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ORIGINAL CONTRIBUTIONS

Associations Between Approach and Avoidance Coping, Psychological Distress, and Disordered Eating Among Candidates for Bariatric Surgery

Larissa A. McGarrity[1] · Nicholas S. Perry[2] · Christina M. Derbidge[1] · Stephen K. Trapp[1] · Alexandra L. Terrill[3] · Timothy W. Smith[4] · Anna R. Ibele[5] · Justin J. MacKenzie[1]

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Abstract

Background Individuals seeking bariatric surgery evidence risk for binge and disordered eating behaviors, which can lead to poorer post-surgical weight loss outcomes. Use of avoidant coping strategies to manage stress, along with symptoms of depression, are associated with disordered eating in the general population. However, the role of coping has not been examined among candidates for bariatric surgery, and coping and depression have rarely been considered in combination. Given the emerging standard that psychologists are involved in evaluations and treatment before and after surgery, consideration of these variables is clinically relevant.

Methods Participants were 399 patients undergoing pre-surgical bariatric psychological assessment. Hierarchical linear regression analyses tested whether gender, age, and BMI; approach and avoidance coping; and depression and anxiety were associated with disordered eating (binge eating, restraint, eating concerns, shape concerns, weight concerns) in a cross-sectional study design.

Results In initial steps of the model controlling demographic variables, approach coping predicted less and avoidance coping predicted more disordered eating across most outcomes examined. In models including depression and anxiety, avoidance (but not approach) coping remained a relevant predictor. The effects of depression were also quite robust, such that participants who were more depressed reported more disordered eating. More anxious participants reported more restrained eating.

Conclusions Avoidance coping and depressive symptoms emerged as key variables in understanding recent disordered eating among patients considering bariatric surgery. Pre-surgical psychological evaluations and treatment approaches could be enhanced with consideration of patient coping strategies, particularly avoidant coping responses to stress, independent of psychological distress.

✉ Larissa A. McGarrity
larissa.mcgarrity@hsc.utah.edu

Nicholas S. Perry
nicholas_perry@brown.edu

Christina M. Derbidge
christina.derbidge@hsc.utah.edu

Stephen K. Trapp
stephen.trapp@hsc.utah.edu

Alexandra L. Terrill
alex.terrill@hsc.utah.edu

Timothy W. Smith
tim.smith@psych.utah.edu

Anna R. Ibele
anna.ibele@hsc.utah.edu

Justin J. MacKenzie
justin.mackenzie@hsc.utah.edu

[1] Division of Physical Medicine & Rehabilitation, University of Utah, 30 N 1900 E (Rm 1B620), Salt Lake City, UT 84132, USA

[2] Department of Psychiatry and Human Behavior, Brown University, Providence, RI, USA

[3] Department of Occupational & Recreational Therapies, University of Utah, Salt Lake City, UT, USA

[4] Department of Psychology, University of Utah, Salt Lake City, UT, USA

[5] Division of General Surgery, University of Utah, Salt Lake City, UT, USA

Keywords Approach coping · Avoidance coping · Disordered eating · Binge eating · Bariatric surgery · Psychological distress

Introduction

Among individuals with severe obesity, bariatric surgery is recognized as the most effective treatment to accomplish durable weight loss and reduction in weight-related morbidity and mortality [1, 2]. The success of bariatric surgery is dependent on effective postoperative lifestyle modification, including dietary selection and eating behaviors [3]. Individuals seeking bariatric surgery often display elevated rates of binge eating and other disordered eating behaviors [4, 5]. Although consumption of objectively large quantities of food is difficult or impossible post-surgically, individuals who continue to experience loss of control over eating (a key feature of binge eating disorder) are more likely to experience suboptimal weight loss or weight regain [4, 5]. It is, therefore, important to understand which psychological factors contribute to binge and disordered eating patterns in this patient population. If those factors identified are modifiable, this research will lend itself to development of effective interventions for patients struggling with binge eating pre and postoperatively.

