

Examination of Shame as a Mediator of the Relationship
Between Food Insecurity and Disordered Eating

by

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ABSTRACT

Background: An emerging literature has found associations between food insecurity and disordered eating behaviors. This study was two-fold. First, to replicate the existing literature that food insecurity is associated with disordered eating symptoms including loss of control over eating. Second, to expand the existing literature by examining stigma control theory, which purports that experiences related to food insecurity potentially induce stigma-related shame, with disordered eating behaviors used to cope with the shame. Further, to explore if emotion coping strategies moderate associations between shame and disordered eating. Method: This is a secondary analysis of a cross-sectional study of 582 adults with food insecurity. Participants completed a 20-minute online survey on food insecurity, shame related to food insecurity, coping strategies, and disordered eating behaviors. Analyses: Hierarchical regressions were computed where food insecurity, shame, and emotion focused coping were entered as predictor variables, followed by their interaction terms, and with disordered eating behaviors entered as outcome variables. Results: Regressions suggest that a) internalized shame partially mediated the relationship between food insecurity and global disordered eating, b) internalized shame did not mediate the relationship between food insecurity and loss of control, c) emotion focused coping did not moderate any relationship. Discussion: Internalized shame may be one mechanism in which disordered symptoms arise in food insecure populations, however emotion focused coping does not have any effect on this relationship. Results indicate that coping strategies alone may not reduce eating disorder symptoms, and internalized shame may be an important predictor of disordered eating in food insecure populations.

TABLE OF CONTENTS

	Page
LIST OF TABLES	iv
LIST OF FIGURES	v
CHAPTER	
1 INTRODUCTION	1
2 THE CURRENT THEORETICAL MODEL FOR THE STUDY	4
Interpersonal Model for Eating Disorders	4
Stigma Control Theory	8
Synthesis of the IPT-ED and Stigma Control Model into the Current Study.....	11
3 WHY MAY FOOD INSECURE INDIVIDUALS TURN TO DISORDERED EATING?	13
4 MECHANISMS WITH THE POTENTIAL TO EXPLAIN THE RELATIONSHIP BETWEEN FOOD INSECURITY AND DISORDERED EATING	16
5 THE ROLE OF SHAME WITH FOOD INSECURITY AND DISORDERED EATING BEHAVIORS.....	17
6 THE ROLE OF COPING WITH FOOD INSECURITY AND DISORDERED EATING BEHAVIORS.....	20
7 CURRENT STUDY	22
8 METHOD	24
Participants.....	24

CHAPTER	Page
Procedure	24
Measures	24
Covariates	28
9 DATA ANALYSIS	29
10 RESULTS	31
Measurement Analysis	31
Hypothesis 1	32
Hypothesis 2	33
Hypothesis 3	34
Hypothesis 4	36
Hypothesis 5	37
Post Hoc Analyses	37
11 DISCUSSION	39
REFERENCES	51
APPENDIX	
A TABLES	66
B FIGURES	79

LIST OF TABLES

Table	Page
1. Descriptive Statistics for the Entire Sample	67
2. All Items Within the Food Insecurity Internalized Shame Scale	69
3. Mean, Standard Deviation, and Score Range for Each Variable	70
4. Partial Correlations of Main Variables.	70
5. Results of Hierarchical Regression Analyses for Hypothesis 2.....	71
6. Results of Hierarchical Regression Analyses for Hypothesis 3.....	73
7. Results of Hierarchical Regression Analyses for Hypothesis 4.....	74
8. Results of Hierarchical Regression Analyses for Hypothesis 5.....	76
9. Results of Hierarchical Regression Analyses for Post Hoc Analyses.....	77
10. Loss of Control Over Eating Scale Endorsement Rates.....	78

LIST OF FIGURES

Figure	Page
1. The Role of Shame and Coping Within the Relationship Between Food Insecurity and Eating	80
2. Mediation Analyses. EDEQ-G as Outcome Variable.....	80
3. Mediation Analyses. LOCES as Outcome Variable	81
4. Mediation Analyses for Hypothesis 4	81
5. Post Hoc ModerationAnalyses 1	82
6. Post Hoc Moderation Analyses 2	82

CHAPTER 1

INTRODUCTION

Food insecurity is the inability to access adequate and nutritious food to support healthy and active living due to a lack of resources and money (Coleman-Jensen et al., 2017). In 2020, 10.5% of households in the United States qualified as food insecure; specifically, 9.4 million adults and 6.1 million children lived in food insecure households (Coleman-Jensen et al., 2021). However, due to layoffs, reduction in job opportunities, and increasing financial strain, secondary to the COVID-19 pandemic, Feeding America estimates that food insecurity rates could potentially climb up to 42 million people in 2021 (Hake et al., 2001). The rising number of individuals with food insecurity is disheartening, attention and concern should also be placed on the health consequences associated with food insecurity (Zilak & Gunderson, 2015).

Food insecurity among adults is associated with many negative health outcomes including low nutrient intakes (Lee & Frongillo, 2001), diabetes (Seligman et al., 2007), hypertension (Stuff et al., 2004), poorer health relative to food secure individuals (McIntyre et al., 2003; Vozoris et al., 2003), and negative effects on sleep (Ding et al., 2015). Further, food insecurity has been positively associated with obesity within female samples; however, the links between food insecurity and obesity within male samples is inconsistent (Franklin et al., 2013). Although the medical effects of food insecurity have been widely documented, less research has explored the effects of food insecurity on mental health. Both cross-sectional and longitudinal data have shown that food insecurity is associated with depression, anxiety, and broadly defined mental illness in female and male samples (Alaimo et al., 2002; Davison & Kaplan, 2015; Palar et al., 2015).

However, the majority of the research focuses primarily on women, or current and expecting mothers, (Whitaker et al., 2006; Heflin et al., 2005; Heflin et al., 2008; Tarasuk, 2001; Hromi-Fiedler et al., 2011). Recently Becker et al., (2017, 2019) found that higher levels of food insecurity are associated with increased levels of disordered eating across both genders, sparking a new interest in the associations between food insecurity and disordered eating behavior. They document that higher levels of food insecurity, specifically among households with hungry children, have elevated disordered eating scores, binge eating, compensatory behaviors (i.e. vomiting and laxative use), and weight and shape concerns (Becker et al., 2017, 2019). They noted that in their sample of 503 adults visiting a food pantry, 17 % of individuals in the most severe level of food insecurity reported clinically significant disordered eating (Becker et al., 2017). In a second study of adults recruited online, Rasmussen and colleagues (2018) found that low and very low food security was associated with overeating (i.e., eating a large amount of food), binge eating (i.e., eating a large amount of food with a sense of loss of control over eating) and obesity. Further, in an experimental paradigm using an automated vending machine where participants had free access to a vending machine, food insecure participants ingested more kilocalories over a three-day period than food secure participants, even after standardized meals (Stinson et al., 2018). In addition, participants with food insecurity had higher body weight (n=46, 56%) and higher scores of disordered eating behaviors including disinhibition cues, hunger cues, and binge eating scores compared to food secure samples. Food insecurity has also been associated with bulimia nervosa, and binge eating frequency within bulimia nervosa (Lydecker & Grilo, 2019).

Collectively, existing cross-sectional research paradoxically observes an association between food insecurity and disordered eating, with binge eating emerging consistently across studies. Further, one longitudinal prospective study also found significant associations. In a study of 2,179 adolescents assessed over a 5-year time period, food insecurity predicted increased risk for binge eating, with food insecure adolescents having 1.4 times increased risk to binge eat than food secure adolescents (West et al., 2019). Overall, continued research needs to move beyond documenting prevalence, and begin examining the relationship of food insecurity and disordered eating within existing theoretical models. By including food insecure populations within current theoretical models of disordered eating, the field may begin to identify moderators of this relationship that will influence prevention and treatment intervention.

CHAPTER 2

THE CURRENT THEORETICAL MODEL FOR THE STUDY

For the current study, I propose a moderated mediation effect occurring on the association between food insecurity and disordered eating behavior, as seen in Figure 1. Within this model, a) disordered eating is mediated by feelings of shame and in turn, b) the influence of shame on disordered eating behaviors is moderated by the use of emotion focused coping. This proposed model is informed by two theories of disordered eating: 1) the interpersonal model for eating disorders and 2) the stigma control theory for eating disorders.

Interpersonal Model for Eating Disorders (IPT-ED). Sullivan and Meyer believed that the study of psychiatry was the understanding of two dependent factors: individuals and their environment (Sullivan, 1953; Meyer, 1957). For this reason, Sullivan proposed that interpersonal patterns have the potential to foster psychological outcomes such as self-esteem, hopelessness, anxiety, and/or psychopathology (Sullivan, 1953; Meyer, 1957). In congruence with this theory, Bowlby posited that an individual's desire to be loved and cared for, especially in times of sickness or distress, is a natural part of human nature (Bowlby 1969, 1977, 1988). However, Bowlby extended this theory by proposing that early relationships may also influence distress and subsequent psychopathology, as seen through attachment theory (Bowlby, 1982). Specifically, an individual's attachment style will impact interpersonal communication and the ability to generate social support, further influencing interpersonal patterns (Bowlby, 1973; Stuart, 2008). Maladaptive attachment has the potential to lead to insufficient interpersonal communications and low social support which further affects an individual's ability to

cope with interpersonal stress (Bowlby, 1973). Interpersonal theory, which derived from the original teachings of Sullivan, Meyer, and Bowlby, posit that interpersonal problems (interpersonal disputes, role transitions, grief and loss) may elicit care seeking behavior driven by attachment needs (Tanofsky-Kraff et al., 2007). The amount of social support at this stage is critical, as sufficient social support may diffuse crisis, but insufficient social support will cause individuals to push care seeking behaviors further. The way in which an individual communicates need for care could either effectively lead to additional support or potentially drive others away, creating more distress. The theory suggests that inadequate access to social support will lead individuals to experience psychological distress that further decreases self-esteem and mood (Stuart, 2008; Wilfley et al., 2000). This model has been used to inform interpersonal psychotherapy, developed initially for depression and modified for various forms of psychopathology including the treatment of eating disorders (Klerman et al., 1984; Grilo & Masheb, 2005; Wilfley et al., 1998; Tanofsky-Kraff et al., 2007).

Within the eating disorder model, interpersonal problems and deficits result from negative affect and in turn elicit and maintain eating disorder symptomatology (Wilfley et al., 2000). Specifically, difficulties with interpersonal problems precede low self-esteem, negative affect, and negative self-evaluation (e.g. worthlessness specific to a situation or generally) which trigger binge eating behaviors as an adaptive response to overcome negative feelings, which further affect and reinforce interpersonal problems (Wilfley, Pike, & Striegel-Moore, 1997; Wilfley et al., 1997; Tanofsky-Kraff et al., 2007; Rieger et al., 2010). Some examples of this behavior include: wanting to improve self-esteem by controlling weight through dieting (Cooper et al., 2004) or escaping negative self-

evaluation through binge eating (Heatherton & Baumeister, 1991). It is important to note that past research has found a relationship between insecure attachment and disordered eating behavior, but not much is known about the mechanisms of this relation (Cortes-Garcia et al., 2020). Within the IPT-ED model, disordered eating behaviors occur as a maladaptive attempt to either attain positive self-esteem or positive affect when social interactions yield negative self-evaluation (Rieger et al., 2010). Engagement in disordered eating behaviors increases as interpersonal relations worsen and the individual interprets that disordered eating behaviors elicit a more reliable source of positive affect in the moment (Rieger et al., 2010). Although maladaptive disordered eating behaviors produce positive affect in the moment, subsequent effects of disordered eating, specifically binge eating, include guilt, shame, and anxiety (Haedt-Matt & Keel, 2011; Tachi et al., 2001; Arnou et al., 1992). Negative affect triggered by disordered eating behavior compounded with interpersonal distress intensify negative self-evaluation and create a negative feedback loop which worsens interpersonal problems and intensifies eating disorder symptomatology (Rieger et al., 2010).

