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Predicting Food Cravings: A Piece of Cake or a Hard Nut To Crack?

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The present study aimed to extend previous research investigating the relationships between predictors of food cravings in order to produce some preliminary findings in relation to the variable of sweet food cravings and its relationship to body image avoidance. The sample consisted of 139 university students (36 men and 103 women) at least 18 years old. Hierarchical multiple regression analysis was performed on body image avoidance, trait anxiety and BMI to examine predictors of food cravings. Both body image avoidance and gender separately predicted cravings for sweet foods, with women experiencing more sweet food cravings than men. However, no significant relationship was found between body image avoidance and general food cravings. BMI was not related to trait anxiety. Further implications of the results and directions for future research are discussed.

Keywords: food cravings, body image, body avoidance, anxiety, university, sweets

Food cravings are extremely common phenomena experienced by both men and women. In a study of undergraduate students in the USA, 94% of women and 75% of men reported experiencing food cravings (Zellner, Garriga-Trillo, Rohm, Centeno, & Parker, 1999). Food cravings are consistent across the lifespan (Rodin, Mancuso, Granger, & Nelbach, 1991), with chocolate being the most craved food, regardless of the country under investigation (Gendall, Sullivan, Joyce, Fear, & Bulik, 1997). Gender differences have been noted, with men generally craving carbohydrates (Lafay et al., 2001) and women preferring sweet foods (Wansink, Cheney, & Chan, 2003).

Food cravings are defined as an intense desire to consume a particular food, or type of food, that is difficult to resist (White, Whisenhunt, Williams, Greenway, & Netemeyer, 2002). Consumption of the craved food usually follows a food craving (Hill & Heaton-Brown, 1994; Martin, O'Neil, Tollefson, Greenway, & White, 2008; White et al., 2002). This consumption is considered to be the explicit, measurable aspect of a food craving (White et al., 2002) and links excessive food craving to over-eating and other disordered eating behavior. However, it is important to note that there may not always be a direct relationship between cravings and consumed food.

A recent surge of media attention on the addition of sugar, to everyday foods; the popularization of books such as *Sweet Poison* (Gillespie, 2008), may have contributed to increased consumer interest in sugar consumption and the physical side effects. However, there appears to be contradictory findings in the literature investigating food cravings of sweet, sugary foods. Research has indicated that sweet foods are craved more frequently than other types of food (Davis et al., 2011; Hill & Heaton-Brown, 1994; Martin et al., 2008; Rodin et al., 1991); however there are discrepancies such that Benton (2010) recently found that sugar was not addictive, nor did it play a role in eating disorders.

Body Mass Index (BMI)

The internationally accepted, standardized classifications of overweight and obese are based on the BMI, which allows a comparable analysis of prevalence rates worldwide (World Health Organization, 2012) and is a weight-to-height ratio, calculated by dividing one's weight in kilograms by the square of one's height in meters. The consensus is that the normal range is between 18.5 and 24.9 kg/m^2 (for both sexes and for all ages over 18 years). Obesity is defined as a BMI above $30kg/m^2$, while overweight is defined as a BMI above $25kg/m^2$. Morbid obesity is classified as a BMI above $40kg/m^2$.

Several studies have found that food cravers have higher BMI's than non-cravers (Gendall, Sullivan et al., 1997; White et al., 2002). Others have found that as BMI increases so too does body image avoidance and dissatisfaction (Algars et al., 2009; Barreto, Ferrandez, & Guihard-Costa, 2009; Lu & Hou, 2009; McCabe & Ricciardelli, 2004; Watkins, Christie, & Chally, 2008). Furthermore, BMI is one of the strongest predictors of body image avoidance, with overweight and obese groups reporting more body image avoidance than normal weight groups (Barreto et al., 2011; Lavender & Anderson, 2010; Slevec & Tiggemann, 2011; Watkins et al., 2008; Yates, Edman, & Aruguete, 2004). Finally, BMI is a significant predictor of anxiety in both men and women (Barry, Pietrzak, & Petry, 2008), and has been found to be positively correlated with trait anxiety in a female sample (Hillman, Dorn, & Huang, 2010).