In the general population, coping style (broadly defined as efforts to manage or prevent perceived threats, losses, or decrease related emotions and distress) [6] and depressive symptoms have been associated with binge eating and disordered eating behaviors [7, 8]. However, coping, emotional symptoms, and disordered eating behaviors are rarely examined concurrently and may provide insight into eating patterns among patients seeking bariatric surgery. It has long been recognized that negative emotions can lead to notable changes in eating behaviors [9]. Some individuals experience a loss of appetite and decreased food intake as a result of negative emotional states, such as depression; however, other individuals may experience an increase in food intake in response to negative emotions and stress [10]. Unsurprisingly, depression and stress have been linked to episodes of binge eating [11, 12]. Escape theory posits that episodes of binge eating often result from attempts to decrease aversive self-awareness and manage negative emotions [13]. Although regulation of emotions and binge eating behaviors are interconnected, coping is believed to play an integral role between these factors [14]. Thus, engagement in binge eating may provide a mechanism for coping and regulating emotions when other attempts at emotional management have failed. Research from the literature on non-surgical obesity treatment suggests that one of the main factors differentiating those who maintain weight loss over time from those who regain weight is the patient's coping style [15]. A review on this topic concluded that the best predictor of weight maintenance success is not quantity of stressful life events experienced but instead the way individuals respond to or cope with those stressors [16].

While measured in a number of ways, coping is often separated into approach and avoidance coping behaviors [17]. Approach coping refers to efforts focused on directly confronting or dealing with a stressor. This may involve active attempts to resolve the stressor or manage related emotions. For example, if an individual manages weight-related stress by developing a plan with goals for eating and exercise changes and consulting with their medical providers, this would represent an approach-focused strategy. In contrast, avoidance coping is focused on escaping from the stressor and may involve active avoidance, denial, or even wishful thinking as a way to manage associated distress. While avoidance coping may provide initial stress relief, it is generally thought of as less effective over time, as it does not change the stressor or the negative impact it may have on the individual. For example, if an individual manages weight-related stress by attempting not to think about it and watching TV for distraction, this would represent an avoidance-focused strategy, as the stressor remains present.

Approach and avoidance coping have been linked to binge and disordered eating behaviors. In a large sample of women who engage in binge eating without use of compensatory weight management behaviors, approach coping strategies were associated with decreased binge eating frequency [14]. Patterns of avoidance coping have also been linked with disordered eating behaviors [18] and engagement in regular binge eating [8]. Further, individuals who meet clinical criteria for a range of eating disorders engage in disproportionate use of avoidance coping strategies, and use of these strategies is positively associated with emotional eating [19]. Studies in the general literature on weight management demonstrate utilization of avoidant coping (e.g., over-sleeping, willing the problem away) among individuals who regain lost weight, and approach coping (e.g., problem solving, confronting the problem) among individuals who maintain lost weight over time [16].

While these studies support the associations between coping, negative emotions, and disordered eating behaviors generally, very little is known about how coping might influence disordered eating behaviors among candidates for bariatric surgery specifically. One study of patients completing a bariatric preoperative psychological evaluation found that patients higher in negative affect also endorsed higher levels of eating concerns and higher levels of avoidant coping [20].

Although this study did not examine direct associations between coping and eating concerns, it provides preliminary evidence that psychological distress might interact with disordered eating and coping behaviors among individuals pursuing bariatric surgery.

The current study aimed to better understand disordered eating behaviors among candidates for bariatric surgery by examining associations between psychological distress (anxiety and depression), coping, and disordered eating behaviors. Based upon relevant literature in populations with and without obesity, we hypothesized that approach coping would be negatively related and avoidance coping would be positively related to binge and disordered eating behaviors, above and beyond demographic variables and psychological distress.

Methods

Participants and Procedure

The University of Utah Institutional Review Board approved all study procedures.

