

AMERICAN UNIVERSITY OF BEIRUT

THE RELATIONSHIP BETWEEN FAMILY FUNCTIONING
AND DISORDERED EATING AMONG UNIVERSITY
STUDENTS IN LEBANON: THE MEDIATING ROLE OF
RESILIENCE

by
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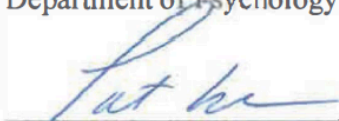
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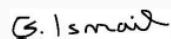
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ABSTRACT OF THE THESIS OF

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Disordered eating has been recognized as a rising concern on college campuses among students. Family functioning has been found to be negatively associated with disordered eating patterns, with a proposed mechanism of lower resilience. Studies have found a positive correlation between family functioning and resilience, and between resilience and disorder eating patterns. Only one study explored this mechanism, finding a mediation effect of resilience on the association between family functioning and disordered eating in a clinical sample. However, no literature has explored this relationship in a non-clinical college sample. The aim of this study is to examine the relationship between family functioning and disordered eating patterns, and the mediating role of resilience in a non-clinical sample of male and female college students in Lebanon. An online survey was administered to a convenience sample of undergraduate students at a Lebanese university ($N=86$) using measures with good psychometric properties, piloted for use with students in Lebanon. Results showed that family functioning was significantly correlated with disordered eating patterns, and with resilience. Only the subscale family cohesion, and not adaptability, was associated with disordered eating. No association was found between resilience and disorder eating. The findings demonstrate the importance of family functioning, particularly cohesion, in playing a role in disordered eating patterns and resilience. The findings also indicate that resilience is not the mechanism that explains the relationship between family functioning and disorder eating for college students in Lebanon. The findings are discussed in the context of multi-level stressors on students at the time of data collection, methodological limitations, and theoretical implications.

Keywords: disordered eating, family functioning, resilience, undergraduate students, Lebanon

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ABBREVIATIONS

1. SES: Socioeconomic Status
2. EAT-26: Eating Attitudes Test
3. FACES-III: Family Adaptability and Cohesion Evaluation Scale
4. RS-25: Resilience Scale

CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

A. Disordered Eating Patterns

Feeding and eating disorders are persistent disorders that result in psychological and physical debilitation (American Psychiatric Association, 2013). Eating disorders include anorexia nervosa, bulimia nervosa, binge-eating disorder, and other specified feeding and eating disorders (APA, 2013), all of which are mutually exclusive. They are characterized by persistent disturbances in eating or eating-related behaviors that cause variations in the consumption or absorption of food and that impair one's physical health and psychosocial functioning significantly (APA, 2013). Each of the mentioned disorders is characterized by a set of psychological and behavioral symptoms or features called disordered eating patterns (Garner et al., 1982; Mintz & O'Halloran, 2000). Disordered eating patterns have been shown to be linked to several psychological consequences (Crow, 2005) such as functional impairments within multiple domains including family, work, personal life, and social life (Hudson et al., 2007), and a decrease in interpersonal competence, quality of life, and general satisfaction (Niemeier, 2003).

It is important to distinguish between eating disorders and disordered eating patterns. Eating disorders are clinically diagnosable disorders involving serious disturbances in eating behaviors that require a health professional's intervention (medical and/or psychological), whereas disordered eating patterns refer to a set of abnormal eating patterns, that can include disruptive feelings, attitudes, and behaviors, that do not currently meet the threshold for a clinical diagnosis (Bryla, 2003).

Disordered eating patterns are therefore considered identifiers of eating disorders and are not characteristic of any specific eating disorder; they are common symptoms among all DSM-5 feeding and eating disorders (APA, 2013; Garner et al., 1982).

Disordered eating patterns include disturbances in one's feelings, attitudes, and behaviors in relation to food and eating (Mintz & O'Halloran, 2000). These disturbances may include extreme reduction of food intake, skipping meals, severe overeating, feelings of distress, preoccupation with one's weight or body shape, feeling guilty after eating, eating in secret, or laxative use (National Institute of Mental Health, 2001). While individuals with disordered eating patterns do not engage in disordered eating patterns as often as those diagnosed with an eating disorder, it is important not to overlook individuals with disordered eating patterns because these disruptive behaviors can act as risk factors that lead to the development of a clinically severe eating disorder (Chavez & Insel, 2007; Forney & Ward, 2013). Moreover, disordered eating patterns are more prevalent than clinical eating disorders that meet DSM-V diagnostic criteria such as anorexia nervosa and bulimia nervosa, and are associated with adverse health consequences (Mintz & Betz, 1988; Solmi et al., 2014). Stice et al. (2009) found that among 18-20 year-old individuals in the U.S., sub-threshold eating disorders were more common than full-criteria eating disorders. Sanchez-Ruiz et al. (2017) showed disordered eating patterns and eating disorders correlated significantly, which was in line with previous research indicating that individuals with disordered eating patterns are at risk of more severe eating disturbances and future psychopathology (Parkinson et al., 2012).

Recent studies have shown that disordered eating patterns are on the rise in both Western and non-Western countries (Ayranci et al., 2010; Kessler et al., 2013; Veses et

al., 2011; Musaiger et al., 2013), including Lebanon (Afifi-Soweid et al., 2017; Yahia et al., 2011; Zeeni et al., 2013), therefore it is crucial to screen for disordered eating patterns among vulnerable populations as a first step in order to identify those who may be at risk for developing a full-blown eating disorder (McBride et al., 2013). Research has shown that early identification and intervention improves the speed of recovery, greatly helps with symptom reduction, and decreases the likelihood of relapse. For instance, studies have shown that when adolescents with anorexia nervosa were given family-based treatment within the first three years of the onset of illness, likelihood of recovery was significantly greater (Lock et al., 2005; Loeb et al., 2007; Russell et al., 1987; Treasure & Russell, 2011). In Lebanon, research on eating disorders is limited, but existing evidence suggests that disordered eating patterns and eating disorders are on the rise (Zeeni et al., 2017).

B. Disordered Eating Among College Students

College years have been shown to be periods of time where students experience a great deal of stress and challenges in coping with academic pressure, separation or individuation from family, and attending to novel responsibilities (Pedrelli et al., 2014). As a result, mental health problems such as anxiety, depression, obsessive-compulsive disorders, eating disorders, and disordered eating patterns are common among college students (Blanco et al., 2008; Eisenberg et al., 2011; Stice et al., 2009). Longitudinal studies have generally found increasing patterns in weight and shape concerns in addition to overall eating disorder psychopathology from early/mid adolescence to early adulthood (Calzo et al., 2012; Graber et al., 1994; Slane et al., 2014). Basow et al. (2007) found that during college years, most students experience great changes in their

eating behaviors, body image, and weight. Evidence from a number of sources point to a high prevalence of eating disorders in college populations (Eisenberg et al., 2011), where prevalence of eating disorders among college students ranges from 8-17% (Hoerr et al., 2002; Kirk et al., 2001; Prouty et al., 2002; Reinking & Alexander, 2005). Help seeking behavior seems to be lower in students who show subclinical symptoms. Often, those symptoms worsen into more serious disordered eating with poor prognosis and an increased chance of relapse (Yager et al., 2006).

Over the years, higher prevalence in eating disorders and disordered eating has been shown to be consistent across Western and non-Western countries, including Middle-Eastern countries like Lebanon (Afifi-Souweid et al., 2002; Khawaja & Afifi, 2004; Doumit et al., 2017; Zeeni et al., 2013; Zeeni et al., 2017), the UAE (Schulte & Thomas, 2013), Turkey (Kugu et al., 2006), and Jordan (Madanat et al., 2011; Mousa, et al., 2010). Afifi-Souweid et al. (2002) found worrying amounts of preoccupation with weight, and disordered eating behaviors among first year college students in Lebanon, and females particularly, with a proportion of students stating “often” on preoccupation with weight indicators varying between 3% and 26.8%, and a proportion of students stating “often” on behaviors related to disordered eating varying between 0.8% and 10.7%. In addition, in a cross-cultural study exploring the relationship between eating behaviors and sociocultural influences in female university students in Lebanon and Cyprus, Zeeni et al. (2013) found that Lebanese students were more likely to engage in emotional and external eating (i.e. eating in response to food related cues, regardless of the internal state of hunger or satiety) than Cypriot students in addition to having higher prevalence of social influences on body image, suggesting that the difference between the two could be that Lebanese students might be more sensitive to peers’ opinions and

give more importance to social judgment than Cypriot students. Another study conducted in a Lebanese university exploring disordered eating patterns among college students found that there was a prevalent desire to become thinner, a high awareness of caloric content, and avoidance of particular foods (Afifi-Souweid et al., 2002). Yahia et al. (2011) also showed that among 252 Lebanese university students 4% of the sample reported using diet pills and 8% reported using laxatives, while according to the American College Health Association's National College Health Assessment (ACHA-NCHA) in the USA, 4% of females and 1% of males reported vomiting or taking laxatives to lose weight in the previous 30 days (ACHA, 2008). More recently, Doumit et al. (2017) investigated the vulnerability to eating disorders among 949 female university students and found that 21.2% of the students were vulnerable to developing an eating disorder, which was comparable to prevalence rates of vulnerabilities to eating disorders in other Arab countries such as Algeria, Syria, Libya, and the UAE with prevalence rates of 16.2%, 32%, 32.6%, and 23.4% respectively (Eapen et al., 2006; Musaiger et al., 2013). These rates are also in accordance with prevalence rates in other Western countries such as Greece and the U.S. with prevalence of disordered eating being 18.3% and 25.8% respectively (Costarelli et al., 2011; Rivas et al., 2010). They also found that 11.4% had already been diagnosed with anorexia nervosa, bulimia nervosa, or binge eating disorder by a health professional (Doumit et al., 2017). It is important to note, however, that these studies are not without limitations such as recruiting only female participants, recruiting clinical samples, not taking into consideration existing participant psychiatric diagnoses (if any), and others. Nonetheless, this research shows that MENA countries are also greatly affected by

eating disorders, and particularly Lebanon where a number of studies show alarming rates of eating disorders and disruptive eating patterns.

Knowing that disordered eating patterns are more common than clinical eating disorders, and that the incidence of eating disorders and disordered eating patterns among college students, and in males, is rising, disordered eating patterns among female and male college students should be a public health concern.

C. Etiology of Eating Disorders and Disordered Eating Patterns

Systems theorists and family therapists Minuchin et al. (1978) coined the term psychosomatic families, referring to families with an adolescent with an eating disorder. They suggested that psychosomatic families were characterized by enmeshment, overprotectiveness, rigidity, and lack of conflict resolution. Bruch (1974) suggests that among individuals with anorexia, common family patterns were excessive parental control and the hindrance of children to develop independence. She formulates that anorexia is a way in which a child attempts to proclaim his or her own identity and control at times when he or she feels powerless or ineffective (Bruch, 1978), and their main focus becomes achieving complete control over their eating, weight, and shape, believing that control in these domains is possible when such control is not possible in other aspects of their lives (Polivy & Herman, 2002). Others have proposed theories about the link between family patterns and bulimic disordered eating patterns. According to Johnson and Connors (1987) the link between family patterns and the etiology of bulimia may be that the individual does not acquire the necessary skills to cope with distressing emotional experiences due to the family environment. An individual with bulimia in that case will deal with distressing situations by bingeing

(and then by purging) to gain emotional relief (Polivy & Herman, 2002). Moreover, it is suggested that for both individuals with anorexia and bulimia, the focus on weight loss and other disordered eating patterns provides a way to channel identity concerns, and to avoid dealing with broader issues (Polivy & Herman, 2002).

Several individual characteristics have been explored in relation to the emergence of disordered eating patterns and eating disorders with some studies finding gender, sexual orientation, personality traits, and low self-esteem being associated with the development of eating disorders (Farstad et al., 2016; Loxton & Dawe, 2009; Polivy & Herman, 2002). Additionally, attachment style has been linked to a higher risk of eating disorders, suggesting that insecure attachment can be a risk factor for eating disorders (Troisi et al., 2006). Resilience, which will be described in detail below, has also been studied in relation to eating disorders whereby several studies suggest that individuals with higher levels of resilience show less disordered eating patterns and susceptibility to eating disorders (Calvete et al., 2018; Las Hayas et al., 2014; Leys et al., 2017). Finally, family functioning has been linked to the development of eating disorders (Franko et al., 2008; Minuchin et al., 1978; Polivy & Herman, 2002), with some studies showing that families of patients with anorexia had similar family patterns, with a lack of boundaries between generations as particularly prevalent (Minuchin et al., 1978).

However, some studies have suggested that the link between family functioning and eating disorders is not direct, and the relationship between the two should be examined through indirect links (Wei et al., 2005). Studies have also shown that the components of resilience are directly linked to those of family functioning, especially

family cohesion (Nam et al., 2016; Yee & Suleiman, 2017), making resilience an important variable to explore in relation to family functioning.

D. Family Functioning

According to Olson et al. (1985), family functioning is characterized by its adaptability and its cohesion. Family adaptability relates to the ability to cope with changes and the ability of the family system to change its role relationships and relationship rules in response to situational or developmental stress, while cohesion relates to the degree of autonomy members of the family experience as well as the ability to maintain strong emotional bonds between family members (Olson et al., 1985; Olson et al. 1989). Overly cohesive (enmeshed) and undercohesive (disengaged) families, and overly adaptive (chaotic) and underadaptive (rigid) families are more likely to experience difficulties, while those that fall in the middle range of cohesion (separated or connected) and of adaptability (flexible or structured) are the most adaptive and healthy.

In their review, Mayhew et al. (2017) found that eating disorders are related to specific elements of family functioning such as overprotection, cross-generation enmeshment, emotional unresponsiveness, and intrusiveness. This supports historical texts on family functioning and eating disorders; Minuchin et al. (1978) described how families of adolescent patients with anorexia had similar characteristics, including a lack of cohesion and a lack of boundaries between the generations. Family preoccupation with weight and appearance has been shown to have direct effects on body dissatisfaction and eating symptoms in adolescent girls (Leug et al., 1996), with later studies showing that even the mothers' perception of family functioning among a

sample of 49 female patients diagnosed with anorexia nervosa and bulimia nervosa predicted the daughters' perceptual body size distortion and body dissatisfaction (Benninghoven et al., 2007). Cross-sectional studies have also found that patients with bulimia reported greater parental intrusiveness (Rorty et al., 2000), and perceived parental encouragement of independence is associated with less dieting behaviors (Strong & Huon, 1998). In addition, Waller (1994) found that among individuals with eating disorders, greater family cohesion is associated with less frequent binges. Other cross-sectional studies have found that several additional familial factors can contribute to the development of eating disorders and affect prognosis, such as higher perceived levels of marital conflict between the parents (Salafia et al., 2014) and between the parents and children (Franko et al., 2008), failure to resolve problems (Goncalves et al., 2016), loss of boundaries between family members (Barnhill & Taylor, 2001), low levels of attachment and a lack of parental warmth (Cerniglia et al., 2017; Goncalves et al., 2016), and destructive relationship between parents and daughters (Balottin et al., 2017; Korotana et al., 2018).