Body Image Avoidance and Food Cravings

Body image avoidance can be defined as the dissatisfaction with one's physical appearance. It can lead to unhealthful responses including poor eating behaviors, a decrease in levels of physical activity, substance abuse and isolating social interactions (Australian Medical Association [AMA], 2009), and is extremely prevalent worldwide (Cheung et al., 2011; Forbes et al., 2012). There appears to be a lack of published research linking food cravings with body image avoidance, but a strong link has been established between body image avoidance and disordered eating styles (Michou & Costarelli, 2011; Stice & Bearman, 2001; Watkins, et al., 2008). Moreover, body image avoidance has been found to strongly predict disordered eating behaviors such as Binge Eating Disorder, in both men and women (Cheung et al., 2011, McFarland & Petrie, 2012; Urbszat, Herman, & Polivy, 2002; Thompson, Coovert, & Stormer, 1999; Tylka, 2001).

Anxiety and Food Cravings

In addition to these studies examining the relationship between BMI and body image avoidance, further investigations have concentrated on the impact of anxiety on food cravings. Individuals who have frequent food cravings are suggested to have higher levels of anxiety than those who have infrequent food cravings (Hill et al., 1991; Moreno-Dominguez et al., 2012; White & Grilo, 2005), and those individuals with high anxiety are at increased risk of developing an eating disorder than those with low anxiety (Scherr, Ferraro, & Weatherly, 2010). However, research is inconsistent. Another study has found no differences in anxiety between cravers and non-cravers (Gendall et al., 1997).

The differences in results may be because anxiety is considered a multifaceted construct, consisting of various dimensions including state and trait anxiety (Endler & Kocovski, 2001). State anxiety describes the experience of unpleasant feelings when confronted with specific situations and when the object or situation that is perceived as threatening goes away, the person no longer experiences anxiety (Endler & Kocovski, 2001). Trait anxiety can be defined as the anxiety an individual experiences on a day to day basis. (Spielberger, Gorsuch, & Lushene, 1983) and has a positive relationship with disordered eating attitudes (Michou & Costarelli, 2011) and BMI (Hillman, Dorn, & Huang, 2010). Recent research has investigated the ability of trait, rather than state anxiety, to predict food intake but not cravings (Schneider, Appelhans, Whited, Oleski, & Pagoto, 2010). The present study aimed to investigate the nature of trait anxiety only, in order to determine if it had an impact on food cravings and potential eating psychopathology, rather than a single state situation.

Hypotheses

Positive relationships were expected between BMI and food cravings, body image avoidance, and trait anxiety. In addition, it was hypothesized that gender and body image avoidance would account for more variance in sweet food cravings than trait anxiety.

Method

Participants

Fifteen cases were removed due to missing data. Upon inspection of the descriptive analysis, it was revealed that there were only 10 underweight participants, all of which were female. The final sample therefore, consisted of 139 university students (n_{male} = 36, n_{female} = 103), all over 18 years. In terms of BMI

Table 1
Participant Demographics (N = 139)

Characteristic	%(n)
Gender	
M	25.9 (36)
F	74.1 (103)
Age	
18–25	38.8 (54)
26–35	28.1 (39)
35 and over	33.1 (46)
Education	
High school	42.4 (50)
Vocational/TAFE	24.5 (34)
Bachelors degree	25.2 (35)
Masters degree	7.1 (11)
Relationship status	
Partnered	28.1 (39)
Not partnered	71.9 (100)
Body Mass Index (M = 25.7, SD = 5.80)	
Healthy	58.3 (81)
Overweight	24.5 (34)
Obese	17.3 (24)

status, 58.3% fell into the healthy weight category, 24.4% fell into the overweight category and 17.3% fell into the obese weight category. See Table 1 for further details.

Procedure

Ethical approval was obtained from Bond University Research Ethics Committee, Bond University, Queensland, Australia. After responding to a call to participate, students were forwarded an email containing an electronic link to a web-based survey. Participation was voluntary and informed consent was obtained prior to survey completion. Inclusion criteria specified that participants needed to be a currently enrolled student between 18–60 years old.

