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Adult Picky Eating Behaviors:
Impact of Psychosocial and Nutritional Factors

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Abstract

The *DSM-5* (APA, 2013) added the diagnostic category of avoidant/restrictive food intake disorder (ARFID) as a subcategory of feeding and eating disorders, which provides for inclusion of adult picky eating. An exploratory study to investigate a predictive model for adult picky eating as measured by the Picky Eating Questionnaire (PEQ) related to psychosocial functioning and nutritional functioning was conducted. Data were utilized from 183 participants who are members of an international online support group for picky eating. Participants self-identified as picky eaters, with 83% meeting full criteria for ARFID and 16% also meeting full criteria for an eating disorder. A predictive model was created with gender as a covariate due to its correlation with PEQ. Social Eating Anxiety Scale (SEAS) was the only significant study variable entered into the regression equation and the final predictive model was statistically significant and accounted for 7.4% of the variance. However, SEAS, Body Mass Index (BMI), and the Maudsley Obsessive Compulsive Index (MOCI) were significantly correlated with the PEQ. Participants demonstrated mean scores on the Liebowitz Social Anxiety Scale (LSAS) and Clinical Impairment Assessment (CIA) that were above the cut-off for clinical significance, indicative of social anxiety disorder and general clinical impairment. Participants were found to have overall poorer nutritional functioning, as measured by the Healthy Eating Index (HEI), with average scores in the 30th percentile, as well as mean BMI scores in the overweight range, which suggests nutritional concerns.

Adult Picky Eating Behaviors: Impact of Psychosocial and Nutritional Factors

Picky eating has been considered a normal part of development during childhood, with one in four children experiencing these symptoms (Lewinsohn et al., 2005). Picky eating has been characterized “by eating an extremely limited range of foods, that may include avoidance of unfamiliar foods or rejection of foods based on sensory characteristics” (Wildes, Zucker, & Marcus, 2012, p. 576). The majority of this literature is focused on children under the age of seven and children with developmental disabilities. Researchers have only recently begun to report that, for some individuals, picky eating is not simply a transient phase during childhood. These findings have prompted researchers to begin to investigate picky eating in adults. In a recent online study, Wildes et al. (2012) identified a sample of 6,895 men and women over the age of 18 who self-identified as picky eaters and completed their survey (Bryant-Waugh, Markham, Kreipe, & Walsh, 2010; WCEDCA, 2007; Wildes et al., 2012). This was the first and is the only published study to date to the author’s knowledge that examines picky eating behaviors in adults.

The diagnostic criteria for feeding disorder of infancy and early childhood in the fourth edition of the *Diagnostic and Statistical Manual* (DSM-IV-TR, American Psychiatric Association [APA], 2000) did not allow for categorization of problematic picky eating behaviors that persist into adulthood and compromise functioning. Instead adults with picky eating behaviors were most frequently diagnosed with eating disorder, not otherwise specified (ED-NOS), an over-utilized diagnosis that yielded very little clinical utility for those with eating disorders and even less for those with picky eating behaviors (WCEDCA, 2007; Zimmerman, Francione-Witt, Chelminski, Young &

Tortolani, 2008). The *DSM-5* (APA, 2013) expanded the diagnostic classification system to better account for the eating and feeding disorders reported in the research and clinical literatures, including adult picky eating, and added the diagnostic category of avoidant/restrictive food intake disorder (ARFID) as a subcategory of feeding and eating disorders (APA, 2013; WCEDCA, 2007; Wildes et al., 2012).

Based on the available literature, ARFID has been defined as a distinct construct from eating disorders, with the diagnoses of anorexia nervosa (AN) and bulimia nervosa (BN) listed as exclusionary criteria for ARFID. Individuals with picky eating behaviors have not demonstrated the core eating disorder concerns of body image, weight, and shape issues (Jiménez-Murcia et al., 2007; Lampard, Byrne, McLean, & Fursland, 2012; Waller, Shaw, Meyer, Haslam, Lawson, & Serpell, 2012), they have been found to eat a very narrow selection of bland, savory, high caloric rather than low caloric foods (Lobera & Rios, 2009; Stoner, Fedoroff, Andersen, & Rolls, 1994; WCEDCA, 2007; Wildes et al., 2012) and, as adults, they have not been found to be underweight as in AN, but may, in fact, be obese (Wildes et al., 2012). However, while eating disorders and picky eating are beginning to be understood as distinct categories in the literature, Wildes et al. (2012) identified a group of individuals who experienced co-morbid picky eating and disordered eating symptoms.

The criteria for both feeding disorder of infancy and early childhood in the *DSM-IV-TR* and for ARFID in the *DSM-5* rule out general medical conditions that could interfere with food intake, such as diabetes, celiac disease, food allergies, gastrointestinal disorders, or difficulties with the mouth, in establishing the diagnosis. However, research also supports that medical conditions can contribute to the development of feeding and

eating difficulties (Bryant-Waugh et al., 2010; Nicholls, Christie, Randall, & Lask, 2001; Timimi, Douglas, & Tslftsopoulou, 1997). For consistency with past research and with the current diagnostic criteria, a more conservative approach was used in the present study, such that relevant general medical conditions reported by participants served as exclusionary criteria for inclusion in the primary analysis.

Picky eating has been found to be significantly related to psychosocial functioning in children and adults (Jacobi, Schmitz, & Agras, 2008; Nicholls et al., 2001; Timimi et al., 1997; Wildes et al., 2012). Children with picky eating demonstrated social difficulties, avoidance and isolation, and signs of anxiety in situations involving food (Nicholls et al., 2001; Timimi et al., 1997), with one study with children indicating a broader degree of social impairment that may more closely resemble social anxiety disorder (Timimi et al., 1997). Further, Wildes et al. (2012) found that adults with picky eating also experience a significant degree of anxiety related to social situations with food. However, the researchers did not measure social anxiety as a broader construct and cited this as a study limitation. Therefore, psychosocial functioning, which addresses the narrower context of social anxiety while eating and the broader construct of social anxiety disorder, were both measured in the current study.

Psychosocial difficulties in the form of obsessive-compulsive symptoms have been found to be related to picky eating in children and adults (Timimi et al., 1997; Wildes et al., 2012). Obsessive-compulsive disorder (OCD) tendencies related to food symptoms, as well as more broadly, have been supported in studies with children (Timimi et al., 1997). However, there is minimal research currently available with adults, with preliminary evidence from the Wildes' et al. (2012) study suggesting that OCD

symptoms may be related to adult picky eating. Thus, a measure of OCD symptoms was important to include in the current study.

No known published studies have measured the nutritional functioning of adults with picky eating. However, nutritional deficiency is listed as a criterion for the *DSM-5* diagnosis of ARFID. Since research has found that children with extreme feeding difficulties are more likely to be underweight and undernourished (Mascola, Bryson, & Agras, 2010), it was important to measure the nutritional functioning of adults with picky eating to determine if they also demonstrate nutritional deficits.

The present study was an exploratory study of correlates of adult picky eating, which drew from previous research with children, the eating disorders literature, and the one published study on adult picky eating (Wildes et al., 2012). More specifically, this research project examined the relationship between psychosocial functioning and nutritional functioning as related to picky eating in adults who have self-identified as picky eaters as part of an online support group. The predictor variables included four measures of psychosocial functioning: (1) clinical impairment; (2) social anxiety related to food; (3) social anxiety disorder; and (4) OCD; and two measures of nutritional functioning: (1) dietary assessment and (2) BMI. The criterion variable was picky eating as measured by the Picky Eating Questionnaire.