Participants in this cross-sectional study were 399 patients with obesity (75% women, 25% men) who were seeking bariatric surgery (either Roux-en-Y gastric bypass or sleeve gastrectomy) for weight loss and presented to an outpatient psychology clinic at the University of Utah Medical Center for their standard pre-surgical evaluation. Measures for the study were completed by patients prior to clinical interview as part of the comprehensive evaluation. The data from these pre-surgical assessments is entered into a de-identified database, and this study represents secondary data analysis on the first 399 patients who presented to this clinic for evaluation. Participants ranged in age from 18 to 74 ($M = 44$, $SD = 12$). Mean BMI of participants was 45.73 kg/m^2 ($SD = 9$). The majority of participants endorsed moderate to significant health problems associated with obesity (92%), at least 8 prior dieting attempts (56%), and moderate to very active current dieting status (91%).

Measures

Demographics and Covariates Participants self-reported their age, sex, height, and weight. Body mass index (BMI) was calculated from current height and weight. These variables were used as covariates in all models.

Approach and Avoidance Coping Coping style was measured using the Coping Responses Inventory [21]. This 48-item measure asks participants to consider "the most important problem or stressful situation you have experienced in the last 12 months" and then rate how often they engaged in each behavior. The response options are Not at All (0), Once or Twice (1), Sometimes (2), or Fairly Often (3). This measure results in two scales: approach coping, which includes strategies of logical analysis, positive reappraisal, seeking guidance, and problem solving, and avoidance coping, which includes strategies of cognitive avoidance, acceptance and resignation, seeking alternative rewards, and emotional discharge. An example approach coping item is "Did you make a plan of action and follow it?" and an example avoidance coping item is "Did you try not to think about the problem?" The inventory has been validated in a variety of populations, including patients in medical settings, and shows high internal consistency with moderate stability of scales over time [21]. Cronbach's alpha was 0.87 for the approach scale and 0.80 for the avoidance scale in this sample.

In order of strategies endorsed, participants reported greatest use of approach coping strategies (problem solving ($M = 13.37$, $SD = 3.84$), positive reappraisal ($M = 12.37$, $SD = 3.69$), logical analysis ($M = 12.18$, $SD = 3.72$), seeking guidance ($M = 11.19$, $SD = 3.65$)) relative to avoidance coping strategies (acceptance/resignation ($M = 8.16$, $SD = 3.92$), cognitive avoidance ($M = 7.66$, $SD = 3.91$), seeking alternative rewards ($M = 6.72$, $SD = 3.93$), emotional discharge ($M = 5.82$, $SD = 3.19$)).

Depressive Symptoms The Patient Health Questionnaire (PHQ-9), a 9-item scale, was used for measuring recent depressive symptoms. The items parallel diagnostic criteria for depression with symptoms including anhedonia, sadness, insomnia, fatigue, poor appetite, self-blame, concentration problems, psychomotor slowing, and suicidal ideation. Participants are asked how often they have been bothered by each of these problems in the past 2 weeks. The response options are Not at All (0), Several Days (1), More than Half the Days (2), and Nearly Every Day (3). Example items include "little interest or pleasure in doing things" and "feeling bad about yourself—or that you are a failure or have let yourself or your family down." According to standard clinical cutoffs on the PHQ-9, 34% of participants fell into the normal or minimal range for depression (sum score of 0–4), 31% mild (5–9), 20% moderate (10–14), 10% moderately severe (15–19), and 5% severe (20–27). This scale has been validated for use in a variety of populations seeking medical care, including among patients who were seeking bariatric surgery [22]. Cronbach's alpha was 0.87 in this sample.