Research supports the growing use of IPT models within the understanding of disordered eating and eating disorder treatment (Arcelus et al., 2013; Whight et al., 2011). Specifically, multiple studies have found that problems with social interactions play a role in eating disorder symptomatology (Wilfley et al., 2000; Wilfley et al., 2002; Elliot et al., 2010). Elliot et al., (2010) found that negative affect mediated parental ratings of social problems in children and adolescents that were associated with disordered eating symptomatology, specifically loss of control. Similarly, Ansell et al., (2012) found that the association of interpersonal problems and binge eating was

mediated by depressive and negative affect in adult women. Importantly, the success of interpersonal psychotherapy for treatment of binge eating disorder and other eating disorder symptomatology in adults further supports the interpersonal theoretical model (Wilfley et al., 2002; Wilson et al., 2011). Interpersonal therapy for binge eating focuses on reduction of interpersonal problems to increase self-esteem and reduce reliance on food to cope (Tanofsky-Kraff et al., 2007). It is important to note, that the IPT-ED has not been studied within food insecure populations. Applying the IPT-ED model to food insecure populations, it is theorized that by nature of low socioeconomic status and food insecurity, these individuals experience or are at heightened risk for experiencing negative interpersonal events or distress. According to Pearlin (1989), sources of stress, both chronic and acute experiences, are a result of social roles that develop from constructs such as social class, race, gender, and age. The various social sources of stress create a multitude of potential mechanisms that may explain socioeconomic health disparities (Baum et al., 1999; Evans et al., 1994; Wilkinson, 1999). Many expect that almost everyone experiences stress due to personal relationships, work related situations, or financial crises; however, it is important to note, that individuals living with social and economic disparity face a greater amount of stress over the life course than those living without economic or social disparity (Taylor & Seeman, 1999; Thoits, 1995). Due to higher rates of stress, individuals living with economic or social disparity should have more adverse biological effects. For example, research from epidemiological studies corroborates that individuals of low socioeconomic status or educational attainment report more negative life events, poorer health, depression, life satisfaction, and quality of life, with scores getting worse over time (Lantz et al., 2005; Anshensel, 2009).

In addition to more negative interpersonal events or distress, low socioeconomic status is also associated with low self-esteem and lower social support resources (Twenge & Campell, 2002; Gyasi et al., 2020). Thus, cumulatively, the literature supports that individuals from low socioeconomic status such as food insecure populations, are at risk for negative interpersonal events, interpersonal distress, report low self-esteem, and have reduced social support resources. According to the IPT-ED model, disordered eating behaviors emerge as a coping mechanism to increase self-esteem and/or reduce negative affect created from the negative interpersonal events and distress. Given the association between FI and disordered eating behaviors, this is worthy of further exploration.

However, the IPT-ED model does not fully explain why oppressed and stigmatized populations, like the food insecure, might be at heightened risk for selecting disordered eating behaviors as a coping mechanism instead of other maladaptive coping mechanisms. The Stigma Control Theory was developed to further delineate the process (Mason et al., 2018).

Stigma Control Theory. Like the IPT-ED Model, the stigma control theory proposes that disordered eating occurs in response to environmental and internal cues unrelated to hunger (Mason et al., 2018). However, this process of disordered eating, specifically, emotional and binge eating, in response to environmental and internal cues occur more often in marginalized groups, such as racial/ethnic minorities, individuals with low SES, sexual/gender minorities, individuals with higher body weights, etc. (Diemer et al., 2015; Hudson et al., 2007; Meneguzzo et al., 2018). Different from the IPT- ED Model, the stigma control theory focuses on how, specifically, experienced stigma and the subsequent management of stigma, may lead to greater negative affect

which has the potential to elicit disordered eating (Mason et al., 2018). Mason and colleagues (2018) define stigma as stressors including labeling, stereotyping, and status loss that are rooted in various levels of societal social status and perpetrated by different individuals (family, friends, coworkers, strangers, or self). The different forms of stigma include: structural (relating to stigma due to systemic factors and institutional laws/policies), external (objective events of discrimination, harassment, and victimization), and internalized stigma (expectations of rejection, internalizing societal ideals, and concealing identity). Past research has shown that individuals that identify with multiple marginalized groups are at risk for greater amount of discrimination (Seng et al., 2012). When faced with negative feedback, individuals will engage in self-regulation or stigma management strategies to reduce emotional distress and in some cases reduce future stigma. Different stigma management strategies include withdrawal behavior, excessive reassurance seeking, negative feedback seeking, self-silencing, co-rumination, catastrophizing, vigilance, and conforming to norms to reduce future discrimination (Himmelstein et al., 2015; Joiner et al., 1999; Jack, 1991; Rose, 2002; Aladao et al., 2010; Mason et al., 2018). Stigma management strategies are used to cope with discriminating or stigmatizing experiences in the moment, yet effects of the use of stigma management strategies include negative emotion states, low self-esteem, depression and anxiety (Lehavot & Simoni, 2011; Mason & Lewis, 2015). Further, and similarly to IPT-ED, these strategies may unintentionally cause negative responses from social networks and elicit further distress and use of disordered eating behaviors (Joiner et al., 1999; Mason et al., 2018). Specifically, engagement in disordered eating, specifically over eating, is an attempt to regulate negative affect that resulted from the

use of stigma management strategies (Mason et al., 2018; Polivy & Herman, 1993). Importantly, affect regulation models of eating disorders have been tested using ecological momentary assessment data. In fact, Schaefer and colleagues (2020) found that levels of negative affect and guilt significantly decreased following binge episodes across gender. However, it is important to recognize that disordered eating is not considered a stigma management strategy within the stigma control model. Disordered eating is a maladaptive coping strategy to alleviate negative affect and low self-esteem secondary to the use of stigma management strategies. For example, an individual who is food insecure may receive stigmatizing feedback from schools, teachers, or other community members for being unable to provide sufficient food for their child. The individual may engage in specific coping strategies to manage the stigma in the moment like withdrawal, catastrophizing, or negative feedback seeking behavior. Yet, these specific management strategies produce further negative affect and lower self-esteem. It is then that the individual is hypothesized to engage in disordered eating behavior, specifically to mitigate negative affect secondary to stigma management strategies. Importantly, it is necessary to remember that populations with food insecurity have unstable and unpredictable access to food which increases vulnerability to overeating and binge eating (Keys et al., 1950). Further, as understood through social learning theory, this variable access to food within food insecure populations may act as a powerful reinforcer in the maintenance of overeating and binge eating behavior (Bandura, 1977). The stigma control theory posits that individuals who experience stigma (conceptualized broadly) become distressed and cope with this distress using stigma management strategies to reduce negative emotions. However, these strategies may elicit further

distress that may prompt disordered eating behaviors used to manage high levels of emotional distress and negative effect (Mason et al., 2018).

There is past research to support the hypothesized mediation model proposed within the stigma control theory. For example, stigma associated with increased binge eating in lesbian and bisexual women was mediated by social isolation and emotional coping (Mason & Lewis, 2015). Specifically, increased social isolation and emotional coping was related to emotional distress and subsequently increased levels of binge eating (Mason & Lewis, 2015). Mason et al., (2017 a,b) found that increased self-reported discrimination was related to higher levels of daily emotional distress and lower self-awareness, and were further related to increased daily binge eating. Currently, there have yet to be any tests of the stigma control model; however, two studies have used the stigma control model to inform their design (Siegel & Sayer, 2019; Kamody et al., 2020). Siegel & Sayer (2019) found that sexual minorities who reported experiences of discrimination had significantly higher prevalence of AN than those who did not endorse discrimination; however, there was no significant difference in BN or BED. Although more research is needed, the stigma control model acknowledges the unique experiences of marginalized groups that are not yet considered within other gold standard models of disordered eating like the IPT-ED (Mason et al., 2018).

Synthesis of the IPT-ED and Stigma Control Model into the Current Study.

Based on the stigma control theory and interpersonal theorized model of eating disorders, the proposed model posits that the relationship between food insecurity and disordered eating is influenced and maintained by the level of internalized stigma and subsequent coping strategies to manage the specific internalized and external stigma specific to food

insecurity. Specifically, individuals with food insecurity face structural stigma regarding socioeconomic status, work status, receiving/denial of benefits, etc., as well as internalized stigma or the self-imposed shame due to external perceptions of self, based on food insecurity status which do not align with societal ideals. Based on the stigma control theory, individuals with food insecurity will use different coping strategies to manage the negative affect associated with both shame and externalized stigma. To the extent the coping strategies do not alleviate the negative emotion or inadvertently increase negative affect, the individual may turn to disordered eating. Suggested by the interpersonal theory for eating disorders, this maladaptive attempt to attain positive affect within individual and social interactions will not resolve interpersonal problems/distress and intensify eating disorder symptomatology.

Although this is the first study to examine the relationship of food insecurity and disordered eating within shame and coping, there is literature to support each path in the proposed model. The following sections provide a literature review for each section of this model.

CHAPTER 3

WHY MAY FOOD INSECURE INDIVIDUALS TURN TO DISORDERED EATING?

A limitation of the existing theoretical models is a lack of explanation for why marginalized populations, like the food insecure, may turn to disordered eating as a coping mechanism over other coping strategies. FI populations may have a different relationship to food due to instability of access that renders them vulnerable to disordered eating behaviors, particularly overeating and binge eating. Further, in social learning theory, we know that a variable reinforcement schedule is the most powerful for maintaining behavior, which may occur in FI populations where there may be unpredictability of food access and availability. Keys et al., (1950) documented the emergence of disordered eating in healthy male participants of the Minnesota Starvation study. In this study, participants agreed to a reduction in calorie consumption by 50% for a six-month period, where baseline diet average was 3200 calories and was reduced to 1570 calories. Importantly, individuals were not overweight. After the six months, participants engaged in a three-month experimental refeeding period in which the participants were randomly assigned to 4 different energy intake groups with different protein or vitamin levels. Within this time, Keys et al., (1950) documented that participants reported binge eating, feelings of loss of control during eating, preoccupation with food, stealing food, and eating slowly. Remarkably, these behaviors persisted well after the study, ranging two months to two years after the refeeding period (Keys et al., 1950; Tucker, 2006; Kalm & Semba, 2005). This was the first study to clearly document that the process of being hungry can fundamentally alter individuals' relationship and control with food even when food security returns.

Becker et al., (2017) theorized that there are many reasons to expect disordered eating behaviors among the food insecure including the food environment. Specifically, food insecure populations live in food deserts, or an area that is both low income and lacks access to affordable as well as nutritious food, and food swamps, or urban areas dominated by inexpensive food retailers selling highly processed foods (i.e. foods high in salt, sugar, and fat) (Dutko, 2012; Kato & Irving, 2013). Past animal research shows that introducing foods high in salt, sugar, and fat lead some rats to binge eat, despite the lack of binge eating on a diet of rat chow (Boggiano et al., 2007). Further, Boggiano et al., (2007) found that stressed rats that engaged in binge eating behavior decreased consumption of regular rat chow, but not the introduced foods high in salt, sugar, and fat. Becker and colleagues hypothesized that the combination of living in food deserts and food swamps has the potential of increasing binge eating.