There are mixed findings on the differential effects of families in the development of disordered eating patterns (e.g. Beato-Fernandez et al., 2004; Graber et al., 1994; Le Grange et al., 2010; McKnight Investigators, 2003; Nicholls & Viner, 2009). In an 8-year longitudinal study among adolescent girls, Graber et al. (1994) found that eating problems were minimally associated with family relations, four and eight years later. However, some studies argue that it remains possible that other factors can interact with family functionality and contribute to eating disturbances even if family factors alone do not directly relate to increases in eating disorder symptomology (Stice, 2002). Also, since eating pathology may emerge at a later stage, family

functionality may exert its effects on more proximal factors rather than distal ones (i.e. eating disorders), and thus would show weaker links to eating dysfunctionality (Stice, 2002).

This possibility is supported by studies using a developmental psychopathology framework. Tafà et al. (2017) examined the differences in perceptions of family functioning of adolescents with eating disorders and their parents and found that parental psychopathological vulnerabilities and family functioning were associated with the diagnosis of eating disorders. Moreover, some studies have shown that families of diagnosed sufferers of eating disorders have similar patterns of functioning (e.g. disengaged) that are different from families without any sufferers of eating disorders (Casper & Zachery, 1984; Lattimore et al., 1989). In a systematic review of the literature, poorer family functioning was found among families with individuals diagnosed with eating disorders than with those of controls (Holtom-Viesel & Allan, 2014). The evidence therefore points towards a role of family functioning in the risk of disordered eating, particularly when measured by the Family Adaptability and Cohesiveness Evaluation Scale (Olson et al., 1985) examining levels of family cohesion and adaptability. While there is research examining the role of family functioning in the development of eating disorders (e.g. Franko et al., 2008; Leys et al., 2017; Minuchin et al., 1978; Polivy & Herman, 2002), quantitative studies exploring the relationship between family functioning and disordered eating patterns are scarce. Previous studies explored family functioning in relation to eating disorders, however most were conducted on clinical samples with eating disorder diagnoses (Bowles et al., 2011; Leys et al., 2017; Kluck et al., 2018) and with exclusively female samples (Bowles et al., 2011; Franko et al., 2008; Larsen et al., 2017; Leys et al., 2017; Kluck et al., 2018).

Therefore, previous research has been able to shed light mainly on the effects of family functioning on eating disorders in female clinical samples, which not only excludes male samples, but also disregards the effects of family functioning in non-diagnostic samples where disordered eating patterns are just as prevalent. As a result, and as a first step, the current study will aim at filling the research gap between family functioning and disordered eating patterns among both males and females in context non-clinical sample of college students.

The relationship between family functioning and the likelihood of eating disorders and disordered eating patterns may be explained by a number of salient mechanisms, however, one important understudied factor is resilience, which is the main focus of this study.

E. Mediating Variables

The mechanism between poor family functioning and the development of eating disorders is not clearly understood. Developing disordered eating patterns may be affected by many other intermediary factors that can be mutually accountable for the relationship between both variables (Canals et al., 2009). As discussed, it is suggested that the relationship between family functioning and eating disorders goes beyond the direct link (Wei et al., 2005) and other direct and indirect factors can further explain the relationship between the two. Studies on mediators and moderators of family functioning and eating disorders stem from research exploring, personality characteristics, body dissatisfaction, emotional dys/regulation, and resilience (Kroplewski et al., 2019). In fact, several mediators have been extensively studied in relation to family functioning and eating disorders such as attachment style, self-esteem,

self-compassion, and body image dissatisfaction (Eggert et al., 2007; Gouveia et al., 2018; Kluck et al., 2010; Kroplewski et al., 2019; Münch et al., 2016; Tasca et al., 2009). To date, however, only one study by Leys et al. (2017) has examined the mediating role of resilience and found that resilience mediated the link between family functioning and eating disorders, but without controlling for any possible covariates. No known study has been conducted on resilience as a mediating factor in disordered eating, including both males and females, in a non-clinical sample, and controlling for possible covariates.

1. Resilience

Resilience in the field of mental health has been described as process of adapting positively to an adversity such as illness (APA, 2010). It has also been defined as a process of adapting to significant sources of stress or trauma (Luthar, 2006; Schoon, 2006; Windle, 2011). Resilience has been theoretically defined as a dynamic process involving an interaction between protective and risk factors that can be internal and external to the individual (Scoloveno, 2017). It has also been found to negatively correlate with several psychological disorders including depression and anxiety (Fossion et al., 2013), post-traumatic stress disorder (Fossion et al., 2015), addiction (Cuomo et al., 2008), and eating disorders (Leys et al., 2017). Resilience is shown to be adaptable through “person environment interactions” (Lenette et al., 2013) and supportive circumstances such as levels of emotional bonds between members in the family (Chan, 2006; Schweitzer et al., 2006). According to Wagnild and Young (1993), resilience is measured through two main factors. The first is “personal competence” which describes a person’s subjective perception of being able to handle life stressors.

The second is “acceptance of self and life” which describes a person’s subjective perception of being able to flourish and extract meaning from challenges and to have a sense of peace in spite of adversity. These two factors are considered as aspects of personality that promote adaptation (Ruiz-Parraga et al., 2012). Personal competence items measure self-reliance, independence, determination, invincibility, mastery, resourcefulness, and perseverance. The acceptance of self and life factor items measure adaptability, flexibility, and a balanced perspective of life.

Resilience has been shown to be positively associated with family functioning (Besharat, 2007; Leys et al., 2017). Resilience has also been examined in relation to family functioning and mental health disorders. For example, Nam et al. (2016) studied the mediating effect of resilience on the relationship between family functioning and depression among North Korean refugees. They found that resilience fully mediated the relationship between family cohesion and clinical depression when clinical depression was based on culturally-specific cut-off scores, and partially mediated the relationship when depressive symptoms were measured as a continuous construct. However, while resilience is considered a protective factor against mental disorders (Laird et al., 2019; Ziaian et al., 2012), there is little research on its protective function for eating disorders and disordered eating (Las Hayas et al., 2014). For example, Ziaian et al. (2012) discovered that lower resilience scores were found among adolescents with depression and those within the “borderline” and “abnormal” diagnostic categories in comparison to adolescents with no depression and those within the “normal” diagnostic categories respectively. With regards to eating disorders, Las Hayas et al. (2014) explored resilience scores (based on personal competence and acceptance of self and life) among three female groups: the general population, patients currently suffering from eating

disorders, and participants who had recovered from an eating disorder. They found that there were significant differences between the three groups, with patients with eating disorders scoring lower than the other two groups. Similarly, Calvete et al. (2018) investigated the role of resilience factors of personal competence, and acceptance of self and life, on the reduction of eating disorder symptoms over time in patients diagnosed with an eating disorder. Their findings show that both acceptance of self and life and personal acceptance predicted a reduction of eating disorder symptoms (Calvete et al., 2018). In a qualitative study investigating the role of resilience in women who have recovered from eating disorders and primary caregivers of women with eating disorders, several themes came up including deep dissatisfaction with life, acceptance and hope, accountability for the illness, active coping, getting social support, gaining self-knowledge, increased wellbeing, etc (Las Hayas et al., 2015). This shows that resilience can have an impact on several aspects of a person's life and that working on facets of resilience such as personal acceptance and the acceptance of the self may protect a person with eating disorders into succumbing to their unhealthy coping behaviors and patterns in the face of adversity (Fletcher & Sakar, 2013; Las Hayas et al., 2015). For example, resilience could be a protective factor against eating disorder and disordered eating by promoting positivity around food by discussing healthy choices instead of body size and weight (Maor & Cwikel, 2016).

Resilience has been linked to the core components of family functioning, and has been linked to eating disorders, however, it has been less studied as a mediating variable between the two, and hasn't been studied in relation to disordered eating in males and females. The current study will attempt to explain the role of resilience in the relationship between family functioning and disordered eating.

F. Individual and Sociocultural Risk Factors

It is important to explore the individual risk factors and attributes that have been found to contribute to disordered eating patterns. There is limited research on some systemic and individual risk factors, in particular, family functioning and resilience, which is the focus of this paper. There are however a number of consistent findings in the literature on the role of individual differences in the etiology of disorder eating, including gender, sexual orientation, socioeconomic status, individual comorbid psychopathology, parental psychopathology, religious affiliations, and adverse events (Ahren et al., 2013; Braden et al., 2014; Doumit et al., 2017; Shearer et al., 2015; Trottier & MacDonald, 2017; Qian et al., 2013). Due to these consistent findings on the aforementioned variables, and since they have not been studied in the literature in relation to family functioning, resilience, and disordered eating patterns altogether, they have been included in the study to check if they would still have an effect on disordered eating. It is also important to note that these variables have been specifically chosen either because they have not been examined enough in the literature (e.g. gender, specifically males, non-clinical samples, etc.) or because there are mixed and inconsistent findings (e.g. sexual orientation, socioeconomic status, etc.), particularly in Lebanon. These will be explored in detail below and were adjusted for in this study.

1. Gender

Many studies investigating disordered eating among college students have focused solely on female participants (e.g. Bardone-Cone & Boyd, 2007; Katsounari & Zeeni, 2012; Mond et al., 2006; Shediak-Rizkallah, 2002; Zeeni et al., 2013),

considering heterosexual women as the most vulnerable to developing disturbed eating behaviors and having disruptive eating patterns (Slevec & Tiggemann, 2011). However, studies have shown that eating disorders are also common among males (Garaigordobil & Maganto, 2013; Striegel-Moore et al., 2009; Thapliyal et al., 2018), with rates making up 25% of total patient samples in some studies (Hudson et al., 2007). While prevalence rates of anorexia nervosa and bulimia nervosa are lower among males (Hoek, 2006; Hudson, 2007; Striegel-Moore & Bulk, 2007; Swanson et al., 2011), prevalence rates of binge eating disorder are similar among males and females (Merikangas et al., 2011). In addition, subthreshold binge eating disorder shows a higher prevalence rate in men than in women (1.9% in men and 0.6% in women) (Hudson et al., 2007). A meta-analysis of community surveys reported the lifetime, 12-month, and 4-week prevalence of eating disorders among females as 4.2-, 2.6-, and 3.2-fold the corresponding prevalence in males respectively (Qian et al., 2013). Prevalence rates for males are rising (Mond et al., 2014), and Keski-Rahkonen and Mustelin, (2016) showed that while rates for bulimia nervosa remained stable (12 per 100,000 person-years) in women, it tripled among men. Moreover, in the UK, the prevalence rates of eating disorders are also increasing at a faster rate in boys than girls with an increase of 98% between 2010 and 2018 in young men (NHS Digital, 2018).

Eating disorder symptomology emerges differently across males and females whereby males are more likely to report overeating, while females are more likely to report loss of control while eating (Striegel-Moore et al., 2009). In addition, it is more common among females to report weight dissatisfaction, drive for thinness, and use of purging while males report binge eating and use of excessive exercise for weight control (Anderson & Bulik, 2004; Lewinsohn et al., 2002).

In Lebanon, there are a few studies investigating eating disorders among both males and females (Afifi-Souweid et al., 2002; Khawaja & Afifi, 2004; Sanchez-Ruiz et al., 2017; Sukariyah & Sidani, 2014; Tamim et al., 2006; Yahia et al., 2011). In their study, Yahia et al. (2011) found that 52% of females in comparison to 81% of males were not worried about weight loss, with body shape concerns higher among females than males. Using a cross-sectional study, Tamim et al. (2006) found that among 2,013 Lebanese university students, females were more prone to engage in extreme weight control practices than males. Afifi-Souweid et al. (2002) found that female university students were less likely to be classified as overweight or obese and more likely to be trying to lose weight (52.9% vs. 24.5% in males). Restricting research on eating disorders to samples of females is limiting because conclusions are only drawn for half the population, despite evidence of increasing global prevalence rates for males. Given that the literature has neglected disordered eating among males in comparison to females, more recent data should be gathered on eating disorders and disordered eating patterns among males to be able to identify gender differences in prevalence rates, and to inform mental health service planning. This will not only help in reducing the stigma of eating disorders for males, but would also put pressure on publicizing the importance of males being able to recognize and respond to eating disorder symptomology. Males share similar and different clinical presentations of eating disorders with females, and this would mean that diagnostic classifications, instruments, conceptualization and treatment of disordered eating and eating disorders needs to be refined to meet the needs of males with eating disorder symptoms.

2. Sexual Orientation

There have been some mixed findings among research investigating the prevalence of disordered eating patterns among lesbian, gay, and bisexual (LGB) individuals and heterosexual individuals (Cella et al., 2010; Feldman & Meyer, 2007; Matthews-Ewald et al., 2014). Some studies found no differences in the prevalence of eating disorders symptomology for lesbian, bisexual, and heterosexual women (Cella et al., 2010; Feldman & Meyer, 2007; Frisell et al., 2010), while other studies did find significant differences compared to heterosexual women, with lesbian and bisexual women reporting great eating disorder symptomology than heterosexual women (Hadland et al., 2014; Shearer et al., 2015). On the other hand, studies investigating the prevalence of disordered eating patterns among gay and bisexual men in comparison to heterosexual men have been consistent, with gay and bisexual men reporting greater symptoms of eating disorders (Cella et al., 2010; Feldman & Meyer, 2007; Hadland et al., 2014; Matthews-Ewald et al., 2014; Shearer et al., 2015; Russell & Keel, 2002; Williamson & Hartley, 1998; Yager et al., 1988). In a study examining predictors of disordered eating patterns among 129 Lebanese self-identified gay men, Naamani & Al Jamil (2018) found that self-objectification and shame-proneness were significant predictors of disordered eating patterns among gay men. While there is some research on the lives and wellbeing of Lebanese LGB individuals (Wagner et al., 2013; Naamani & Al Jamil, 2018), there is little evidence on disordered eating patterns among the LGB population in Lebanon and how the prevalence of disordered eating differs between LGB individuals and heterosexual individuals.

3. Socioeconomic Status (SES)

Eating disorders have been historically thought to be disorders of wealthy, white, young females (Bruch, 1973), however more recent studies have shown that other demographic groups are affected by disordered eating including low SES families, males, middle-aged and older people, and people of non-White ethnicity (Gentile et al., 2007; Hudson et al., 2007; Lee et al., 2013; Shaw et al., 2004). SES is assessed through indexes made up of measures of income, education level, and occupation, however, due to complexity of measurement, many studies have used income as an indicator (APA, 2007).

