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Gender differences in the relationship between impulsivity and disordered eating behaviors and attitudes

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ABSTRACT

Objective: We investigated relationships among gender, impulsivity and disordered eating in healthy college students.
Method: Participants ($N = 1223$) were healthy, undergraduate men (28.5%) and women (71.5%), who completed the Barratt Impulsiveness Scale — Version 11 (BIS-11) and a four-factor version of the Eating Attitudes Test (EAT-16).
Results: As predicted, mean scores on all four EAT-16 factors were significantly higher for women than for men. Attentional impulsivity was related to poorer self-perception of body shape, more dieting, and a greater preoccupation with food for the sample as a whole. Moreover, motor impulsivity was related to poorer self-perceptions of body shape and a greater preoccupation with food. However, no gender differences emerged in the relationship between impulsivity and disordered eating attitudes.
Discussion: This study elucidates the role of impulsivity in disordered eating behaviors among non-clinical college students. For both women and men, attentional and motor impulsivity were related to disordered eating attitudes and behaviors. Overall, these findings suggest that different facets of impulsivity are related to disordered eating attitudes and behaviors in a non-clinical college population.

1. Introduction

Disordered eating behaviors are highly prevalent among college-aged individuals, placing them at-risk for eating disorders (Krahn, Kurth, Gomberg, & Drewnowski, 2005). It is therefore important to understand which factors contribute to the likelihood of developing disordered eating behaviors. One such risk factor may be impulsivity, a multi-faceted trait marked by motor, non-planning, and attentional impulsiveness (Depue & Collins, 1999). Much research with clinical populations implicates impulsivity in eating disordered behaviors (e.g., Beck, Smits, Claes, Vandereycken, & Bijttebier, 2009; Casper, Hedeker, & McClough, 1992; Engel et al., 2005), though there are exceptions (e.g., Wonderlich, Connolly, & Stice, 2004). Most research with clinical populations suggests that individuals classified with binge eating disorder (BED) traits are more likely to be impulsive than those classified as exhibiting anorexia nervosa (AN) traits (Beck et al., 2009; Casper et al., 1992; Claes, Vandereyeken, & Vertommen, 2002). However, others have found elevated levels of impulsivity among all eating disordered subtypes, suggesting that impulsivity is a common underlying factor associated with disordered eating, in general (Claes, Robinson, Muehlenkamp, Vandereycken, & Bijttebier, 2010).

Though research with clinical populations is important, there is a need for greater focus on sub- and non-clinical populations in order to identify characteristics that place individuals at-risk and to prevent clinical eating disorders from developing. If impulsivity can be regarded as a risk factor for clinical eating disorders, a relationship between impulsivity and disordered eating behaviors should be found and replicated in non-clinical populations. Moreover, sub-threshold eating problems often persist beyond college and into later adulthood, providing further support for examining potential risk factors in college populations (Arriaza & Mann, 2001). To date, the role of impulsivity in disordered eating behaviors in sub- or non-clinical populations is not well-established. Lyke and Spinella (2004) found significant correlations between motor and attentional impulsivity and disinhibited eating, as well as between attentional impulsivity and feelings of hunger. Others have also found general impulsive traits to relate to disordered eating behaviors and thoughts in non-clinical populations (Cooper, O'Shea, Atkinson, & Wade, 2014; Fischer, Smith, & Anderson, 2003; Guerrieri, Nederkoorn, & Jansen, 2007; Leitch, Morgan, & Yeomans, 2013), though again, there are exceptions (e.g., Cooley, Toray, Valdez, & Tee, 2007).

Importantly, only one study examining impulsivity and eating behaviors in non-clinical populations included men (Lyke & Spinella, 2004), and this study did not examine gender differences. Though

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disordered eating behaviors and attitudes are more prevalent among women than men throughout childhood, adolescence and adulthood (Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011), this does not imply that men are immune to developing disordered eating behaviors (Hoerr, Bokram, Lugo, Bivins, & Keast, 2002). However, the manner in which men and women manifest disordered eating behaviors differs. For example, women are more likely to report dieting or purging than men, but may be equally (or even less) likely than men to report exercising excessively or binging (Anderson & Bulik, 2004; Grucza, Przybeck, & Cloninger, 2007; Guidi et al., 2009; Striegel-Moore et al., 2009). Another study found that women experienced disordered eating at greater rates, but that men's disordered eating was more persistent over time (Keel, Baxter, Heatherton, & Joiner, 2007). Thus, while research is beginning to elucidate gender differences in disordered eating behaviors, a thorough examination of gender disparities in disordered eating behaviors and attitudes among a general undergraduate population is currently lacking.