Due to the limited research to support the formation of specific hypotheses, the null hypothesis was tested at the .05 level:

H₀. There is no variable or combination of variables that significantly predicts adult picky eating, as measured by the Picky Eating Questionnaire, in members of a self-defined online support group.

However, informed by the very limited research with children and adults, it was expected that a combination of some of these variables would be predictive of picky eating behaviors in adults. Specifically, it was expected that picky eating would be predicted by nutritional difficulties, specifically poor diet and higher BMI, as well as high levels of social anxiety related to eating and mildly elevated obsessive compulsive-disorder symptoms. It was also expected that the relationship of these variables with picky eating would become more pronounced in the subset of individuals who experienced co-morbid picky eating and eating disorder symptoms (see Figure 1 for a graph of the predictive model).

Method

Participants

The participants were adults, ranging in age from 19 to 64, who are members of an international online support group for picky eating. A total of 230 participants consented to participate in the study, with two participants (0.9%) excluded because they were less than 18 years old, 36 participants (15.7%) excluded due to a reported general medical condition that may interfere with their eating (i.e., diabetes, celiac disease, gastroesophageal reflux disease, irritable bowel syndrome, colitis, problems with the mouth or jaw [temporomandibular joint disorder, dentures], or pregnancy [or nausea related to pregnancy]), and nine participants (3.9%) excluded due to too much missing data, which resulted in a total of 183 participants, or 79.6% of the total number of individuals who consented to participate.

However, only 91 of these 183 participants (50%) completed both sets of study measures (i.e., the demographic and psychosocial measures, as well as the nutritional

measure). Of the sample of 91, six more participants (6.5%) were excluded due to not completing a sufficient number of items on the nutrition measure (see Figure 2 for a graph of the order of exclusion of participants). Thus, the final number of participants was 86, which is 37% of the total number of individuals who consented to participate.

Thus, the larger sample of 183 participants (who were missing the nutritional measure) served as the study sample utilized for the primary analyses. The 86 participants constituted the smaller sample, used to analyze the nutrition variable.

For the study sample ($N = 183$), the mean age of the participants was 33.9 years ($SD = 11.90$). Thirty-nine participants reported being male (21.3%) whereas 144 reported being female (78.7%). The majority reported their race as White or Caucasian (168, 91.8%); eight participants reported as Black or African-American (4.4%); five participants as bi- or multiracial (2.7%), and one participant (0.5%) reported Native Hawaiian or Pacific Islander. One participant (0.5%) chose not to specify race. Regarding ethnicity, 173 participants identified as non-Hispanic or Latino (94.5%), whereas nine participants identified as Hispanic or Latino (4.9%), and one participant (0.5%) did not specify. Participants represented an international sample with the majority (109, 59.6%) reporting being U.S. Americans and the remainder representing 18 different nationalities. Five participants (2.7%) seemed to misunderstand “Nationality,” and 14 participants (7.7%) chose not to answer. The majority of participants reported their primary language as English (174 participants, 94%). Participants were highly educated, with 134 (73.2%) completing at least some college and 32 (17.5%) having post-graduate degrees, compared to 14 participants (7.7%) completing high school/GED and three participants (1.6%)

completing less than high school (see Table 1 for demographics of study sample [N = 183] and smaller sample [N = 86]).

Also, the presence of an eating disorder was originally to serve as an exclusionary factor for inclusion in the study analyses, but instead was used as a covariate in the analyses. Based on the Eating Disorder Diagnostic Scale (EDDS), no participants in the study sample met full criteria for AN, seven participants (3.8%) met full criteria for BN, and 10 participants (5.4%) met full criteria for BED, resulting in 17 (9.3%) with eating disorders based on this measure (see Table 1 for study sample and smaller sample).

Measures

Demographic Questionnaire. A Demographic Questionnaire constructed for the purposes of this study included items regarding age, gender, ethnicity, race, nationality, education, primary language and presence of a general medical condition that could interfere with food intake.

Picky Eating Questionnaire. The Wildes' et al. (2012) Picky Eating Questionnaire (PEQ), an 11-item questionnaire regarding picky eating, was utilized as the dependent measure in this study. The first five items are rated on a 5-point Likert-type scale that ranges from 1 - "all of the time" to 5 - "rarely or never." These first five items are summed to produce an overall picky eating score, with a possible range from 5 to 25. For the purposes of this study, items were recoded so that higher scores were indicative of higher levels of picky eating to be consistent with other study measures that had higher scores indicating greater impairment. The remaining six items are exploratory questions not used to measure the criterion variable for the primary analysis, but used in further

analyses to identify the percentage of the sample that met criteria for the diagnosis of ARFID.

Eating Disorder Diagnostic Scale. The Eating Disorder Diagnostic Scale (EDDS; Stice, Telch, & Rizvi, 2000) is a 22-item, self-report measure for diagnosing eating disorders based on the *DSM-IV-TR* criteria. The *DSM-IV-TR* requirement of amenorrhea for the diagnosis of AN was eliminated for use in this study to be consistent with its deletion in the *DSM-5* (American Psychiatric Association, 2013; Attia & Roberto, 2009) and with the Wildes et al. (2012) study. The EDDS consists of three subscales, allowing for categorization of AN, BN, and BED. It requires self-reported height and weight measures such that BMI can be calculated. This scale is scored using published computer scoring algorithms (Stice et al., 2000).

Clinical Impairment Assessment. The Clinical Impairment Assessment (CIA; Bohn & Fairburn, 2008) is a 16-item, 4-point Likert-type self-report measure of psychosocial impairment related to eating difficulties. This measure was designed to specifically assess the nature and severity of the psychosocial impairment of individuals with eating disorders and was intended to be used in conjunction with an assessment for the presence of an eating disorder. Consistent with the Wildes et al. (2012) study, a modified version of this measure was used in the present study that prompted the participants to think only about how their “eating habits” have affected their life over the past 28 days. The items are summed to produce a CIA global scale score, which ranges from 0 to 48, with higher scores indicating greater clinical impairment. Based on available normative data, scores higher than 16 are considered indicative of clinically significant levels of clinical impairment (Bohn et al., 2008).

Social Eating Anxiety Scale. The Social Eating Anxiety Scale (SEAS) was developed by Wildes et al. (2012) to measure anxiety in social situations related to food. The three items are rated on a 5-point Likert-type scale ranging from 1 - “all of the time” to 5 - “rarely or never” and summed to produce a total social eating anxiety score, with a possible range from 3 to 15. For the purposes of this study, items were recoded so that higher scores were indicative of higher levels of social anxiety related to food to be consistent with other study measures that had higher scores indicating greater impairment.

Liebowitz Social Anxiety Scale. The Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987) is a 24-item measure of social anxiety consisting of two subscales measuring fear and avoidance in performance-related situations (13 items) and social interaction situations (11 items). The participant rates each situation for both fear and frequency of avoidance on a 4-point Likert-type scale. For fear ratings, the scale ranges from 0 – “none” to 3 – “severe”. For frequency of avoidance, the quantitative scale and accompanying qualitative descriptors range from 0% – “never” to” 68-100% “usually.” The sum of the 24 items, with a possible range from 0 to 144, was used as the measure of social anxiety and avoidance, with higher scores indicating higher levels of social anxiety and avoidance. The author of the scale recommends that scores above 50 indicate clinically significant levels of social anxiety disorder, and research trials often use this as a clinical cut-off score (Kobak et al., 1998; Liebowitz, 2003).