Measures

Participants completed demographic information, which included their self-reported height and weight. The primary researcher then calculated the BMI to classify participants into categories based on their weight and height (WHO, 2012). A BMI below 18.5 is classified as underweight, BMI from 18.5 to 24.99 is considered within the normal range, a BMI from 25 to 29.99 is classified as overweight range and a BMI over 30 is considered obese. Within the obese category, Class I obesity is defined as a body mass index ≥ 30 but < 35. Class II obesity is defined as a BMI ≥ 35 but < 40. Class III obesity is defined as a BMI ≥ 40 (WHO, 2012).

The Body Image Avoidance Questionnaire (BIAQ; Rosen, Srebnik, Saltzberg, & Wendt, 1991) was used to measure the frequency of avoidance of situations that might cause concern about one's physical appearance (Rosen et al., 1991). Participants were to indicate on a 6-point Likert scale (*0 = never, 1 = rarely, 2 = sometimes, 3 = often, 4 = usually, 5 = always*), how often they engaged in "certain behaviors at the present time". The BAIQ has been found to contain satisfactory psychometric properties, with an internal consistency coefficient of .89 and a test-retest correlation of .87 (Rosen et al., 1991).

The 40-item self-report State and Trait Anxiety Inventory Form Y (STAI; Spielberger et al., 1983) was used to measure state and trait anxiety. Participants were to respond to statements indicating their current (State) feelings using a four point Likert scale, (*1 = not at all, 2 = somewhat, 3 = moderately so, and 4 = very much so*), and how they "generally feel" (Trait), on a four point Likert scale, (*1 = almost never, 2 = sometimes, 3 = often, and 4 = almost always*). Quek et al., (2004), found internal consistency for the state and trait subscale and also the overall anxiety score (Cronbach's alpha = .87, .83 and .86 respectively). Vitasari et al., (2011), also found excellent internal consistency for both subscales and the total anxiety score (Cronbach's alpha of .80, .78 and .85 respectively).

Participants were to rate the frequency of individual food cravings over the past month on a 5-point Likert scale ranging from 1 ("*never*") to 5 ("*almost every day*"). The 37-item self-report Food Craving Inventory (FCI; White et al., 2002) was used to measure four subscales: high fats (8 items; e.g. fried chicken, sausage), carbohydrates/starches (8 items;

Table 2
Summary of Intercorrelations, Means and Standard Deviations for Age, Gender, Marital Status, Education Level, BMI, BIAQ, State and Trait Anxiety, the Sweets subscale of the FCI and the total score of the FCI. (N = 139)

Variable	1	2	3	4	5	6	7	8	9	10	M	SD
1. Age	--	.01	.61**	.24**	.29**	.03	-.13	-.06	-.13	-.12	--	--
2. Gender		--	-.01	.01	-.19*	.38**	.25**	.25**	.20*	.11	--	--
3. Martial status			--	-.12	-.39**	-.16	-.00	-.03	.20*	.16	--	--
4. Education level				--	.16	.19*	.02	.03	.03	-.11	--	--
5. BMI					--	.21*	-.04	.02	-.04	-.03	25.76	5.80
6. BIAQ						--	.27**	.33**	.23**	.11	28.24	11.99
7. State anxiety							--	.81**	.16	.18*	38.81	11.39
8. Trait anxiety								--	.18*	.13	40.77	11.17
9. FCI–Sweets									--	.81**	17.06	5.78
10. FCI–Total										--	55.38	15.02

Note: * $p < .05$, ** $p < .01$.

e.g. baked potato, pasta), sweets (e.g. 8 items; chocolate, ice cream) and fast food fats (4 items; e.g. pizza, hamburger). To limit errors due to cultural differences, the authors replaced two of the food items with the Australian equivalent of the American food. Cinnamon rolls were replaced with finger buns and candy was replaced with lollies. Possible scores range from 0 to 140, with higher scores indicating increased food cravings. The FCI has been found to be both reliable and valid when used in a variety of populations including a community sample of individuals of varying weight (White et al., 2002) and an obese sample with binge eating disorder (White & Grilo, 2005).