Anxiety Symptoms The Generalized Anxiety Disorder (GAD-7), a 7-item scale, was used for measuring recent anxiety. Symptoms assessed include nervousness, worrying, difficulty controlling worry, difficulty relaxing, restlessness, irritability, and anxious dread. Participants are asked how often they have been bothered by each of these problems in the past 2 weeks. The response options are the same as PHQ-9. Example items include "feeling nervous, anxious, or on edge" and "feeling

afraid as if something awful might happen." According to standard clinical cutoffs on the GAD-7, 54% of participants fell into the normal or minimal range for anxiety (sum score of 0–4), 26% mild (5–9), 14% moderate (10–14), and 6% severe (15–21). This scale has similarly been validated for use in a variety of populations seeking medical care and has high specificity and sensitivity in assessing severity of anxiety symptoms [23]. Cronbach's alpha was 0.90 in this sample.

Binge Eating The Binge Eating Scale (BES) was used to measure binge eating severity [24]. Participants are asked to choose the statement from each of 16 groups of statements that best describes their eating behaviors. Symptoms assessed include self-consciousness, eating until uncomfortably full, perceived control over eating, eating when bored, cravings in the absence of hunger, guilt and self-hatred after overeating, binge eating after lapses, large amounts of food, starvation and overeating, control over urges, purging, shame and embarrassment, mindless snacking, preoccupation with urges, preoccupation with food, and identification of hunger signals. According to standard clinical cutoffs on the BES, 62% of participants reported little to no binge eating (sum score of 0–17), 29% moderate (18–26), and 9% severe (27–46). This scale has high internal consistency and is valid and reliable in identifying individuals at risk for binge eating disorder in the general population [25, 26] and among patients seeking bariatric surgery [27, 28]. Cronbach's alpha was 0.88 in this sample.

Disordered Eating The Eating Disorder Examination Questionnaire (EDE-Q) was used to measure recent disordered eating [29]. The EDE-Q has four subscales intended to measure restraint (e.g., "Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?"), eating concerns (e.g., "Has thinking about food, eating, or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?"), shape concerns (e.g., "Have you had a definite desire to have a totally flat stomach?"), and weight concerns (e.g., "Has your weight influenced how you think about (judge) yourself as a person?"). The scale has 5 items for restraint, 5 items for eating concerns, 8 items for shape concerns, and 5 items for weight concerns. Response options vary but include number of days in the past month, ranging from No Days (0) to Every Day (6), and extent to which participants identify with statement, ranging from Not at All (0) to Markedly (6). Prior research has demonstrated reliability and validity of this measure and subscales [30]. Cronbach's alpha in the current study sample was 0.68 for the restraint subscale, 0.79 for eating concerns, 0.84 for shape concerns, and 0.67 for weight concerns.

Scores on the EDE-Q revealed that participants reported prominent shape concerns (M = 3.56, SD = 1.30) and weight concerns (M = 3.22, SD = 1.02), followed by restraint (M = 2.54, SD = 1.18), and eating concerns (M = 1.20, SD = 1.20). Single items from the EDE-Q that are not included in overall scales revealed that, in the past month, 67% of participants endorsed at least one episode of eating an unusually large amount of food and 53% reported at least one episode of a sense of loss of control over eating. Overall, 56% reported at least 1 day of binge eating in the past month. Modal number of binge days among those who reported any binge eating was 2 in the past month. About 15% of the sample reported binge eating on more than 5 days in the past month. Only 2% reported purging or making themselves vomit as a means of controlling weight and only 3% reported use of laxatives as a means of controlling weight in the past month. Thirty percent of the sample reported exercising in a driven or compulsive way as a means of controlling weight in the past month.

Statistical Analysis

Five participants were not included in analyses because they did not complete one or more of the measures of interest, resulting in a final analytic sample of 394. For participants missing data on an individual item in a scale, the mean of remaining items in the scale was calculated for use in analyses. Missing data was minimal (i.e., 1.1% of items missing on the PHQ-9, 0.6% on the GAD-7, 0.5% on the BES, 0.9% on the EDE-Q, and 2.8% on the CRI). Hierarchical linear regression analyses were used to examine each of three steps: (1) associations between approach and avoidance coping and each disordered eating outcome (binge eating, restraint, eating concerns, shape concerns, weight concerns), (2) whether these associations are altered with control for demographic variables (age, sex, BMI), and (3) if these associations remain significant above and beyond psychological distress (depressive symptoms and anxiety).