Other studies note the importance of including the cyclical pattern of food restriction followed by problematic eating behaviors within hypotheses of the relationship between food insecure populations and disordered eating (e.g. overeating and increase in low nutrition, energy dense foods) (Rasmussen et al., 2018). Engaging in strict periods of dietary restriction followed by uncontrollable overconsumption is a characteristic of binge eating disorder (Fairburn, 2013). However, within food insecure individuals, this maladaptive pattern of eating behavior may be caused by uncontrollable factors including timing of monthly paychecks and/ or allocation of food stamps (Bove & Olson, 2006; Burns, 2004; Rasmussen et al., 2018). These factors may reduce the overall caloric intake of individuals with food insecurity and in turn potentially contribute to overeating in the future (Corwin, 2000). Increased consumption after food deprivation for periods ranging

from 1 to 48 hours has been documented within individuals with and without disordered eating pathology (Hetherington et al., 2000; Telch & Agras, 1996; Drobles et al., 2001; Hill, 1974; Spiegel et al., 1989), and has occurred within longer periods of food deprivation as well. For example, Franklin and colleagues (1948) found that men reported increased appetite and loss of control while eating after enduring 24 weeks of reduced caloric intake (1500 kcal/day). Similarly, prisoners of World War II, who were deprived of food, reported higher rates of binge eating in comparison to veterans of World War II who did not experience food deprivation (Polivy et al., 1994). It is hypothesized that as the reinforcing value of food increases, so may food consumption (Eisenberger et al., 1982; Raynor & Epstein, 2003). Eisenberger and colleagues (1982) theorize that restriction of food affects subsequent eating behavior due to an increased reinforcing value of food, which may cause certain individuals to eat instead of participate in non-eating activities and/or be more responsive to eating cues (Epstein & Saelens, 2000). Explicitly, during times of food availability, food insecure individuals may engage in problematic eating behaviors (e.g. overeating and loss of control while eating) due to an increased reinforcing value of food, secondary to food deprivation caused by uncontrollable factors resulting in food scarcity (Stinson et al., 2018).

CHAPTER 4

MECHANISMS WITH THE POTENTIAL TO EXPLAIN THE RELATIONSHIP BETWEEN FOOD INSECURITY AND DISORDERED EATING

Currently, a lack of research exists examining the processes via which food insecurity and disordered eating are connected. A common thread within the stigma literature among those that report experiencing discrimination is the experience of shame (Matheson & Anisman, 2009). Shame has also been highlighted in the disordered eating literature as a powerful emotion associated with disordered eating behaviors, particularly overeating and binge eating (Arnouk et al., 1995; Goldfield et al., 2008; Heatherton & Baumeister, 1991; Leehr et al., 2015). Another variable that may influence the relationship between food insecurity and disordered eating is coping, specifically maladaptive emotion focused coping. Indeed, coping strategies are continuously mentioned in IPT-ED and Stigma Control Theory. The following sections, highlight the existing literature on shame and coping and present the hypotheses in the current study for a moderated mediation model of food insecurity with disordered eating.

CHAPTER 5

THE ROLE OF SHAME WITH FOOD INSECURITY AND DISORDERED EATING BEHAVIORS

Shame is a self-conscious emotion which derives from the perception that others view the self as defective, inferior, inadequate and unattractive due to specific behaviors or characteristics of the individual (Gilbert, 1998, 2000, 2002). This emotion has many negative impacts including negative sense of self, decreased wellbeing, and increased vulnerability to psychopathology (Kim et al., 2011; Tagney & Dearing, 2002). Shame due to factors of food insecurity status have been documented in qualitative research. For example, in a semi structured interview of 33 men and women living with food insecurity, a thematic analysis found that food insecurity resulted in feelings of shame specific to alienation (Nanama & Frongillo, 2012). Further, the event of food running out and the act of relying on borrowing or asking others for food resulted in feelings of shame. As explained by the interview, these events and actions reveal food insecurity status to others, and expose an individual to judgment about inability to provide for the family. A fear of criticism by others led certain individuals to engage in alienation strategies to avoid judgment; these strategies included reducing daily food amount and skipping meals rather than borrowing or asking others for food (Nanama & Frongillo, 2012). Shame as a result of others discovering food insecurity status was found among food insecure adolescents (Connell et al., 2005). A qualitative study of food insecurity in Quebec, found that the immediate unmodifiable conditions of food insecurity and continuous deprivation of food led certain individuals to feel unfit for a place in society (Hamelin et al., 2002). Other feelings related to food insecurity included powerlessness,

guilt, embarrassment and shame, inequity and frustration (Hamelin et al., 2002). Interestingly, Booth (2005) found that 16% of the 150 homeless youth sampled in South Australia, named shame as a reason not to use welfare agencies. Recently, in a New York Times article depicting food insecurity during the COVID-19 pandemic, Tim Arango documented shame and embarrassment within food insecure families due to the inability to choose what to eat, inability to afford enough food, the label of “desperation,” and revealing food insecurity status through attending food pantries and using well fare benefits in public spaces (<https://www.nytimes.com/2020/09/03/us/food-pantries-hunger-us.html>; published 9-3-2020, updated 9-4-2020). Although the association between food insecurity and shame has been sufficiently documented qualitatively, further research is needed to understand the effects of shame on various forms of psychopathology. However, due to qualitative research documenting changes in eating strategies (i.e. reducing daily food amount and skipping meals) to modify feelings of shame (Nanama & Frongillo, 2012), research should also focus on the role of shame within the association of food insecurity and disordered eating and other mental health.

Although the role of shame within disordered eating in food insecure populations has yet to be explored, the association between shame and eating disorders has been highly documented within both non-clinical and clinical samples. For example, within non-clinical samples, being prone to experience shame was positively associated with eating disorder symptomatology in women (Barlow et al., 1995; Gerr & Troop, 2003). Similar findings were seen within clinical samples of women (Troop et al., 2008); interestingly, Masheb & Brondolo (1999), found that patients with binge eating disorder reported higher levels of shame than non-eating disordered women. Past research also

supports shame as a maintenance factor of eating disorder pathology, specifically, shame stimulates disordered eating behaviors that may increase obsessive focus on the need to control body image and weight (Gilbert, 2002; Goss & Allan, 2009; Pinto Gouveria et al., 2014). This hyper focus on body image may lead to an even greater sense of failing to reach body ideal standards, further continuing the cycle (Gilbert, 2002; Goss & Allan, 2009; Pinto Gouveria et al., 2014). Within models of shame and binge eating, binge eating was conceptualized as a maladaptive strategy to avoid and escape thoughts or negative emotions which may be associated to shame (Arnow et al., 1995; Goldfield et al., 2008; Heatherton & Baumeister, 1991; Leehr et al., 2015). Engaging in binge eating, however, may further increase negative affect and self-evaluation which is associated with increased levels of shame, guilt and criticism (Duarte et al., 2014; Goss & Gilbert, 2002; Hayaki et al., 2002; Jambekar et al., 2003).

Thus, across both the food insecure literature and the disordered eating literature, shame emerges as variable of interest that may serve as a bridge between food insecurity and disordered eating. In the current study, it is hypothesized that shame due to food insecurity status will mediate the relationship between food insecurity and disordered eating. Specifically, increased levels of shame will be associated with increased levels of eating disorder pathology, dietary restraint, and loss of control.

CHAPTER 6

THE ROLE OF COPING WITH FOOD INSECURITY AND DISORDERED EATING BEHAVIORS

According to the World Health Organization, coping strategies are short term actions used to compensate for a stressful event in order to maintain survival (1998). Past literature indicates that there are three basic coping strategies, these include: emotion focused coping, problem focused coping, and avoidance coping (Endler & Parker, 1999; Endler & Parker, 1990). Emotion focused coping refers to emotional reactions used to reduce stress including emotional responses, self-preoccupation, and fantasizing (Endler & Parker, 1999). On the other hand, problem focused coping refers to the strategies and actions used to solve the problem or alter the situation including planning and cognitive restructuring (Endler & Parker, 1999). Lastly, avoidance coping includes the use of social diversion or distraction strategies to avoid the problem. Because past literature suggests that the style of coping (emotion focused, problem focused, and avoidance) may help explain the impact of stressors on overall wellbeing (De Ridder, 1997), it is important to discover how emotion focused, problem focused, and avoidance coping within food insecure populations interact with internalized shame specific to food insecurity status and impact disordered eating behavior.

Past disordered eating literature has examined task oriented coping, emotion focused coping and avoidance coping within the relationship of emotional dysregulation and disordered eating. For example, coping style and symptoms of depression have been associated with disordered eating behaviors including binge eating (Ball & Lee, 2000; Wolff et al., 2000). Specifically, Kelly et al., (2012), found that women who used

positive cognitive coping strategies reported fewer binge episodes. These task oriented strategies included positive refocusing, refocus planning, positive reappraisal, and putting things in to perspective (Kelly et al., 2012). Within a sample of women with and without disordered eating behaviors, Spoor et al., (2007) found that coping style, specifically emotion oriented and avoidance coping, was associated with increased levels of emotional eating even when controlling for levels of negative affect. Similarly, in a study conducted by Sulkowski et al., (2011), results indicated that the relationship between stress and binge eating was partially mediated by emotion focused coping. Furthermore, within a longitudinal study of adolescent girls, Nolen-Hoeksema et al., (2007) found that ruminative coping predicted binge eating. Similarly, in a sample of college women, avoidance coping was associated to binge eating (Engler et al., 2006). Collectively, the literature suggests that task-oriented coping may serve to protect from disordered eating, while emotion focused and avoidance coping may increase risk for disordered eating. This study will focus on the effects of emotion focused coping on the relationship of food insecurity, shame, and disordered eating.

CHAPTER 7

CURRENT STUDY

Historically, the majority of eating disorder research has focused primarily on young, White, affluent, women samples (Becker et al., 2019). In doing so, individuals like those in food insecure populations, have been understudied (Becker et al., 2019). It is also important to note, that because past research has focused primarily on White, affluent samples, what we currently understand about disordered eating behavior and how we measure eating disorder pathology may not always apply to food insecure samples. Yet, it is necessary to review the current research exploring the relationship between food insecurity and disordered eating. The goal of the current study is to extend the existing literature by examining shame as a potential mechanism linking food insecurity to disordered eating and emotion focused coping as a moderating variable between shame and disordered eating. Specifically, this model hypothesizes that food insecurity will be associated with increased levels of eating disorder pathology, loss of control over eating, internalized shame, and emotion focused coping. Second, the model hypothesizes that shame will mediate the relationship between food insecurity and global disordered eating. Specifically, it is hypothesized that food insecurity is associated with shame, which in turn, is associated with disordered eating. Third, the model hypothesizes that shame will mediate the relationship between food insecurity and loss of control. Specifically, it is hypothesized that food insecurity will have an indirect association with loss of control through shame. Fourth, the model hypothesizes that emotion focused coping will moderate the mediated relationship between food insecurity, shame, and global disordered eating. Specifically, it is hypothesized that shame and emotion focused coping

will independently predict higher levels of disordered eating. Fifth, the model hypothesizes that emotion focused coping will also moderate the mediated relationship between food insecurity, shame, and loss of control over eating. Specifically, it is hypothesized that the interaction between shame and coping will also be associated with loss of control over eating. In other words, as scores in emotion focused coping increase, the relationship between disordered eating and shame increases.

CHAPTER 8

METHOD

Participants

The sample consists of 582 adults residing across the United States. Table 1 presents demographics, including participants' age, gender, and highest level of education, ethnicity, and current household income. The sample was diverse (i.e., White 62.8%, Black 15.6%, Hispanic 6.4%), female (70.8%), and with an annual household income under \$25,000 (50.6%).

Procedure

Following Institutional Review Board (IRB) approval, Qualtrics Research Core platform recruited participants via social media and leveraging their connections with social organizations across the United States. The Qualtrics recruiting ads contained online links to a consent form and anonymous 25-minute survey. Participants received the survey if they consented to the study and endorsed at least one of two food insecurity screener items. These items included: 1) "In the last year, we worried whether our food would run out before we got money to buy more." and 2) "In the last year, the food we bought just didn't last, and we didn't have money to buy more." After completing the survey, participants received compensation options within Qualtrics which included money or points towards purchasing food or a variety of merchandise and goods. This Qualtrics points system is similar to credit card reward miles, and by participating in surveys participants can accumulate points to use in different ways.

