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Disordered Eating Behaviours in an Undergraduate Sample: Associations Among Gender, Body Mass Index, and Difficulties in Emotion Regulation

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The ability of individuals to recognise and regulate their emotions is known as emotion regulation. It is well established that difficulties in emotion regulation are associated with disordered eating. The present study explored the relationships among gender, body mass index, difficulties in emotion regulation, and disordered eating behaviours in a nonclinical sample of men and women. As part of a larger study, men ($n = 85$) and women ($n = 165$) from undergraduate university programs provided weight and height information and completed the Difficulties in Emotion Regulation Scale and the Eating Attitudes Test. Results from regression analyses suggest that, in a nonclinical sample, gender, body mass index, and specific difficulties in emotion regulation are related to disordered eating attitudes and behaviours. With respect to dieting, some of these relationships are more complex and involve interactions between BMI and both gender and impulse control.

Keywords: gender, emotion regulation, disordered eating, nonclinical

Emotions provide invaluable information necessary for human survival (Nesse & Ellsworth, 2009). The process of recognising and moderating the experience and expression of an emotion as well as its evoked physiological response is referred to by some researchers as emotion regulation (Gross & Feldman Barrett, 2011; Izard et al., 2011). Optimal emotion regulation involves the ability to recognise emotions and respond to them in a flexible and adaptive way (Paivio & Pascual-Leone, 2010). Whether emotion regulation is a distinct process or part of a more complex emotional response is a topic of debate in the literature (Gross & Feldmann Barrett, 2011). However, many researchers and clinicians agree that difficulties in emotion regulation are a key feature across several mental disorders and maladaptive behaviours (see Aldao, Nolen-Hoeksema and Schweizer [2010] for a review). In fact, difficulties in emotion regulation are related to more than half of all Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (*DSM-IV*; American Psychiatric Association, 2000) Axis I disorders and all of the *DSM-IV* Axis II disorders (Cole, Michel, & O'Donnell Teti, 1994). Emotion regulation is also the target of various therapies, including emotion-focused therapy (Greenberg, 2004), dialectical behaviour therapy (Lynch, Chapman, Rosenthal, Kuo & Linehan, 2006), and enhanced cognitive behaviour therapy for eating disorders (Fairburn, 2008).

Gratz and Roemer (2004) describe six different (yet related) skills that are involved in emotion regulation including identifying emotions, accurately labelling emotions, using strategies to regulate an emotion, accepting an emotion, engaging in goal-directed behaviour, and exhibiting self-control while experiencing an emotion. These skills can be conceptualised as encompassing the awareness and understanding of emotion, as well as the ability to act or inhibit a maladaptive action in response to a strong negative emotion. According to Gratz and Roemer (2004), the relative absence of either or all of these skills will relate to difficulties in emotion regulation, or emotion dysregulation.

In terms of emotion regulation and maladaptive behaviours, recent research has considered the role of gender as a possible moderator. The disposition hypothesis suggests that men and women respond differently to emotion, and that these differences may be rooted in genetics and early learning (Tamres, Janicki, & Helgeson, 2002). A recent review examined the different relationships among gender, emotion regulation, and psychopathology and found that, overall, although women report using more emotion regulation skills than do men, emotion regulation is related to psychopathology in both men and women (Nolen-Hoeksema, 2012). The author also concluded that too little is known regarding the ways in which men regulate their emotions and that far more research is needed to further understand the complex relationships among gender, emotion regulation and psychopathology (Nolen-Hoeksema, 2012).

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Eating Behaviours and Emotion Regulation

Disordered eating patterns have been found to be related to difficulties in emotion regulation in both clinical (Harrison, Sullivan, Tchanturia, & Treasure, 2009; Tasca et al., 2009) and

nonclinical (Evers, Stok, & de Ridder, 2010; Ridout, Thom, & Wallis, 2010) samples of women. For example, research with women has shown that difficulties regulating emotions is a common trait underlying binge eating disorder (Clyne, Latner, Gleaves, & Blampied, 2004; Svaldi, Caffier, & Tuschen-Caffier, 2010), anorexia nervosa (Harrison et al., 2009; Harrison, Tchanturia, & Treasure, 2010), and bulimia nervosa (Mauler, Hamm, Weike, & Tuschen-Caffier, 2006). It is also interesting to note that in some studies examining the relationship between disordered eating and emotional regulation difficulties, body mass index (BMI) also emerged as a unique predictor (Sim & Zeman, 2006; Svaldi, Caffier, & Tuschen-Caffier, 2010), but not always (Merwin, Zucker, Lacy & Elliott, 2010).