Results

Correlations

Bivariate correlations among study variables are presented in Table 1. Relative to men, women in the sample reported greater use of both approach and avoidance coping strategies on the CRI, as well as greater shape and weight concerns on the EDE-Q. Higher scores on avoidant coping evidenced small to moderate positive correlations with PHQ-9, GAD-7, and BES scores, as well as with the shape, weight, and eating concern subscales of the EDE-Q. Participants who reported

Table 1 Bivariate correlations among study variables ($N = 394$)

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Sex											
2. Age	.06										
3. BMI	− 0.05	− 0.19***									
4. Approach coping	− 0.15**	− 0.06	− 0.07								
5. Avoidance coping	− 0.17***	0.03	− 0.01	0.34***							
6. Depression	− 0.05	0.07	− 0.01	− 0.16***	0.22***						
7. Anxiety	− 0.02	0.03	0.02	− 0.12*	0.29***	0.64***					
8. Binge eating	0.01	0.04	0.04	− 0.06	0.19***	0.47***	0.32***				
9. Restraint	− 0.04	0.10+	0.08+	− 0.05	0.02	0.01	0.11*	0.04			
10. Shape concerns	− 0.12*	0.06	0.03	− 0.08	0.21***	0.56***	0.42***	0.51***	0.27***		
11. Weight concerns	− 0.16**	− 0.01	0.07	− 0.06	0.23***	0.57***	0.43***	0.54***	0.26***	0.82***	
12. Eating concerns	− 0.06	0.07	0.03	− 0.05	0.28***	0.56***	0.44***	0.69***	0.15**	0.61***	0.65***

Sex is coded 0 = women, 1 = men

+$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$ (two-tailed)

greater use of approach coping strategies reported lower scores on the PHQ-9 and GAD-7, but no significant association was identified with binge and disordered eating. PHQ-9 and GAD-7 scores were significantly associated in a positive direction with BES scores, as well as shape, weight, and eating concerns on the EDE-Q. GAD-7 scores (but not PHQ-9) were significantly associated with the restraint subscale of the EDE-Q in a positive direction.

Hierarchical Regression Analyses

Hierarchical linear regression analyses were conducted to examine main questions of interest, namely, whether approach and avoidance coping are associated with binge and other forms of disordered eating and whether associations remain after controlling for demographic covariates and psychological distress (depression and anxiety). Results are presented in Table 2.

In the first step of each model, approach and avoidance coping were significantly associated with binge eating scores on the BES, as well as eating, shape, and weight concern subscales of the EDE-Q. Specifically, individuals who reported lower levels of approach coping and higher levels of avoidance coping also reported higher levels of each of these forms of disordered eating on relevant measures. Considered together, these variables accounted for 5% of the variance in binge eating, 10% eating concerns, 7% shape concerns, and 8% weight concerns. Approach and avoidance coping were not significantly related to the restraint subscale of the EDE-Q and did not contribute to variance in prediction of this variable.

In the second step of each model with adjustment for demographic covariates (sex, age, BMI), approach and avoidance coping each independently remained significantly associated with scores on the BES and EDE-Q subscales of eating, weight, and shape concerns. Women reported significantly more concerns related to their shape and weight than men. Individuals who were older and higher BMI reported greater symptoms of restraint than individuals who were younger and lower BMI. The addition of demographic covariates did not significantly contribute to additional explained variance beyond step 1 for binge eating, eating concerns, or shape concerns. Step 2 did contribute to significant additional prediction for weight concerns with 10% variance explained and a non-significant trend for restraint with 2% variance explained.