Measures

In addition to collecting demographic information in Table 1, participants completed questions regarding their history of food insecurity as well as status of food insecurity over the past 12 months.

Status of Food Security. The 13-item Radimer Cornell Food Insecurity measure assessed food security status on a 3-point Likert scale consisting of 0=*Not True*, 1=*Sometimes True*, and 2=*Always True* (RCFIM; Kendall et al., 1995; Radimer et al., 1992). This measure delineates three clusters of food insecurity consisting of household food insecurity, individual food insecurity, and child hunger household food insecurity (Radimer et al., 1992). Household food insecurity refers to anxiety specific to food running out, but not the actuality of a severe lack of food leading to hunger. Individual food insecurity is the lack of resources and inability to access sufficient food for all members of the household that results in adults, but not children going hungry. Finally, child hunger household food insecurity refers to a specific situation in which adults report having hungry children in the home (Radimer et al., 1992). Research supports the internal consistency as well as construct and criterion related validity of the RCFIM (Kendall et al., 1995). Further, the RCFIM was found to be highly reliable in the current study ($\alpha = .909$).

Coping Style. Coping strategies was assessed via the Coping Inventory for Stressful Situations (CISS-21) a 21-item tool that assesses the likelihood of behavioral strategies used during times of stress on a 5-point Likert scale ($\alpha = .898$; Endler & Parker, 1990; 1999). The three subscales consist of 7-items each: 1) Task Oriented Coping, refers to efforts made to problem solve, use cognitive restructuring, or alter the situation to reduce stress; 2) Emotion Focused Coping, refers to the use of emotional responses, self-

preoccupation, and fantasizing in order to reduce stress; and 3) Avoidant Coping, which refers to specific activities like distancing, social engagement, or cognitive distraction to avoid the situation and reduce stress. This study will focus on the use of emotion focused coping subscale.

Shame. To our knowledge, a validated scale that measures internalized shame specific to food insecurity does not exist. After canvassing the literature for diverse measures of shame, the 11 item Weight Bias Internalization Scale (WBIS), which measures the degree to which an individual believes and applies negative statements about weight to themselves, was selected (Durso & Latner, 2008). This measure was most similar to the objective of measuring shame due to food insecurity and required the least modification. Importantly, this measure has been successfully modified and validated for different marginalized groups in the past. The WBIS was modified for internalized bias due to antifat attitudes and homonegativity (degree to which a homosexual internalizes stigmatizing messages). The use of this measure to address internalized bias in other marginalized groups indicates that this measure could be used to understand internalized bias within food insecure populations as well (Lewis et al., 1997; Ross & Rosser, 1996; Durso & Latner, 2008). For this study, all items were modified with the words “overweight” or “because of my weight” replaced with “lack of food” or “because of lack of access to food.” This modified measure is called the Food Insecurity Shame Internalization scale (FIIS) and consists of 11-items assessed on the original 7-point Likert scale (1 = *Strongly Disagree* to 7= *Strongly Agree*). Internal consistency for the FIIS was good, $\alpha = .841$. Please refer to Table 2 for a complete list of items on the FIIS. Psychometric properties of this adapted measure are presented in the results section.

Disordered Eating Symptomatology. In order to assess disordered eating within food insecure populations the following measures were used: Eating Disorder Examination Questionnaire (EDEQ) and Loss of Control Overeating Scale (LOCES).

Eating Disorder Examination Questionnaire (EDEQ). The EDE-Q, which is derived from the Eating Disorder Examination interview (Fairburn & Cooper, 1993; Fairburn et al., 2008), measures eating behaviors and attitudes over a 28-day period (Fairburn & Beglin, 1994; 2008). The four subscales are measured on a 7-point Likert scale with higher scores indicating greater disordered eating pathology: Restraint, Eating Concerns, Shape Concerns, and Weight Concerns, which combined provide a global disordered eating scale. The Dietary Restraint subscale consists of 5-items ($\alpha = .843$) focused on food and eating avoidance, dietary rules, and restraint overeating. The second subscale, Eating Concern, has 5-items ($\alpha = .855$) measuring the degree to which individuals are preoccupied with food, eat in secret, and feel guilty about eating. Shape Concern has 8-items ($\alpha = .915$) that focus on factors of shape including dissatisfaction, discomfort, fear of weight gain, and preoccupation with wanting a “flat stomach”. Finally, the Weight Concern subscale which measures the desire to lose weight, importance of weight, and dissatisfaction of weight consists of 5-items ($\alpha = .848$). The EDE-Q is one of the most widely used self-report measures of disordered eating (Lavender et al., 2009).

The Loss of Control over Eating Scale (LOCES). The 13-item LOCES was used to assess behavioral (i.e. “I continued to eat past the point when I wanted to stop”), cognitive/dissociative (i.e. “While eating it did not seem real”), and positive/euphoric aspects (ie, “While eating I feel a physical rush or high”) of loss of control while eating

over the last 28 days (Latner et al., 2014). Items were scored on a 5-point Likert Scale from 1= *Never* to 5= *Always* ($\alpha = .955$).

Covariates

Food insecurity disproportionately affects non-Caucasian households, single mothers, and individuals living with incomes below the poverty line (USDA, 2020); thus, race, gender, annual household income, marital status, and number of children in the household were included as covariates. Further, because food deprivation in childhood has been shown to affect eating patterns in adulthood, history of food insecurity was also included as a covariate (Olson et al., 2007). Although there is a complex relationship between food insecurity and BMI/weight status (Hernandez et al., 2017); BMI was not included as a covariate because 28% of the sample was unsure of their weight and among those that reported weight, only 54% of the sample weighed themselves within the last month. Covariates were dummy coded for analyses: Race (0= White/Caucasian, 1= All other Races), Gender (0=Female, 1= All other genders), Income (0= Under \$25,000, 1= Above \$25,000), Marital Status (0= Married, 1= Single/Other), Children in the Home (0= No Children, 1= Children in the home), History of Food Insecurity (0=No history of food insecurity, 1= History of food insecurity).

CHAPTER 9

DATA ANALYSIS

All analyses were conducted using SPSS version 25. There were 2545 individuals that completed the screener items, only 1410 completed the electronic consent form, and 582 passed all item consistency and validity checks. In order to confirm the absence of multicollinearity, correlations were examined between predictor variables. Further, data was checked for normality and homoscedasticity. Table 3 reports mean, standard deviation, range, as well as skewness and kurtosis of all variables. Significance of mediation was examined using PROCESS 4.0 (Hayes, 2012). Simple regressions were used to examine direct effects, specifically, simple regressions with food insecurity associated with disordered eating (c), food insecurity associated with shame (a), and shame associated with disordered eating while controlling for food insecurity (b) were examined. Note, simple mediation was examined for global disordered eating and loss of control over eating.

Follow-up moderated mediation analyses were conducted on the significant mediation effects to determine if emotion focused coping moderated the mediated effect of food insecurity on disordered eating via shame. A hierarchical multiple regression was computed where covariates were entered in step 1, centered internalized shame and centered emotion focused coping were entered in step 2, and the interaction between centered shame and centered emotion focused coping were entered in step 3, and regressed on disordered eating scores. Significance of moderated mediation were evaluated at the $p < .05$ level.

Post hoc analyses were conducted to further explore the relationship of emotion focused coping, food insecurity, and shame since this relationship has yet to be studied within eating disorder literature. Post Hoc analyses included moderation mediation analyses on the significant relationship between food insecurity and shame (a path) as well as food insecurity and disordered eating scores (c path) to determine if emotion focused coping moderated the mediated effect of food insecurity on disordered eating via shame. Finally, to explore other potential relationships between food insecurity and emotion focused coping, a hierarchical regression was conducted where covariates were entered in step 1, food insecurity was entered in step 2 and regressed on emotion focused coping. Significance of regressions were evaluated at the $p < .05$ level

CHAPTER 10

RESULTS

Measurement Analyses.

Due to the unstable factor structure of the EDE-Q, an exploratory factor analysis was conducted on the 22 items of the EDE-Q that comprise the global EDE-Q score using maximum likelihood estimation. The Kiaser-Meyer-Olkin measure of sampling adequacy, which is the degree of common variance among the items, was .92, well above the recommended .70 (Cerny,1977). The Bartlett's Test of Sphericity was significant, $\chi^2(231) = 8379.19$, $p < .01$. Using Kaiser's (1960) eigenvalue rule of thumb, three factors had eigenvalues greater than 1.0, which was confirmed further by visual inspection of a scree plot (Cattell, 1966). All items loaded onto the factors with loadings ranging from .52 to .77, and suggested use of the 22 items for global EDE-Q was appropriate. Internal consistency for the global EDE-Q scale was .81.

Since the FIIS was adapted for this study, an exploratory factor analysis was conducted on the 11 items of the FIIS. The Kiaser-Meyer-Olkin measure of sampling adequacy, was .90, well above the recommended .70 (Cerny,1977). The Bartlett's test of Sphericity was significant $\chi^2(55) = 3165.62$, $p < .01$. Using Kaiser's (1960) eigenvalue rule of thumb, three factors had eigenvalues greater than 1.0. Which was confirmed further by visual inspection of a scree plot (Cattell, 1966). This is inconsistent with the original psychometric study which found only 1 factor (Durso & Latner, 2008). However, the exploratory factor analysis showed that items #9 and #1 loaded on to multiple factors and were removed. The subsequent exploratory factor analysis yielded one factor. The Kiaser-Meyer-Olkin measure of sampling adequacy, was .91, well above the

recommended .70 (Cerny,1977). The Bartlett's test of Sphericity was significant $\chi^2 (55) = 3011.65, p < .01$. The internal consistency for the adapted FIIS measure was .91. Analyses were conducted with this FIIS measure in which the following items were included: 2,3,4,5,6,7,8,10,11.

Hypothesis 1: Food Insecurity will be associated with increased levels of eating disorder pathology, loss of control over eating, internalized shame, and emotion focused coping.

Partial Correlations were calculated in order to determine the relationships between food insecurity, disordered eating, loss of control, internalized shame, and emotion focused coping (displayed in Table 4). Covariates included income, race, gender, marital status, number of children in the home, and history of FI. Significant relationships were found among all variables. However, it is important to highlight that low correlations (e.g., $r_s < 0.30$) were found between severity of food insecurity with loss of control, disordered eating, internalized shame and emotion focused coping. Results indicate that these relationships are not strong and other factors beyond food insecurity may be affecting levels of disordered eating, internalized shame and emotion focused coping in food insecure populations. However, given the documented prevalence of disordered eating within food insecure populations (Becker et al., 2019), it is important to evaluate potential associations and mechanisms of the relationship between food insecurity and disordered eating. Further, a low correlation was found between loss of control and shame. Consistent with the existing literature, loss of control over eating and disordered eating were highly correlated (Latner et al., 2014). Moderate correlation (e.g., 0.3-0.49) was found between disordered eating and internalized shame, while a high

correlation (e.g., >0.5) was found between disordered eating and emotion focused coping. Finally, a moderate correlation was found between internalized shame and emotion focused coping. As hypothesized, these relationships indicate that higher scores on the food insecurity measure are associated with higher levels of disordered eating behavior, internalized shame, and emotion focused coping.

Hypothesis 2: Internalized shame will mediate the relationship between food insecurity and global disordered eating.

The mediating effects of internalized shame on the relationship between food insecurity and global disordered eating, as measured by EDEQ-G, were estimated using PROCESS 4.0 (Hayes, 2012). Multiple hierarchical regressions were computed to test for mediation. To ensure that food insecurity predicted global disordered eating, covariates were entered in step 1, food insecurity was entered in step 2 and regressed on global disordered eating. As displayed in Table 5, the overall regression was significant and food insecurity was significantly associated with global disordered eating with 10% of the variance being accounted for on scores on the EDEQ-G (path c).