Maudsley Obsessional-Compulsive Inventory. The Maudsley Obsessional-Compulsive Inventory (MOCI; Hodgson & Rachman, 1977) is a 30-item, self-report measure, presented in a “true” or “false format”, which assesses the presence and severity

of OCD symptoms and is a screening tool for the diagnosis of OCD (Sánchez-Meca et al., 2011). The total score was used in the present study, obtained by summing the 30 responses, with higher scores indicating the presence of higher levels of OCD symptoms and scores of 12 or above being considered clinically indicative of the presence of an OCD diagnosis (Amir, Najmi, & Morrision, 2009; Nakao et al., 2005).

Automated Self-Administered 24-hour Recall. Dietary intake data were collected and analyzed using the Automated Self-Administered 24-hour Recall (ASA24) system, version one (2011), developed by the National Cancer Institute, Bethesda, MD (ASA24, 2011). These data were then converted using the Healthy Eating Index (HEI; Guenther, Reedy, Krebs-Smith, Reeve, & Basiotis, 2007) to produce an overall nutrition score. The ASA24 is an interactive, self-reported dietary assessment method that uses a modified version of the Automated Multiple-Pass Method 24-hour recall that involves adding more steps to the procedure to increase the accuracy of the participant's reporting of dietary intake. The HEI is a measure of diet quality that assesses how an individual's food consumption aligns with Federal dietary guidelines and how it compares to other Americans. Further, output from the ASA24 is used with the HEI to compute a total score to represent the individual's overall nutritional functioning that ranges from 0 to 100, with higher scores indicating better diet quality (Guenther et al., 2007).

Procedure

Approval was obtained through Xavier University's Institutional Review Board (IRB, see Appendix). Participants were recruited through the online support group for adults with picky eating via a link posted on the support group website. For the first post, the support group leader posted an informational paragraph written by this researcher to

the blog and, after this, the support group leader requested that this researcher post in the group for the remainder of the requests. All subsequent requests were made after there was a lull in responding, for a total of nine posts across a span of one year and resulting in 230 participants (first post resulted in 84 participants; second post -- 16 participants; third post -- 6 participants; fourth post --14 participants; fifth post -- 4 participants; sixth post -- 50 participants; seventh post -- 46 participants; eighth post -- 2 participants; ninth post -- 8 participants). The link posted on the support group website directed individuals to the Study Information and Informed Consent Form that included a place for the participants to indicate their consent to participate in the study. Individuals were informed that the study was not a requirement for membership in the support group nor did the support group have access to the study data, and that all information from the study would be kept confidential.

After agreeing to participate in the study, the participants were directed to a separate page that contained a randomly generated username and password unique to them that was later used to access the ASA24. This password was not connected to any identifying information. Participants were instructed to write down the username and password and then were directed to the Survey Gizmo. Participants took a survey with two distinct parts – the first part was housed on Survey Gizmo and included the Demographic Questionnaire and the psychosocial study measures (PEQ, EDDS, CIA, SEAS, LSAS, and MOCI, presented in random order) and the second part of the survey included the nutritional measure (the ASA24), which was accessed by a link on Survey Gizmo which took the participant to the ASA24 respondent's website, run by the

National Cancer Institute. The usernames and passwords were used to match participants' responses from both parts of the survey.

More than half of the participants (63%) did not complete the nutritional part of the survey despite the instructions indicating the necessity to complete both parts in order to be included in the study. Some provided feedback as to the various issues that interfered: not having the entire survey on Survey Gizmo, having difficulty getting the ASA24 website to run properly, having to download Microsoft Silverlight before using the ASA24, and the time involved in continuing the survey. This researcher and the ASA24 research team were available for technical support, and were able to help several participants who were experiencing difficulty with the program.

Results

The purpose of the present study was to explore the potential correlates of adult picky eating, and to test a predictive model for adult picky eating. A mixed (sequential and stepwise) multiple regression was used to test the primary hypothesis. Covariates were determined by assessing for the presence of any correlations between the demographic variables (e.g., age, gender, race, education level, or eating disorders as measured by the EDDS) and the criterion variable (PEQ). Covariates were entered in Step 1 of the regression equation. The remaining six predictor variables (clinical impairment as measured by the CIA; social anxiety related to food as measured by SEAS; social anxiety disorder as measured by the LSAS; OCD as measured by the MOCI; dietary assessment as measured by the ASA24 and converted to an HEI score; and BMI as measured by the EDDS) were entered in Step 2 via stepwise methods. All of the predictor variables were centered on their means, to make the regression coefficients

more interpretable (Tabachnick & Fidell, 2007), and multicollinearity was tested. The analyses were computed using an alpha level of .05.

The means and standard deviations were calculated for each of the study measures for the study sample ($N = 183$) and the smaller sample ($N = 86$) (see Table 2). T-tests were conducted on the study measures comparing the smaller group of 86 to the remaining 97 participants that composed the larger study sample of 183 participants. There were no significant differences between these groups on any of the study variables (note that the nutrition variable could not be compared, as it is not represented in the smaller sample). A Mann Whitney was conducted to test for differences on dichotomous demographic variables (e.g., gender, race, EDDS, and ARFID) and a *t*-test was conducted for continuous demographic variables (e.g., age and education level). There was a significant difference between these two samples on the EDDS ($U = 3621.00$; $p = .002$), indicating a higher percentage of eating disorder diagnoses in the sample of 86. There were no other differences on any other demographic measure (see Table 3 and Table 4 for comparisons between groups).

Cut-off scores indicative of clinical significance are available for some of the study variables. Liebowitz (2003) indicated that a score of 50 or above is considered clinically significant on the LSAS and the study sample had a mean score above the cutoff, indicating a social anxiety disorder ($M = 52.01$, $SD = 26.81$). The BMI mean score for the study sample fell in the “overweight” range, which ranges from 25 to 29.9 ($M = 27.60$, $SD = 8.82$). Bohn et al. (2008) reported that the clinical cut-off score for the CIA is 16, and the study sample had a mean score above the cut-off ($M = 16.15$, $SD = 10.64$), indicating general clinical impairment. The clinical cut-off score for the MOCI is

12 (Amir et al., 2009; Nakao et al., 2005); the MOCI mean score for the study sample did not meet a level of clinical significance for obsessive-compulsive disorder ($M = 7.82$, $SD = 4.67$) (see Table 5 for a comparison of means and clinical cutoff scores for both samples).

A correlation matrix for the study variables and demographic variables for the study sample is presented in Table 6. There was a statistically significant difference on the PEQ based on gender, $t(181) = 2.36$, $p = .02$, and gender was significantly correlated with the criterion variable, $r = -.17$, $p = .02$. Consequently, gender was added as a covariate to control for this effect in the regression analyses for the study sample (Tabachnick & Fidell, 2007). An eating disorder (as measured by the EDDS) was originally considered as a possible covariate in the primary analysis due to its conceptual importance, but was not included in the final analysis, as this variable was not significantly correlated with the criterion variable, $r = .06$, $p = .45$.