Fewer studies have explored the relationship between emotion regulation and eating behaviours in men. Although studies with mixed samples of men and women in clinical and nonclinical settings have been conducted (Merwin et al., 2010; Whiteside et al., 2007), to our knowledge, only two studies examining these processes have been conducted with a sample of men in a non-clinical setting (Lavender & Anderson, 2010; Lavender, Anderson & Gratz, 2011). For example, Lavender and Anderson (2010) reported that BMI, negative affect, and emotion regulation difficulties were each uniquely predictive of disordered eating in a sample of nonclinical men. However, the interactions among these variables were not explored and so it is possible that a different picture may have emerged had these been considered.

In terms of underlying mechanisms, associations between difficulties in emotion regulation and eating behaviours have been suggested according to specific eating pathology. For example, with respect to binge eating, researchers have suggested various functions of the behaviour including: eating to “escape” by restricting one’s focus to the task of eating itself (Heatherton & Baumeister, 1991); eating to alleviate negative emotions, which is in turn negatively reinforced by the reduction of negative emotions (Hawkins & Clement, 1984); eating to increase the experience of positive emotions (Fairburn & Cooper, 1982); and eating as a distraction from distress (Herman & Polivy, 1988). However, a review of studies using ecological momentary assessment failed to find strong support for an affect regulation model of binge eating (see Haedt-Matt & Keel [2011] for a review). Dieting, on the other hand, has been linked to the avoidance of emotional experiences such as guilt and shame (Schmidt & Treasure, 2006), and affective avoidance has been linked to eating disturbances in general (Koff & Sangani, 1997).

The Current Study

It is clear that much research is needed to better understand the complex relationships among gender, difficulties in emotion regulation, and disordered eating. In addition, given that BMI often emerges as an important variable, it is also necessary to consider its role among these variables of interest. As such, this study explored the role of gender and BMI, difficulties in emotion regulation, and their interactions with eating attitudes and behaviours in a sample of nonclinical men ($n = 85$) and women ($n = 160$).

Method

Measures

As part of a larger study, men and women from undergraduate classes from various disciplines were recruited in-class to voluntarily complete a series of measures to assess emotion regulation and eating behaviours. There were no exclusionary criteria. The questionnaire took approximately 20 minutes to complete. This study received institutional ethics board approval.

The Eating Attitudes Test (Garner, Olmsted, Bohr, & Garfinkel, 1982), also known as the EAT-26 (EAT), is a reliable self-report questionnaire (alphas ranging from .8 to .9 across studies) with acceptable criterion-related validity and high internal validity (Garner et al., 1982). The EAT can be used to identify potentially problematic eating patterns. The instrument consists of 26 items on a 6-point scale ranging from *never* to *always*. Conventionally, the first three response choices are coded 0, and the remainder are coded from 1 to 3 along the continuum, producing aggregate scores ranging from 0–78, with higher scores indicating higher eating disturbances. Two of the subscales associated with the test were chosen as response variables: (1) Dieting (thirteen items relating to an avoidance of fattening foods and body shape preoccupations;), and (2) Bulimia (six items relating to thoughts about food and behaviours related to bulimia;). The results for EAT-26 and its subscales for the women were excellent (alphas ranging from .8 to .9, CIs ranging from .7 to .9). For the men, the scale score reliability for each of the subscales was lower but still within the acceptable range (alphas ranging from .7 to .8, CIs ranging from .6 to .9). Table 1 includes details regarding reliability indicators.