Moreover, there are important gender differences in impulsivity that could further complicate the relationship between impulsivity and disordered eating behaviors. In general, men exhibit more impulsivity than women (Cross, Copping, & Campbell, 2011). For instance, men tend to have a greater difficulty focusing their attention and considering the future (non-planning), and are more apt to sensation-seeking and risk-taking than women (Cross et al., 2011). Given these differences, it is plausible that gender differences may exist in the relationship between impulsivity and eating disordered attitudes and behaviors.

The purpose of the current study was to examine gender differences in: (1) disordered eating behaviors and attitudes; and (2) the relationship between impulsivity (i.e., non-planning, attentional, and motor impulsivity) and disordered eating behaviors and attitudes. Regarding the first aim, we hypothesized that men would report disordered eating behaviors and attitudes, though to a lesser degree than women. Regarding the second aim, we hypothesized that greater impulsivity (i.e., non-planning, attentional, and motor) would be associated with poorer self-perception of body shape and greater dieting, food preoccupation, and awareness of food contents among both men and women. We had no priori hypotheses regarding gender differences in these relationships, but rather, sought to describe any gender differences that emerged.

2. Methods

2.1. Participants and procedures

Undergraduate students ($N = 1223$) from a Midwestern university were recruited using the Psychology Department's online subject pool system where students were provided a brief description of the study and an opportunity to sign up for participation. Participants completed several questionnaires using MediaLab v2006.1.25 by Empirisoft Corporation (New York, NY) on a Dell Optiplex GX520 desktop computer via a Windows XP platform and received course credit. All participants gave written informed consent and the university institutional review board approved the study. No inclusion or exclusion criteria were employed, except that participants were required to be at least 19 years old. See Table 1 for a summary of sample characteristics. One percent of the participants had missing data and were therefore not included in the analyses, resulting in a final N of 1208.

Table 1
Sample characteristics.

Variable		Mean (SD) or frequency (%)
Age		20.54 (3.31)
Gender	Men	349 (28.5%)
	Women	874 (71.5%)
Race	White	1075 (87.9%)
	Hispanic/Latino	62 (5.1%)
	Black or African-American	60 (4.9%)
	American-Indian	13 (1.1%)
	Asian-American	66 (5.4%)
	Native Hawaiian/Pacific Islander	6 (0.5%)
EAT-16	Self-perception	2.69 (2.64)
	Dieting	2.94 (2.96)
	Awareness	2.18 (2.28)
	Food preoccupation	1.54 (2.30)
BIS-11	Motor	21.35 (3.90)
	Attentional	16.21 (3.91)
	Non-planning	22.29 (4.86)

2.2. Measures

2.2.1. Barratt Impulsiveness Scale — Version 11 (BIS-11)

The BIS-11 is a widely used 30-item questionnaire that assesses levels of impulsivity (Patton & Stanford, 1995). Items are measured on a 4-point Likert-type scale (1 = *rarely/never* to 4 = *almost always*). Items comprise a total score and three subscales: motor impulsiveness (e.g., "*I do things without thinking*") (score ranging from 8 to 44), attentional impulsiveness (e.g., "*I am a careful thinker*" — reverse scored) (score ranging from 8 to 32), and non-planning impulsiveness (e.g., "*I plan for the future*" — reverse scored) (score ranging from 8 to 44). Higher scores on the BIS-11 indicate higher levels of impulsivity. This measure has demonstrated acceptable internal consistency and validity (Patton & Stanford, 1995; Stanford, Greve, Boudreaux, Mathias, & Brumbelow, 1996). Alpha coefficients for the current sample for motor, attentional and non-planning impulsiveness subscales were 0.63, 0.74, and 0.73, respectively.

2.2.2. Eating Attitudes Test — 26 (EAT-26)

The EAT-26 is a 26-item questionnaire that measures characteristics and concerns of eating disorders (Garner, Olmsted, Bohr, & Garfinkel, 1982). Items are measured on a 4-point scale (0 = *never/rarely* to 3 = *always*). Four subscales using 16 of the 26 items (i.e., EAT-16) have been shown to accurately measure the behaviors of interest and were thus used for these analyses: self-perception of body shape (e.g. "*I am terrified about being overweight*") (score ranging 0 to 9), dieting (e.g., "*I engage in dieting behavior*") (score ranging 0 to 15 awareness of food contents) (e.g., "*I avoid foods with sugar in them*") (score ranging 0 to 12), and food preoccupation (e.g., "*I feel that food controls my life*") (score ranging 0 to 12; Ocker, Lam, Jensen, & Zhang, 2007). The EAT-16 has shown high reliability and discriminant validity (Ocker et al., 2007). Alpha coefficients for the current sample for self-perception of body shape, dieting, awareness of food contents, and food preoccupation subscales were 0.83, 0.77, 0.70, and 0.82, respectively.