In the third step of each model with the addition of psychological distress variables (depression on the PHQ-9, anxiety on the GAD-7), the association between approach coping and each disordered eating variable was no longer significant. Avoidance coping remained significantly associated with scores on the BES and the eating concern subscale of the EDE-Q and was marginally associated with weight concern subscale on the EDE-Q in these full models. As with prior steps, individuals who reported higher levels of avoidance coping also reported higher levels of these forms of disordered eating on relevant measures. Individuals who reported more anxiety on the GAD-7 in the past 2 weeks also reported greater symptoms of restraint on the EDE-Q subscale and marginally more eating concerns on the EDE-Q than those with less anxiety. Individuals with higher PHQ-9 scores also evidenced higher scores on the BES, and on the eating, weight, and shape concern subscales of the EDE-Q than those with lower PHQ-9 scores. GAD-7 score was not related to binge eating, shape concerns, and weight concerns on relevant measures. Depression score was not related to the restraint subscale on the EDE-Q. The addition of psychological distress variables added significant prediction to models for binge eating, eating concerns, shape concerns, and weight concerns. There was a non-significant trend at this stage for restraint. Full models

Table 2 Hierarchical regression analyses predicting binge and disordered eating from approach and avoidance coping, demographic covariates, and psychological distress ($N = 394$)

Steps	Binge eating		Eating concerns		Shape concerns		Weight concerns		Restraint	
1	$R^2 = .05$***		$R^2 = .10$***		$R^2 = .07$***		$R^2 = .08$***		$R^2 = .004$	
	B	SE B	B	SE B	B	SE B	B	SE B	B	SE B
Approach coping	− 0.14**	0.05	− 0.39**	0.12	− 0.44**	0.13	− 0.33**	0.11	− 0.15	0.13
Avoidance coping	0.26***	0.06	0.94***	0.14	0.81***	0.16	0.67***	0.12	0.12	0.15
2	$R^2 = .06$		$R^2 = .11$		$R^2 = .08$		$R^2 = .10$*		$R^2 = .02$+	
	B	SE B	B	SE B	B	SE B	B	SE B	B	SE B
Sex	0.04	0.06	− 0.10	0.14	− 0.33*	0.15	− 0.33**	0.12	− 0.08	0.14
Age	0.001	0.002	0.01	0.01	0.01	0.01	− 0.001	0.004	0.01*	0.01
BMI	0.002	0.003	0.004	0.01	0.004	0.01	.01	0.01	0.01*	0.01
Approach coping	− 0.13*	0.05	− 0.38**	0.12	− 0.45***	0.14	− 0.35***	0.11	− 0.12	0.12
Avoidance coping	0.26***	0.06	0.91***	0.14	0.75***	0.16	0.62***	0.12	0.09	0.15
3	$R^2 = .23$***		$R^2 = .35$***		$R^2 = .33$***		$R^2 = .35$***		$R^2 = .04$+	
	B	SE B	B	SE B	B	SE B	B	SE B	B	SE B
Sex	0.06	0.05	− 0.04	0.12	− 0.26*	0.13	− 0.28**	0.10	− 0.10	0.14
Age	0.001	0.002	0.004	0.004	0.003	0.01	− 0.003	0.004	0.01*	0.01
BMI	0.003	0.002	0.01	0.01	0.01	0.01	0.01	0.01	0.01+	0.01
Approach coping	− 0.01	0.05	− 0.03	0.11	− 0.07	0.12	− 0.04	0.09	− 0.09	0.13
Avoidance coping	0.11*	0.06	0.43**	0.13	0.23	0.14	0.21+	0.11	0.02	0.16
Anxiety	− 0.001	0.04	0.18+	0.10	0.17	0.11	0.13	0.08	0.28*	0.12
Depression	0.34***	0.05	0.89***	0.11	0.99***	0.12	0.80***	0.09	− 0.20	0.13

Regression coefficients and standard errors are based on the regression equation containing all predictors entered at each step as indicated in the table. Sex is coded 0 = women, 1 = men. Significance for R^2 values reflect the significance of F change at each step

+$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$ (two-tailed)

explained 23% of the variance in binge eating, 35% eating concerns, 33% shape concerns, 35% weight concerns, and 4% restraint.