The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a 36-item self-report measure designed to evaluate patterns of emotion regulation. Participants respond to questions on a five-point scale with responses ranging from 1 = *Almost Never* to 5 = *Almost Always*. Gratz and Roemer (2004) report that the total scale demonstrates good scale score reliability ($\alpha = .9$), construct validity and test–retest reliability. In addition to its total score, the DERS is made up of six subscales that were theoretically formulated and confirmed through factor analysis. The six subscales include the following: (1) lack of emotional awareness (awareness; six items), (2) lack of emotional clarity (clarity; five items), (3) difficulties engaging in goal-directed behaviours (goals; five items), (4) impulse control difficulties (impulse; six items), (5) nonacceptance of emotional responses (nonacceptance; six items), and (6) limited access to emotion regulation strategies (strategies; eight items). Higher scores on this scale represent greater emotion regulation difficulties, with possible scores ranging from 36–180. College student and community adult samples report average scores of 75 to 80 (Gratz & Roemer, 2004). The DERS instrument yielded adequate scale score reliability for its total and all subscales, with Cronbach alphas ranging from .8 to .9 and confidence intervals ranging from .7 to .9 across both gender groups. Table 1 includes details regarding reliability indicators.

Participants were also asked to provide gender and weight and height information which was used to calculate BMI scores using the formula $weight/height^2$.

Table 1
Mean Differences by Gender

Variables	Total sample (<i>n</i> = 250)		Women (<i>n</i> = 165)			Men (<i>n</i> = 85)		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	Reliability	<i>M</i>	<i>SD</i>	Reliability
EAT								
Dieting	5.3	6.3	6.5*	7.1	.9 (.9, .9)	3.0*	3.6	.8 (.8, .9)
Bulimia	0.9	1.9	1.1*	2.2	.8 (.7, .8)	0.5*	1.1	.7 (.6, .8)
BMI	23.5	4.3	23.2	4.6		24.1	3.5	
DERS								
Awareness	15.1	4.5	14.8	4.2	.8 (.8, .8)	15.6	4.9	.8 (.8, .9)
Clarity	10.7	3.5	11.1*	3.5	.8 (.8, .9)	10.0*	3.5	.8 (.7, .8)
Goals	15.3	4.8	15.8*	4.8	.9 (.9, .9)	14.1*	4.5	.8 (.8, .9)
Impulse	11.7	4.2	11.9	4.1	.8 (.8, .9)	11.4	4.4	.8 (.8, .9)
Non-acceptance	13.0	5.4	13.3	5.5	.9 (.9, .9)	12.3	5.2	.9 (.8, .9)
Strategies	14.6	5.5	15.2*	5.7	.9 (.9, .9)	13.6*	4.8	.8 (.8, .9)

Note. Reliability = Cronbach alpha coefficient (95% confidence interval).

* Denotes statistically significant row-wise difference (between genders), $p < .05$. (2-tailed).

Procedure

Moderated hierarchical regression analyses were used to assess whether gender, BMI, emotion regulation, and gender interactions accounted for variance in eating attitudes and habits. Separate models were identified for each of the EAT subscales and final models are reported.

Where necessary, variables were transformed to improve normality, linearity, and homoscedasticity of residuals. A natural log transformation was used on the EAT subscales, BMI, and the clarity, impulse and strategies subscales of the DERS. Square root transformation was used for the awareness, goals, and nonacceptance subscales. To account for different sample sizes for gender groups, weighted effect coding was utilized (women = .33, men = -.66). The response variables were centered to facilitate the interpretation of the parameter estimates. Interaction terms were created using gender \times DERS subscales, BMI \times DERS subscales, and gender \times BMI \times DERS subscales.

Sequential blocks were used. Gender and BMI were inputted in Block 1; emotion regulation variables in Block 2; 2-way interaction terms in Block 3; and 3-way interaction terms in Block 4.

The significance of the R^2 change between blocks was examined to assess the value of each block's contribution to the total explained variance for each response variable. Error independence was assessed using the Durbin-Watson statistic. Multicollinearity was assessed using the variance inflation factor and its reciprocal.

Significant interactions were plotted by calculating the simple slopes for $\pm SD$ of the moderator in a modified Excel utility created by W. R. Louis (2009).

Results

Participants

The sample included 1st (56%), 2nd (19%), 3rd (21%), and 4th (4%) year students. Approximately 28% of the students were enrolled in social science programs, and the remainder were enrolled in other programs of study. Participants ranged in age from 17 to 50 ($M = 20.8$, $SD = 5$). Participant BMIs ranged from 16 to 40 ($M = 23.6$, $SD = 4.5$), within the average range for a nonclini-

cal sample. No gender differences were detected for age, university level, program, or BMI.