Results

The data was analysed using the software Statistical Package for Social Studies (SPSS version 19.0). All statistical analyses were considered significant at alpha level $p = .05$. Prior to analysis, all variables were examined for data entry errors, missing data, linearity, normality, and the presence of univariate and multivariate outliers. In 15 cases, complete missing data existed, therefore it was decided to delete all 15 cases. Partial data was missing in three cases, so were they removed. Preliminary analysis was undertaken using Pearson product-moment correlation to investigate whether the demographic variables (age, education level, marital status and gender) covaried with the predictor variables (food cravings) or the criterion variable (body mass index, body image avoidance or anxiety). Further analysis was then undertaken to investigate the relationship between food cravings and several associated criterion variables using Pearson product-moment correlation. Reporting of correlations was pursuant to the strength coefficient categories of small = .10–.29, medium = .30–.49 and large = .50–1.0 reported by Tabchnick and Fidell (2007). In order to determine whether food cravings could be predicted by gender, BMI, body image avoidance and trait anxiety, a hierarchical multiple regression analysis was performed.

As demonstrated in Table 2, a number of significant relationships were found relating to gender. A small significant negative relationship was found between gender and BMI ($r = -.19$, $p = .027$), indicating that men had higher BMI's than women. A significant

Table 3
Means and Standard Deviations of Variables

	Trait Anxiety		BIAQ		Sweets–FCI		Total–FCI	
	M	SD	M	SD	M	SD	M	SD
Gender								
M	36.05	7.80	20.67	8.90	15.17	5.21	52.50	15.94
F	42.42	11.72	30.88	11.83	17.73	5.84	56.39	14.63
Age								
18–25	40.74	10.38	28.61	12.85	18.37	5.94	59.61	13.77
26–35	41.67	11.33	25.69	10.23	16.49	5.24	52.51	14.57
36 and over	40.04	12.09	29.95	12.20	16.02	5.84	52.85	15.94
Marital status								
Partnered	41.79	12.16	30.33	14.14	15.77	5.67	51.95	16.13
Not partnered	40.37	10.80	27.42	11.00	17.57	5.77	56.72	14.43
BMI								
Healthy	41.05	11.30	26.62	10.71	17.32	17.32	5.63	13.67
Overweight	38.79	10.77	28.26	13.64	16.56	16.56	5.97	16.52
Obese	42.62	11.33	33.67	12.49	16.92	16.92	6.19	17.45

medium positive relationship was found between gender and body image avoidance ($r = .38$, $p < .001$), such that women had higher levels of body image avoidance than men. Gender was also significantly positively correlated with both state ($r = .26$, $p = .002$) and trait anxiety ($r = .25$, $p = .003$), indicating that women had higher levels of anxiety than men. Analysis between gender and total score of the FCI revealed no relationship. However, a significant negative relationship was found between gender and the high-fats subscale ($r = -.19$, $p = .029$), such that men had more cravings for high-fat foods than women. Analysis revealed that gender and the subscale for sweets were significantly positively correlated ($r = .20$, $p = .022$), as was the relationship between gender and carbohydrates ($r = .17$, $p = .047$); women craved more of these types of food than did men.

Body Mass Index and Food Cravings. The relationship between BMI and food cravings was investigated using Pearson product-moment correlation. As seen in Table 2, support was not found for the hypothesis that participants with a higher BMI would have more food cravings than those with a lower BMI. As seen in Table 3, healthy range BMI participants admitted more food cravings than both the overweight and obese groups.

Body Mass Index and Body Image Avoidance. To investigate the hypothesis that the obese and overweight group would have more body image avoidance than the normal group, a one-way between-groups ANOVA was performed. Participants were divided into three groups (healthy, overweight and obese) based on the criteria recommended by the World Health Organization. A statistically significant difference was found for BIAQ scores between the three BMI groups: $F(2, 136) = 3.31$, $p = .04$. The effect size was $\eta^2 = .05$. As can be seen in Table 3, Post-hoc comparisons using the Tukey HSD test indicated that the mean scores for Group 1 ($M = 26.62$, $SD = 10.71$, $p < .05$) were significantly different from Group 3 ($M = 33.67$, $SD = 12.49$, $p < .05$). Group 2 ($M = 28.26$, $SD = 13.64$) did not differ significantly from either Group 1 or 3. As shown in Table 3, support was partially found for the hypothesis, as the obese group, but not the overweight group, had significantly more body image avoidance than their normal weight counterparts.