Studies using income have found mixed results. Swanson et al. (2011) found no association between household income and eating disorders among adolescents. Lee et al. (2013) conducted a study in Korea and found that the association between the risk of eating disorders and SES was U-shaped with girls among the lowest and highest SES ranges being at highest risk (Lee et al., 2013). Interestingly, Power et al. (2008) found that lower SES levels predicted higher eating disorder scores among female adolescents. In an analysis of cross-sectional surveys conducted in 1998 and 2008, prevalence of eating disorder symptoms was comparable between participants of below-median household income and those above-median income (Mitchison et al., 2014) indicating that both low and high income may be risk factors for adolescent disordered eating.

Research has shown that SES is an important variable to control for when exploring disordered eating patterns. In order to address the discrepancies in previous research regarding SES and disordered eating patterns, the current study measured SES through annual household income.

4. Comorbid Psychopathology

Comorbidity of eating disorders and other mental disorders have been investigated in several studies (Blinder et al., 2006; McElroy et al., 2016; Solmi et al., 2016), and studies have shown that eating disorders are highly comorbid with depression, anxiety disorders, and personality disorders (Couturier, 2004). Swinbourne et al. (2012) investigated the prevalence of comorbid eating and anxiety disorders among 100 women presenting for inpatient and outpatient treatment for an eating disorder, and found that 65% of the sample had at least one comorbid anxiety disorder. Other studies have shown that the onset of anxiety disorders sometimes precedes the onset of eating disorders (Bulik, 2003; Godart et al., 2003). Thus, understanding the relationship between those disorders becomes complicated because the onset of both disorders could be due to common vulnerability factors such as family functioning (Godart et al., 2003). In addition, some personality disorders (e.g. borderline personality disorder) share similar characteristics and symptoms with eating disorders (e.g. bulimia nervosa), such as impulsivity, emotional instability, and rapid mood changes. Any comorbid disorders with eating disorders should be recognized and diagnosed as they impact recovery and those with comorbid disorders show higher and more severe symptoms of eating disorders. In fact, failure to recognize comorbidities shows higher rates of relapse and is associated with more bingeing and purging behaviors (Spindler & Milos, 2007). Thus, given that comorbid disorders along with eating disorders have been shown to impact the person's eating disorder symptomology and severity, the current study measured individual comorbid disorders and included it as an additional correlate of disordered eating behaviors among college students.

5. Parental Psychopathology

Previous research has clearly established the link between parental and child psychopathology (Goodman et al., 2011; Ha et al., 2008; Hicks et al., 2004; Hodge et al., 2010; Mordoch & Hall, 2002; Ramchandani & Psychogiou, 2009; van Meurs et al., 2009; Vostanis et al., 2006). Children of parents with psychiatric disorders have been shown to be at an increased risk for a range of psychological problems including emotional, behavioral, and cognitive difficulties (Ashford et al., 2008; Leverton, 2003; Wang & Goldschmidt, 1994; Weijers et al., 2018). Some of the associations between parental and child psychopathology have shown to be non-specific, meaning a parent with a mental disorder increases the risk of the children having any mental disorder, and not specifically the disorder of the parent (Weijers et al., 2018). For example, studies have shown that children with parents who have externalizing disorders (conduct disorder or drug/alcohol dependence) have higher chances of developing internalizing and externalizing disorders (Bierut et al., 1998; Clark et al., 1997; Hicks et al., 2004; Weijers et al., 2018). In addition, other studies have shown that children whose mothers are diagnosed with depression have a high risk of developing depression themselves as well as conduct behavior problems (Beck, 1999; Goodman & Gotlib, 1999). In terms of eating disorders, there has been a great deal of research on maternal psychopathology, including eating disorders, and its effect on child psychopathology. Studies have shown that mothers with eating disorders, depression, and anxiety significantly affect their children's emotional and behavioral functioning, and more specifically their eating behaviors (Braden et al., 2014; Coulthard et al., 2004; Coulthard & Harris, 2003; Goodman et al., 2011). Given the research on parental psychopathology and its impact on child psychopathology, specifically eating disorders, the current study also assessed

parental psychopathology as an additional correlate of disordered eating behaviors among college students.

6. *Religious Affiliations*

Religious affiliation has been shown to play a protective role against a variety of psychological and physiological illnesses (Afifi et al., 2011; Hackney & Sanders, 2003). Doumit et al. (2017) investigated the associations between vulnerability to eating disorders and religious affiliations in a sample of university students in Lebanon. They found that affiliating as a Christian significantly decreased the risk of developing an eating disorder, while affiliating as a Muslim or Druze was not significantly associated to eating disorder vulnerability. Several other studies have supported that Muslim women who live in Western countries or who are the first generation to be exposed to Western media have higher rates of disordered eating patterns compared to non-Muslim women in Western countries (Al-Adawi et al., 2002; Apter et al., 1994; Eapen et al., 2006; McCourt & Waller, 1995; Nasser, 1986; Nasser, 1994; Thomas et al., 2002). Given the religious diversity of Lebanon and the link between religious affiliation and vulnerability to disordered eating behaviors, this study measured and controlled for religious affiliation.

7. *Adverse Life Events*

Several studies have found an association between the experiencing of adverse life events (e.g. childhood emotional abuse, sexual abuse, separation) and the likelihood of developing an eating disorder (Trottier & MacDonald, 2017). Fossion et al. (2015) showed that a family that has been exposed to several traumas will more likely foster a

dysfunctional family structure according to Olson et al.'s (1985) dimensional model of adaptability and cohesion (Fossion et al., 2015; Leys et al., 2017). This relationship between adverse life events and eating disorders is not straightforward however.

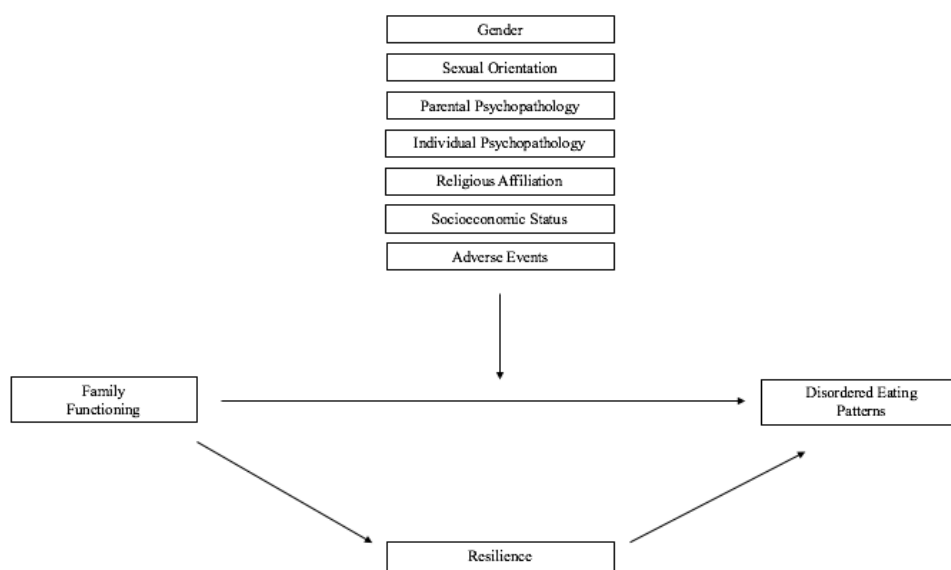
Adverse life events can have the opposite effect and increase the potential for resilience which in turn can help decrease the likelihood of developing mental disorders, including eating disorders (Seery, 2011). Therefore, the relationship between family functioning, adverse life events and propensity to developing an eating disorder seems to depend on whether a person is able to foster a sense of resilience and adaptability. As a result of this possible confounding effect, adverse life events were controlled for in the current study.

G. Theoretical Framework

Leys et al. (2017) adapted Fossion et al.'s (2015) model of anxio-depressive disorders linked family dysfunctionality through lower resilience, to higher levels of symptomology. To support this model, the authors showed that women brought up in dysfunctional families were more vulnerable to developing eating disorders (Leys et al., 2017). They found that resilience mediates the main effect between family functioning and eating disorders (Leys et al., 2017). Distressing family relationships and experiences are therefore thought to influence the development of resilience (Charles & Almelda, 2007; Stawski et al., 2008) and it is this resilience that can buffer the risk of developing disordered eating (Nam et al., 2016). A number of individual risk factors that have been linked to disordered eating may exacerbate or moderate this risk, including gender, sexual orientation, SES, religious affiliation, comorbid psychopathology, parental psychopathology, and adverse life events.

The theoretical framework for this study is shown in Figure 1, where the relationship between family functioning and disordered eating is mediated by resilience, influenced by other individual risk factors. These factors will be adjusted for in this study.

Figure 1. Theoretical Framework.



Following this framework, the current study explored the mediating effect of resilience on family functioning and disordered eating patterns in a male and female college sample. The current study builds on the previous studies not only by including males and a non-clinical student sample, but also by controlling for the main individual risk factors including socioeconomic status, sexual orientation, individual comorbid psychopathology, parental psychopathology, religious affiliation, and adverse life events that have been linked to disordered eating, family functioning, and resilience.

CHAPTER 2

AIMS AND HYPOTHESES

A. Aims

The current study aims to investigate the mediating effect of resilience on the relationship between family functioning and disordered eating patterns, in a sample of both male and female college students.

B. Hypotheses

The five following hypotheses have been generated to address the aims of the proposed study:

Family functioning has been shown to be associated with disordered eating patterns (Holtom-Viesel & Allan, 2014; Le Grange et al., 2010; Tafà et al., 2017), and higher family cohesion and adaptability has been linked to less disordered eating symptomology (Lampis et al., 2014; Meno et al., 2008; Waller, 1994).

1. Hypothesis 1

There will be a main effect between levels of family functioning and disordered eating patterns.

a. Hypothesis 1a

Individuals with lower scores on family cohesion will show more disordered eating symptomology.

b. Hypothesis 1b

Individuals with lower scores on family adaptability will show more disordered eating symptomology.

c. Hypothesis 1c

Individuals with lower scores on family functioning (total score) will show more disordered eating symptomology.

Lower family functioning has been linked to lower resilience (Besharat, 2007; Nam et al., 2016; Yee & Sulaiman, 2017).

2. *Hypothesis 2*

Individuals with low scores on family functioning will show lower resilience scores than those in families with higher scores on family functioning.

Lower resilience was associated with more disordered eating symptomology (Calvete et al., 2018; Las Hayas et al., 2014).

3. *Hypothesis 3*

Individuals with lower resilience scores will show more disordered eating symptomology than those with higher resilience scores.

Resilience has been found to mediate the relationship between family functioning and mental health disorders, including eating disorders (Leys et al., 2017; Nam et al., 2016).

4. Hypothesis 4

Resilience will mediate the relationship between family functioning and disordered eating symptomology.

Gender, SES, sexual orientation, individual comorbid psychopathology, parental psychopathology, religious affiliation, and adverse events have all been found to be associated with disordered eating and eating disorders (Ahren et al., 2013; Doumit et al., 2017; Hadland et al., 2014; Streigel-Moore et al., 2009; Trottier & MacDonald, 2017; Weijers et al., 2018).

5. Hypothesis 5

Resilience will still have a mediating effect on the relationship between family functioning and disordered eating even after controlling for gender, SES, sexual orientation, parental psychopathology, religious affiliation, and adverse events.

CHAPTER III

METHODOLOGY

A. Research Design

The current study employed a cross-sectional design with family functioning as the independent variable, resilience as the mediating variable, and disordered eating patterns as the outcome variable. The variables gender, socioeconomic status, sexual orientation, religious affiliation, adverse events, individual psychopathology, and parental psychopathology were measured as covariates. Participants were asked to fill out a socio-demographic questionnaire requesting the following information: age, gender, nationality, sexual orientation, education level, parental education level, annual household income, weight and height, religious affiliation, individual comorbid psychopathology, parental psychopathology, and adverse life events (refer to Appendix A). In addition, three questionnaires, namely the Eating Attitudes Test-26 (EAT-26), Family Adaptability and Cohesion Evaluation Scale-III (FACES-III), and the Resilience Scale-25 (RS-25; refer to Appendices B through D) were administered to the participants. All the instruments were originally in English and were administered as such since the main language at AUB is English. To control for order effects, and with the exception of the demographics section that remained at the beginning of the questionnaire, all included scales were randomized. The estimated time to complete the battery of survey questions was no more than 20-30 minutes.

B. Scales and Instruments

1. Demographics and Additional Information

This section includes the participant's age, gender, religious affiliation, education level, SES, and sexual orientation (See Appendix A). SES was measured through annual household income. Additional information including participant height and weight, and participant history of psychiatric diagnoses were included. Information on parent psychopathology was also asked in addition to amount of exposure to adverse life events. For parental psychopathology, participants were asked to state whether each of their parents has been diagnosed with an eating disorder or any other psychiatric disorder. Adverse life events were measured using Smyth et al.'s (2008) customized survey consisting of five questions about the experience of adverse events to measure students' life experiences (See Appendix A). Participants indicated whether they have experienced an adverse event, the nature of the adverse event(s) (choosing as many as applicable from death of a loved one, divorce or separation of parents, traumatic sexual experience, traumatic violent experience, other), and the age at which the event occurred, the severity of the experience. Participants answered the last 2 questions on a scale of 1 (not at all) to 5 (a great deal). Body Mass Index (BMI) was assessed by dividing self-reported weight in Kilograms by height in centimeters.

2. Disordered Eating

The Eating Attitudes Test-26 (EAT-26; Garner et al., 1982) is the most widely used self-report instrument for screening large populations for attitudes and symptoms characteristic of eating disorders. This scale 26-item standardized screening instrument

is used to assess a wide range of eating disorder symptoms such as dieting, eating attitudes, weight concern, binge eating, anorexia, and bulimia (Garner et al., 1982). Items are scored on a six-point Likert-type scale with scores ranging from 0 (Never) to 6 (Always) (See Appendix B). A score of 20 or above indicates the participant has a risk for developing an eating disorder, with no specific diagnosis of which type of eating disorder. As per the recommendations of the original scale (Garner et al., 1982) in order to create a total score, a value of 3 was assigned to responses of “Always,” a value of 2 was assigned to responses of “Usually,” and a value of 1 was assigned to responses of “Often” for items 1 through 25. A value of 1 was assigned to responses of “Sometimes,” a value of 2 was assigned to responses of “Rarely,” and a value of 3 was assigned to responses of “Never” for item 26. The total score was obtained by summing the items. Garner et al. (1982) found the EAT-26 to have high internal consistencies reliability with a Cronbach’s α ranging from .83 to .94 (Garner et al., 1982). The EAT-26 has been translated into several languages including Arabic, and has been validated in studies using university students in several Arab countries (Al-Subaie, 2000; Musaiger et al., 2013; Nasser, 1986). In addition, since the current sample population is college students and the EAT-26 has been frequently used to measure disordered eating behaviors in non-clinical samples (e.g. Carr & Francis, 2010; Cash et al., 2004; Coombs et al., 2011; Mujtaba & Furnman, 2001), the scale was appropriate for the current study.