Table 1 includes the uncentered means for all variables, as well as their standard deviations. The descriptive results for the EAT and DERS subscales indicate that both gender groups fell within the average range for nonclinical samples (Garner et al., 1982; Gratz & Roemer, 2004; Lavender & Anderson, 2010; Morry & Staska, 2001; Ruganci & Gençöz, 2010; Rusch, Westermann, & Lincoln, 2012).

Univariate Gender Differences

One-way ANOVAs were conducted to determine whether gender differences existed for the key variables. Women had higher results than men on both the diet and bulimia subscales of the EAT, $F(1, 249) = 4.87$, $p < .001$, $r = .26$ and $F(1, 249) = 5.89$, $p < .05$, $r = .15$, respectively. Gender differences were also detected for three of the DERS subscales: clarity, $F(1, 249) = 8.04$, $p < .01$, $r = .18$; goals, $F(1, 249) = 7.08$, $p < .05$, $r = .17$; and strategies, $F(1, 249) = 4.93$, $p < .05$, $r = .14$. No gender differences were observed for BMI or the remainder of the DERS subscales.

Bivariate Correlations

Bivariate correlations were performed to explore the strength and direction of the relationships among the variables of interest (see Table 2). For women, all of the variables ($ps < .01$) except BMI were positively related with the dieting and bulimia subscales of the EAT, with r s between .18 and .32. For men, there was no association between dieting and awareness, clarity or goals; however, the remaining variables were positively related, including BMI, with r s between .22 and .37, $ps < .05$. BMI, awareness and goals did not correlate with the men's scores on the bulimia subscale; however, r s between .27 and .36, $ps < .05$ were observed for the remaining variables.

Sequential Multiple Regression

Table 3 presents the final models' unstandardized and standardized coefficients (B and β) of the retained explanatory

Table 2
Bivariate Correlations by Gender

Variables	Dieting	Bulimia	BMI	Awareness	Clarity	Goals	Impulse	Non-acceptance	Strategies
Dieting	—	.544	.072	.197*	.177*	.178*	.201**	.187*	.314**
Bulimia	.222*	—	.106	.239**	.188*	.198*	.320**	.249**	.279**
BMI	.286**	.008	—	.110	-.017	-.030	.073	.113	.061
Awareness	-.038	.106	.017	—	.520**	.152	.309**	.322**	.384**
Clarity	.147	.266*	-.182	.548**	—	.364**	.495**	.520**	.601**
Goals	.114	.113	-.008	-.061	.144	—	.503**	.390**	.584**
Impulse	.301**	.289**	-.094	.111	.352**	.594**	—	.547**	.667**
Non-acceptance	.373**	.363**	-.033	.157	.409**	.415**	.412**	—	.668**
Strategies	.245*	.345**	-.214*	.123	.540**	.616**	.734**	.605**	—

Note. $n = 250$, $n = 165$ women, $n = 85$ men. Women's results are above the diagonal, and men's results are below the diagonal. (Women's correlations are highly representative of the total sample's correlations. As such, in the interest of parsimony, total sample results are not reported.) Correlations performed with transformed variables.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

variables, the intercepts, the R^2 measures of explained variance, and the ΔR s after entry of each block. The analyses of outliers did not detect any undue influence on the regression results for either model.

The first model assessed dieting behaviours. Its final model retained gender, BMI, impulse, and strategy, along with associated two-way interactions (gender \times BMI and BMI \times impulse) accounting for 18% of the variance of the dieting scores. The significant relationships among gender and BMI and the emotion regulation variables contributed about equally to the variance (8.5% each). Among the significant relationships, women ($\beta = .25$), participants with higher BMI scores ($\beta = .15$), and those with greater strategy scores ($\beta = .26$) had higher scores on the dieting subscale of the EAT, all $ps < .05$.

The first significant interaction was observed between gender and BMI ($\beta = -.16$, $p < .05$). Women with low BMI had higher dieting scores than men with low BMI. At high BMI levels, the genders had similar dieting scores. Within each gender group, BMI was associated with dieting scores differently. For men, the higher the BMI score, the higher the dieting score. For women, BMI and dieting scores were not related.