Body Mass Index and Trait Anxiety. Pearson

Table 4
Hierarchical Multiple Regression Analysis with Sweet Food Cravings predicted from Age, Marital Status, Education Level, Gender, Body Mass Index, Body Image Avoidance Questionnaire and Trait Anxiety (N = 139)

Predictor	ΔR^2	β	*B*	SE *B*	95% CI for *B*
Step 1	.04				
Constant			14.58	2.32	[9.98, 19.17]
Age of participant		-.03	-.15	.56	[1.26, .05]
Highest level of education		.06	.32	.50	[-.68, 1.31]
Marital status		.18	.60	.35	[-.08, 1.29]
Step 2	.04				
Constant			12.66	2.42	[7.86, 17.45]
Gender		.20	2.59	1.09	[4.3, 4.74]
Step 3	.01				
Constant			10.61	3.26	[4.16, 17.05]
BMI		.09	.66	.70	[-.72, 2.04]
Step 4	.03				
Constant			9.26	3.27	[2.80, 15.72]
BIAQ		.21	.10	.05	[.01, .19]
Step 5	.01				
Constant			7.43	3.61	[.28, 14.58]
Trait anxiety		.10	.05	.05	[-.04, .14]

Note: CI = confidence intervals

product-moment correlation indicated there was no relationship between BMI and trait anxiety. Furthermore, as shown in Table 3, overweight participants did not have significantly more trait anxiety than their normal weight counterparts.

Body Image Avoidance and Food Cravings. As demonstrated in Table 2, and contrary to the expected outcome, a non-significant relationship was found, indicating that body image avoidance was not related to general food cravings.

A hierarchical regression analysis was undertaken for the criterion variable of the FCI sweets subscale. A preliminary analysis revealed that age, marital status and education level co-varied with other variables within the study, they were entered at Step 1. Gender also co-varied with other variables within the study, however, as it was also a predictor variable, it was entered at Step 2. Based on the existing food craving literature, BMI was entered at Step 3, body image avoidance was entered at Step 4 and trait anxiety was entered at Step 5.

Table 4 details the results of the hierarchical regression analysis for sweet food cravings. After Step 5, when all variables were entered into the regression equation, a significant amount of variance in sweet food cravings was accounted for (R = .13, adjusted R = .082; $F(7, 131) = 2.77$, p = .01. The R value of 12.9 for the model with all four variables indicates that almost 13% of the variance in sweet food cravings was predicted by gender, BMI, body image avoidance and anxiety.

On Step 1 of the hierarchical multiple regression analysis, the demographic variables of age, marital status and education level, accounted for a non-significant amount of 4.1% of the variance in sweet food cravings, $R^2_{change} = .041$, $F_{change}(3, 135) = 1.94$, p = .126. Therefore, at their point of entry, the demographic variables were not significant predictors of

sweet food cravings.

At Step 2, after controlling for the demographic variables, gender accounted for an additional 3.9% of the variance in sweet food cravings, R^2 = .039, F = (1, 134) = 5.64, p = .019. At the point of entry into the model, consistent with hypothesis, gender was a significant predictor of sweet food cravings.

At Step 3, after controlling for the demographic variables and gender, BMI accounted for a non-significant .6% of the variation in sweet food cravings, R = .006, F = (1, 133) = .884, p = .349. At this point, BMI was not a significant predictor of sweet food cravings.

At Step 4, after controlling for the demographic variables, gender and BMI, participants BIAQ scores accounted for a significant additional 3.3% of the variance in sweet food cravings, R = .033, F = (1, 132) = 5.01, p = .027, at its point of entry into the equation, consistent with the hypothesis, participants' body image avoidance (as measured by the BIAQ) was a significant predictor of sweet food cravings.