3. Family Functioning

Olson et al. (1985) have suggested a theoretical model to assess family through two factors, adaptability and cohesion. Therefore, the authors have operationalized these two factors through the Family Adaptability and Cohesion Scale III (FACES III, Olson

et al., 1985), a 20-item self-report scale, which is one of the most used family assessment scales. It is designed to measure family cohesion (degree to which family members are separated or connected to their family), family adaptability (extent to which the family system is flexible and able to change), and family functioning (extreme, mid-range, moderately balanced, and balanced) (Olson et al., 2003). Following this model, there are four levels of family cohesion and family adaptability. Family cohesion ranges from extremely low cohesion to extremely high cohesion with the four levels being disengaged, separated, connected, and very connected. Family adaptability ranges from extremely low adaptability to extremely high adaptability with the four levels being rigid, structured, flexible, and very flexible. The scores of adaptability and cohesion are then averaged and those scores identify four separate family subtypes which are: Balanced (the more functional), Moderately balanced, mid-range, and extreme (the less functional) (Olson, 1991). FACES III has 10 items for cohesion and 10 items for adaptability. A 5-point rating scale is used to rate individual self-reports with scores ranging from 1 (Almost Never) to 5 (Almost Always). The 10 odd numbered questions are then added to compute the score for cohesion, and the 10 even numbered questions are added to compute the score for adaptability. Both scores are then placed in the corresponding box on the FACES III Linear Scoring and Interpretation sheet (see Appendix C). Family functioning total score is computed by adding the cohesion and adaptability scores and dividing by two. Psychometric data indicated test–retest reliability of 0.93 at a 5-week interval and evidence of discriminate validity has been shown by low correlations between cohesion and adaptability ($r = .03$) (Olson et al., 1985). One of the limitations of the FACES III measure is that it's limited in cross-cultural validity (Kouenski, 2000). Acceptable family dynamics differ across

cultures (Kouenksi, 2000). To the best of our knowledge, FACES III has not been used in a study in Lebanon before, therefore the results from the pilot study were used to ensure the items are clear and culturally relevant.

4. Resilience

The Resilience Scale – 25 (RS-25; Wagnild & Young, 1987) consists of 25 items and is the most frequently used scale to assess resilience in the literature (Ahern et al., 2006; Las Hayas et al., 2014). Each item is responded by means of a seven-option response scale, from 1 (disagree) to 7 (agree) (See Appendix D). The total score ranges between 25 and 175 points. Scores exceeding 161 indicate a very high degree of resilience, among 146-160 a high resilience degree, between 131-145 a moderate degree of resilience, between 116-130 a low degree of resilience, and scores below 100 indicate a very low degree of resilience capacity (Wagnild, 2009). The total score for the scale measuring resilience was obtained by summing the scores obtained on all of the items (Wagnild & Young, 1987). Concurrent validity has been extensively supported with hypothesized and statistically significant associations with morale, self-esteem, life satisfaction, depression, and perceived stress (Wagnild, 2009). The RS-25 has been used in one study in Lebanon and administered in Arabic to Lebanese caregivers using the North American norms due to the lack of scales on norms in Lebanon and the region (Seoud & Ducharme, 2015). Thus, the results from the pilot study were also used to make sure the scale is clear.

C. Participants

To be included in the study, participants had to be Lebanese students from AUB

enrolled in a selected undergraduate psychology courses and 18 years old or above. Participants who were not registered in the selected courses, under 18 years of age, and non-Lebanese students were excluded from the study. The exclusion of non-Lebanese participants was to control for differences in family functioning that may come out due to different cultural dynamics or exposure to Western media that may differ from one country to another. In addition, the current sample is not large enough to have enough participants within each group to make comparisons if needed.

To calculate the required sample size, we applied a method that uses several parameters, including effect size, and power, and produces a recommended sample size using the software G*Power 3.1 (Faul et al., 2009). We calculated the expected effect size, by extracting the average effect sizes found in a similar study by Leys et al. (2017). We set alpha at 0.05, for a total of 10 predictors (including all subscales). Using an average expected effect size of 0.3 (for main effect), the recommended sample size was 77. In order to anticipate loss due to missing data or withdrawal, we added 30% bringing the total required sample size to 99. The final sample retained for the analysis was 86. This sample was above the minimum number required for analysis.

The sample consists of 81.4% females, with ages ranging from 18 to 25 ($M = 19.79$, $SD = 1.44$). As shown in Table 1, for sexual orientation, 89.5% of the participants were heterosexual or straight, while others identified as bisexual or Other. Due to the small numbers, sexual orientation was excluded from the rest of the analysis. In terms of religious affiliation, 40.7% of the participants were Muslim, 27.9% were Christian, and 31.4% were under Other (self-reported as either Druze, agnostic, atheist, or other). For participant BMI, the majority of the sample fell in the normal range (61.6%). In addition, 17.4% of the participants reported to have had a psychiatric

diagnosis and 61.6% of the sample reported to have experienced at least one adverse event, with the majority experiencing the death of a loved one (34.9%). For income, the majority of students' families (39.5%) had an annual income over 120,000,000 LBP (around \$28,000 at the time of data collection). For parental education, the majority of mothers (41.9%) had a Bachelor's degree and the majority of fathers (40.7%) had more than a Bachelor's degree. For parental psychiatric diagnoses, 15.1% of mothers and 8.1% of fathers were reported by participants to have had a psychiatric diagnosis. Overall, the sample consisted of young educated adults with educated parents and a middle to high socioeconomic background.

Table 1
Demographics

Variable	n	%	M	SD
Age (<i>M, SD</i>)			19.79	1.44
Gender				
Male	16	18.6		
Female	70	81.4		
Sexual Orientation				
Heterosexual	77	89.5		
Other	9	10.5		
Religious Affiliation				
Muslim	35	40.7		
Christian	24	27.9		
Other	26	31.4		
Body Mass Index (BMI)				
Underweight (≤ 18.5)	6	7.0		
Normal (≤ 24.9)	53	61.6		
Overweight (≤ 29.9)	18	20.9		
Obese (≥ 30)	9	10.5		
Individual Psychiatric Diagnosis	15	17.4		
Individuals who have experienced an adverse event	53	61.6		
Family Annual Income				
Less than 60,000,000. LBP	26	30.3		
60,000,000 LB to 120,000,000 LBP	23	26.7		
Over 120,000,000 LBP	34	39.5		
Mother's Education				
Less than a college degree	23	26.7		
Bachelor's degree (e.g. BA, BS)	36	41.9		

Higher than Bachelor's degree (e.g. MA, MS, MD, PhD)	27	31.4
Father's Education		
Less than a college degree	23	26.7
Bachelor's degree (e.g. BA, BS)	28	32.6
Higher than Bachelor's degree (e.g. MA, MS, MD, PhD)	35	40.7
Mothers with a Psychiatric Diagnosis	13	15.1
Fathers with a Psychiatric Diagnosis	7	8.1

D. Procedure

Following AUB's IRB SBS approval of the study (reference: SBS-2020-0101), the abovementioned measures were piloted with eight participants recruited through convenience sampling of graduate psychology students. The pilot study involved the administration of the questionnaires via LimeSurvey. Students who expressed an interest were sent an invitation by email (see Appendix E) for the study by a psychology course instructor, those that clicked on the link were presented with the informed consent form, and provided consent by clicking to the next page (see Appendix F). The pilot survey included comments boxes to give feedback on the time needed to complete the questionnaires, the comprehensibility of the scales, the ease in filling them out, and cultural appropriateness of items. Participants were asked to highlight items that may need to be amended to the context of Lebanon. The data collected from the pilot study was not included in the main study or in the data analysis.

The main participant pool was obtained through convenience sampling. Students were recruited from selected undergraduate psychology courses where the instructor agreed to give 1 course credit for participation (see Appendix G for invitation script). Students who were interested in taking part in the study received an extra class credit, and students who do not wish to participate in the study or who were not eligible, were

given the option to write a report on a psychological article in exchange for an extra class credit. Course instructors emailed the class, and those interested in participating clicked the link and were provided with an explanation of the study, their rights as volunteer research participants in the study (see Appendix G). The indicated consent by clicking to the next page. After the measures, the survey was concluded with an information sheet (see Appendix I) that included information on where to access mental health support if needed, and how to receive the extra credit on their course. Extra credit data was collected in a separate survey so that survey responses remained anonymous.

A regression predicting disordered eating patterns with family functioning was conducted. A multivariate model examined the relationship between family functioning and resilience, and the relationship between resilience and disordered eating was explored. The role of resilience as a mediator between family functioning and disordered eating patterns was examined.

CHAPTER IV

RESULTS

A. Pilot Study

Findings from the pilot study led to minor modifications to the presentation and definition of items on scales to ensure their comprehensibility in this population. For example, replacing the words “seldom” and “in stride” with “rarely” and “in a calm and easy way”. The currency was also changed to estimate income in Lebanese Pounds instead of USD, which was sensible given the currency devaluation and fluctuation at the time of data collection.

B. Data Analyses

Data was analyzed using SPSS v25 (IBM SPSS Statistics for Windows, Version 25.0). First, data cleaning was conducted, including identifying missing values, reliability analysis, checking univariate outliers, and the normality of variable distribution. Then, sample and scale descriptives were carried out, and correlation analyses were conducted between scale variables. Prior to conducting regression analyses, test assumptions (multivariate outliers, no outliers in the solution, no influential cases, no multicollinearity, independence of errors, normality of residuals, and homoscedasticity) were tested (Tabachnick & Fidell, 2012). Scale descriptives were then explored, followed by the testing of correlations between the predictor variables and the outcome variable, as well as the correlation between family functioning and resilience. The mediating effect of resilience was not investigated further due to null findings between resilience and disordered eating. However, a final

multiple regression was conducted to investigate whether family functioning predicted disordered eating after controlling for gender, socioeconomic status, religious affiliation, individual psychopathology, parental psychopathology, and adverse events.

Before conducting preliminary analysis, categories in variables that had low cell counts were amalgamated. Therefore, religious affiliation was reduced into three groups, mother's education and father's education were amalgamated together creating a new variable, parental education, and mother's and father's psychiatric diagnoses were amalgamated and reduced into parental psychiatric diagnosis creating three groups.

1. Preliminary Analyses

a. Missing Value Analysis

A total number of 99 participants took part in the study. Thirteen participants were excluded for either fully incomplete data on one of the scales, or for missing more than 25% of a scale. A missing value analysis in addition to Little's MCAR test were conducted. Results obtained show that all items had less than 5% missing values, and data was found to be missing at random since Little's MCAR test showed to be non-significant, $\chi^2(876) = 883.95, p = 0.419$. Therefore, no imputation of data was required.

b. Reliability Analysis

A reliability analysis for the two dimensions of *Cohesion* and *Adaptability* of the Family Adaptability and Cohesion Evaluation Scale was assessed. The measure of internal consistency was analyzed for each subscale. The dimension of *Cohesion* showed to have high reliability with a Cronbach's alpha of .89 (refer to Table 2), and

the dimension of *Adaptability* showed to have an adequate reliability with a Cronbach's alpha of .76 (refer to Table 2). The values were above the recommended criterion of .7 indicating that the scale displays good internal consistency. Furthermore, reliability analyses were conducted for the rest of the scales. All scales had high internal consistency since their Cronbach's alpha were above .70 (see Table 2).

Table 2
Reliability of the Scales and Subscales: Cronbach's alpha

<i>Scales and Subscales</i>	<i>Cronbach's alpha</i>	<i>N of items</i>
<i>Family Adaptability and Cohesion Evaluation Scale (Cohesion)</i>	.89	10
<i>Family Adaptability and Cohesion Evaluation Scale (Adaptability)</i>	.76	10
<i>Family Adaptability and Cohesion Evaluation Scale (Cohesion + Adaptability)</i>	.88	20
<i>Resilience Scale</i>	.89	25
<i>Eating Attitudes Test</i>	.88	26

c. Univariate Outliers and Multivariate Outliers

Univariate outliers were inspected through Z-scores and one univariate outlier was found on the outcome variable (disordered eating behavior). The outlier was kept in the analysis unless the case also turned out to be a multivariate outlier. Multivariate outliers were inspected through Mahalanobis distance. No multivariate outliers were found in the seven regression analyses. The outlier was kept in the analysis.

d. Influential Cases

All the cases had a Cook's distance and standardized DFbeta values that were below 1 indicating that there are no influential cases in the dataset.

e. Normality

Normality of the variables was tested through the examination of the z-scores of skewness. A z-skew value of ± 3.29 was used as the marker for significant skewness and

violation of normality. None of the scores on the variables of resilience, cohesion, adaptability, and total family functioning showed to have a z-skewness greater than +3.29 or less than -3.29 indicating that they are not significantly different from a normal distribution.

2. Scale Descriptives

The calculated mean for the dependent variable of disordered eating patterns ($M = 11.06$, $SD = 10.64$) showed to be below the cut-off score of 20 suggesting that, on average, the sample scored low on disordered eating patterns (see Table 3). In fact, 14 participants (16.3%) scored above the cut-off, while the majority of the patients scored below the cut-off score (83.7%). Furthermore, the calculated mean for the variable of cohesion ($M = 34.87$, $SD = 8.42$) showed that, on average, the sample had low levels of cohesion, while for adaptability ($M = 26.91$, $SD = 6.59$) the levels of adaptability were high. The total score for family functioning ($M = 30.89$, $SD = 6.55$) was shown to be moderately balanced in this sample. The mean of the scores obtained on the scale measuring resilience showed that on average, the sample was moderately resilient ($M = 133.74$, $SD = 18.96$) (see Table 3).

Table 3
Scale Descriptives

	N	Min.	Max.	Mean	SD
Disordered Eating Patterns	86	0	47	11.06	10.64
Cohesion	86	12	47	34.87	8.42
Adaptability	86	10	43	26.91	6.59
Family Functioning Total	86	14.5	44.5	30.89	6.55
Resilience	86	75	174	133.74	18.96

3. Correlation Matrices

The correlations between the predictor variables and the dependent variable, as well as the correlation between family functioning and resilience were tested through a Spearman's rho coefficient using a one-tailed test (refer to Table 4).

Family functioning total score and the subscale cohesion had significant, negative correlations with the outcome variable of disordered eating patterns. Total family functioning had a significant, negative relationship with a small effect size ($r_s = -.19, p < .05$), while family cohesion had a significant negative correlation with a medium effect size ($r_s = -.28, p < .01$). However, the relationship between family adaptability and disordered eating patterns was not significant ($r_s = .20, p = .418$). Moreover, resilience and family type showed a significant, positive correlation with one another with a small to medium effect size ($r = .24, p < .05$). However, the relationship between resilience and disordered eating patterns was negative yet insignificant as well ($r_s = -.08, p = .232$).