The SEAS, $r = .21$, $p = .01$, BMI, $r = -.18$, $p = .02$, and the MOCI, $r = .15$, $p = .05$, were significantly correlated with the PEQ. In addition, a number of the study variables were significantly correlated with each other (see Table 6). Due to these correlations, multicollinearity analyses were included for each regression analysis. Multicollinearity refers to the independent variables in the regression being very highly linearly correlated such that the effects of the individual predictors are diluted, as evidenced by $VIF > 10$ or Tolerance < 0.1 . There was no evidence of multicollinearity in this sample with VIF ranging from 1 to 1.4 and Tolerance ranging from .71 to 1.

The null hypothesis for the current study stated: There is no variable or combination of variables that significantly predicts adult picky eating, as measured by the

Picky Eating Questionnaire, in members of a self-defined online support group,. A mixed (sequential and stepwise) multiple regression with gender entered as a covariate and the six study variables as predictor variables was used to test the primary hypothesis. The predictive model at Step 1 was statistically significant and accounted for 3% of the variance in PEQ, $F(1, 182) = 5.56, p = .02, R^2 = .03$. Using this model, gender was a significant individual contributor to PEQ, $B = -1.19, p = .02$. At Step 2, SEAS was the only significant study variable entered into the equation and the predictive model was statistically significant and accounted for 7.4% of the variance, $F(2,182) = 7.23, p = .001, R^2 = .07$. Both gender ($B = -1.22, p = .02$) and SEAS ($B = .18, p = .004$) were significant individual contributors of the predictive model. Further, adding the SEAS variable to the predictive model resulted in a significant improvement to the model, $\Delta R^2 = .04, p = .004$. None of the other variables (i.e., CIA, BMI, LSAS, MOCI, or HEI), were entered into the equation, as they were not significantly predictive of PEQ (See Table 7). Based on the results, the null hypothesis was able to be rejected.

The second half of the PEQ included questions that asked directly about the *DSM-5* criteria for ARFID and were used to determine the percentage of individuals in this sample who met criteria for this disorder. In this sample, 153 participants (83.6%) met criteria for ARFID and 30 participants (16.4%) did not meet criteria.

To explore whether the level of picky eating had an impact on the study variables, two groups were established, based on splitting the study sample using the mean of the PEQ. The two groups based on the split were found to be statistically significantly different from each other ($M = 22.14, 78$ below mean and 105 above mean,

$t(181) = -17.60, p = .001$). A series of t-tests were calculated, with each of the study variables used as a dependent measure, and the Bonferroni correction used to correct for Type I error when using multiple t-tests (Bonferroni correction: $p = .01$). In the sample, individuals with higher levels of picky eating had statistically significant higher levels of social anxiety related to eating, (SEAS), $t(181) = -2.71, p = .01$, and statistically significant lower levels of BMI, $t(181) = 2.64, p = .01$, than those with lower levels of picky eating.

Due to the fact that 63% of the sample did not complete the nutrition measure, the nutrition variable was not able to be included in the previous analyses. However, since nutritional health is a very important clinical construct of picky eating, the earlier mixed (sequential and stepwise) multiple regression was replicated with the smaller sample ($N = 86$) which did complete the nutritional measure. There was no evidence of multicollinearity in this sample, with VIF ranging from 1 to 1.01 and Tolerance ranging from .97 to 1. A statistically significant difference was found on the PEQ for race, $t(84) = -2.12, p = .04$, and race was significantly correlated with PEQ, $r = .23, p = .04$. Consequently, race was subsequently added as a covariate to the primary analysis to control for this effect for the smaller sample (Tabachnick & Fidell, 2007). An eating disorder (as measured by the EDDS) was considered as a possible covariate in this analysis, but was not included, as this variable was not significantly correlated with the criterion variable, $r = -.07, p = .58$. With race as a covariate, the predictive model at Step 1 was statistically significant and accounted for 5.1% of the variance in PEQ, $F(1, 85) = 4.50, p = .04, R^2 = .05$. Using this model, race was a significant individual contributor to the predictive model, $B = 2.65, p = .04$. At Step 2, BMI was the only

significant study variable entered into the equation and the predictive model was statistically significant and accounted for 11% of the variance, $F(2,85) = 4.92, p = .01, R^2 = .11$. Both race ($B = 2.73, p = .03$) and BMI ($B = -.07, p = .03$) were significant individual contributors to this predictive model (See Table 8). BMI was the only study variable that was significantly correlated with the criterion variable, PEQ, for the smaller sample and it was negatively correlated, $r = -.23, p = .04$ (See Table 9 for correlation matrix for the smaller sample). Further, adding the BMI variable to the predictive model resulted in a significant improvement to the model ($\Delta R^2 = .05, p = .04$). None of the other variables, SEAS, CIA, LSAS, MOCI, or HEI, were entered into the predictive model, as they were not significantly predictive of PEQ (see Table 9). However, while the HEI was not entered in to the predictive model, it is very important to note that the HEI mean score ($M = 41.15, SD = 13.65$) for the smaller sample fell within the 30th percentile, which is indicative of poorer nutritional health.

Discussion

The study of picky eating behaviors has only recently become an area of interest in the clinical and research spheres, with the limited available research focused on children. The *DSM-5* expanded the earlier diagnostic classification system to better account for the eating and feeding disorders reported in the literature, including adult picky eating. The diagnostic category of ARFID was added as a subcategory of feeding and eating disorders in the *DSM-5* (APA, 2013; WCEDCA, 2007; Wildes et al., 2012) to replace the previous diagnosis of feeding disorder of infancy and early childhood in the *DSM-IV-TR* (APA, 2000).

The current study included many of the same measures that the only previously published study of picky eating in adults (Wildes et al., 2012) had included, more specifically, social anxiety related to food (as measured by the SEAS), clinical impairment (as measured by the CIA), the presence of an eating disorder (as measured by the EDDS) and obsessive compulsive symptoms (as measured by the MOCI). The present study also included additional variables that were conceptually meaningful and/or further expanded the previous findings, namely, a global social anxiety measure using the LSAS and nutritional functioning measures using the ASA24/HEI and BMI as predictors of PEQ.

Although all participants in the study self-identified as adult picky eaters, only 83% in the sample met diagnostic criteria for ARFID. In addition, the sample included individuals who additionally met criteria for an eating disorder (9.3%). Thus consistent with the Wildes' et al. (2012) study, there was a group of participants identified as having a co-morbid disorder of picky eating and an eating disorder. More specifically, 14 of 17 individuals (82.4%) with an eating disorder diagnosis also met criteria for ARFID. In both the current study and the Wildes' et al. (2012) study, none of the participants with eating disorders had scores that met full criteria for AN; they, instead, met criteria for BN and BED. Wildes et al. (2012) suggested that BN and BED are likely consistent with higher rates of obesity and a "lack of sustained dietary restriction" (Wildes et al., 2012, p. 580). In the current study, the participants who had a co-morbid disorder had BMI's that fell, in fact, in the obese range, which is a BMI of 30 or over ($N = 14$, $M = 35.88$).

As expected, social anxiety related to food (SEAS) was significantly positively correlated with and predictive of picky eating (PEQ). This is consistent with findings

from the Wildes' et al. (2012) study, in that higher social anxiety associated with eating was one of the only differentiating findings for their picky eating only group. The current study also included a more global measure of social anxiety to determine if social anxiety alone was the important variable or if it was the social anxiety within the context of eating that was the important correlate of picky eating. The LSAS variable was not correlated with or predictive of PEQ in either sample. However, the mean score for this variable was above the cut-off for clinical significance, suggesting that social anxiety disorder is a potential clinical issue for adults with picky eating. The lack of statistically significant impact of this variable may be due, in part, to its correlation with the SEAS and the overall tendency for picky eaters to be more distressed by their social anxiety related to eating. Based on the current results, SEAS has stronger support as a predictor of picky eating than does a global measure of social anxiety.