A different regression equation was computed to examine the association between internalized shame and global disordered eating in which covariates were entered in step 1, internalized shame was entered in step 2 and regressed on global disordered eating. The overall regression was significant and internalized shame was significantly associated with global disordered eating with 15% of the variance being accounted for on scores of the EDEQ-G (path b).

Another regression equation was computed to examine the association between food insecurity and internalized shame with covariates entered in step 1, food insecurity

entered in step 2 and regressed on internalized shame. The overall regression equation was significant with food insecurity significantly associated with shame and accounting for 12% of the variance on FIIS scores (path a).

Finally, to test if internalized shame mediated the relationship between food insecurity and disordered eating, covariates were entered in step 1, internalized shame and food insecurity were entered in step 2, and regressed on disordered eating. All regressions were significant. Importantly, the adjusted R^2 increased by .12 after including internalized shame into the regression of food insecurity on disordered eating. Indicating that including internalized shame improves the model more than to be expected by chance. For a graphical depiction please refer to Figure 2.

PROCESS 4.0 was used to determine significance of the mediation (Hayes, 2012). A 95% bias-corrected confidence interval based on 10,000 bootstrap samples indicated that the indirect effect ($ab=.0141$) did not include zero (.04 to .07). The hypotheses that internalized shame would mediate the relationship between food insecurity and disordered eating was supported. Further, increased severity of food insecurity was associated with increased global disordered eating after considering food insecurity's indirect effect through internalized shame ($c'=.04$, $p<.001$).

The proportion of effects accounted for by direct effects and mediated effects can be calculated by dividing the mediated effect by the total effect (Mackinnon et al., 1995). Calculation of the proportion mediated effects revealed that 25% of the effect of food insecurity on disordered eating is mediated through internalized shame.

Hypothesis 3: Shame will mediate the relationship between food insecurity and loss of control over eating.

To ensure that food insecurity predicted loss of control over eating, covariates were entered in step 1, food insecurity was entered in step 2 and regressed on loss of control. As displayed in Table 6, the overall regression was significant and food insecurity was significantly associated with global disordered eating with 13% of the variance being accounted for on scores on the LOCES (path c).

A different regression equation was computed to examine the association between internalized shame and loss of control in which covariates were entered in step 1, internalized shame was entered in step 2 and regressed on loss of control. The overall regression was significant and internalized shame was significantly associated with loss of control with 9% of the variance being accounted for on scores of the LOCES (path b).

Another regression equation was computed to examine the association between food insecurity and internalized shame with covariates entered in step 1, food insecurity entered in step 2 and regressed on internalized shame. The overall regression equation was significant with food insecurity significantly associated with shame and accounting for 12% of the variance on FIIS scores (path a).

Finally, to test if internalized shame mediated the relationship between food insecurity and loss of control, covariates were entered in step 1, internalized shame and food insecurity were entered in step 2, and regressed on loss of control. All regressions were significant. Importantly, the adjusted R^2 did not increase after including internalized shame into the regression of food insecurity on loss of control. Indicating that including internalized shame does not improve the model. Please refer to Figure 3 for a graphical depiction.

PROCESS 4.0 was used to determine significance of the mediation (Hays, 2012). A 95% bias-corrected confidence interval based on 10,000 bootstrap samples indicated that the indirect effect ($ab=.001$) included zero (.00 to .01) meaning the indirect effect was not significant. Consequently, the hypotheses that internalized shame would mediate the relationship between food insecurity and disordered eating was not supported.

Hypothesis 4: Emotion focused coping will moderate the mediated relationship between internalized shame and disordered eating, such that the interaction between shame and emotion focused coping would predict higher levels of global disordered eating.

As displayed in Table 7 and Figure 4, there was no significant interaction between emotion focused coping and internalized shame on disordered eating. However, there were significant main effects of emotion focused coping on disordered eating. Specifically, a 1-point increase in centered emotion focused coping scores was associated with .56 increase in disordered eating scores. Results indicate that although emotion focused coping is associated with disordered eating, it does not moderate the partially mediated relationship of food insecurity, shame and disordered eating.

Hypothesis 5: Emotion focused coping will moderate the mediated relationship between internalized shame and loss of control, such that the interaction between shame and emotion focused coping would predict higher levels of loss of control over eating.

As displayed in Table 8, there was no significant interaction between internalized shame and emotion focused coping on loss of control over eating. However, there was a significant main effect of emotion focused coping on loss of control. Specifically, a 1-point increase in emotion focused coping scores was associated with .45 increase in loss

of control. Results indicate that emotion focused coping is associated with loss of control over eating, but does not moderate the partially mediated relationship of food insecurity, shame and loss of control.

Post Hoc Analyses:

Although emotion focused coping did not moderate the mediated relationship of food insecurity and disordered eating via shame, it does have moderate to high correlations with disordered eating and loss of control over eating. There may be a possibility that emotion focused coping may relate to these variables in other ways. The main analyses explored moderation of emotion focused coping on the (b) path but not the (a) or (c) paths. Exploratory post hoc analyses examined moderation mediation analyses on the significant relationship between food insecurity and shame (a path) as well as food insecurity and disordered eating scores (c path) to determine if emotion focused coping moderated the mediated effect of food insecurity on disordered eating via shame. Moderated mediation was examined for global disordered eating.

The first post hoc moderation model on path (a) was tested using a computed hierarchical regression in SPSS, in which covariates were entered in step 1, centered food insecurity and centered emotion focused coping scores were entered in step 2, and two-way interaction between centered food insecurity and emotion focused coping were entered in step 3, and regressed on internalized shame. Table 9 displays the hierarchical regression analyses. Emotion focused coping was significantly related to internalized shame such that a 1-point increase in emotion focused coping was associated with .40 increase in internalized shame. As displayed in Figure 5, there was no significant interaction between food insecurity and emotion focused coping on internalized shame.

The second post hoc moderation model on path (c) was examined using a computed hierarchical regression in SPSS, in which covariates were entered in step 1, centered food insecurity and centered emotion focused coping was entered in step 2, and two-way interaction between centered food insecurity and centered emotion focused coping was entered in step 3, and regressed on disordered eating scores. Table 9 displays the hierarchical regression analyses. There were significant main effects, but there was no significant interaction between food insecurity and emotion focused coping. Specifically, 1-point increase in emotion focused coping was associated with .56 increase in disordered eating. As displayed in Figure 6, results indicate that emotion focused coping does not moderate the relationship between food insecurity and disordered eating.

CHAPTER 11

DISCUSSION

Current research within the field of eating disorders tends to focus on prevalence of disordered eating symptoms within populations that identify as food insecure. However, this paper aimed to expand on current research to identify potential mediators and moderators of the relationship between food insecurity and disordered eating to further inform prevention and treatment of disordered eating within food insecure populations. The primary aim of this study was to extend existing literature on the association between food insecurity and disordered eating by a) examining internalized shame as a potential mediator linking food insecurity to disordered eating and b) exploring if emotion focused coping was a moderator between internalized shame and disordered eating.

Consistent with existing literature, food insecurity was associated with increased levels of disordered eating and loss of control over eating such that higher levels of food insecurity were associated with high levels of disordered eating. Within this study, 16.2% of the sample met criteria for low food insecurity, 4.3% met criteria for h food insecurity for the entire household, 37.2% met criteria for individual food insecurity, and 42.3% met criteria for the child hunger indicating there are children in the home who are hungry. In past studies of food insecurity that used the RCFIM, the household food insecurity group ranged from .08-40%, individual food insecurity group ranged from 27-37%, and child hunger group ranged from 22-45% (Becker et al., 2017; 2019); largely similar to our sample Differences in prevalence of food insecurity may be due to contextual factors. For example, previous work has collected data from a local food bank (Becker et al., 2019),

and within community food pantries (Becker et al., 2017), while this study used an online Qualtrics sample. Previous research has categorized their samples (e.g. RCFIM: not food insecure, household, individual, and child hunger, Becker et al., 2017; 2019. USDA Short Form: Food Secure, Low food secure, very low food secure, Rasmusson et al., 2018), while the current study evaluated food insecurity continuously. Despite differences in samples and context, the food insecurity-disordered eating link has now been consistently found (Becker et al., 2017; El Zein et al., 2019; Hazzard et al., 2022).

Importantly, the current study increases understanding of the Food insecurity-disordered eating link by extending research on loss of control within a population that is food insecure. Past research has found that loss of control is a better predictor of disordered eating and impairment compared to amount of food consumed in both community and clinical samples of adults (Latner et al., 2014). Interestingly, mean scores on the LOCES ($M=2.31$, $SD=1.04$) from this study were higher than non-clinical group mean scores in a community sample ($M=1.73$, $SD=0.63$; Stefano et al., 2016) and non-clinical group mean scores in a sample of college women ($M= 1.90$, $SD=0.79$; Jaques-Tiera et al., 2021), but less than the probable disordered eating diagnosis group mean scores ($M=2.60$, $SD=0.61$; Stefano et al., 2016). Higher levels of loss of control in this sample, compared to non-clinical group samples, indicates a greater need to understand the relationship of food insecurity and loss of control (Latner et al., 2014). The stigma control theory and interpersonal theory of disordered eating posit that disordered eating, including loss of control, is a negatively reinforced maladaptive coping mechanism for interpersonal distress due to structural stigma of being food insecure (Mason et al, 2018; Rieger et al., 2010). The feelings that occur during or as a result of loss of control over

eating are measured in the LOCES, specifically “feeling a rush or high”, “feeling relief or release” or even disassociation (e.g. “feeling like I was watching or looking at myself from the outside”; Latner et al., 2014). As demonstrated in Table 10, there were high rates of endorsement of “feeling relief or release” relative to the other items in the LOCES, suggesting that those that report a loss of control are also reporting a potential reinforcing quality of the loss of control eating episode consistent with the interpersonal model of eating disorders. Future research is needed to replicate and understand mechanisms of this relationship within individuals with food insecurity as consequences of loss of control over eating for food insecure populations further diminish quality of life and overall functioning (i.e. diminishing ability to manage food supplies and finances, predisposition to health consequences, etc.).

Consistent with qualitative research, food insecurity was associated with internalized shame in this study (Nanama & Frongillo, 2012; Connell et al., 2005; Hamelin, Beaudry, & Habicht, 2002). This is not surprising given studies that suggest that financial difficulties are associated with reduced wellbeing and shameful experiences due to others’ perceptions and one’s own perception of worth and purpose (Rantakeisu et al., 1999). In fact, Marmot & Wilkinson (2001) found that experiences of poverty, stigma, and discrimination lead to feelings of shame due to perceived failure secondary to comparing oneself to others. More recently, Frankham et al., (2020) found that shame is not only associated with financial hardship, but also acts as a mediator between financial hardship and mental health outcomes. Based on the stigma control theory, individuals will manage feelings of shame and negative affect secondary to discrimination and externalized stigma through the use of different coping strategies (Mason et al., 2018).

Individuals with food insecurity face structural stigma regarding socioeconomic status, work status, and receipt/denial of benefits (Twenge & Campell, 2002; Gyasi et al., 2020) as well as discrimination within different settings including: while in court/with police, public places, hiring/workplace environments, and school settings (Phojanakong et al., 2019). These discriminatory settings, other's perceptions of one's worth and/or one's own negative perception of self may lead to the use of maladaptive eating behaviors like loss of control over eating and disordered eating. However, no study to date has specifically examined if stigma experiences are leading to increased internalized shame among populations experiencing food insecurity, and if disordered eating is used to cope with the internalized shame. Future research should address the different forms of stigma and discrimination present within the lives of individuals who are food insecure across level of food insecurity, and how internalized shame psychologically affects individuals with food insecurity.

Consistent with the research finding shame is a mediator between financial hardship and mental health (Frankham et al., 2020), 25% of the effect of food insecurity on global disordered eating was mediated through internalized shame. However, the data is cross-sectional in nature and longitudinal studies should explore the temporal sequence of food insecurity, internalized shame, and disordered eating. It is important to note that this study consisted only of individuals that endorsed some level of food insecurity, future research should compare level of internalized shame within non-food insecure individuals and those living with food insecurity to begin to understand and identify unique factors of different levels of food insecurity.

