $F(32, 1779.12) = 37.12$, $p < .001$. All four functions were extracted. Eigenvalues, percentages of variance explained, and the squared canonical correlations for each function (see Table 1). For the total sample, the first function accounted for approximately 79% of the explained variance, and the second function added somewhat more than 16% to that. The dimension reduction analysis indicated that all four functions were statistically significant, but only the first two, which cumulatively accounted for more than 95% of the explained variance, were interpreted. Based on the Cramer−Nicewander (1979) index, approximately 29% of the variance of the dependent variables was explained by the predictor variables. Comparatively, the first predictive function accounted for a greater amount of variance for women than men. Men and women varied on the strength of some of the structure coefficients for the predictor and dependent variables of functions one and two (Tables 2 and 3).

Table 1. Eigenvalues, Cumulative Percentage of Explained Variance, and Squared Canonical Correlations for Each Canonical Function.

	Function	Eigenvalue	Percent of Variance Explained	Squared Canonical Correlation
Total	1	2.46	79.26	.71
	2	0.52	16.89	.34
	3	0.10	3.29	.09
	4	0.02	0.57	.02
Men	1	1.98	69.36	.66
	2	0.46	16.30	.32
	3	0.39	13.73	.28
	4	0.02	0.61	.02
Women	1	2.81	80.80	.74
	2	0.57	16.27	.36
	3	0.80	2.28	.07
	4	0.02	0.65	.02

The first predictor function was associated with higher levels of restraint, shape concern, weight concern, and eating concern (Table 2); the first dependent function was associated with greater body dissatisfaction, cognitive restraint, and binge-eating (Table 3). Taken together, the first function appears to indicate that concerns around appearance and eating behaviours are predictive of controlling thoughts around food, increased binge-eating episodes and greater body dissatisfaction. Interestingly, the strength of the relationship for EDE-Q: Restraint was greater for women than men (Table 2).

Table 2. Structure Coefficients for the First Two Predictor Canonical Variables.

	Total		Men		Women	
Predictor Variable	Function 1	Function 2	Function 1	Function 2	Function 1	Function 2
EDE-Q: Restraint	.73	-.63	.50	-.78	.79	-.56
EDE-Q: Eating Concern	.82	-.27	.66	-.21	.85	-.19
EDE-Q: Shape Concern	.98	.12	.97	-.06	.97	.20
EDE-Q: Weight Concern	.96	.01	.93	-.29	.94	.11

The second predictor function was associated with lower levels of restriction (Table 2). The second dependent function was associated with lower levels of cognitive restraint (Table 3). This second function indicates that lower levels of thoughts of restriction and restrictive behaviours are predictive of lower levels of cognitive restraint around food. The association for body dissatisfaction in the second dependent function was stronger for women than men (Table 3).

Table 3. Structure Coefficients for the First Two Dependent Canonical Variables.

	Total		Men		Women	
Dependent Variable	**Function 1**	**Function 2**	**Function 1**	**Function 2**	**Function 1**	**Function 2**
EPSI:Body Dissatisfaction	.96	.23	.97	-.04	.94	.33
EPSI: Binge	.50	.06	.58	.19	.53	.11
EPSI: Cognitive Restraint	.70	-.61	.60	-.68	.74	-.55
EPSI: Purge	.43	-.40	.35	-.32	.48	-.32
EPSI: Restrict	.38	-.34	.33	-.14	.38	-.37
EPSI: Excessive Exercise	.44	-.34	.32	-.34	.53	-.26
EPSI: Negative Attitudes Towards Obesity	.24	-.17	.37	-.09	.30	-.14
EPSI: Muscle Building	.21	-.10	.32	.01	.30	-.03

4. Discussion

The purpose of this study was to examine the linear relationships between the EDE-Q subscales (Fairburn & Beglin, 1994) and the EPSI subscales (Forbush et al., 2013) using canonical correlation. Results indicate a substantial multivariate association between clinical presentation of eating disorder symptoms (EDE-Q; Fairburn & Beglin, 1994) and cognitions and behaviours associated with eating (Forbush et al., 2013), suggesting these measures capture overlapping but partially distinct constructs. In particular, the first function revealed that concerns about weight, shape, appearance, and food intake leads to more compensatory thought processes and behaviours, and greater body dissatisfaction. The second function noted that lower levels of restriction led to less restrictive thoughts around food. Gender differences indicated could be due to how eating disorder symptoms manifest in men versus women. Women typically engage in more restrictive behaviours such as fasting compared to men (Capuano et al., 2025).

Fairburn et al.'s (2003) Transdiagnostic Cognitive Behavioural Model of Eating Disorders contextualizes the findings of Function 1. People with eating disorders tend to judge themselves based shape, weight, eating, and their ability to control them, leading to an over-evaluation of control over the appearance of one's body. In turn, people with eating disorders address these concerns through restrictive thought patterns and behaviours. Fairburn et al. (2003), and Nikčević et al. (2017) argued that binge-eating occurs due to a breakdown in self-regulation processes; although, the cause for the disruption to self-regulation is debated (i.e., either due to broken rules around consumption as proposed by Fairburn et al., 2003, or exhaustion from the cognitive restriction proposed by Nikčević et al., 2017). Further research also supports the link between restriction and binge-eating episodes. A scoping review by Casari et al. (2025) noted that 53 out of 76 articles presented a relationship between restriction and binge-eating episodes, with negative emotions being one of the common agitators.

The findings from Function 2 indicate that lower rates of behavioural restriction predict lower cognitive restraint. Westenhoefer (1991) suggested that dietary restraint exists on a continuum and is not a single entity, the results of the current study support this conclusion about restraint. These factors could be associated with what Westenhoefer (1991) described as flexible control, with no rigid rules, nor strong monitoring of behaviour and thoughts. Flexible control is described as independent of pathology. Herman and Polivy's (1975) Restraint Theory suggests cognitive and behavioural domains to restraint where greater cognitive restriction predicts increased binge-eating. Function 2 might represent a more general model of restraint capturing both the cognitive and behavioural aspects as noted by Herman and Polivy (1975) and the multidimensional approach suggested by Westenhoefer (1991).

4.1. Conclusion

The current study identified two distinct functions linking the EDE-Q (Fairburn & Beglin, 1994) and the EPSI (Forbush et al., 2013) subscales. Function 1 captured core eating disorder pathology, with overvaluation of appearance and eating leading to greater cognitive restraint, binge-eating, and lower body satisfaction, consistent with Fairburn et al.'s (2003) transdiagnostic model. Function 2 reflected a general dietary control continuum, where lower behavioural restriction was linked to lower cognitive restraint, indicating a non-pathological variation in flexible dietary control consistent with Westenhoefer's (1991) approach to dietary restriction. These findings suggest that while there is distinction between the two scales, they can both reliably capture aspects associated with eating disorders, reinforcing their validity. Further, cognitive and behavioural constraint could be considered an important tool in delineating pathological versus adaptive and/or healthy restraint. Future research should investigate the role of restraint in people with eating disorders versus the general population.

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