As expected, BMI was significantly correlated with picky eating and predictive of picky eating with the smaller sample, but not in the expected direction. Despite the mean BMI falling in the overweight range, BMI was negatively correlated with picky eating, indicating that as picky eating increased, BMI decreased. This finding is consistent with the literature involving young children and with adults in the Wildes' et al. (2012) study, which reported that, individuals in the picky eating only group were more likely to have a lower BMI as compared to the comorbid group. However, others have expected that the weight of picky eaters in adulthood would increase with age (Dubois, Farmer, Girard, & Peterson, 2007; Mascola et al., 2010). It should be noted that BMI in the current study was calculated based upon the self-reported heights and weights of the participants. It is not unusual for individuals to incorrectly report their weight, with the tendency towards

minimizing weight (Kuskowska-Wolk, Karlsson, Stolt, & Rössner, 1989; Shiely, Hayes, Perry, & Kelleher, 2013). Thus the level of accuracy of these data needs to be considered.

Obsessive-compulsive disorder symptoms (MOCI) were significantly correlated with picky eating (PEQ), but were not predictive of picky eating. In fact, the predictive model for the study sample did not include obsessive-compulsive symptoms as part of the equation and the participants did not demonstrate clinically significant levels of OCD. These findings are consistent with Wildes' et al. (2012) who reported that obsessive-compulsive symptoms were not statistically significant for the picky eating only group. It is also important to note that the MOCI was significantly correlated with all the other study measures and, as such, the shared variance of the underlying construct of anxiety among most of these measures may have decreased the statistical importance of this variable in a stepwise regression. However, some form of anxiety seems an important correlate of picky eating and should be further explored in future research.

Also, the mean score for CIA was clinically, as opposed to statistically, significant. The CIA was not correlated with or predictive of PEQ. This finding is consistent with the Wildes' et al. (2012) study that found very low levels of clinical impairment in the picky eating only group. Overall, the results do not support that general psychosocial impairment is a strong correlate of picky eating in adults; however, due to the clinical significance of this variable in the present study, further research is recommended.

Further, the HEI mean score for the smaller sample fell within the 30th percentile, which is indicative of poorer nutritional health. However, it is important to note that the HEI technical guide (Guenther et al., 2007) offers various cautions around interpreting

this finding, such as: 1) data derived from only one day of food intake (as was done in the current study) has interpretative limitations, as no individual is expected to meet all dietary guidelines in any one given day; and 2) summing data into a total score results in a loss of information, such that an individual could perform higher in specific subcategories and lower in others, which could result in a more moderate general score. However, the HEI mean score, along with the BMI mean score, give cause for concern for the overall nutritional functioning of adults who are picky eaters. As the research supports, the very limited food lists for individuals with picky eating are often restricted to highly palatable foods (WCEDCA, 2007; Wildes et al., 2012), which place individuals at higher risk for obesity. However, it is important to note that, although the average adult picky eater in the current study was overweight, as picky eating increased, BMI decreased (study sample: $M = 27.60$, $SD = 8.82$; smaller sample: $M = 28.91$, $SD = 9.72$)

Lastly, overall, when the highest percentage of picky eaters were isolated, via a mean split, higher levels of picky eating were associated with greater impairment on two significant predictor variables: higher levels of social anxiety related to eating (SEAS) and lower levels of BMI.

Further, although the mean scores for participants fell above clinically significant cut-off levels on many of the study measures used (i.e., BMI, CIA, and LSAS) and many of the study measures were significantly correlated with one another, only two of these variables were found to be predictive or correlated with the criterion variable of PEQ, the SEAS and BMI. These variables should be further explored in greater depth in future research.

Limitations and Areas for Future Research

This study is an exploratory study representing initial efforts to better understand psychological and nutritional correlates of adult picky eating behaviors and their predictive ability with picky eating in adults. This study adds to the sparse literature in this fledging area, by directly investigating nutritional functioning, and by adding broader measures of psychosocial functioning than has been done in previous research. An additional strength of the current study is its use of an international sample of men and women who identify themselves as picky eaters. Overall, the participants were predominantly middle-aged, female, highly educated, Caucasian Americans who seem to be psychologically healthy individuals, despite their struggles related to picky eating. However, there are several limitations to this study, as well.

One of the major limitations of this study is the lack of power when using all the study variables, due to the unexpected lower number of participants who completed the final nutrition measure and met the study requirements (37% of the total participants who consented to the study). Some of these individuals had technical problems with accessing the measure but many were not willing to complete one day of 24-hour diet recall. It should be noted that one day recall is less than that recommended for understanding an individual's nutritional functioning, as no one is expected to meet all nutrition standards in one day (ASA24, 2011). Therefore, for future research, it would be beneficial to utilize either multiple days of recall or active tracking of diet, as well as obtaining a record of the overall foods the individual is willing or able to eat. Also, a more robust measure of picky eating may help address the limited and uneven distribution of scores on this variable and may be useful to more deeply understand this construct in adults. However,

as highlighted in the present study by almost half of the participants not completing the nutritional measure, the researcher needs to be practical and balance the participants' willingness to engage in a more demanding protocol with the need for more robust and time-intensive measures.

In addition, the current study did not address all of the possible correlates of picky eating found in the literature with children, such as sensory difficulties, autism spectrum disorder, parental influence, etc. Specifically, several members of the support group asked the researcher to include more explicit research on sensory difficulties in future studies.

The current study was also not a longitudinal study that addressed picky eating across the life span to allow causal conclusions to be drawn. In addition, the scope of this study does not enable conclusions to be made about the prevalence of picky eating in the general population, or about the epidemiology or pathogenesis of picky eating. Further, this study relies on self-report data, which has inherent limitations in that participants may not accurately report their experiences (e.g., may exaggerate symptoms, under-report the severity or frequency of symptoms, may be biased in their view of their own symptoms, etc.). Another limitation of this study is that, due to the recruitment of participants from a support group, inherent differences in social support or impairment between these participants and those not part of the support group for picky eating were not able to be controlled for or measured.

While the above ideas for future research in the area of adult picky eating have their benefits, researchers may, instead, consider narrowing the scope of the variables explored rather than doing a broad screening for this construct. Such an approach may

enable researchers to begin to gain a more in-depth understanding of adult picky eating. In the current study, many of the variables included were significantly correlated with each other and the shared variance may have weakened or disguised their predictive quality of picky eating.