The hypotheses that internalized shame would mediate the food insecurity-disordered eating/loss of control over eating link was based on the stigma control and interpersonal theories (Mason et al, 2018; Rieger et al., 2010). It was expected that disordered eating and loss of control acted as maladaptive coping mechanisms that produced relief from the negative affect of shame short term, and in turn negatively reinforced maladaptive eating behaviors over time. However, results indicated that internalized shame does not mediate the relationship between food insecurity and loss of control which is inconsistent with the stigma control theory and interpersonal theorized model of eating disorders. Based on these theoretical models, the presence of internalized shame may not be the best mediator linking food insecurity and loss of control over eating. Instead negative affect as a result of internalized or externalized shame may be a better mediator between food insecurity and loss of control.

The finding that internalized shame was not a mediator between food insecurity and disordered eating was surprising for many reasons. First, given that loss of control is known to produce feelings of euphoria and escape, posited negative reinforcing coping mechanisms by stigma control and interpersonal theories, the result that internalized shame did not mediate the relationship between food insecurity and loss of control was unexpected. Second, literature supports the association of binge eating and food insecurity (Hazzard et al., 2020), and results from this study replicated such literature. Further, within this sample, food insecurity was similarly correlated to global disordered eating ($r=.24$) and loss of control ($r=.25$). However, there is one finding that may help contextualize analyses, the association between internalized shame and global disordered eating was stronger ($r =.31$) in comparison to the relationship between internalized shame

and loss of control ($r = .15$). This finding indicates a need to explore potential differences between global disordered eating and loss of control to further understand potential implications.

The EDEQ is a global measure of disordered eating that addresses attitudinal facets of disordered eating: weight and shape concerns, eating, and restraint (Fairburn et al., 2008), while the LOCES measures the perception and behavior of being unable to stop eating (Latner et al., 2014). The difference in measures may suggest that internalized shame may be related to cognitive aspects of disordered eating as measured through the EDEQ versus more behavioral aspects as seen through the LOCES. Specifically, it may be that shame and feelings of worthlessness due to food insecurity status may drive a need to be interpersonally accepted which leads to an increase in disordered eating thoughts (i.e. fear of gaining weight, obtaining/maintaining body ideals, and focus on control over weight) and in turn disordered eating behavior. This aligns with the cognitive behavioral theory of eating disorders which posits that an individual's thoughts, specifically over evaluation of shape and weight, causes and maintains disordered eating behavior including dietary restraint, body checking and avoidance, and preoccupation with thoughts about eating, shape and weight (Fairburn, 2008). This suggests a need for future research to tease apart cognitive and behavioral aspects of disordered eating and the association with internalized shame separately within a food insecure sample. More research is needed to understand the nature of this relationship, and the potential effects of internalized shame within the relationship of food insecurity and disordered eating. Although there is a paucity of research documenting styles of coping within food insecure samples, past research in eating disorders suggests that use of emotion focused

coping increases risk for disordered eating behavior (Spoor et al., 2007). This is the first study to examine the use of emotion focused coping strategies within populations that live with food insecurity. Results indicated that there was a moderate correlation between food insecurity and emotion focused coping strategies, such that as levels of food insecurity increased so did use of emotion focused coping strategies. Examples of these strategies specific to the CISS-21 include: blaming self for problems, feeling anxious about inability to cope, and focus on inadequacies. The use of these specific coping strategies further aligns with the stigma control theory. As food insecurity levels increase, it is expected that economic stress and other relevant stressors would increase as well, leading to a rise in coping strategies. Mason and colleagues (2018) hypothesized that emotion focused, avoidant, and problem focused styles of coping may be used in response to structural stigma and discrimination (Mason et al., 2018). Further, it may be that emotion focused coping is a moderator of the relationship between internalized shame and negative affect instead of disordered eating. The stigma control theory and interpersonal theory of disordered eating posit that disordered eating is a negatively reinforced maladaptive coping mechanism for interpersonal distress due to structural stigma of being food insecure. In turn, other potential moderators of the relationship between internalized shame and disordered eating in food insecure populations include problem focused coping, negative affect, and desire for control. Although all forms of coping may increase in response to structural stigma and discrimination, past research has shown that the use of problem focused coping (i.e. problem solving, cognitive reframing, and acceptance) has decreased disordered eating behaviors (Kelly et al., 2012). Further, the severity of negative affect in response to food insecurity status as well as trait levels

of negative affect may increase use of disordered eating behaviors indicating it may be a potential moderator of the relationship between internalized shame and disordered eating in food insecure populations. Based on the interpersonal and stigma control theory of disordered eating, negative affect due to interpersonal distress may moderate the relationship between internalized shame and disordered eating in food insecure populations. In fact, past research shows that increases in anxiety, disappointment, or feeling uncomfortable, known feelings of interpersonal shame, lead to increases in disordered eating (Stein et al., 2007). Further, negative affect is continually hypothesized to be a predictor of overeating (Schuler & Kuster, 2011). Finally, in accordance with the structural and interpersonal theories of disordered eating, individuals with food insecurity may respond to structural stigma and internalized shame with the need to re-establish control or feelings of competence. Past research has shown that this need for control may increase dietary restraint (Deci and Ryan, 2000), and overall disordered eating, as dietary restraint a known precursor of binge eating (Downe et al., 2009). Potential moderators including problem focused coping, negative affect, and desire for control, need to be explored in future research.

Within post hoc analyses, moderated mediation analyses were completed on both the (a) and (c) path of the relationship between food insecurity and disordered eating mediated by internalized shame with emotion focused coping as moderator. Results indicated that emotion focused coping did not moderate the relationship between food insecurity and disordered eating or food insecurity and internalized shame. The use of emotion focused coping does not indicate that individuals with food insecurity will have higher levels of internalized shame. Which highlights the importance of understanding

other potential conditions of internalized shame due to living with food insecurity, specifically external factors like discrimination/stigma and external shame (i.e. others perception of worth). According to the stigma control and interpersonal theories, internalized shame is a result of interpersonal distress, and within food insecure populations, interpersonal distress derives from multiple sources including discrimination, structural stigma, and external shame due to implicit and explicit bias. The presence of these factors may moderate the degree in which an individual with food insecurity engages in disordered eating and/or feels internalized shame. In fact, it may be worth looking at other potential moderators of these relationships like impulsivity. Impulsivity is defined as “predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions” (Moeller et al., 2001, p.1784). In accordance with stigma control theory, it may be that individuals who are food insecure and experiencing internalized shame due to their food insecurity status may act impulsively on this negative affect in the moment using disordered eating as a coping mechanism to escape feelings of worthlessness. This presence of impulsivity may be the condition in which internalized shame leads to eating disordered behavior in food insecure individuals. A study conducted by Higgins and Colleagues (2015) found that impulsivity moderated the relationship between body shame and binge eating episodes in Black Women, but not White women. Future research is needed to replicate findings and explore other coping mechanisms as well as other potential moderators within populations with food insecurity. Future research should explore these potential moderators, discrimination/stigma, external shame, and impulsivity, within the

relationship of food insecurity and disordered eating and food insecurity and internalized shame.

There are various noteworthy limitations. First, analyses are based on cross sectional, self-report data that utilized measures to assess disordered eating behavior. Given that longitudinal data is the best way to test mediation and moderation analyses, current analyses cannot be interpreted as causal. Rather, cross-sectional data can be used to determine variables that merit further exploration. In the case of the findings in this study, food insecurity, internalized shame and disordered eating need to be replicated with longitudinal studies. Further, future studies should incorporate the use of structured interviews for the assessment of disordered eating to reduce measurement error including bias and interpretation errors known to accompany self-report. Second, this study was collected during the COVID 19 pandemic in the fall of 2020. This was a unique moment in history in which many environmental variables were not controlled for within analyses. It may be possible that findings may not be generalizable to other moments in time. Third, the only variable used to assess coping was, emotion focused coping which measured ways in which an individual felt inadequate or anxious about their situation. Although it is unclear which style of coping is most used by individuals with food insecurity, this version of emotion focused coping is very specific and may not represent the most used style of coping within this population. More research is needed to understand styles of coping within individuals with food insecurity. Further, the concepts of internalized shame and emotion focused coping are similar in that they both account for personal inadequacies. This conceptual similarity may limit interpretation of current analyses. However, it is important to note that there was only a moderate correlation

between internalized shame specific to food insecurity and use of emotion focused coping strategies ($r = .44$). Initial analyses did not indicate multicollinearity within variables suggesting that although internalized shame due to food insecurity and use of emotion focused coping are similar, the variables are two separate constructs. Finally, the LOCES and EDEQ were developed with the assumption that the individual has access to food. Given that these measures were not created for individuals who are food insecure, it may be possible that these measures are not acceptable for addressing eating disordered behavior within individuals who are food insecure. In fact, qualitative research has shown that engagement in disordered eating behaviors occur because of economic hardship (ie. Lack of Money/food stamps and other payments), weight and shape concerns, and/or other unspecified reasons (Middlemass et al., 2020), in comparison to weight and shape concerns alone as historical conceived in past eating disorder research (i.e. Johnson et al., 2012).

This study examined potential mediators and moderators of the relationship of food insecurity and disordered eating using the stigma control model and interpersonal theorized model of eating disorders. This study highlights the need to understand different sources of externalized stigma and discrimination that may lead to internalized shame, and how internalized shame may have negative effects to psychological and overall wellbeing in individuals who live with food insecurity. Importantly, this research addresses the need to look at both cognitive and behavioral aspects of disordered eating and the association with internalized shame in order to inform future prevention and treatment efforts. Clinically, the potential differences in the presentation of disordered eating in food insecure populations indicates a need to assess for food insecurity and

sources of interpersonal distress due to food insecurity status within clinical interviews. Further, treatment may need to focus on cognitive aspects of disordered eating related to feelings of shame and worthlessness secondary to invalidating, unsupportive, and damaging interpersonal relations (i.e. structural stigma, discrimination, bias, etc.) within a variety of settings to reduce disordered eating behaviors. Further research is needed to replicate and extend findings, as well as look in to the cognitive and behavioral factors of the EDEQ separately. Understanding potential mediators of the relationship between food insecurity and disordered eating will advance both theoretical, prevention, and treatment efforts.