At Step 5, after controlling for the demographic variables, gender, BMI and BIAQ, participants trait anxiety scores accounted for a non-significant .9% of the variance in sweet food cravings, R = .009, F(1, 131) = 1.38, p = .242. Therefore at its point of entry, trait anxiety was not a significant predictor of sweet food cravings.

With all four predictors entered into the equation at Step 5, gender and body image avoidance (as measured by the BIAQ), were the only predictors to significantly predicted sweet food cravings. With regards to unique variance, gender contributed 3.8% unique variance to food cravings, whilst body image avoidance contributed 3.3% unique variance to food cravings.

Gender and Sweet Food Cravings. Gender accounted for more variance in sweet food cravings than did trait anxiety. In order to ascertain which gender had more sweet food craving, an independent sample t-test was conducted. Analysis revealed a statistically significant difference in scores for men (M = 15.17, SD = 5.21) and women (M = 17.73, SD 5.84); t(137) = -2.33, p = .022, two-tailed). The magnitude of the difference in the means (mean difference = -2.56, 95% CI: -4.74 to -0.38) was small to medium (η^2 = .04). Inspection of means in Table 3, show that women had significantly more sweet food cravings than men.

Body Image Avoidance and Sweet Food Cravings. Body image avoidance significantly accounted for more variance in sweet food cravings than trait anxiety. This indicates that higher levels of body image avoidance significantly predicted increased cravings for sweet foods. As shown in Table 2, those with higher body image avoidance scores had significantly more sweet food cravings than those with lower body image avoidance scores.

Discussion

The present study sought to investigate whether gender, BMI, body image avoidance and trait anxiety were useful in predicting sweet food cravings. BMI was not found to be related to either food cravings or trait anxiety and this was unexpected. A considerable amount of past research has shown that there was a relationship between BMI and food cravings (Gendall & Sullivan, 1997; White et al., 2002). However, the samples used were often clinically diagnosed participants, for example obese patients with binge eating disorder (White & Grilo, 2005). It is possible that the experience of food craving is different for those with a clinical diagnosis of an eating disorder than those without. Perhaps food cravings experienced by the university sample in the present study, were more related to other factors, for example stress, rather than BMI. Future research could investigate food cravings in both a clinical and non-clinical sample, to examine differences in the food craving experience across culture and diagnosis.

It was an aim of this study to expand on findings of previous research by Zhao et al., (2009) who found that BMI predicted anxiety, but did not use a valid and reliable measure of anxiety. Surprisingly, in this study it was found that BMI was not related to trait anxiety, although previous research has found support for this hypothesis (Hillman et al., 2010; Schneider, et al., 2010). Substantial research has also shown a robust relationship between BMI and general anxiety only (Barry, Pietrzak, & Petry, 2008; Hillman et al., 2010). It is possible that the lack of significant results in the present research is a result of the change of investigation from general anxiety to the specific component of trait anxiety. Future research would

benefit from including both state and trait anxiety.

The hypothesis that BMI would be related to body image avoidance was partially supported, as the obese group, but not the overweight group, had significantly more body image avoidance than the normal weight group. However, there was no significant difference between the overweight group and the healthy weight group in terms of their body image avoidance. These results are not consistent with previous research that has found both obese and overweight groups report more body image avoidance than their normal weight counterparts (Barreto et al., 2011; Lavender & Anderson, 2010; Slevec & Tiggemann, 2011; Watkins et al., 2008; Yates et al., 2004). These differing results could be due to the lack of understanding of what constitutes a healthy BMI or the colloquial use of the term 'overweight' which may include obese individuals. Many people incorrectly believe a BMI over 25 is still within the healthy range, when in fact this reflects the overweight or obese range (Basterra-Gortari, Bes-Rastrollo, Forga, Martinez, & Martinez-Gonzalez, 2007). While the current study did not ask participants to calculate their own BMI, future studies could measure participants' understanding of BMI against their own self-reported status to control for this issue. The healthy weight range participants did not differ from the overweight participants in terms of body image avoidance, perhaps due to the participant's individual differences that were not measured, for example, disordered eating or the presence of an eating disorder was not evaluated. In the present research, several variables known to relate to food cravings were measured in an attempt to predict food cravings, however, it was not possible to measure all individual differences. Future research could use a more clinical measure of eating disorders to control for this issue.