References

- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: American Psychiatric Association.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Association.
- Amir, N., Najmi, S., & Morrision, A. S. (2009). Attenuation of attention bias in obsessive-compulsive disorder. *Behavior Research and Therapy*, *47*(2), 153-157. doi:10.1016/j.brat.2008.10.020.
- Attia, E., & Roberto, C.A. (2009). Should amenorrhea be a diagnostic criterion for anorexia nervosa? *International Journal of Eating Disorders*, *42*, 581–589.
- Automated Self-Administered 24-Hour Recall (ASA24), Version 1 (2011). Bethesda, MD: National Cancer Institute.
- Bryant-Waugh, R., Markham, L., Kreipe, R. E., & Walsh, B. T. (2010). Feeding and eating disorders in childhood. *International Journal of Eating Disorders*, *43*(2), 98-111. doi: 10.1002/eat.20795
- Bohn, K., Doll, H. A., Cooper, Z., O'Conner, M., Palmer, R. L., & Fairburn, C. G. (2008). The measurement of impairment due to eating disorder psychopathology. *Behavior Research and Therapy*, *46*, 1105-1110. doi:10.1016/j.brat.2008.06.012
- Bohn, K., & Fairburn, C. G. The Clinical Impairment Assessment Questionnaire (CIA 3.0, 2008). In Fairburn CG (Ed). *Cognitive behavior therapy and eating disorders*. New York: Guilford Press.

- Dubois, L., Farmer, A. P., Girard, M., & Peterson, K. (2007). Preschool children's eating behaviours are related to dietary adequacy and body weight. *European Journal of Nutrition, 61*, 846–855.
- Guenther, P.M., Reedy, J., Krebs-Smith, S.M., Reeve, B.B., & Basiotis, P.P. (2007). Development and evaluation of the Healthy Eating Index-2005: Technical report. *Center for Nutrition Policy and Promotion, U.S. Department of Agriculture*. Available at <http://www.cnpp.usda.gov/HealthyEatingIndex.htm>.
- Hodgson, R. J., & Rachman, S. (1977). Obsessional-compulsive complaints. *Behavior Research & Therapy, 15*, 389–395.
- Jacobi, C., Schmitz, G., & Agras, W. S. (2008). Is picky eating an eating disorder? *International Journal of Eating Disorders, 41*(7), 626–634.
- Jiménez-Murcia, S., Fernández-Aranda, F., Raich, R. M., Alonso, P., Krug, I., Jaurrieta, N., ... Vallejo, J. (2007). Obsessive-compulsive and eating disorders: Comparison of clinical and personality features. *Psychiatry and Clinical Neurosciences, 61*, 385-391.
- Kuskowska-Wolk, A., Karlsson, P., Stolt, M., & Rössner, S., (1989) The predictive validity of Body Mass Index based on self-reported weight and height. *International Journal of Obesity, 13*(4), 441-453.
- Kobak, K. A., Schaettle, S. C., Greist, J. H., Jefferson, J. W., Katzelnick, M. D., & Dottl, S. L. (1998). Computer-administered rating scales for social anxiety in a clinical drug trial. *Depression and Anxiety, 7*, 97-104.
- Lampard, A. M., Byrne, S. M., McLean, N., & Fursland, A. (2012). The Eating Disorder Inventory-2 Perfectionism Scale: Factor structure and associations with dietary

- restraint and weight and shape concern in eating disorders. *Eating Behaviors*, *13*, 49-53. doi:10.1016/j.eatbeh.2011.09.007
- Liebowitz, M.R. (2003) *Guidelines for using the Liebowitz Social Anxiety Scale (LSAS)*. Unpublished manuscript.
- Liebowitz, M.R. (1987). Social phobia. *Modern Problems of Psychopharmacology*, *22*, 141-173.
- Lewinsohn, P. M., Holm-Denom, J. M., Gau, J. M., Joiner, T. E., Striegel-Moore, R., Bear, P., & Lamoureux, B. (2005). Problematic eating and feeding behaviors of 36-month-old children. *International Journal of Eating Disorders*, *38*, 208-219.
- Lobera, I. J., & Rios, P. B. (2009). Choice of diet in patients with anorexia nervosa. *Nutricion Hospitalaria*, *24*, 682-687. doi: 10.3305/nh,2009.24.6.4552
- Mascola, A. J., Bryson, S. W., & Agras, W. S. (2010). Picky eating during childhood: A longitudinal study to age 11 years. *Eating Behaviors*, *11*, 253-257.
- Nakao, T., Nakagawa, A., Yoshiura, T., Nakatani, E., Nabeyama, M., Yoshizato, C., ... Kawamoto, M. (2005). A functional MRI comparison of patients with obsessive-compulsive disorder and normal controls during a Chinese character Stroop task. *Psychiatry Research Neuroimaging*, *139*, 101– 114. doi:10.1016/j.psychresns.2004.12.004
- Nicholls, D., Christie, D., Randall, L., & Lask, B. (2001). Selective eating: Disorder or normal variant. *Clinical Child Psychology and Psychiatry*, *6*, 257-270.
- Sánchez-Meca, J., López-Pina, J., López-López, J. A., Marín-Martínez, F., Rosa-Alcázar, A. I., & Gómez-Conesa, A. (2011). The Maudsley Obsessive-Compulsive

- Inventory: A reliability generalization meta-analysis. *International Journal of Clinical and Health Psychology*, *11*(3), 473-493.
- Shiely, F., Hayes, K., Perry, I. J., & Kelleher, C. C. (2013). Height and weight bias: The influence of time. *PLoS ONE*, *8*(1), e54386. doi:10.1371/journal.pone.0054386
- Stice, E., Telch, C. F., & Rizvi, S. L. (2000). Development and validation of the eating disorder diagnostic scale: A brief self-report measure of anorexia, bulimia, and binge-eating disorder. *Psychological Assessment*, *12*, 123–131.
- Stoner, S. A., Fedoroff, I. C., Andersen, A. E., & Rolls, B. J. (1994). Food preferences and desire to eat in anorexia and bulimia nervosa. *International Journal of Eating Disorders*, *19*, 13-22.
- Tabachnick, G. G., and Fidell, L. S. (2007). *Experimental Designs Using ANOVA*. Belmont, CA: Duxbury.
- Timimi, S., Douglas, J., & Tsiltsopoulou, K. (1997). Selective eaters: A retrospective case note study. *Child Care, Health, and Development*, *23*(3), 265-278.
- Waller, G., Shaw, T., Meyer, C., Haslam, N., Lawson, R., & Serpell, L. (2012). Persistence, perseveration and perfectionism in the eating disorders. *Behavioral and Cognitive Psychotherapy*, *40*, 462-473. doi:10.1017/S135246581200015X:
- Wildes, J. E., Zucker, N. L., & Marcus, M. D. (2012). Picky eating in adults: Results of a web-based survey. *International Journal of Eating Disorders*, *45*(4), 575-582. doi: 10.1002/eat.20975
- Workgroup for Classification of Eating Disorders in Children and Adolescents. (2007). Classification of child and adolescent eating disturbances. *International Journal of Eating Disorders*, *40*, 117-122. doi: DOI 10.1002/eat

Zimmerman, M., Francione-Witt, C., Chelminski, I., Young, D., & Tortolani, C. (2008).

Problems applying the DSM-IV eating disorders diagnostic criteria in a general psychiatric outpatient practice. *Journal of Clinical Psychiatry*, *69*, 381-384.