The second and final interaction term involved impulse and BMI ($\beta = .12$, $p < .05$). At high BMI levels, high impulse levels were associated with higher dieting levels compared with low impulse. Conversely, at low BMI levels, dieting scores did not vary with impulse level. Within each impulse level, BMI was associated with dieting scores differently. At the high impulse level, dieting scores increased as BMI increased. However, at the low level of impulse, BMI and dieting scores were not associated. Awareness, clarity, goals and nonacceptance subscales did not add to the explanatory value of the model, in spite of being correlated with dieting in our preliminary analyses.

The second model assessed the bulimia subscale and retained gender, impulse, and nonacceptance as significant variables, accounting for 12% of the variance. There were no significant interactions observed. The emotion regulation variables accounted for 11% of the variance, while gender accounted for 2% of the variance. Women tended to have higher bulimia scores ($\beta = .12$, $p < .05$). As well, impulse and nonacceptance scores associated positively with bulimia scores ($\beta = .22$ and $.16$, respectively, $ps < .05$). BMI, awareness, clarity, goals, and strategy did not contribute to the model.

Table 3
Final Model Parameters

Model	Block	Parameters	B	SE B	β	R^2	Adj. R^2	ΔR^2	
Dieting ^a	1	Gender	0.50	.12	.25	.20	.18	.09	
		BMI	0.81	.33	.15				
	2	Impulse	0.16	.22	.06 (ns)				
		Strategies	0.69	.21	.26				
	3	Gender \times BMI	-2.01	.77	-.16				.03
		BMI \times Impulse	1.77	.88	.12				
Constant		1.38	.06						
Bulimia ^b	1	Gender	0.21	.08	.12	.13	.12	.02	
	2	Impulse	0.40	.13	.22				
		Non-acceptance	0.25	.11	.16				
		Constant	0.37	.04					

Note. B = unstandardized beta; SE = standard error; β = standardized beta; R^2 = coefficient of determination; Δ = amount of change with addition of each block; ns = non-significant. All $ps < .05$ unless noted.

^a Excluded variables: awareness, clarity, goals, and nonacceptance. ^b Excluded variables: awareness, clarity, goals, strategies, and BMI.

Discussion

Past research has demonstrated that relationships exist between difficulties with emotion regulation and eating behaviours in both clinical and nonclinical samples; however, few research studies have examined these relationships while considering potential interactions with key variables such as gender and BMI. The present study builds upon previous studies to better understand the complex relationships among gender, BMI, emotion regulation, and eating behaviours in a nonclinical sample.

In terms of overall gender differences, consistent with previous studies, our results suggest that, among undergraduates, women report more tendencies toward dieting and bulimia/food preoccupation than do men (Pettit, Jacobs, Page & Porras, 2010). Women also reported greater difficulties with a number of emotion regulation skills, including emotional clarity, the ability to engage in goal-directed behaviour, and the ability to use adaptive strategies to regulate an emotion. Although it is possible that women are more likely than men to admit to experiencing emotional difficulties, this pattern of significant differences is identical to that reported by Weinberg and Klonsky (2009) in their study examining gender differences with respect to emotion regulation in a sample of adolescents. As such, it is also possible that these results lend support to their hypothesis that women may report greater difficulties in these areas due to the fact that they experience emotions more intensely. However, given that participants did not report on emotional intensity or negative affect, the interpretation of this finding is less clear.

In terms of bulimia and food preoccupation, the relationships were fairly straightforward and consistent with previous research in that, aside from gender, difficulties with impulse control and the nonacceptance of emotion were the main predictors (Anestis, Selby, Fink & Joiner, 2007; Fischer, Smith & Cyders, 2008; Lavender & Anderson, 2010; Lavender, Jardin & Anderson, 2009; Spranger, Waller & Bryant-Waugh, 2001). Scores did not vary according to relationships among gender, BMI, and emotion regulation difficulties.