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APPENDIX A

TABLES

Table 1.*Descriptive statistics for the entire sample (N=583). Mean age =37.5*

Variable	n	Frequency (%)	FI		LOCES		EDEQ		Shame		Emotion Coping	
			Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Income	581											
\$0-25,000	294	50.6	8.45	6.38	2.23	1.022	1.77	1.47	4.08	1.24	18.51	7.6
\$26,000-50,000	195	33.6	7.51	5.64	2.27	1.02	1.87	1.39	3.87	1.17	17.83	6.40
\$51,000-\$75,000	43	7.4	8.42	5.96	2.47	1.10	1.94	1.14	4.10	1.21	19.96	7.63
\$76,000-\$100,000	23	4.0	8.22	7.20	2.65	1.09	2.04	1.22	3.73	.90	19.48	5.96
\$101,000-150,000	9	1.5	13.67	7.21	2.68	1.007	2.56	1.28	3.85	.84	20.44	4.19
\$151,000-\$200,000	5	.9	9.60	7.96	2.91	1.09	2.03	.95	3.42	1.34	19	5.83
\$200,000	12	2.1	9.33	8.25	2.97	.96	2.67	1.37	4.11	.72	19.25	6.72
Race	581											
American Indian/Alaskan Native	21	3.6	10.19	6.47	2.90	1.16	1.82	1.17	3.71	1.01	18.43	5.63
Asian	18	3.1	6.33	5.80	2.39	1.01	1.92	1.58	4.35	1.15	20.56	8.25
African American Black	91	15.6	8.20	6.00	2.43	1.04	1.73	1.39	3.78	1.07	17.85	6.81
Spanish Origin/Hispanic/Latino	37	6.4	9.30	7.08	2.86	1.13	1.93	1.23	4.08	1.06	20.03	6.20
Middle Eastern/North African	5	.9	11	9.87	3.32	1.60	2.61	1.42	4.30	1.08	24.80	3.03
Native Hawaiian	2	.3	6	8.49	2.04	.27	1.61	.10	3.73	.38	19.5	2.12
White	340	58.4	7.84	5.91	2.14	.96	1.92	1.49	4.07	1.26	18.52	7.39
Other/Mixed	51	8.8	9.71	7.06	2.58	1.06	1.90	1.27	3.73	.99	18.08	6.27
Prefer Not to Say	16	2.7	8.44	7.79	1.80	.78	.97	1.15	3.94	1.12	14.25	5.45
Gender	581											
Male	130	22.4	8.24	6.09	2.29	1.01	1.68	1.48	3.96	1.05	17.27	6.90
Female	398	68.5	8.06	6.20	2.24	1.03	1.89	1.44	4.03	1.25	18.76	7.16
Transgender	4	.7	11.25	3.20	3.02	.50	2.51	1.01	3.20	.49	17.50	3.70
Other	49	8.4	9.35	7.04	2.83	1.04	2.05	1.12	3.85	1.07	19.45	6.90
Marital Status	581											
Single	267	46	8.52	6.26	2.47	1.05	1.96	1.44	4.02	1.08	18.85	6.77
Married/Living with Partner	208	35.8	8.20	6.34	2.28	1.06	1.87	1.40	3.98	1.24	18.56	6.95
Separated	19	3.3	8.53	5.72	2.49	.84	2.49	1.31	4.37	1.33	21.89	7.93

Divorced	62	10.7	7.97	5.89	1.92	.87	1.59	1.41	3.89	1.24	16.95	7.83
Widowed	25	4.3	5.80	6.285	1.60	.651	.98	1.11	3.79	1.60	14.92	7.45
Parental Status (# of Children in House)	561											
0	320	55	7.94	6.22	2.26	1.04	1.75	1.42	3.97	1.22	18.27	7.15
1	101	17.4	8.35	6.21	2.34	1.04	2.05	1.41	4.05	1.16	19.03	6.81
2	77	13.2	8.95	6.54	2.42	1.08	2.13	1.53	4.13	1.24	19.79	7.47
3	31	5.3	9.29	6.32	2.44	1.00	1.82	1.28	3.89	1.08	17.97	6.92
4	17	2.9	6.47	4.71	2.33	1.15	1.55	1.24	3.72	.87	16.88	6.04
5	6	1	9.50	5.54	2.46	1.00	2.28	1.44	4.55	1.82	19.17	8.75
6	3	.5	13.00	2.65	2.54	.91	1.60	1.41	2.73	1.05	13.67	7.64
7	4	.7	13.25	8.18	2.54	.69	2.15	1.26	4.34	.75	18.50	6.46
8+	2	.3	15.5	4.95	2.35	.816	2.68	.64	4.86	.84	22.5	3.54
History of FI	582											
No	111	19.1	4.18	4.82	1.88	.96	1.24	1.24	3.35	1.17	15.77	6.67
Yes	471	80.9	9.19	6.15	2.41	1.03	2.01	1.43	4.14	1.14	19.11	7.04

Table 2.

All items within the Food Insecurity internalized shame scale.

In the past 30 days, when thinking about your lack of access to food, do you think or feel the following ways:

1. I feel that I am just as competent as anyone
 2. I am less attractive than most other people because of my situation
 3. I feel anxious about my situation because of what people might think of me
 4. I wish I could drastically change my situation
 5. Whenever I think a lot about my situation. I feel depressed
 6. I hate myself because of my situation
 7. My situation is a major way that I judge my value as a person
 8. I don't feel that I deserve to have a really fulfilling social life, because of my situation

 9. I am OK being the way that I am
 10. Because of my situation I don't feel like my true self
 11. Because of my situation, I don't understand how anyone attractive would want to date me
-

Table 3.*Mean, standard deviation, and score range for each variable.*

Variable	Mean	Standard Deviation	Score Range	Skewness	Kurtosis
FI (RCFIM)	8.23	6.24	0-24	.437	-.413
Disordered Eating (EDEQ-G)	1.86	1.42	.05-6.05	.436	-.556
Loss of Control (LOCES)	2.31	1.04	1-5	.534	-.582
Shame (FIIS)	4.03	1.38	1-7	-.050	-.360
Emotion (CIIS-E)	18.47	7.08	7-35	.342	-.595

Table 4.*Partial correlations of main variables. Covariates include income, race, gender, marital status, parental status, and history of FI*

	1	2	3	4	5
1. Food Insecurity (RCFIM)	-				
2. Loss of Control (LOCES)	.25***	-			
3. Disordered Eating (EDEQ-G)	.24***	.59***	-		
4. Shame (FIIS)	.22***	.15**	.31***	-	
5. Emotion (CIIS-E)	.21***	.44***	.60***	.44***	-

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 5.

Results of hierarchical regression analyses for hypothesis 2: Internalized shame will mediate the relationship between food insecurity and global disordered eating.

	<i>Adj. R²</i>	<i>F</i>	<i>df</i>	<i>Standardized β</i>	<i>t</i>	<i>LL</i>	<i>UL</i>	<i>Partial Correlation</i>	<i>Part Correlation</i>
Disordered Eating									
Model 1	.05	5.94***	6,574						
Income				.08	1.98*	.00	.469	.08	.08
Race				-.07	-1.57	-.43	.05	-.07	-.07
Gender				-.01	-.21	-.28	.24	-.01	-.01
Marital Status				.04	.80	-.15	.35	.03	.03
Children				.06	1.32	-.08	.41	.06	.05
History of FI				.23	5.19***	.48	1.07	.21	.21
Model 2	.10	10.24***	7,573						
FI				.24	5.83***	.04	.07	.24	.23
Disordered Eating									
Model 1	.05	5.94***	6,574						
Income				.08	1.98*	.00	.469	.08	.08
Race				-.07	-1.57	-.43	.05	-.07	-.07
Gender				-.01	-.21	-.28	.24	-.01	-.01
Marital Status				.04	.80	-.15	.35	.03	.03
Children				.06	1.32	-.08	.41	.06	.05
History of FI				.23	5.19***	.48	1.07	.21	.21
Model 2	.15	14.40***	7,573						
Shame				.31	7.84***	.24	.41	.31	.30
Shame									
Model 1	.07	8.06***	6,574						
Income				-.05	-1.18	-.35	.09	-.05	-.05
Race				-.13	-3.09**	-.59	.13	-.13	-.12
Gender				-.02	-.41	-.29	.19	-.02	-.02
Marital Status				.01	.22	-.22	.27	.01	.01
Children				-.01	-.31	-.27	.20	-.01	-.01
History of FI				.241	5.92***	.57	1.13	.24	.24
Model 2	.12	11.53***	7,573						
FI				.23	5.50***	.03	.06	.23	.22

Disordered Eating

Model 1	.05	5.94***	6,574						
Income				.08	1.98*	.00	.469	.08	.08
Race				-.07	-1.57	-.43	.05	-.07	-.07
Gender				-.01	-.21	-.28	.24	-.01	-.01
Marital Status				.04	.80	-.15	.35	.03	.03
Children				.06	1.32	-.08	.41	.06	.05
History of FI				.23	5.19***	.48	1.07	.21	.21
Model 2	.17	15.40***	8,572						
FI				.18	4.39***	.02	.06	.18	.17
Shame				.28	6.78***	.20	.37	.27	.26

Note. LL= lower limit; UL = upper limit. FI= Food Insecurity. Children= Children in the home. *p<.05, **p<.01, ***p<.001

Table 6.

Results of hierarchical regression analyses for hypothesis 3: Internalized shame will mediate the relationship between food insecurity and loss of control over eating

	Adj. R ²	F	df	Standardized β	t	95% CI		Partial Correlation	Part Correlation
						LL	UL		
Loss of Control									
Model 1	.07	8.54***	6,574						
Income				.07	1.62	-.03	.31	.07	.07
Race				.16	3.82***	.16	.51	.16	.15
Gender				.07	1.73	-.03	.31	.07	.07
Marital Status				.01	.16	-.17	.20	.01	.01
Children				.02	.50	-.13	.20	.02	.02
History of FI				.20	4.82***	.31	.73	.20	.19
Model 2	.13	13.10***	7,573						
FI				.25	6.10***	.03	.06	.25	.24
Shame									
Model 1	.07	8.06***	6,574						
Income				-.05	-1.18	-.35	.09	-.05	-.05
Race				-.13	-3.09**	-.59	.13	-.13	-.12
Gender				-.02	-.41	-.29	.19	-.02	-.02
Marital Status				.01	.22	-.22	.27	.01	.01
Children				-.01	-.31	-.27	.20	-.01	-.01
History of FI				.241	5.92***	.57	1.13	.24	.24
Model 2	.12	11.53***	7,573						
FI				.23	5.50***	.03	.06	.23	.22
Loss of Control									
Model 1	.07	8.54***	6,574						
Income				.07	1.62	-.03	.31	.07	.07
Race				.16	3.82***	.16	.51	.16	.15
Gender				.07	1.73	-.03	.31	.07	.07

Marital Status				.01	.16	-	.20	.01	.01.
Children				.02	.50	-	.20	.02	.02
History of FI				.20	4.82***	.31	.73	.20	.19
Model 2	.09	9.27***	7,573						
Shame				.15	3.56***	.05	.17	.15	.14
Loss of Control									
Model 1	.07	8.54***	6,574						
Income				.07	1.62	-	.31	.07	.07
Race				.16	3.82***	.16	.51	.16	.15
Gender				.07	1.73	-	.31	.07	.07
Marital Status				.01	.16	-	.20	.01	.01.
Children				.02	.50	-	.20	.02	.02
History of FI				.20	4.82***	.31	.73	.20	.19
Model 2	.13	12.23***	8,572						
FI				.23	5.45***	.02	.05	.22	.21
Shame				.10	2.32*	.01	.13	.10	.09

Note. CI= confidence interval. LL= lower limit; UL = upper limit. FI= food insecurity.

Children= children in the home. *p<.05, **p<.01, ***p<.001

Table 7.

Results of hierarchical regression analysis for hypothesis 4: Emotion focused coping will moderate the mediated relationship between internalized shame and disordered eating, such that the interaction between shame and emotion focused coping would predict higher levels of global disordered eating

	Adj. R ²	F	df	Standardized β	t	LL	UL	Partial Correlation	Part Correlation
Disordered Eating									

Model 1	.05	5.94***	6,574						
Income				.08	1.98*	.00	.469	.08	.08
Race				-.07	-1.57	-.43	.05	-.07	-.07
Gender				-.01	-.21	-.28	.24	-.01	-.01
Marital Status				.04	.80	-.15	.35	.03	.03
Children				.06	1.32	-.08	.41	.06	.05
History of FI				.23	5.19***	.48	1.07	.21	.21
Model 2	.27	27.99***	8,572						
Shame				.39	10.68***	.05	.07	.41	.38
EC				.17	4.33***	.02	.04	.18	.15
Model 3	.27	24.84***	9,571						
Shame*EC				-.01	-.17	-	-	-.01	-.01
						.002	.001		

Note. CI= confidence interval. LL= lower limit; UL = upper limit. FI= food insecurity.

Children= children in the home. EC= emotion focused coping. *p<.05, **p<.01,

***p<.001

Table 8.