Discussion

Approach and avoidance coping are related to pre-surgical disordered eating among candidates for bariatric surgery. Specifically, approach coping is associated with less binge and disordered eating, whereas avoidance coping is associated with more binge and disordered eating. Relations between coping style and eating behaviors remained constant regardless of age, sex, and BMI. This finding indicates that individuals with obesity who are seeking weight loss surgery and confront stressors actively by logically analyzing the problem, attempting to solve it, engaging in positive reappraisal, or seeking support from others are better able to manage eating behaviors pre-surgically than those who do not engage in these strategies. Conversely, those who engage in more passive strategies when confronted with stress, such as cognitively avoiding the problem, resigning oneself to it, reacting emotionally, or engaging in activities in order to distract oneself are more likely to evidence disordered eating behaviors pre-surgically. The role of coping in disordered eating has not previously been examined in this population despite a clear need to enhance guidelines for psychologists tasked with assessing readiness of these patients for surgery and to identify treatment targets to help patients manage their eating behaviors. Recent research documenting an association between approach-focused coping and percent excess weight loss following sleeve gastrectomy [31] further demonstrates the need for understanding how coping impacts eating behaviors in this population.

The role of mental health on coping behavior was also examined. When depression and anxiety are accounted for, approach coping no longer relates significantly to binge and disordered eating. The effects for avoidance coping are diminished, but not eliminated, with the inclusion of depression and anxiety. This finding suggests that avoidance coping remains predictive of disordered eating regardless of psychological distress, while the role of approach coping may be due to shared variance with psychological distress. This finding is actually consistent with previous research showing robust associations between avoidance coping and poor health outcomes but inconsistent effects for approach coping [32]. In a

review on this topic, Taylor and Stanton [33] proposed possible reasons for this difference. First, certain approach coping strategies may be effective only in situations in which an individual perceives (or actually has) control of the outcome. For example, active attempts to solve the problem may be useful for some stressors but counterproductive for others, whereas avoidance coping strategies may be universally detrimental. This difference may obscure effects for approach coping given that participants were responding to items on the coping measure with diverse stressors in mind. Second, the majority of the literature on effects of coping has focused on poor health outcomes. It is possible that avoidance coping is most predictive of negative outcomes while approach coping is most predictive of positive outcomes (e.g., resiliency, adjustment), which are less frequently studied. The outcomes investigated in the current study (binge and disordered eating) are negative health behaviors and may be independently associated with avoidance coping but only associated with approach indirectly through psychological distress. It is possible that future studies investigating positive changes in weight-relevant variables (e.g., healthy diet, increased exercise) might find that approach coping is a significant predictor, independent of psychological distress. Yet another possibility relevant for this study involves what has been termed the "perils of partialling" [34]. Specifically, removing variance associated with one variable from the other (e.g., approach coping controlling for avoidance coping, or coping style controlling for depression) may fundamentally alter the constructs themselves, which is why both the univariate and simultaneous regression models were presented.

In full models, depression was strongly associated with binge eating, shape concerns, weight concerns, and eating concerns (but not restraint), while anxiety showed completely the opposite effect as it was associated only with eating restraint. It is important to first consider that anxiety and depression were strongly correlated in this sample ($r = .64$) so these results represent the effects of each variable independent of the other even though in reality they covary. Second, the meaning of the restraint subscale on the EDE-Q is questionable in this sample even though it has been well validated in the general population and is commonly used in pre-surgical psychological evaluations. Specifically, this measure was designed to detect eating disorders among patients in the low or normal BMI ranges rather than patients who are overweight or obese. The demands of a bariatric program, such as visits with a nutritionist and requirements for limiting caloric intake, could influence how participants respond to items assessing eating restraint. One research study suggested that restraint may actually represent a healthy eating behavior in this population as it is associated with less frequent disordered and emotional eating [35]. It is possible that participants with anxiety were also more vigilant and cautious in following program recommendations, resulting in higher levels of eating restraint, while participants with depression experienced lower levels of energy and motivation to decrease unhealthy disordered eating behaviors.