2.3. Analytic plan

Bivariate correlations were used to examine relationships among the four factors from the EAT-16 (self-perception of body shape, dieting, awareness of food content, food preoccupation) and BIS-11 subscales (motor, attentional, non-planning). Multivariate analyses of variance (MANOVAs) were used to examine gender differences in these variables. This approach was chosen given that each of the BIS-11 subscales (and EAT-16 subscales) is inter-correlated. For each MANOVA analysis, the multivariate test statistic (Wilks' Lambda) is reported. Bonferroni corrected ANOVAs were then conducted to assess gender differences on the individual BIS-11 and EAT-16 subscales (corrected alpha = 0.007). Next, to examine the unique relations between BIS-11 subscales and EAT-16 subscales, a multivariate general linear model was conducted. Age and race were entered as covariates, centered BIS-11 attentional, non-planning, and motor impulsivity subscales and gender were entered as predictor variables, and the interactions between gender and each of the BIS-11 subscales were added. EAT-16 subscales (self-perception of body shape, dieting, awareness of food content, and

food preoccupation) were the outcome variables in the model. Bonferroni corrected post-hoc parameters (corrected alpha = .003) were examined to determine specific relationships between impulsivity factors and disordered eating behaviors and attitudes.

3. Results

3.1. Preliminary analyses

Pearson's correlations (Table 2) were used to examine relationships among the four factors from the EAT-16 (self-perception of body shape, dieting, awareness of food content, food preoccupation) and BIS-11 subscales (motor, attentional, non-planning). BIS-11 subscales were related to each other in the expected directions, as well as EAT-16 factors. Both BIS-11 motor and attentional impulsivity were positively associated with EAT-16 self-perception of body shape, dieting, and food preoccupation. BIS-11 non-planning was positively associated with self-perception of body shape and food preoccupation, but was negatively associated with awareness of food content.

3.2. Aim 1: gender differences in disordered eating behaviors and attitudes

The MANOVA of group differences in BIS-11 subscales (i.e. motor, attentional, non-planning) revealed a significant effect of gender [$\Lambda =$ 0988, $F(3,1204) = 5.013$, $p = .002$, $\eta^2 = .012$] indicating that men reported higher scores on all BIS-11 subscales, except for the attentional impulsivity subscales (with small effect sizes; Cohen, 1988). Table 3 summarizes descriptive statistics for both men and women, as well as the results of the Bonferroni corrected post-hoc group comparisons. The MANOVA of group differences in EAT-16 factors (i.e., self-perception of body shape, dieting, awareness of food content, food preoccupation) also revealed a significant effect of group [$\Lambda = 0.934$, $F(4,1217) = 21.593$, $p < .001$, $\eta^2 = .066$], indicating that women reported higher scores on all EAT-16 subscales, with small to medium effect sizes (see Table 3).

3.3. Aim 2: gender differences in the relationship between impulsivity and disordered eating behaviors and attitudes

A multivariate general linear model was conducted, with self-perception of body shape, dieting, awareness of food content, and food preoccupation as the dependent variables. Overall, sex [$\Lambda =$ 0.923, $F(4,1194) = 4.094$, $p < .001$, $\eta^2 = .077$], age [$\Lambda = 0.986$, $F(4,1194) = 4.094$, $p = .003$, $\eta^2 = .014$], race [$\Lambda = 0.983$, $F(4,1194) = 5.214$, $p < .001$, $\eta^2 = .017$], motor impulsivity [$\Lambda =$ 0.991, $F(4,1194) = 2.731$, $p = .028$, $\eta^2 = .009$], and attentional impulsivity [$\Lambda = 0.973$, $F(4,1194) = 8.250$, $p < .001$, $\eta^2 = .027$] predicted disordered eating attitudes and behaviors for the entire sample. However, no gender differences emerged in the relationship between impulsivity subtypes and disordered eating behaviors and attitudes, as evidenced by non-significant interaction factors. Non-significant predictors (i.e., non-planning impulsivity and the interactions) were removed from the final model. Bonferroni corrected post-hoc parameters (summarized in Table 4) reveal that attentional impulsivity was related to poorer self-perception of body shape, more dieting, and a greater preoccupation with food, with small effect sizes. Motor impulsivity was associated with poorer self-perception of body shape and greater preoccupation with food. No other significant differences emerged in regard to the relationship between impulsivity subtypes and disordered eating attitudes and behaviors.