Results of hierarchical regression analysis of hypothesis 5: Emotion focused coping will moderate the mediated relationship between internalized shame and loss of control, such that the interaction between shame and emotion focused coping would predict higher levels of loss of control over eating

	Adj. R ²	F	df	Standardized β	t	LL	UL	Partial Correlation	Part Correlation
Loss of Control									
Model 1	.07	8.54***	6,574						
Income				.07	1.62	-.03	.31	.07	.07
Race				.16	3.82***	.16	.51	.16	.15
Gender				.07	1.73	-.03	.31	.07	.07
Marital Status				.01	.16	-.17	.20	.01	.01
Children				.02	.50	-.13	.20	.02	.02
History of FI				.20	4.82***	.31	.73	.20	.19
Model 2	.25	25.12***	8,572						
Shame				-.06	-1.31	-.10	.02	-.06	.05
EC				.45	11.06***	.05	.08	.42	.40
Model 3	.25	22.51***	9,571						
Shame*EC				-.05	-1.21	-.01	.00	-.05	-.05

Note. CI= confidence interval. LL= lower limit; UL = upper limit. FI= food insecurity.

Children= children in the home. EC= emotion focused coping. *p<.05, **p<.01,

***p<.001

Table 9.*Results of hierarchical regression analyses for post hoc analyses*

	<i>Adj. R²</i>	<i>F</i>	<i>df</i>	<i>Standardized β</i>	<i>t</i>	<i>LL</i>	<i>UL</i>	<i>Partial Correlation</i>	<i>Part Correlation</i>
Shame									
Model 1	.07	8.06***	6,574						
Income				-.05	-1.18	-.36	.09	-.05	-.05
Race				-.13	-3.09**	-.59	-.13	-.13	-.12
Gender				-.02	-.41	-.29	.19	-.02	-.02
Marital				.01	.22	-.22	.27	.01	.01
Status									
Children				-.01	-.31	-.27	.20	-.01	-.01
History of				.24	5.92***	.57	1.13	.24	.24
FI									
Model 2	.26	26.49***	8,572						
FI				.14	3.68***	.02	.05	.15	.13
EC				.40	10.71***	.06	.09	.41	.38
Model 3	.26	23.52***	9,571						
FI*EC				.01	.28	-	.002	.01	.01
						.002			
Disordered Eating									
Model 1	.05	5.94***	6,574						
Income				.08	1.98*	.00	.469	.08	.08
Race				-.07	-1.57	-.43	.05	-.07	-.07
Gender				-.01	-.21	-.28	.24	-.01	-.01
Marital				.04	.80	-.15	.35	.03	.03
Status									
Children				.06	1.32	-.08	.41	.06	.05
History of				.23	5.19***	.48	1.07	.21	.21
FI									
Model 2	.40	48.50***	8,572						
FI				.12	3.50***	.01	.04	.15	.11
EC				.56	16.77***	.10	.13	.57	.54
Model 3	.40	43.50***	9,571						
FI*EC				-.003	-.11	-	.002	-.004	-.003
						.002			
Loss of Control									
Model 1	.07	8.54***	6,574						
Income				.07	1.62	-.03	.31	.07	.07
Race				.16	3.82***	.16	.51	.16	.15
Gender				.07	1.73	-.03	.31	.07	.07
Marital				.01	.16	-.17	.20	.01	.01.
Status									
Children				.02	.50	-.13	.20	.02	.02
History of				.20	4.82***	.31	.73	.20	.19
FI									

Model 2	.27	27.99***	8,572						
FI				.17	4.33***	.02	.04	.18	.15
EC				.39	10.68***	.05	.07	.41	.38
Model 3	.27	24.84***	9,571						
FI*EC				-.006	-.17	-	.001	-.01	-.01
						.002			

Note. CI= confidence interval. LL= lower limit; UL = upper limit. FI= food insecurity.

Children= children in the home. EC= emotion focused coping. *p<.05, **p<.01,

***p<.001

Table 10

Endorsement Rates of items on the loss of control over eating scale (LOCES)

Item	Endorsement Rate
1.I felt I had lost control over eating	66.8%
2. I continued to eat past the point I wanted to stop	65.6%
3. I ate until I was uncomfortably full	71.1%
4. I kept eating even though I was no longer hungry	68.7%
5. I found myself eating despite negative consequences	66.8%
6. While eating, I was stuffing myself	69.2%
7. While eating, I felt a sense of relief or release	71.8%
8. I felt a physical rush or high	57%
9. I felt like I was watching or looking at myself from “Outside”	45.4%
10. I could not concentrate on anything other than eating	51.7%
11. I felt like I could not do anything other than eat	49.3%
12. I finished eating only to discover I had eaten more than I thought	63.2%
13. While eating, it did not seem real	44.4%

Note. Endorsement rate refers to the following endorsements of the item: rarely,

occasionally, often, and always.

APPENDIX B

FIGURES

Figure 1

The role of shame and coping within the relationship between food insecurity and eating disorders

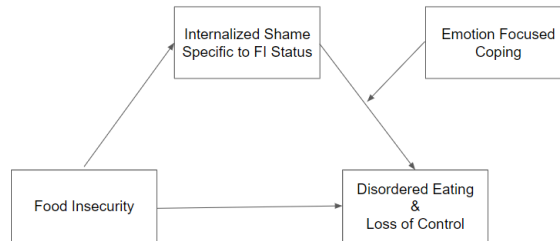
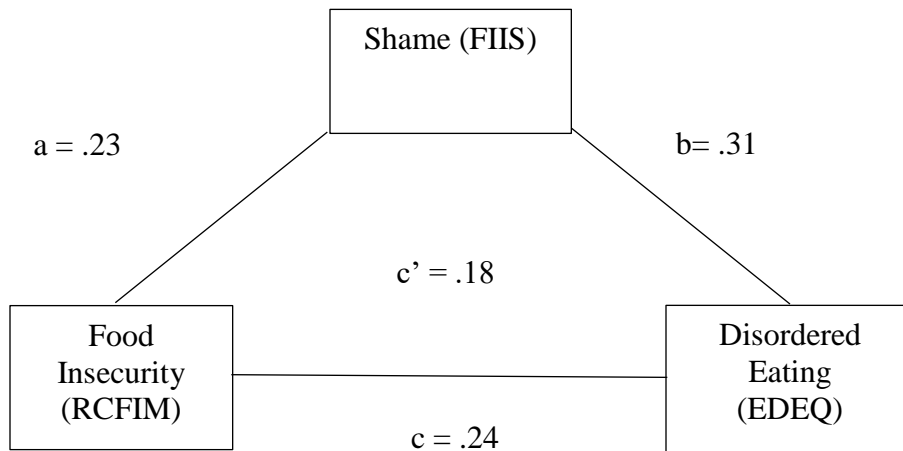


Figure 2.

Mediation analysis. Severity of FI as predictor variable, Shame as process variable, and EDEQ-G as outcome variable



Note: Standardized Beta's are reported.

Figure 3.

Mediation analysis. Severity of FI as predictor variable, Shame as process variable, and LOCES as outcome variable

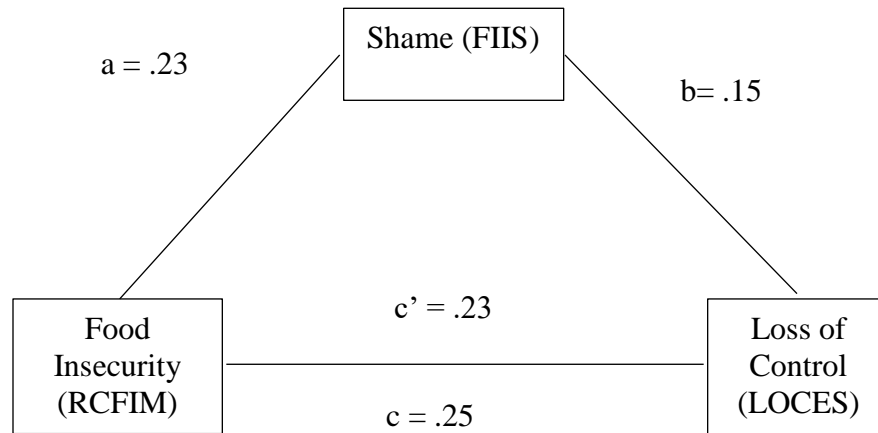


Figure 4.

Moderation analyses for hypothesis 4. There were no significant interactions between emotion focused coping and internalized shame on disordered eating.

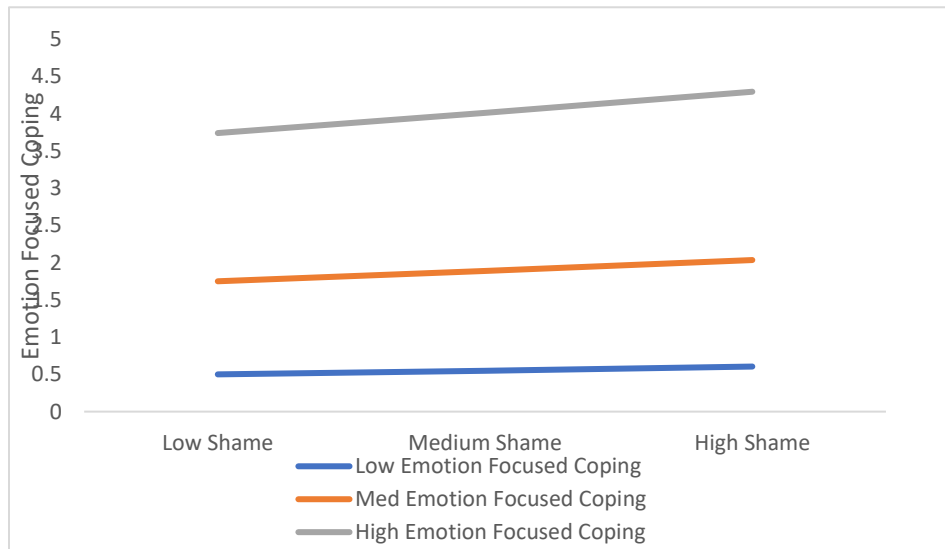


Figure 5.

Post Hoc moderation analyses. There were no significant interactions between emotion focused coping and food insecurity on internalized shame.

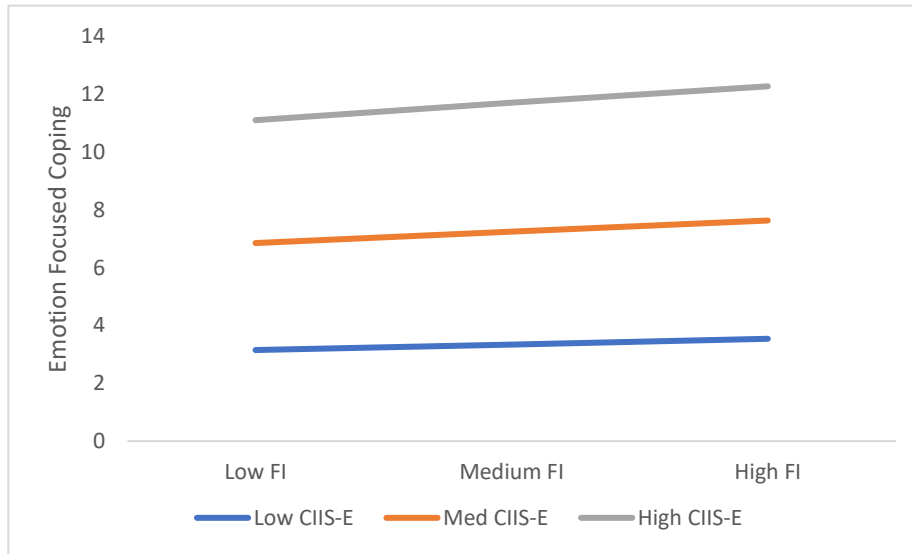


Figure 6.

Post Hoc moderation analyses. There were no significant interactions between emotion focused coping and food insecurity on disordered eating.