With respect to dieting, the significant relationships included gender, BMI, and difficulties in the use of adaptive strategies when experiencing an emotion. There is research to suggest that in the absence of adaptive strategies, individuals are more likely to engage in restrictive or disordered dieting patterns in an attempt to alleviate unregulated distress (Aldao et al., 2010; Nolen-Hoeksema, & Schweizer, 2010; Evers et al., 2010; Nolen-Hoeksema, 2012). When the interactions were examined among the key variables and dieting behaviours, a much more complex picture emerged. First, dieting behaviours varied according to gender and BMI in that regardless of women's BMI, the likelihood of dieting was the same. This finding may reflect the pervasive need felt by women to engage in dieting behaviours regardless of their actual body size. For women, the difficulties with the use of adaptive strategies were more strongly related to dieting behaviours than their BMI scores. For men, on the other hand, BMI seemed to play a more pragmatic role in dieting in that they were more likely to engage in dieting behaviours only if they had a higher BMI. It is also conceivable that men with a low BMI actually may be motivated to increase their weight to conform to the societal norms for male physical appearance (McCreary & Sasse, 2000).

Another interesting finding with respect to dieting is related to the interaction between BMI and impulse control. Regardless of gender, increased difficulties with impulse control coupled with a higher BMI were associated with higher dieting attitudes and behaviours. It is plausible that emotional eating, an example of poor impulse control, may be related to an elevated BMI, which in turn may perpetuate dieting behaviours. These results also suggest that it is insufficient to examine the direct relationships between emotion regulation skills and dieting without also considering gender and BMI as well.

Many of the emotion regulation subscales were correlated with eating behaviours but were not statistically significantly associated with either dieting or bulimia. The percentage of variance explained in the models was also modest. This pattern of results may be related to overlap among the subscales, or perhaps other factors that require study. The results from a number of studies suggest that negative affect may be an important factor to consider (Lavender & Anderson, 2010; Sim & Zeman, 2006).

Overall, the results of this study suggest that, in a nonclinical sample, gender, BMI, and specific difficulties with emotion regulation are related to disordered eating attitudes and behaviours. With respect to dieting, some of these relationships are more complex and involve interactions with BMI and both gender and impulse control. The results of this study set the stage for further exploration of the specific emotion regulation difficulties that can be targeted with specific population groups in order to prevent the onset of more serious problems with disordered eating in undergraduate students in particular.

Limitations and Future Directions

Although the results of this study add to the growing literature on the relationships between emotion regulation and disordered eating by formally examining the complex relationship between gender and BMI, the study's limitations must be noted. Its design was limited to self-report measures. Future research might include interviews as well as the use of experimental designs, including the use of physiological measures such as heart rate and electrodermal response in order to measure stress responses. Future research might also include negative affect as a variable to better understand the processes underlying the complex relationships that were found. In addition, the sample in the present study was comprised solely of nonclinical (and non-treatment-seeking) participants who voluntarily participated in the study. As such, it would be useful to replicate the study with a clinical sample of both women and men to better understand the relationships underlying these mechanisms. Such studies would also better inform the development of effective primary prevention and intervention strategies.

Résumé

La régulation des émotions est la capacité à les reconnaître et à les maîtriser. Il est bien établi que les difficultés à ce chapitre sont associées aux troubles de l'alimentation. L'étude qui fait l'objet de l'article s'est penchée sur les rapports entre le sexe, l'indice de masse corporelle (IMC), les difficultés à réguler les émotions et les comportements alimentaires perturbés dans un échantillon non clinique d'hommes et de femmes. Dans le contexte d'une étude

plus vaste, des hommes ($n = 85$) et des femmes ($n = 165$) de programmes universitaires du premier cycle ont fourni des renseignements sur leur poids et leur taille et ont rempli la Difficulties in Emotion Regulation Scale (échelle des difficultés de régulation des émotions) et l'Eating Attitudes Test, questionnaire d'autoévaluation des attitudes alimentaires. Selon les résultats d'analyses de régression, dans un échantillon non clinique, le sexe, l'indice de masse corporelle et des difficultés précises au chapitre de la régulation des émotions ont un lien avec les attitudes et les comportements alimentaires perturbés. Dans le contexte des régimes, certains de ces rapports sont plus complexes et impliquent des interactions entre l'IMC, d'une part, et le sexe et le contrôle des impulsions réunis, d'autre part.

Mots-clés : sexe, régulation des émotions, troubles alimentaires, non clinique.

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