Table 2
Zero-order correlation matrix.

	1.	2.	3.	4.	5.	6.	7.
1. BIS-11 motor	–	.47**	.50**	.14**	.13**	.04	.15**
2. BIS-11 attentional	–	–	.53**	.20**	.18**	.03	.20**
3. BIS-11 non-planning	–	–	–	.09*	.04	−.06*	.11**
4. EAT-16 self-perception	–	–	–	–	.75**	.48**	.61**
5. EAT-16 dieting	–	–	–	–	–	.67**	.63**
6. EAT-16 awareness	–	–	–	–	–	–	.39**
7. EAT-16 food preoccupation	–	–	–	–	–	–	–

* $p < .05$.
** $p < .001$.

Table 3
Differences between men and women in BIS-11 and EAT-16 subscale scores.

	Men ($n = 341$)	Women ($n = 867$)	F	p	η^2
BIS-11 motor	22.02 (.23)	21.09 (.13)	14.45	<0.001	0.011
BIS-11 attentional	16.61 (.21)	16.04 (.13)	5.23	0.022	0.004
BIS-11 non-planning	22.95 (.26)	22.02 (.16)	8.99	0.003	0.007
EAT-16 self-perception	1.63 (.11)	3.11 (.09)	83.62	<0.001	0.064
EAT-16 dieting	1.93 (.13)	3.34 (.10)	59.76	<0.001	0.046
EAT-16 awareness	1.74 (.10)	2.36 (.08)	18.46	<0.001	0.015
EAT-16 food preoccupation	0.93 (.09)	1.78 (.08)	34.86	<0.001	0.028

Note. Values represent mean (standard error).
Bonferroni corrected alpha = 0.007.
η^2 effect size evaluation: >0.01 = *small effect*; >0.06 = *medium effect*; >0.13 = *large effect* (Cohen, 1988).

4. Discussion

The present study aimed to elucidate gender differences in eating disordered behaviors in a non-clinical, college sample, as well as in the multifaceted relationship between impulsivity and disordered eating behaviors. Consistent with the authors' first hypothesis, compared to men, women undergraduates reported greater disordered eating behaviors and attitudes on all four disordered eating factors (e.g., self-perception of body shape, dieting, awareness of food content, and preoccupation with food). These findings are consistent with past research in clinical populations that indicate lower rates of disordered eating behaviors in men compared to women (Hudson, Hiripi, Pope, & Kessler, 2007). However, it is important to note that healthy, undergraduate men did endorse low levels of these attitudes and behaviors, providing further evidence that disordered eating behaviors and attitudes do not affect only women.

Table 4
Parameter estimates for multivariate general linear model examining gender differences in relationship between impulsivity and disordered eating attitudes.

		B	p	η^2
Self-perception	Intercept	1.987	<0.001*	0.012
	Gender	−1.560	<0.001*	0.074
	Age	−0.035	0.110	0.002
	Race	−0.461	0.034	0.004
	Motor impulsivity	0.063	0.002*	0.008
	Attentional impulsivity	0.114	<0.001*	0.025
Dieting	Intercept	1.069	0.065	0.003
	Gender	−1.521	<.001*	0.055
	Age	0.014	0.557	0.000
	Race	−0.822	0.001*	0.009
	Motor impulsivity	0.067	0.005	0.007
	Attentional impulsivity	0.119	<0.001*	0.021
Awareness	Intercept	0.272	0.556	0.000
	Gender	−0.632	<0.001*	0.016
	Age	0.044	0.027	0.004
	Race	−0.880	<0.001*	0.016
	Motor impulsivity	0.027	0.156	0.002
	Attentional impulsivity	0.013	0.498	0.000
Food preoccupation	Intercept	0.031	0.946	0.000
	Gender	−0.956	<0.001*	0.036
	Age	0.015	0.432	0.001
	Race	−0.062	0.750	0.000
	Motor impulsivity	0.056	0.003*	0.008
	Attentional impulsivity	0.097	<0.001*	0.022

η^2 effect size evaluation: >0.01 = *small effect*; >0.06 = *medium effect*; >0.13 = *large effect* (Cohen, 1988).
* Bonferroni corrected alpha = .003.