Although this study is the first to examine approach and avoidance coping in patients pursuing bariatric surgery, a range of limitations exists. The data for this study are cross-sectional and consist of exclusively self-report measures and thus share limitations inherent in this study design. Future research using longitudinal measurement of these variables before and after surgery, as well as objective measurement of behaviors, would better demonstrate trends between coping, psychological distress, and disordered eating. More advanced designs, such as an experimental approach, could determine causality among these variables and applications to treatment, as well as mechanisms for these effects. Although some research suggests that pre-surgical disordered eating predicts post-surgical disordered eating and subsequent weight regain in this patient population, other studies have had mixed results [4, 5]. The effect of coping style before and after surgery on post-surgical outcomes has not been studied in this population. Additional research is needed to further support the practical and clinical implications of this study, namely that working with patients to adapt their coping styles and decrease avoidance may optimize their success post-surgically.

Despite limitations, this study is the first to assess the association between approach and avoidance coping and binge and disordered eating in a sample of candidates for bariatric surgery. Use of a large dataset including the first 399 patients who presented for bariatric surgery at this institution provided a robust and ecologically valid sample. Further, use of reliable and valid multi-item measures (BES, EDE-Q, PHQ-9, GAD-7) increased strength in the study's conclusions about key constructs. The significance of the findings were also enhanced by the ability to control for participant mental health, which has been extremely rare in the literature. This statistical control is particularly important because coping styles are associated with psychological distress and might operate similarly in association with eating behaviors. For example, symptoms of depression might influence a patient's coping style to be more avoidant in nature and limit approach coping strategies. This relation might explain associations found between coping and disordered eating. Further, avoidance and isolation, hallmark symptoms of depression, are conceptually similar to avoidant coping and could overshadow general coping style in an assessment interview if not evaluated independently. Our study was able to examine the independent effects of coping empirically. The key finding was that avoidance coping remained significantly associated with binge eating and disordered eating concerns, over and above the effects of depression and anxiety.

This finding highlights that unique aspects of avoidant coping, not captured by depressive or anxious symptoms, influence eating behaviors among patients who are seeking bariatric surgery.

The variables in our full models explain significant variance in disordered eating among patients prior to bariatric surgery, suggesting that researchers and clinicians should consider coping styles and psychological distress comprehensively in understanding eating behaviors pre-surgically. The findings suggest that avoidance coping should be considered in assessment during pre-surgical psychological evaluations, as well as in intervention development for this population. Coping is a potentially modifiable behavior for improving eating outcomes. Evaluation and interventions targeting the coping strategies of patients prior to surgery could enhance healthier coping approaches and reduce unhealthy eating behaviors. Further, if the treatment target is reduction of binge and disordered eating (as is often the case for these patients), it will be important to intervene on depressive symptoms and avoidance coping in particular. Traditional cognitive behavioral therapy (CBT) interventions may indirectly serve to improve patient coping strategies and decrease avoidance through such techniques as cognitive restructuring, behavioral activation, and relaxation training. Even still, interventions developed from a CBT framework that directly target increased approach and decreased avoidance coping styles have demonstrated effectiveness in other populations [36, 37]. Additionally, research has documented that brief resilience-based interventions focused specifically on improving patient coping skills for stress management are effective [38]. Taken together, the current study and existing literature suggest the possibility that candidates for bariatric surgery may benefit from brief coping interventions in some cases, and from CBT interventions that additionally target avoidance coping in other cases. Further research is warranted to develop and test such interventions in the bariatric surgery context.

Compliance with Ethical Standards

Conflict of Interest Drs. McGarrity, Perry, Derbidge, Trapp, Terrill, Smith, and MacKenzie have no conflicts of interest to disclose. Dr. Ibele's division received reimbursement from the Obalon Therapeutics for clinical time spent participating in the Obalon Balloon System Pivotal IDE (SMART) multicenter trial.

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