An aim of this study was to provide preliminary results relating to body image avoidance and food cravings, as research in this area appears to be limited. Based on the previously established relationship between body image avoidance and disordered eating styles (see Michou & Costarelli, 2011; Stice & Bearman, 2001; Watkins, et al., 2008) and the similarities between the disordered eating literature and that of the food cravings literature, it was hypothesized that body image avoidance would be related to food cravings. Surprisingly, there was no significant relationship between body image avoidance and general food cravings. However there was a predictive relationship as body image avoidance was predictive of sweet food cravings. Perhaps the reason is the lack of men in the present study. Males typically experience less general cravings than women (Rozin, Levine & Stoess, 1991; Weingarten & Elston, 1991), and when they do crave food, it is more for carbohydrates (Lafay et al., 2001). It is possible that due to the small number of male participants in the present study, the amount of general food cravings was not large enough to produce a significant effect.

The current study found that body image avoidance was predictive of sweet food cravings. This finding supports previous disordered eating research where it was found to be predictive of body image avoidance in both men and women (Cheung et al., 2011; McFarland & Petrie, 2012; Thompson, Coover,t & Stormer, 1999; Tylka, 2001; Urbszat, et al., 2002). This study highlighted that gender was also predictive of sweet food cravings, with women having significantly more sweet food cravings than men. Since food cravings are usually followed by consumption of the craved food (Hill & Heaton-Brown, 1994; Martin et al, 2008; White et al., 2002); it would be assumed, then, that women also have increased rates of being overweight. However, at a worldwide level, reports suggest men are more often overweight than women (Algars et al., 2009; Cheung et al., 2011; Neighbors & Sobal, 2007; Yates, Edman, & Aruguete, 2004). Future studies should investigate other potential factors e.g., portion size and frequency of eating as reasons for this discrepancy.

Limitations of the current study include the retrospective nature of the questionnaires. Participants were asked to retrospectively evaluate their food cravings over the past 30 days, how often they engaged in body image avoidance behaviors, and how they generally felt with regard to their anxiety. It is possible that participants' responses were influenced by memory distortions, which have been shown to occur when recalling past events (Schacter, 1999). The present study examined only normal weight, overweight and obese participants. A sample more representative of the general population, including underweight and morbidly obese, would ensure results are

generalizable to a wider population. Additionally, this study did not have an even distribution of women to men in order to examine true gender effects and differences; therefore, future research would benefit from an equal ratio of men to women. Finally, including the demographic questions prior to the other measures may have inadvertently introduced a stereotype threat (a risk of confirming, as self-characteristic, a negative stereotype about one's group, either based on BMI or food cravings; Steele & Aronson, 1995).

Conclusion

This study contributes to the research on sweet and general food cravings, and their relationship to other related variables, despite its limitations. This study revealed participants' body image avoidance was a significant predictor of sweet food cravings; those with higher body image avoidance scores had more sweet food cravings than those with lower body image scores. In addition, women had significantly more sweet food cravings than men. However, while higher BMI ratings were not related to increased food cravings, those in the obese group had significantly more body image avoidance than the normal weight participants.

Treatment programs for addressing the obesity epidemic have included combined dietary and physical activity approaches (Fujioka, 2002; McGuire, Wing, Klem, Lang, & Hill, 1999), but those with higher BMI scores may benefit from the inclusion of specific skill training relating to body avoidance, specifically with regard to the role of sweet food cravings and consumption. The results of this study suggest that it is possible to identify predictive variables of sweet food cravings. As worldwide consumption of sugar and sweet foods increases (Davis et al., 2011; Gillespie, 2008), and as the obesity epidemic worsens (Withrow & Alter, 2010), innovative and effective treatment approaches to the whole issue are critical.

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