Table 4
Correlation Matrix with Predictors

	1	2	3	4	5
1 Disordered Eating Patterns	-	-.08	-.19*	-.28*	.02
2 Resilience		-	.24*	.26**	.16
3 Family Functioning total score			-	.89**	.81**
4 Cohesion				-	.48**
5 Adaptability					-

** $p < .01$ (one-tailed).

* $p < .05$ (one-tailed).

4. Regression Analyses

a. Statistical Assumptions of Multiple Regression.

i. Outliers in the solution

To examine the presence of outliers in the solution, the standardized residual value should be less than the absolute value of 3.29. No outliers in the solution were found in the regression analyses between cohesion and disordered eating, or between family functioning, resilience, and disordered eating while controlling for the covariates. However, case number 40 (ID=13) came out as an outlier in the solution for the regression analyses between family functioning total score and disordered eating patterns, the adaptability subscale of family functioning and disordered eating, resilience and disordered eating patterns, and between family functioning, resilience. However, since this case did not show to be an influential case and because in a large sample size it is expected to obtain at least one outlier that is not well predicted by the regression model (Tabachnick & Fidel, 2012), the case was retained for the analyses.

ii. Multicollinearity

Multicollinearity was checked through the correlation matrix among predictors and the Variance Inflation Factor (VIF) values. All correlations between IVs were below .8, and all VIF values were below 10. Therefore, the assumption of multicollinearity was met for all regressions.

iii. Normality of Residuals

The assumption of normality of the residuals of the outcome variable disordered eating patterns was assessed through the histograms. Normality of residuals for all

regressions was not met evident by positively skewed histograms (refer to Figures 2-8 in Appendix J). Hence, the normality of residuals was not met for all regressions and the reporting of the coefficients in these regressions involved bootstrapping.

iv. Homoscedasticity of regression slope

The scatterplot of the standardized residuals (ZPRED vs. ZRESID) was examined to test the assumption of homoscedasticity across all regressions. The assumption was met as the residuals were scattered evenly across all scores (refer to Figures 9-15 in Appendix J).

v. Independence of errors

In this analysis, the Durbin Watson value among the regressions, which varies usually between 0 and 4 (Field, 2009), varied between 1.84 and 1.86 and thus the assumption of independent errors was met for all regressions.

C. Main Analysis

Separate regression analyses between disordered eating and total family functioning, and disordered eating and family cohesion were conducted. Regression results showed that total family functioning $F(1,82) = 2.69, p <.05$, and family cohesion $F(1, 82) = 8.65, p <.05$, were significant predictors of disordered eating patterns with family functioning model explaining 3% of the total variance and family cohesion explaining 10% (see Tables 5-8).

Table 5

Model Summary of Regression Analysis: Total Family Functioning and Disordered Eating Patterns

Change Statistics

Model	R	R ²	Adjusted R ²	SE of the Estimate	R ² Change	F Change	df1	df2	Sig. F Change
1	.18	.03	.02	9.73	.03	2.69	1	82	.105

Table 6
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Model		B	Bias	SE	Sig. (1-tailed)	95% Confidence Interval	
						Lower	Upper
1	(Constant)	18.59	.20	4.32	.001	.001	.001
	Total Family Functioning	-.27	-.00	.13	.03	.03	.03

Table 7
Model Summary of Regression Analysis: Family Cohesion and Disordered Eating Patterns

Model	R	R ²	Adjusted R ²	SE of the Estimate	R ² Change	Change Statistics			
						F Change	df1	df2	Sig. F Change
1	.31	.10	.08	9.40	.10	8.65	1	82	.00

Table 8
Bootstrap for Coefficients: Family Cohesion and Disordered Eating Patterns

Model		B	Bias	SE	Sig. (1-tailed)	95% Confidence Interval	
						Lower	Upper
1	(Constant)	22.89	.35	4.61	.00	14.28	32.68
	Family Cohesion	-.36	-.01	.12	.00	-.61	-.14

Resilience did not show to have a significant relationship with disordered eating patterns indicating no mediating effect, therefore a mediation analysis was not carried out. The final model was conducted with family cohesion and disordered eating patterns while controlling for the covariates. Family cohesion was entered into the first block along with the covariates, gender, individual psychopathology, parental

psychopathology, religious affiliation, income, and adverse events, using forced entry method (Table 9). Since data was collected during the holy month of Ramadan when Muslims fast, fasting during Ramadan was included in the questionnaire and controlled for in the regression. To control for measuring individual psychopathology against itself, the two participants who had identified having a psychiatric diagnosis of eating disorders were excluded from the analysis. Results showed that the total variance explained by the model as a whole was 25%, $F(10, 68) = 2.23, p < .05$ (Table 9). However, family cohesion did not maintain its significance when entered with the covariates and did not maintain its significance beyond the bivariate level (Table 10). Moreover, results showed that none of the covariates had a significant association with disordered eating patterns when the regression was conducted (Table 10).

Table 9
Model Summary of Regression Analysis: Family Cohesion and Disordered Eating Patterns with Covariates

Model	R	R ²	Adjusted R ²	SE of the Estimate	R ² Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.50	.25	.14	9.17	.25	2.23	10	68	.03

Table 10
Regression Parameters: Family Cohesion and Disordered Eating Patterns with Covariates

Model	B	Bias	Std. Error	Sig. (2-tailed)	Bootstrap ^a	
					95% Confidence Interval	
					Lower	Upper
1 (Constant)	-5.5	.99	10.33	.59	-24.87	15.73
Family Cohesion	-.18	-.02	.12	.15	-.44	.03
Gender	3.2	-.01	2.27	.14	-1.00	8.11
Psychiatric Diagnosis	8.44	.04	5.52	.13	-1.55	20.15
Parental Psychiatric Diagnosis	-2.93	-.25	4.38	.49	-12.42	5.24

Adverse Event	4.01	.21	2.32	.08	-.07	9.11
Low Income	.13	-.40	2.86	.96	-6.33	5.15
High Income	1.59	-.20	2.68	.56	-3.71	6.54
Muslim	-2.71	.36	2.85	.30	-7.53	4.05
Other	4.08	.25	2.93	.17	-1.29	10.27
Fasting Ramadan	2.25	-.19	2.32	.26	-3.39	6.13

* $p < .05$

CHAPTER V

DISCUSSION

In this paper, it was hypothesized that family functioning and resilience will be predictors of disordered eating patterns among male and female college students. It was also hypothesized that resilience will mediate the relationship between family functioning and disordered eating patterns, even after accounting for potential covariates including gender, sexual orientation, socioeconomic status, religious affiliation, parental psychopathology, individual psychopathology, and adverse events. The results showed an association with total family functioning and cohesion but not with adaptability. In addition, there was an association between total family functioning and resilience but not with resilience and disordered eating patterns, therefore no mediation effect was found for resilience. In the final model, family cohesion did not maintain its association with disordered eating when measured with the covariates.

A. Family Functioning

Total family functioning, and specifically family cohesion, was found to be a significant predictor of disordered eating. The other facet of total family functioning, family adaptability, however, had an insignificant association with disordered eating. This is in line with previous studies that have found that low levels of cohesion are associated with increased disordered eating patterns and that adaptability is not associated with disordered eating (Kagan & Squire, 1985; Latzer et al., 2002). This leads to the question of why family cohesion in particular is associated with lower disordered eating levels. One explanation may be that by definition, family cohesion

means that members of the family offer mutual support to each other. This support may help decrease or even prevent disordered eating. Indeed, several other studies have shown that cohesion is associated with lowered levels of other disorders such as depression (Nam et al. 2016). Other than support, families with high cohesion have shown to be supportively involved in each other's lives. So, families with high cohesion may directly prevent a person from engaging in disordered eating patterns. This may be one of the reasons why Kagan and Squire (1985) found that when students move out of their families' homes, their levels of disordered eating increase.

Adaptability on the other hand is the ability of the family system to change its role relationships and relationship rules in response to situational or developmental stress, but a family high on adaptability does not necessarily mean that this family offers support to each other or may have strong emotional bonds. Baker et al. (2011) suggested that family adaptability might be especially pertinent for caregivers of people whose special needs require expanded critical thinking and problem solving and on-going flexibility and accommodation. For example, Deimling et al. (2001) found that for caregivers of impaired elders, low adaptability was the strongest predictor of depression. In addition, Baker et al. (2011) found that in families of adolescents and adults with autism, lower family adaptability may worsen the course of maternal depression and child behavior problems. Therefore, it seems that family adaptability is an important factor for disorders that involve life changes, flexibility in role changing among a family (e.g. the child becoming the caregiver due to illness of parent(s)), or those that need constant accommodation problem solving (e.g. parents of children with autism), which may not be necessary for families dealing with a member with disordered eating or eating disorders. Furthermore, it is important to note that at the

time of data collection (May 2020), participants had already been experiencing an ongoing revolution, an economic collapse, and had been in quarantine under strict “confinement” and possibly isolation from their usual social groups and routines. Altogether, this may therefore be why it was shown that having more cohesiveness among family members was a significant predictor of decreased levels of disordered eating, while adaptability was not.

Despite cohesion’s important role in explaining disordered eating, our results suggested that the variance explained by cohesion significantly decreased when taking into account covariates. Family cohesion did not have a significant relationship with disordered eating patterns beyond the bivariate level. This suggests that other factors such as gender, psychiatric diagnosis, sexual orientation, adverse life events, and others may better explain the risk of disordered eating levels. Indeed, Naamani and Al-Jamil (2018) found a substantial amount of disordered eating patterns among 129 gay men in Lebanon, with 27% of the sample had a risk of developing an eating disorder with their scores being above the cut-off on the EAT-26. Unfortunately, in the current study, the sample size was not large enough to be able to compare between groups on sexual orientation, however as findings on other studies suggest, it is crucial to explore sexual orientation as well as other variables that may be contributing to disordered eating patterns.

B. Resilience

Consistent with hypothesis 2, family functioning showed to be positively associated with resilience, with increased family functioning showing higher levels of resilience. The findings showed that family cohesion specifically had a significant

positive correlation with resilience, which is supported by past literature showing a stronger association between family cohesion and resilience, than family adaptability (Nam et al., 2016; Yee & Sulaiman, 2017). This therefore suggests that when it comes to resilience in the face of adversity and stressful situations, family bonding and support has a more protective effect than how adaptable family members are to their roles in the family and their structural relationships.

Interestingly, while most studies found a positive association between resilience and mental disorders (Fossion et al., 2013; Nam et al., 2016), including eating disorders (Leys et al., 2017), the current study did not show a significant relationship between the two. One explanation may be that the current sample was not a typical sample. Our participants were and still are going through a life changing pandemic filled with uncertainty in a country that's economically collapsing. Recent studies have shown that people have reported lower resilience in comparison to pre-pandemic periods (Killgore et al., 2020). Participants in our study were experiencing an extraordinary amount of stress and increased adversity during the time of data collection, resilience scores may have been lower than what they normally would have been before the pandemic and economic crisis. This low resilience may have not manifested in disordered eating patterns or attitudes yet, as data collection occurred at the height of these stressors. Another explanation may be that this is a real effect, where in the face of this increased collective adversity, individual resilience is limited in its protective effect. Perhaps family cohesion, in this context, is more important to be able to support individual coping to withstand the stress of the collectivistic traumas and adversities facing students in Lebanon. This may explain why the theoretical framework proposed by Leys et al. (2017) was not replicated in our study, context, and population. Further

research in different contexts would help to explore differential impacts of family cohesion and resilience on disordered eating.

C. Strengths and Limitations

This study benefits from exploring the relationship between family functioning and disordered eating patterns among both males and females in a college sample in Lebanon, and including mediating and confounding variables. Past studies have found a high prevalence rate of eating disorders and disordered eating among both males and females in the region and particularly in Lebanon (Doumit et al., 2017; Zeeni et al., 2017), in college students (Afifi-Soued et al., 2002; Doumit et al., 2017; Yahya et al., 2011).

This study is not without limitations. The main limitation is the diversity of the sample in terms of demographics, gender, and major. While initially recruitment of participants from broader psychology courses was intended, it proved to be unfeasible. Thus, recruitment of participants was through core psychology courses, which limited the sample's diversity, especially in terms of gender. Therefore, while the desired sample size was reached, it was not possible to compare variables within the sample (e.g. gender, sexual orientation), thus limiting the investigation into the potential covariate effects. In addition, the majority of the sample came from middle to high socioeconomic backgrounds which also proved to be difficult to explore and compare against participants with lower socioeconomic statuses. Results may have differed if the sample were more diverse in terms of background and demographics. For future studies, it would be important to make sure that the sample is large and diverse enough to have

statistically comparable groups in order to examine if such variables are important in relation to disordered eating patterns among college students.

A third limitation in the current study is the employment of a cross-sectional design, therefore, there no causal inferences can be made. Thus, the findings in the current study should be interpreted in terms of association and not causation. Moreover, the current study captures resilience and family functioning in a fixed moment through the use of a cross-sectional design and self-report questionnaires, thus potentially neglecting dynamic aspects of the variables. Future studies examining the relationship between the three variables should employ a longitudinal and prospective design to address these limitations.

D. Theoretical Framework and Implications

Leys et al.'s (2017) theoretical framework suggesting that the relationship between family functioning and eating disorders is mediated by resilience did not show to be significant in the current sample. Although our data is not representative, it may suggest that the theoretical framework may not be applicable to populations and contexts in which there is severe and acute exposure to adversity.

Recent studies conducted during the pandemic have shown that due to the increased experiences of loneliness during virus-related social and physical distancing, symptoms of eating disorders have been exacerbated (Fernández-Aranda et al., 2020; Rodgers et al., 2020). Studies have also shown that some caregivers felt that they were able to provide more support to their loved ones and spend more time as a family due to increased time at home (Clark Bryan et al., 2020). It has also been suggested that families can ameliorate eating disorder related loneliness (Treasure & Palazzo Nazar, 2016),

supporting the finding that family cohesion is particularly important for reduced disorder eating for sample during the lockdown. Additionally, family identification (i.e. to which we subjectively feel we belong) which has been linked to improved cohesion has been associated with positive mental health outcomes for adolescents even outside eating disorder related contexts (Miller et al., 2017) and those affected by financial distress (Stevenson & Wakefield, 2020) which is also relevant in our context. That being said, we suggest that a family's ability to maintain strong emotional bonds between family members is more important than the family's ability to change role relationships and relationship rules in the face of such stressful events, especially novel stressors such as COVID-19. This emotional commitment and warmth of relations governed on cohesive families may act as a buffer against COVID-19 containment measures, economic instability, and disordered eating attitudes.