Table 1

Demographic Variables for Study Sample and Smaller Sample

Demographic Variable	Study Sample (<i>N</i> = 183)	Smaller Sample (<i>N</i> = 86)
Age in years <i>M</i> (<i>SD</i>)	33.90 (11.90)	33.81 (11.99)
Gender <i>N</i> (%)		
Male	39 (21.3%)	16 (18.6%)
Female	144 (78.7%)	70 (81.4%)
Race <i>N</i> (%)		
Caucasian	168 (91.8%)	80 (93%)
African-American	8 (4.4%)	3 (3.5%)
Bi- or Multi-racial	5 (2.7%)	2 (2.3%)
Native Hawaiian	1 (0.5%)	--
Did Not Specify	1 (0.5%)	1 (1.2%)
Ethnicity <i>N</i> (%)		
Hispanic or Latino	9 (4.9%)	6 (7%)
Non-Hispanic or Latino	173 (94.5%)	80 (93%)
Did Not Specify	1 (0.5%)	-
Nationality <i>N</i> (%)		
Australian	3 (1.6%)	2 (2.3%)
Brazilian	2 (1.1%)	--
British	3 (1.6%)	--
Canadian	8 (4.4%)	4 (4.7%)
Dutch	1 (0.5%)	1 (1.2%)
French	1 (0.5%)	1 (1.2%)
Ghananian	1 (0.5%)	--
Irish	3 (1.6%)	1 (1.2%)
Israeli	1 (0.5%)	--
Italian	3 (1.6%)	1 (1.2%)
Latvian	1 (0.5%)	--
Mexican	1 (0.5%)	1 (1.2%)
Multiple Nationalities	21 (11.5%)	10 (11.6%)
New Zealander	1 (0.5%)	--
Norwegian	1 (0.5%)	1 (1.2%)
Puerto Rican	1 (0.5%)	1 (1.2%)
Slovenian	1 (0.5%)	--

US American	109 (59.6%)	53 (61.6%)
Welsh	1 (0.5%)	--
Did Not Understand	5 (2.7%)	2 (2.3%)
Did Not Specify	14 (7.7%)	6 (7%)
<hr/>		
Primary Language <i>N</i> (%)		
Bi-lingual	2 (1.1%)	1 (1.2%)
Dutch	1 (0.5%)	1 (1.2%)
English	172 (94%)	82 (95.3%)
French	1 (0.5%)	1 (1.2%)
Italian	1 (0.5%)	--
Latvian	1 (0.5%)	--
Portuguese	2 (1.1%)	--
Slovenian	1 (0.5%)	--
Spanish	2(1.1%)	1(1.2%)
<hr/>		
Educational Level		
Less than High School	3 (1.6%)	--
High School/GED	14 (7.7%)	7 (8.1%)
Some College	51 (27.9%)	27 (31.4%)
2 Year College Degree	11 (6%)	6 (7%)
4 Year College Degree	72 (39.3%)	32 (37.2%)
Master's Degree	29 (15.8%)	13(37.2%)
Doctoral Degree	3 (1.6%)	1 (1.2%)
Professional Degree	--	--
<hr/>		
Eating Disorder <i>N</i> (%)		
Anorexia Nervosa	--	--
Bulimia Nervosa	7(3.8%)	6 (7%)
Binge Eating Disorder	10 (5.4%)	8 (9.3%)
No Diagnosis	166 (90.7%)	72 (83.7%)
<hr/>		

Table 2

Means and Standard Deviations of Study Variables for Study Sample and Smaller Sample

Measure	Total (<i>N</i> = 183)		Total (<i>N</i> = 86)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
PEQ	22.14	2.83	22.20	3.02
SEAS	10.49	3.37	10.15	3.39
BMI	27.60	8.82	28.91	9.72
CIA	16.15	10.64	14.66	9.78
LSAS	52.01	26.81	54.05	25.86
MOCI	7.82	4.67	7.66	4.23
HEI	-	-	41.15	13.65

Note: PEQ = Picky Eating Questionnaire; SEAS = Social Anxiety Eating Scale; BMI = Body Mass Index; CIA = Clinical Impairment Assessment; Leibowitz Social Anxiety Scale; MOCI = Maudsley Obsessive Compulsive Inventory; HEI = Healthy Eating Index.

Table 3

T-test Differences Between the Comparison and Small Samples for Study and Demographic Variables

Measure	Total (<i>N</i> = 97)		Total (<i>N</i> = 86)		<i>t</i> -values	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
PEQ	22.09	2.67	22.20	3.02	.25	.80
SEAS	10.78	3.34	10.15	3.39	.92	.21
BMI	26.45	7.80	28.91	9.72	1.9	.06
CIA	17.46	11.23	14.66	9.78	.12	.08
LSAS	50.21	27.63	54.05	25.86	.71	.34
MOCI	7.97	5.05	7.66	4.23	.18	.65
Age	33.92	11.88	33.88	11.99	-.02	.99
Education	4.32	1.41	4.23	1.30	-.43	.67

Note: * $p < .05$.

Note: PEQ = Picky Eating Questionnaire; SEAS = Social Anxiety Eating Scale; BMI = Body Mass Index; CIA = Clinical Impairment Assessment; Leibowitz Social Anxiety Scale; MOCI = Maudsley Obsessive Compulsive Inventory

Table 4

Mann-Whitney Test for Differences Between the Comparison and Small Samples for Demographic Variables

Measure	Total (<i>N</i> = 97)		Total (<i>N</i> = 86)		<i>U</i> -values	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>U</i>	<i>p</i>
Gender	.24	.43	.19	.39	3958	.40
Race	.09	.29	.07	.26	4075	.57
EDDS	1.03	.17	1.16	.37	3621	.002**
ARFID	1.84	.37	1.84	.37	4162	.97

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

Note: EDDS = Eating Disorder Diagnostic Scale; ARFID = Avoidant/Restrictive Food Intake Disorder.

Table 5

Mean and Standard Deviations of Study Variables with Clinically Significant Cut-Off Scores for Study Sample and Smaller Sample

Measure	Total (<i>N</i> = 183)		Total (<i>N</i> = 86)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
BMI	27.60*	8.82	28.91*	9.72
CIA	16.15*	10.64	14.66	9.78
LSAS	52.01*	26.81	54.05*	25.86
MOCI	7.82	4.67	7.66	4.23

Note: * indicates scores above the clinical cut off score for that variable

Note: BMI = Body Mass Index; CIA = Clinical Impairment Assessment; Leibowitz Social Anxiety Scale; MOCI = Maudsley Obsessive Compulsive Inventory

Table 6

Correlation Matrix for Study and Demographic Variables for Study Sample (N = 183)

Measure	1	2	3	4	5	6	7	8	9	10
1. PEQ	-	.21**	-.18*	.06	.09	.15*	-.17*	.14	-.04	-.06
2. SEAS		-	-.16*	.54**	.37**	.16*	.02	-.04	-.21**	-.02
3. BMI			-	-.10	-.14	-.22**	.11	-.02	.18*	.26**
4. CIA				-	.31**	.21*	-.09	-.02	-.26**	.18*
5. LSAS					-	.34**	-.12	-.02	-.15*	.26**
6. MOCI						-	-.13	.07	-.16*	.24**
7. Gender							-	.06	.23**	-.12
8. Race								-	-.06	.42
9. Age									-	-.02
10. EDDS										-

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

Note: PEQ = Picky Eating Questionnaire; SEAS = Social Anxiety Eating Scale; BMI = Body Mass Index; CIA = Clinical Impairment Assessment; Leibowitz Social Anxiety Scale; MOCI = Maudsley Obsessive Compulsive Inventory; EDDS = Eating Disorder Diagnostic Scale.