In partial confirmation of our second hypothesis, some facets of impulsivity were associated with disordered eating behaviors. Specifically, results indicated that attentional impulsivity was related to poorer self-perception of body shape, more dieting, and a greater preoccupation with food for the sample as a whole. Moreover, motor impulsivity was related to poor self-perceptions of body shape and a greater preoccupation with food. However, contrary to expectations, no gender differences emerged in the relationship between impulsivity and disordered eating attitudes.

According to Patton and Stanford (1995), attentional impulsivity reflects difficulty focusing and maintaining attention, as well as the tendency to experience racing thoughts. In this study, attentional impulsivity was related to poorer self-perception of body shape, greater preoccupation with food, and more dieting among both men and women. These findings may reflect the fact that, among men and women who are highly (and negatively) concerned with their body shape, dieting, and preoccupied with food, the ability to focus on other tasks is impaired. Indeed, research suggests that dieting requires a significant amount of attention, diverting cognitive resources to process diet-related stimuli at the expense of other stimuli (Kemps & Tiggemann, 2005; Tiggemann, 2000).

Motor impulsivity, which reflects an inconsistent lifestyle, or one in which an individual often acts at the spur of the moment, was also associated with poorer self-perception of body shape and greater food preoccupation for the sample as a whole. Lyke and Spinella (2004) found that motor impulsivity was associated with disinhibited eating among a nonclinical college sample, and additional research indicates that both dieting and poor body self-perceptions are common, central features among those who binge eat (Cooley & Toray, 2001; Stice et al., 2001). Thus, motor impulsivity be related to a tendency to become preoccupied with food and prone to binge eat.

No relationship was found between nonplanning impulsivity and disordered eating behaviors and attitudes. These results are consistent with findings by others (e.g., Fischer et al., 2003; Lyke & Spinella, 2004) and suggest that a lack of forethought is not related to disordered eating behavior and attitudes in a nonclinical population. Moreover, no gender differences were found in the relationship between impulsivity and disordered eating behaviors and attitudes. This finding is consistent with other research indicating that the relations among impulsivity, gender and health-risk behaviors are not straightforward (Stoltenberg, Batien, & Birgenheir, 2008). It is possible that the biological mechanisms involved with starting and stopping eating comprise biological circuits and pathways that are so fundamental for the survival of organisms that they are insulated from social influence, sexual selection or gender differentiation pathways; however, further research is needed to confirm this. Overall, the findings of the current study indicate that impulsivity (attentional and motor) is related in a similar manner to disordered eating behaviors for both men and women.

4.1. Limitations and future directions

A number of limitations should be considered when interpreting the current study's results. First, this study was cross-sectional in nature, and thus, the findings from this study do not indicate whether impulsivity precedes or is subsequent to disordered eating behaviors and attitudes. Future research using non-clinical samples should examine longitudinal relationships among impulsivity and disordered eating attitudes and behaviors to disentangle whether or not impulsivity causes disordered eating behaviors or, rather, if impulsivity is a behavioral manifestation of the cognitive deterioration associated with disordered eating behaviors (Kemps & Tiggemann, 2005). Second, caution should be used when interpreting the clinical significance of these findings, as effect sizes were small. Third, the study sample is primarily White (89.2%) and therefore, results may not generalize to other racial or ethnic groups. Fourth, all of the measures used in this study were self-report. It will be important for future research to combine both objective and subjective measurements of both impulsivity and disordered eating behaviors in order to account for self-report biases. Lastly, the specificities of poor self-perception of body shape (i.e., too large or too small; shape) were not assessed, which appears to be particularly important among men.

4.2. Conclusion

Overall, findings indicate that undergraduate women reported more disordered eating attitudes than men, though men did endorse low levels of disordered eating attitudes. Among healthy undergraduate students, a relationship was found between attentional and motor impulsivity and disordered eating behaviors and attitudes. However, no gender differences emerged in these relationships. Future research should examine longitudinal relationships between impulsivity and disordered eating in non-clinical populations in order to determine cause-and-effect relationships.

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Contributors

Authors Stoltenberg and Christ designed the study and wrote the protocol. Authors Lundahl and Wahlstrom conducted literature searches and provided summaries of previous research studies. Authors Lundahl and Wahlstrom conducted the statistical analysis. Author Lundahl wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

Conflict of interest

All authors declare that they have no conflicts of interest.

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