The importance of cohesion during the tough times facing Lebanon was also highlighted through its significant association with resilience and the insignificant association between resilience and disordered eating. Perhaps family resilience rather than individual resilience would better capture the relationship between the proposed variables. In light of the findings, we suggest a model that explores the relationship between family cohesion and disordered eating, and the potential mediating factor of family resilience. We also propose exploring which individual risk factors may be contributing to exacerbating this relationship.

In terms of clinical implications in practice, the findings indicate the importance of incorporating family in the treatment of individuals with eating disorders and disordered eating, with an increased focus on family cohesion. A more systemic approach to treatment of disordered eating patterns as well as mental health in general

may be critical, especially during the many crises in Lebanon, where there is a high reliance on family.

E. Conclusions and Future Research

To the best of our knowledge, this is the first study examining family functioning and disordered eating patterns in college students in Lebanon, and the role of resilience within and between the two. The study provides evidence that family functioning, specifically cohesion, and disordered eating are negatively associated, and family that cohesion is also associated with resilience. We did not find evidence that resilience and disordered eating are associated. Based on our findings, we propose that family cohesion is of particular relevance during acute socio-political and economic crisis to support young people at-risk of disorder eating. The attention of practitioners in this context should therefore be on the role of family cohesion in therapy with young college students presenting with disordered eating patterns. Future research is warranted to explore why cohesion may be more protective than adaptability, whether family resilience is more salient as a protective factor in the face of increased adversity, and to explore these concepts in different contexts and populations.

APPENDICES

APPENDIX A: DEMOGRAPHICS AND ADDITIONAL INFORMATION

You can skip any item you prefer not to answer.

1. Age: _____ (In years)

2. Gender:
 - Male
 - Female
 - Other: _____

3. What is your religious affiliation?
 - Muslim
 - Druze
 - Christian
 - Atheist
 - Agnostic
 - Other: _____

4. What religion were you brought up as?
 - Muslim
 - Druze
 - Christian
 - Atheist
 - Agnostic
 - Other: _____

5. Sexual Orientation:
 - Heterosexual
 - Gay
 - Bisexual
 - Other: _____

6. Academic year at university
 - Sophomore
 - Junior
 - Senior

7. Annual family income bracket:
 - Less than 6,000,000 LBP
 - 6,000,000 LBP to 15,000,000 LBP
 - 15,000,000 LBP to 60,000,000 LBP
 - 60,000,000 LBP to 120,000,000 LBP
 - Over 120,000,000 LBP

8. What is the highest level of education completed by your **mother**?
- Less than a high school diploma
 - High school degree or equivalent
 - Vocational degree or skills-based training
 - Some college, no degree
 - Bachelor's degree (e.g. BA, BS)
 - Master's degree (e.g. MA, MS, MEd)
 - Doctorate (e.g. MD, PhD, EdD)
9. What is the highest level of education completed by your **father**?
- Less than a high school diploma
 - High school degree or equivalent
 - Vocational degree or skills-based training
 - Some college, no degree
 - Bachelor's degree (e.g. BA, BS)
 - Master's degree (e.g. MA, MS, MEd)
 - Doctorate (e.g. MD, PhD, EdD)
10. Body Mass Index (BMI):
- a. Approximately, how much do you currently weigh (in kg)? _____
 - b. What is your current height (in cm)? _____
11. Have you ever been diagnosed with one or more psychiatric disorder? If yes, please specify.
- No
 - Yes: _____
12. To the best of your knowledge, has your mother ever been diagnosed with any psychiatric disorder? If yes, please specify.
- No
 - Yes: _____
13. To the best of your knowledge, has your father ever been diagnosed with any psychiatric disorder? If yes, please specify.
- No
 - Yes: _____
14. **Adverse Events:**
- 14a. Have you ever experienced an adverse event(s)?
If no, please select "No" and press submit.
- No
 - Yes: _____
- 14b. Please indicate the nature of the adverse event. Select all that are applicable:
- Death of a loved one
 - Divorce or separation of parents
 - Traumatic experience
 - Upsetting academic upheaval

- Other

Note: If you have been traumatized by an adverse event, please contact the AUB Counselling Service at AUB West Hall, which provides free counseling services to students. Their number is 01-350 000 ext. 3196. You can also contact the Family Medicine Clinic (ext. 3000) or the Department of Psychiatry at AUBMC (ext. 5650) for appointments that qualify for student HIP-coverage.

14c. Please indicate the age at the time the event occurred: *(If selected more than one adverse event, drop down list with age will appear for each selected event)*

- birth to 6 years,
- 7–10 years
- 11–13 years
- 14–16 years
- 17+ years

14d. Please indicate the severity of the event (1 = not at all severe, 5 = a great deal severe):



Not at all

A great deal

15. Are you fasting during Ramadan?

- Yes
- No

APPENDIX B: EATING ATTITUDES TEST-26 (EAT-26)

You can skip any item you prefer not to answer.

Carefully read each of the items listed below, and record the number that best expresses how frequently the statements describe you:

1 = Never 2 = Rarely 3 = Sometimes 4 = Often 5 = Usually 6 = Always

- | | | | | | | |
|--|---|---|---|---|---|---|
| 1. I am terrified about being overweight. | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. I avoid eating when I am hungry. | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. I find myself preoccupied with food. | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. I have gone on eating binges where I feel that I may not be able to stop. | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. I cut my food into small pieces. | 1 | 2 | 3 | 4 | 5 | 6 |
| 6. I am aware of the calorie content of foods that I eat. | 1 | 2 | 3 | 4 | 5 | 6 |
| 7. I particularly avoid food with a high carbohydrate content (i.e., bread, rice, potatoes, etc.). | 1 | 2 | 3 | 4 | 5 | 6 |
| 8. I feel that others would prefer if I ate more. | 1 | 2 | 3 | 4 | 5 | 6 |
| 9. I vomit after I have eaten. | 1 | 2 | 3 | 4 | 5 | 6 |
| 10. I feel extremely guilty after eating. | 1 | 2 | 3 | 4 | 5 | 6 |
| 11. I am preoccupied with a desire to be thinner. | 1 | 2 | 3 | 4 | 5 | 6 |
| 12. I think about burning up calories when I exercise. | 1 | 2 | 3 | 4 | 5 | 6 |
| 13. Other people think that I am too thin. | 1 | 2 | 3 | 4 | 5 | 6 |
| 14. I am preoccupied with the thought of having fat on my body. | 1 | 2 | 3 | 4 | 5 | 6 |
| 15. I take longer than others to eat my meals. | 1 | 2 | 3 | 4 | 5 | 6 |
| 16. I avoid food with sugar in them. | 1 | 2 | 3 | 4 | 5 | 6 |
| 17. I eat diet foods. | 1 | 2 | 3 | 4 | 5 | 6 |
| 18. I feel that food controls my life. | 1 | 2 | 3 | 4 | 5 | 6 |
| 19. I display self-control around food. | 1 | 2 | 3 | 4 | 5 | 6 |
| 20. I feel that others pressure me to eat. | 1 | 2 | 3 | 4 | 5 | 6 |
| 21. I give too much time and thought to food. | 1 | 2 | 3 | 4 | 5 | 6 |

- | | | | | | | |
|---|---|---|---|---|---|---|
| 22. I feel uncomfortable after eating sweets. | 1 | 2 | 3 | 4 | 5 | 6 |
| 23. I engage in dieting behaviour. | 1 | 2 | 3 | 4 | 5 | 6 |
| 24. I like my stomach to be empty. | 1 | 2 | 3 | 4 | 5 | 6 |
| 25. I have the impulse to vomit after meals. | 1 | 2 | 3 | 4 | 5 | 6 |
| 26. I enjoy trying new rich foods. | 1 | 2 | 3 | 4 | 5 | 6 |

Note: Scores greater than 20 indicate a need for further investigation by a qualified professional. Low scores (below 20) can still be consistent with serious eating problems. Those receiving a score of 20 or above, or those who have concerns about their eating attitudes are strongly advised to contact the Counselling Service for an appointment.

If you think that you need talk to someone, please visit or contact the Counseling Center at AUB West Hall, which provides free counseling services to students. Their number is 01-350 000 ext. 3196. You can also contact the Family Medicine Clinic (ext. 3000) or the Department of Psychiatry at AUBMC (ext. 5650) for appointments that qualify for student HIP-coverage.

APPENDIX C: FAMILY ADAPTABILITY AND COHESION EVALUATION SCALE (FACES-III)

You can skip any item you prefer not to answer.

1	2	3	4	5
Almost Never	Once in a While	Sometimes	Frequently	Almost Always

DESCRIBE YOUR FAMILY NOW:

- ___ 1. Family members ask each other for help.
- ___ 2. In solving problems, the children's suggestions are followed.
- ___ 3. We approve of each other's friends.
- ___ 4. Children have a say in their discipline.
- ___ 5. We like to do things with just our immediate family.
- ___ 6. Different persons act as leaders in our family.
- ___ 7. Family members feel closer to other family members than to people outside the family.
- ___ 8. Our family changes its way of handling tasks.
- ___ 9. Family members like to spend free time with each other.
- ___ 10. Parent(s) and children discuss punishment together.
- ___ 11. Family members feel very close to each other.
- ___ 12. The children make the decisions in our family.
- ___ 13. When our family gets together for activities, everybody is present.
- ___ 14. Rules change in our family.
- ___ 15. We can easily think of things to do together as a family.
- ___ 16. We shift household responsibilities from person to person.
- ___ 17. Family members consult other family members on their decisions.
- ___ 18. It is hard to identify the leader(s) in our family.

____ 19. Family togetherness is very important.

____ 20. It is hard to tell who does which household chores.

APPENDIX D: THE RESILIENCE SCALE (RS-25)

You can skip any item you prefer not to answer.

Please read the following statements. To the right of each you will find seven numbers, ranging from "1" (Disagree) on the left to "7" (Agree) on the right. Click the circle below the number which best indicates your feelings about that statement.

	Disagree		Agree
1. When I make plans, I follow through with them.	1 2 3	4 5	6 7
2. I usually manage one way or another.	1 2 3	4 5	6 7
3. I am able to depend on myself more than anyone else.	1 2 3	4 5	6 7
4. Keeping interested in things is important to me.	1 2 3	4 5	6 7
5. I can be on my own if I have to.	1 2 3	4 5	6 7
6. I feel proud that I have accomplished things in life.	1 2 3	4 5	6 7
7. I usually take things in stride.	1 2 3	4 5	6 7
8. I am friends with myself.	1 2 3	4 5	6 7
9. I feel that I can handle many things at a time.	1 2 3	4 5	6 7
10. I am determined.	1 2 3	4 5	6 7
11. I seldom wonder what the point of it all is.	1 2 3	4 5	6 7
12. I take things one day at a time.	1 2 3	4 5	6 7
13. I can get through difficult times because I've experienced difficulty before.	1 2 3	4 5	6 7
14. I have self-discipline.	1 2 3	4 5	6 7
15. I keep interested in things.	1 2 3	4 5	6 7
16. I can usually find something to laugh about.	1 2 3	4 5	6 7
17. My belief in myself gets me through hard times.	1 2 3	4 5	6 7
18. In an emergency, I'm someone people can generally rely on.	1 2 3	4 5	6 7
19. I can usually look at a situation in a number of ways.	1 2 3	4 5	6 7
20. Sometimes I make myself do things whether I want to or not.	1 2 3	4 5	6 7
21. My life has meaning.	1 2 3	4 5	6 7
22. I do not dwell on things that I can't do anything about.	1 2 3	4 5	6 7
23. When I'm in a difficult situation, I can usually find my way out of it.	1 2 3	4 5	6 7
24. I have enough energy to do what I have to do.	1 2 3	4 5	6 7
25. It's okay if there are people who don't like me.	1 2 3	4 5	6 7

APPENDIX E: AUB SOCIAL AND BEHAVIORAL SCIENCES INVITATION SCRIPT

We are forwarding the below invitation for a research study to be conducted by our research colleague (Dr. Tania Bosqui) at AUB. Participation is **voluntary**.

Invitation to Participate in a Pilot Research Study

This notice is for an AUB-IRB Approved Research Study for Dr. Tania Bosqui and Ms. Zeina Kamareddine. This study is an educational requirement for the fulfillment of the requirements for the degree of Master of Arts to the Department of Psychology.

American University of Beirut, Jesup 101, 01- 350 000 ext. 4370, tb33@aub.edu.lb, or zmk23@aub.edu.lb

It is not an Official Message from AUB

We would like to invite you to participate in a piloting testing of three questionnaires for a Master's thesis research study titled 'The Relation between Disordered Eating and Family Functioning among University Students in Lebanon: The Mediating Role of Resilience.' and conducted at the American University of Beirut. The pilot testing is being conducted to estimate the time needed to complete all questionnaires and to assess for participants' comprehension of the scales and ease in filling them in.

You will be asked to complete a short survey with demographic information and questions on adverse events, eating patterns, family functioning, and resilience. You are eligible for this study if you are aged 18 or above.

The research is conducted online and is hosted on an AUB server.

This is completely **voluntary**, you have the right to refuse to participate and to withdraw from the study or discontinue your participation at any time without giving a reason and with no penalties. Your refusal to participate in this study will not affect your relationship with AUB and will not result in the loss of benefits. Refusal to participate in the study or withdrawal from the study will involve no loss of benefits to which you are otherwise entitled nor will it affect your relationship with AUB and AUBMC.

Please read the consent form and consider whether you want to be involved in the study. If you have any questions about this study, you may contact the research team: Dr. Tania Bosqui, tb33@aub.edu.lb, +961-1-350000 ext. 4370 or Zeina Kamareddine, zmk23@aub.edu.lb.

[Link to survey will be placed here.](#)

APPENDIX F: CONSENT FORM FOR STUDENTS PARTICIPATING IN PILOT TESTING OF A RESEARCH PROJECT (V1.1.)

Project Title: The Relation between Disordered Eating and Family Functioning among University Students in Lebanon: The Mediating Role of Resilience

Nature and Purpose of the Project: We would like to invite you to participate in a pilot testing of three questionnaires for a Master's thesis research study conducted at the American University of Beirut. The study seeks to examine if, and in what ways, a person's resilience can affect the relationship between family functioning and disordered eating in a sample of University students in Lebanon. Disordered eating patterns are feelings, attitudes, and behaviors associated with eating. Family functioning relates to the family environment, and is measured through the families' adaptability and cohesion. Resilience in the field of mental health is a process of adapting positively to an adversity and adapting to significant sources of stress. Ten students will be recruited to give feedback on the measures we are planning to use.

The pilot testing is being conducted to estimate the time needed to complete all questionnaires and to assess for participants' comprehension of the scales and ease in filling them in.

Methodology of Recruitment: We are targeting undergraduate students to take part in this pilot. Students will be sent an invitation for the study by a psychology course instructor. To participate, you must be 18 years old or older. Participants who are under 18 years old will be excluded from the study. Participants who are enrolled in other psychology courses will be excluded because they may be eligible for the main study. Students from the other psychology courses participating in the actual study will receive an extra one-point credit on their course final grade.