Table 7

Stepwise Multiple Regression Analyses Predicting Picky Eating for Study Sample (N=183)

Variable	Step 1				Step 2			
	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>sr</i> ²	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>sr</i> ²
Gender	-1.19	.50	-2.36	-.17	-1.22	.50	-2.47*	-.18
SEAS					.18	.06	2.95*	.21
ΔR^2		.03				.07		
<i>F</i> for ΔR^2		5.56*				7.23**		

Note: Social Eating Anxiety Scale (SEAS) centered at its means.

Note: Body Mass Index (BMI), Clinical Impairment Assessment (CIA), Liebowitz Social Anxiety Scale (LSAS), or Maudsley Obsessive Compulsive Inventory (MOCI) were not entered into the predictive model

Note: * $p < .05$, ** $p < .001$.

Table 8

Mixed Multiple Regression Analyses Predicting Picky Eating for Smaller Sample (N=86)

Variable	Step 1				Step 2			
	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>sr</i> ²	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>sr</i> ²
Race	2.65	1.25	2.12	.23	2.73	1.22	2.23*	.23
BMI					-.073	.03	-2.26*	-.24
ΔR^2		.05				.11		
<i>F</i> for ΔR^2		4.50*				4.92*		

Note: Body Mass Index (BMI) centered at its means.

Note: Social Eating Anxiety Scale (SEAS), Clinical Impairment Assessment (CIA), Liebowitz Social Anxiety Scale (LSAS), Maudsley Obsessive Compulsive Inventory (MOCI), or Healthy Eating Index (HEI) were not entered into the predictive model.

Note: * $p < .05$, ** $p < .001$.

Table 9

Correlation Matrix for Study and Demographic Variables for Smaller Sample (N = 86)

Measure	1	2	3	4	5	6	7	8	9	10	11
1. PEQ	-	.13	-.23*	.07	.02	.17	-.00	-.05	.23*	.01	-.06
2. SEAS		-	-.15	.47**	.38**	.28**	-.10	.14	-.07	-.24*	-.05
3. BMI			-	-.001	-.09	-.16	-.04	-.01	.03	.16	.32**
4. CIA				-	.34**	.22*	-.19	-.06	-.03	-.41**	.27*
5. LSAS					-	.39**	-.08	-.06	-.06	-.15	.27*
6. MOCI						-	-.24*	-.08	.03	-.19	.28**
7. HEI							-	.12	-.09	.11	-.17
8. Gender								-	-.13	.22*	-.13
9. Race									-	.13	.13
10. Age										-	-.001
11. EDDS											-

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

Note: PEQ = Picky Eating Questionnaire; SEAS = Social Anxiety Eating Scale; BMI = Body Mass Index; CIA = Clinical Impairment Assessment; Leibowitz Social Anxiety Scale; MOCI = Maudsley Obsessive Compulsive Inventory; HEI = Healthy Eating Index; EDDS = Eating Disorder Diagnostic Scale.

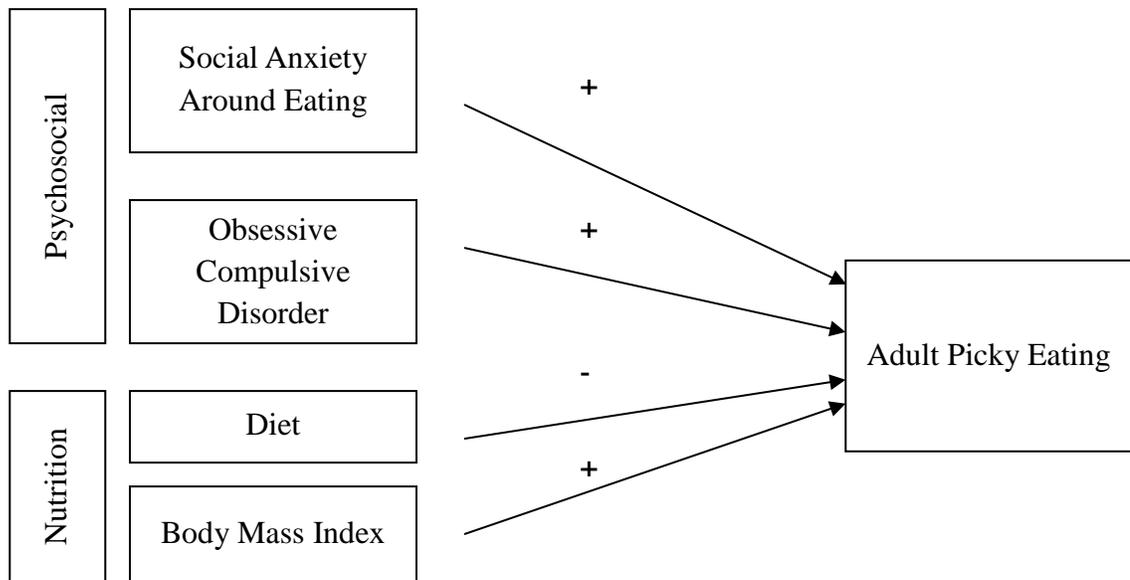


Figure 1. Hypothesized predictive model of adult picky eating by psychosocial and nutritional factors.

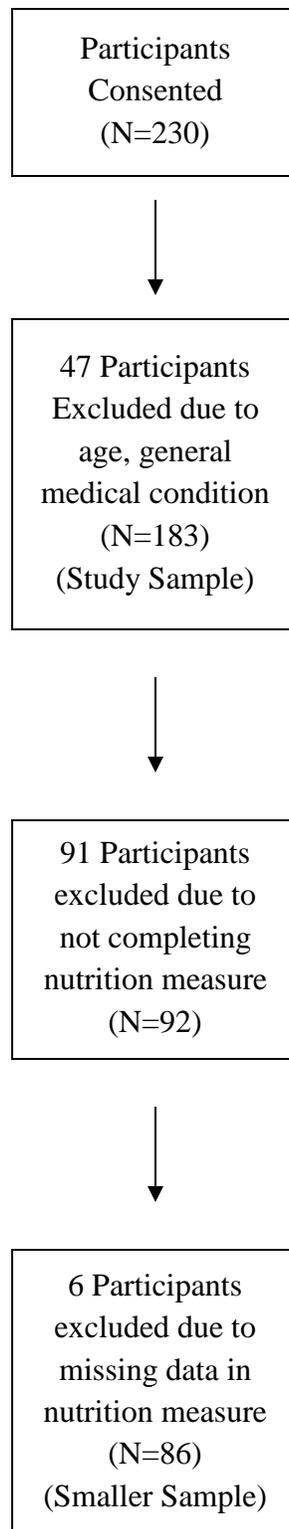


Figure 2. Exclusionary procedures for participants.

Appendix
IRB Approval Letter

December 21, 2012

Jessica Chiu

Re: Protocol #1239, *Adult Picky Eating Behaviors: Impact of Psychosocial and Nutritional Factors*

Dear Ms. Chiu:

The IRB has reviewed the materials regarding your study, referenced above, and has determined that it meets the criteria for the Exempt from Review category under Federal Regulation 45CFR46. Your protocol is approved as exempt research, and therefore requires no further oversight by the IRB. We appreciate your thorough treatment of the issues raised and your timely response.

If you wish to modify your study, including the addition of data collection sites, it will be necessary to obtain IRB approval prior to implementing the modification. If any adverse events occur, please notify the IRB immediately.

Please contact our office if you have any questions. We wish you success with your project!

Sincerely,

Morell E. Mullins, Jr., Ph.D.
Chair, Institutional Review Board
Xavier University