Explanation of Procedures: As a research participant, you will be asked to read this consent form and respond to a questionnaire via LimeSurvey. We will be asking 10 participants to complete the study questionnaire. Your participation in this research will take no more than 30 minutes. This is a one-off survey. After filling out the survey, you will be directed to another page with a few questions regarding the questionnaire and the ease of completion, comprehension, and appropriateness of the scales and items. Your answers will also be recorded on the co-investigator's laptop.

Confidentiality: All of the data collected will be treated in the strictest **confidence** and only the primary investigator and the co-investigator will have access to it. To ensure **anonymity**, no direct identifying information will be recorded; you will not be asked to give us your name. Data and feedback from the pilot study will be retained on the co-

investigator's password-protected computer for a period of three years after which it will be deleted. Data may be audited by the IRB while assuring confidentiality.

Termination of Participation: Your participation is **voluntary**, you have the right to refuse to participate and to withdraw from the study or discontinue your participation at any time without giving a reason and with no penalties. Your refusal to participate in this study will not affect your relationship with AUB and will not result in the loss of benefits. Refusal to participate in the study or withdrawal from the study will involve no loss of benefits to which you are otherwise entitled nor will it affect your relationship with AUB and AUBMC.

Potential Benefits: The results of the study will allow filling the gaps in the literature on the effect of resilience on family functioning and disordered eating. To our knowledge, there are no studies that have examined family functioning and disordered eating together in relation to resilience. There is no monetary reward for participating in this study.

Potential Discomfort and Risks: This study might cause emotional distress. Some of the questions in the survey are sensitive in nature. Some of the scale items in this research study are sensitive. You will be asked about traumatic personal experiences, the mental health of your parents, your religion, your sexuality, your eating attitudes, and whether you have experienced mental health challenges. Please note that scores greater than 20 on the EAT-26 indicate a need for further investigation by a qualified professional. Low scores (below 20) can still be consistent with serious eating problems. Those receiving a score of 20 or above, or those who have concerns about their eating attitudes are strongly advised to contact the Counselling Service for an appointment. If you think that you need talk to someone, please visit or contact the Counseling Center at AUB West Hall, which provides free counseling services to students. Their number is 01-350 000 ext. 3196. You can also contact the Family Medicine Clinic (ext. 3000) or the Department of Psychiatry at AUBMC (ext. 5650) for appointments that qualify for student HIP-coverage. If at any time and for any reason you prefer not to answer any questions, please feel free to skip them.

Debriefing: If you are interested in learning about the outcome of the study, you may contact the co-investigator, Zeina Kamareddine. After data analysis is completed, a summary of the results can be emailed to you upon request.

If you have questions about this research study, or if you are interested in learning about the outcome of the study, you may contact **Dr. Tania Bosqui**, tb33@aub.edu.lb, +961-1-350000 ext. 4370 or Zeina Kamareddine, zmk23@mail.aub.edu

If you have any questions about research or your rights as a participant, you may contact the Social and Behavioral Sciences Institutional Review Board (SBSIRB) at AUB: 01- 350 000 ext. 5445 or 5454 or irb@aub.edu.lb

Who to Call if You Have Any Questions: The approval stamp on this consent form indicates that this project has been reviewed and approved for the period indicated by the American University of Beirut (AUB) Institutional Review Board for the Protection of Human Participants in Research and Research Related Activities. If you have any questions about your rights as a research participant, or to report a research related injury, you may call: IRB, AUB: 01-350000 Ext. 5445 or 5455.

If you accept the above statements and are willing to participate in this study, please click ‘Yes’ and move to the next page. You can refuse to participate or withdraw your participation in this study at any time without penalty.

I agree to participate in this research YES NO

THANK YOU FOR YOUR COOPERATION

Investigator: Dr. Tania Bosqui

Address: American University of Beirut, Jesup 101

Phone: 01- 350 000, ext. 4370

Email: tb33@mail.aub.edu

Co-Investigator: Zeina Kamareddine, MA Candidate in Clinical Psychology

Email: zmk23@mail.aub.edu

APPENDIX G: INFORMED CONSENT

CONSENT TO SERVE AS A PARTICIPANT IN A RESEARCH PROJECT

Principal Investigator: Tania Bosqui, Ph.D., Assistant Professor of Psychology
Department of Psychology, AUB
tb33@aub.edu.lb ♦ 01-350000 Ext. 4370

Research Collaborator: Zeina Kamareddine, Graduate Student of Psychology,
Department of Psychology, AUB
zmk23@aub.edu.lb

Nature and Purpose of the Project: This study involves research that aims to examine the effect of resilience on family functioning and disordered eating in a sample of University students in Lebanon. One hundred participants who are 18 years old or older will be recruited into this study.

Methodology of Recruitment: The psychology department encourages students to make use of the extra credits that are given in exchange for their participation in research. Participating in research is one way for students to make extra credit. Students enrolled in a few selected undergraduate courses who are interested in making extra credit could serve as research participants in research studies or can choose to write a brief report on articles in psychological journals. Recruitment of participants from the psychology courses using the invitation script sent by the professors has been approved by the Institutional Review Board (IRB).

Explanation of Procedures: As a research participant, you will be asked to read this informed consent form and consider carefully your participation. If you decided to participate (by clicking the yes button), the link will take you to the survey. The questions asked will help determine the effect of resilience and on the relationship between family functioning and disordered eating. You will be asked to answer in a truthful and honest manner.

Your name and contact information will **not be asked** and **there will be no identifiers**. **Your answers will be entirely anonymous, meaning that no one could link your response to you.** Your participation will be communicated to your course instructor for extra credit through a unique identifier, that is not linked to your answers.

Only the project director and the co-investigator will have access to the data. **Data sets (i.e. soft copies) that are present on the computer will be protected via a secure password** for a period of three years after which the data will be **permanently deleted**.

It is expected that your participation in this survey will last between 20-30 minutes. You can skip some questions if you do not want to answer them.

Please note that at the end of the survey you will be re-directed to the information sheet and will be presented with a **randomly created identification number** that you should provide to your professor. The identification number cannot be traced back to your answers.

Refusal to participate in the study or withdrawal from the study will involve no loss of benefits to which you are otherwise entitled nor will it affect your relationship with AUB and AUBMC.

Potential Discomfort and Risks: There are no more than minimal risks associated with participation in this survey. Some questions, regarding family and eating patterns, may be sensitive in nature and cause emotional discomfort. Some of the scale items in this research study are sensitive. You will be asked about traumatic personal experiences, the mental health of your parents, your religion, your sexuality, your eating attitudes, and whether you have experienced mental health challenges. Please note that scores greater than 20 on the EAT-26 indicate a need for further investigation by a qualified professional. Low scores (below 20) can still be consistent with serious eating problems. Those receiving a score of 20 or above, or those who have concerns about their eating attitudes are strongly advised to contact the Counselling Service for an appointment.

Potential Benefits: The potential benefit is that your participation will contribute to the research concerned with understanding the relationship between family functioning and disordered eating, and the role of resilience. Through your participation you will also earn one extra percentage point on your final grade on the psychology course.

Costs/Reimbursements: Your participation in this survey incurs no costs. Through your participation, you will earn one extra percentage point on your final grade on the psychology course.

Alternatives to Participation: If you decide not to participate in this or other research studies, you can choose to write a brief report on articles published in psychological journals in exchange for credit (please ask your professor for further details).

Termination of Participation: You may choose to terminate your participation at any point by exiting the survey. Your answers may not be included in the study if missing data exceeds 25% of the main scales.

Confidentiality: The results of your participation will be kept fully confidential. This means that only the project director and co-investigator will have access to the data, which will be anonymous, as no identifying information will be linked to the data you provide. Only information that cannot be traced to you will be used in reports published or presented by the director or investigator. Raw data on the investigator's computer **will be protected via a secure password** for a period of 3 years following the termination of the study. After the 3 years have elapsed, the raw data will be **permanently** deleted. Data will be monitored and may be audited by the IRB while assuring confidentiality.

Withdrawal from the Project: Your participation in this survey is completely voluntary. You may withdraw your consent to participate in this research at any point without any explanation and without any penalty. You're free to stop answering this survey at any point in time without any explanation. If you choose to withdraw from the study before completing the questionnaire, you can still receive the extra one-point credit by submitting a brief report on an article published in a psychological journal.

Debriefing: If you are interested in learning about the outcome of the study, you may contact the co-investigator, Zeina Kamareddine. After data analysis is completed, a summary of the results can be emailed to you upon request.

Who to Call if You Have Any Questions: The approval stamp on this consent form indicates that this project has been reviewed and approved for the period indicated by the American University of Beirut (AUB) Institutional Review Board for the Protection of Human Participants in Research and Research Related Activities. If you have any questions about your rights as a research participant, or to report a research related injury, you may call: IRB, AUB: 01-350000 Ext. 5445 or 5455.

If you think that you need talk to someone, please visit or contact the Counseling Center at AUB West Hall, which provides free counseling services to students. Their number is 01-350 000 ext. 3196. You can also contact the Family Medicine Clinic (ext. 3000) or the Department of Psychiatry at AUBMC (ext. 5650) for appointments that qualify for student HIP-coverage. If at any time and for any reason you prefer not to answer any questions, please feel free to skip them.

If you have any concerns or questions about the conduct of this research project, you may contact:

Tania Bosqui: tb33@mail.aub.edu, 01-350000 Ext. 4370
Zeina Kamareddine: zmk23@mail.aub.edu 70-225386

Participant's Consent: By clicking the yes button, you agree that you have read and understood the information contained in this document, and time to consider your participation in this research study. You also provide consent to participate in this research study. The purpose, procedures to be used, as well as, the potential risks and benefits of your participation have been explained to you in detail. You can refuse to participate or withdraw your participation in this study at any time without penalty.
I agree to participate in this research YES NO

APPENDIX H: INVITATION SCRIPT

We are forwarding the below invitation for a research study to be conducted by our research colleague (Dr. Tania Bosqui) at AUB. Participation is **voluntary**.

Invitation to Participate in a Research Study

This notice is for an AUB-IRB Approved Research Study for Dr. Tania Bosqui and Ms. Zeina Kamareddine. This study is an educational requirement for the fulfillment of the requirements for the degree of Master of Arts to the Department of Psychology.

American University of Beirut, Jesup 101, 01- 350 000 ext. 4370, tb33@aub.edu.lb, or zmk23@aub.edu.lb

I am inviting you to participate in a research study titled The Relation between Disordered Eating and Family Functioning among University Students in Lebanon: The Mediating Role of Resilience. This study aims to examine the effect of resilience on family functioning and disordered eating in a sample of University students in Lebanon.

You will be asked to complete a short survey with demographic information and questions on adverse events, eating patterns, family functioning, and resilience.

You are invited because we are targeting students taking psychology courses (you are eligible for this study if you are aged 18 or above).

The estimated time to complete this survey is approximately 20 minutes.

The research is conducted online and is hosted on an AUB server.

Please read the consent form and consider whether you want to be involved in the study. If you choose to participate in the study, you will receive an extra one-point credit on your course final grade.

If you have any questions about this study, you may contact the research team: Dr. Tania Bosqui, tb33@aub.edu.lb, +961-1-350000 ext. 4370 or Zeina Kamareddine, zmk23@mail.aub.edu.

[Link to survey will be placed here.](#)

APPENDIX I: INFORMATION SHEET

Thank you for participating in the study.

If you have questions about this research study, or if you are interested in learning about the outcome of the study, you may contact Dr. Tania Bosqui, tb33@aub.edu.lb, +961-1-350000 ext. 4370 or Zeina Kamareddine, zmk23@mail.aub.edu.

If you have any questions about research or your rights as a participant, you may contact the Social and Behavioral Sciences Institutional review Board (SBSIRB) at AUB: 01- 350 000 ext. 5445 or 5454 or irb@aub.edu.lb

If any information in the survey made you upset and you think you need to talk to someone, please contact the please contact the AUB Counseling Center (West Hall, room 210, ext. 3196) for free-of-charge counseling services. These services are confidential and anonymous. You can also contact the Family Medicine Clinic (ext. 3000) or the Department of Psychiatry at AUBMC (ext. 5650) for appointments that qualify for student HIP coverage.

To gain your 1% extra credit, please write down your code (as below) and give it to your course professor. This code will not link your responses to you.

APPENDIX J: FIGURES: NORMALITY OF RESIDUALS AND HOMOSCEDASTICITY OF REGRESSION

Figure 2

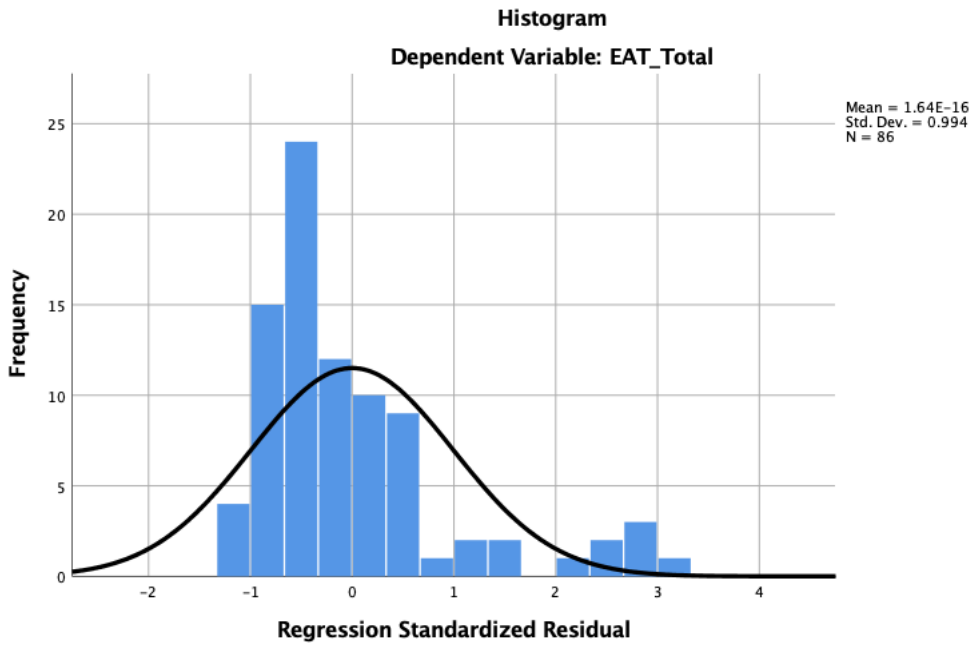


Figure 3

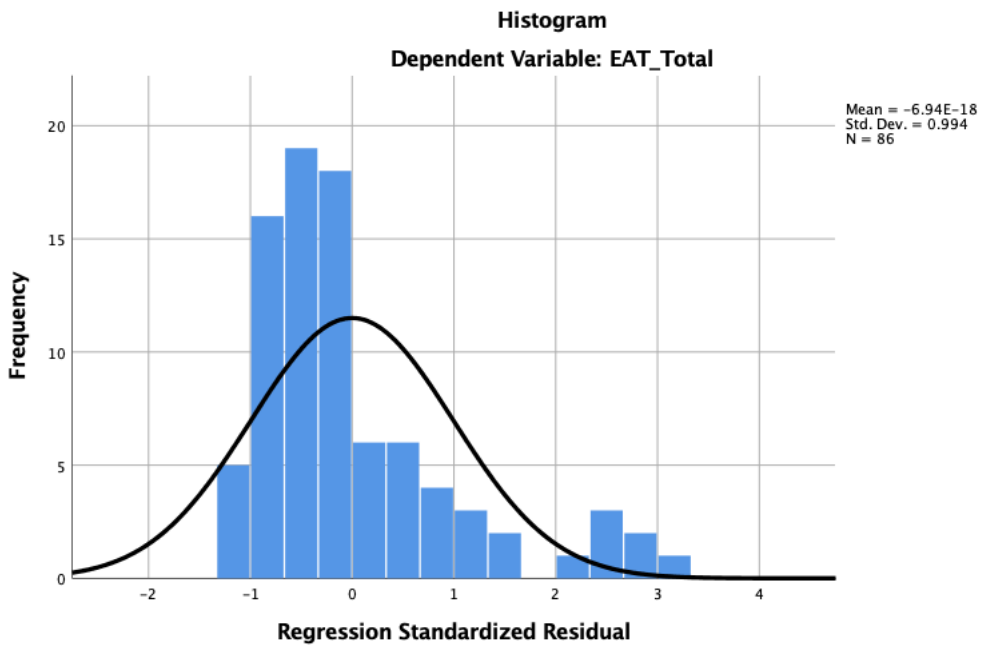


Figure 4

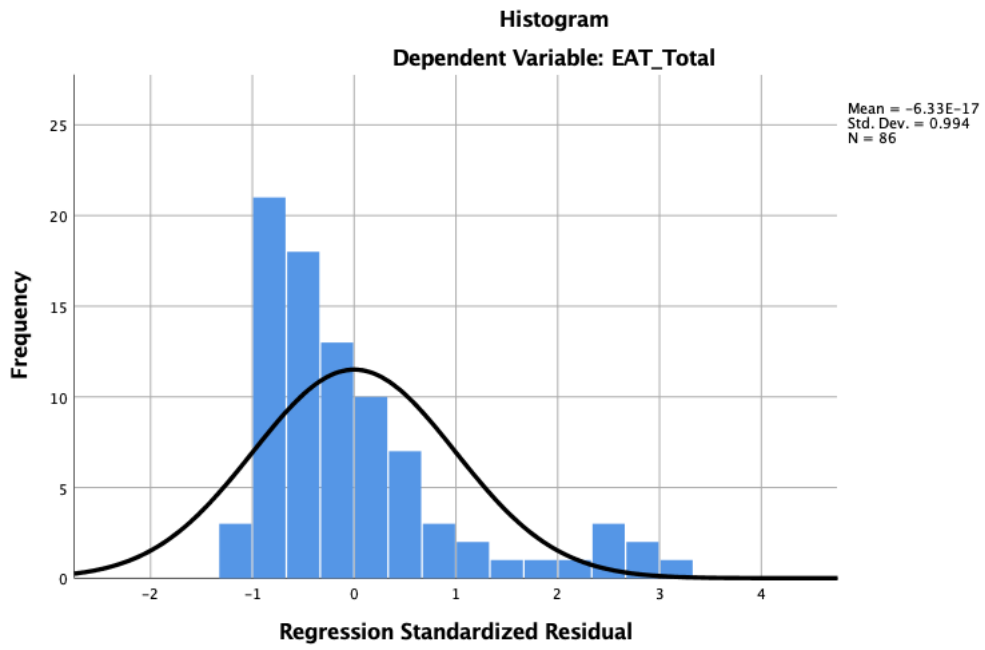


Figure 5

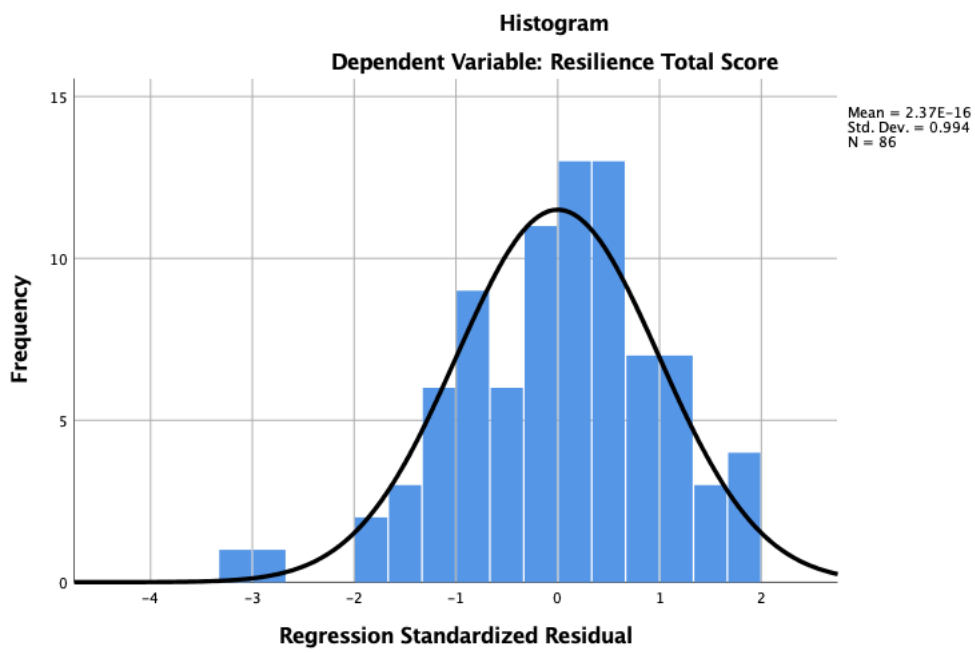


Figure 6

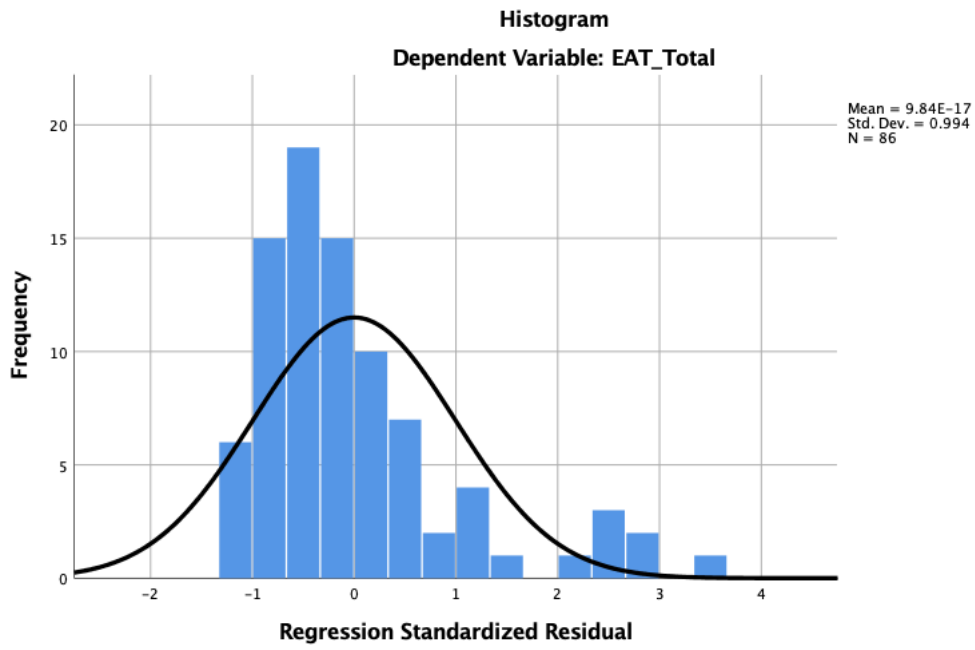


Figure 7

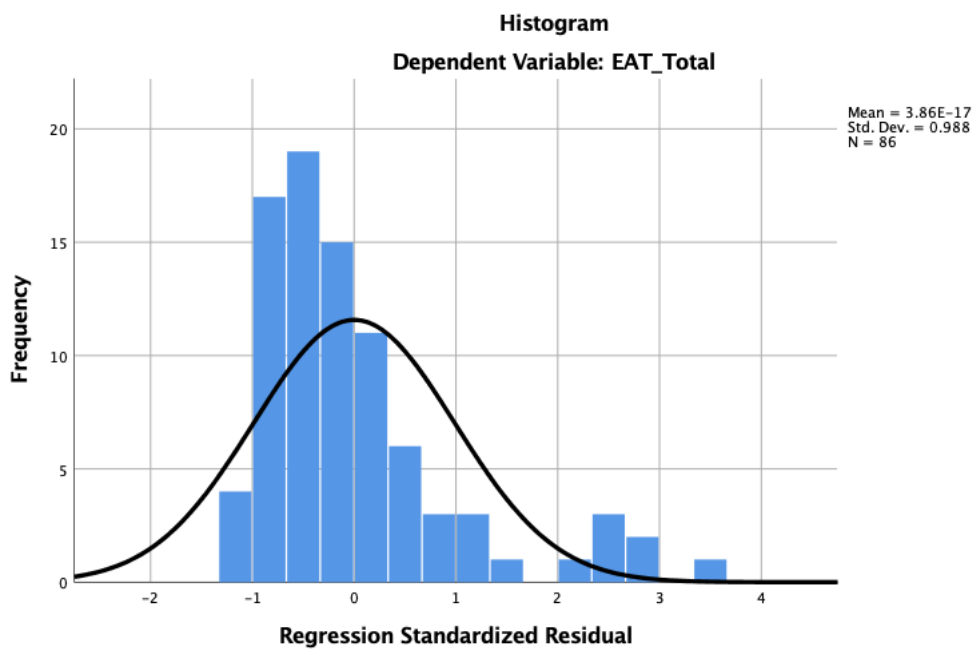


Figure 8

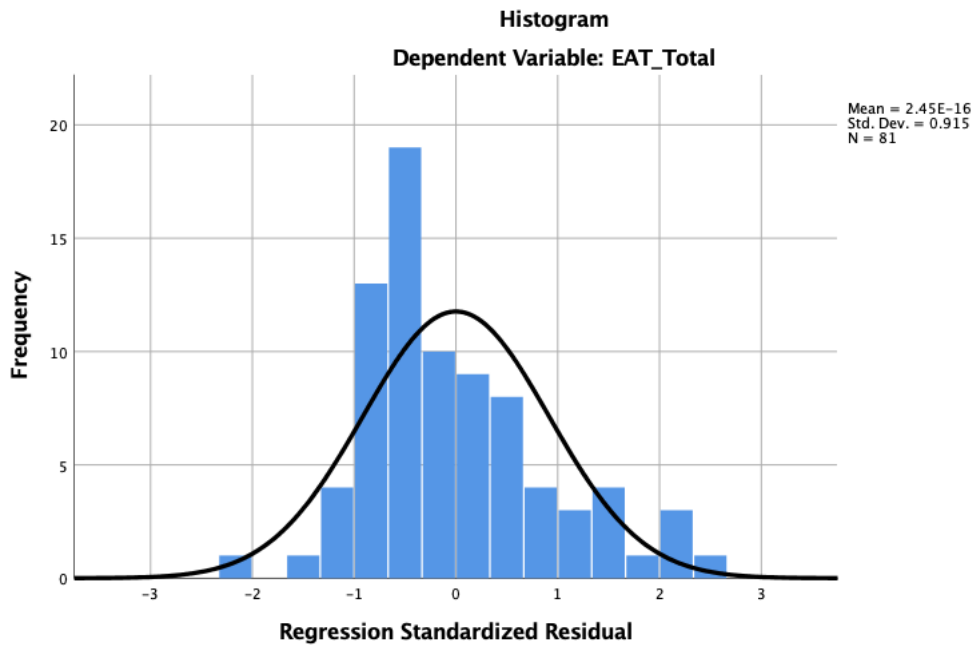


Figure 9

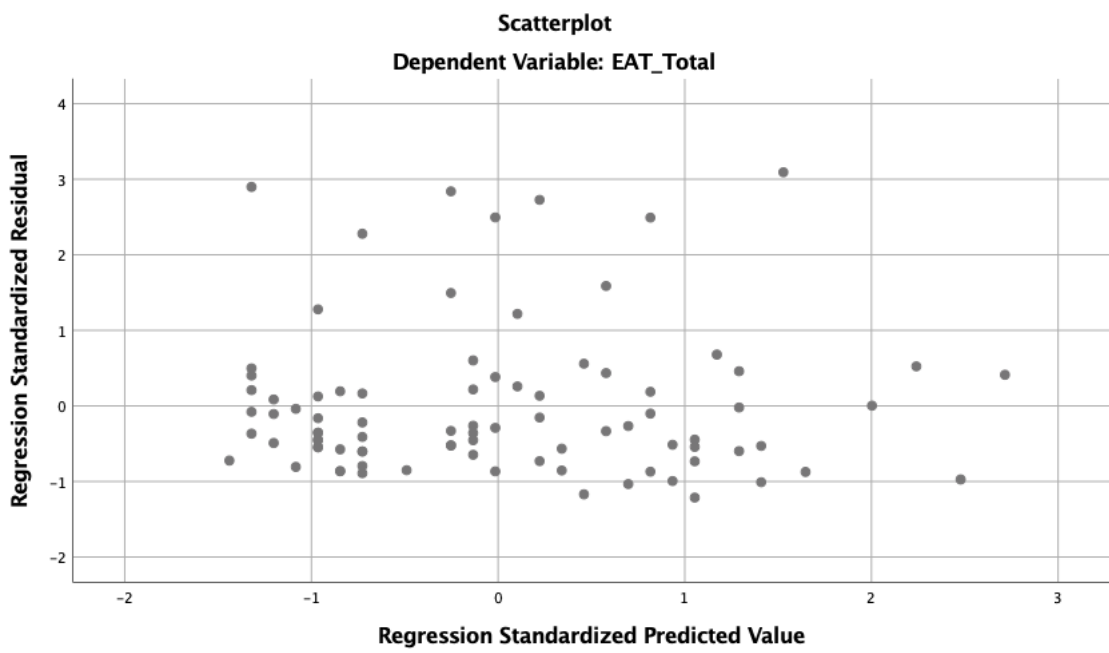


Figure 10

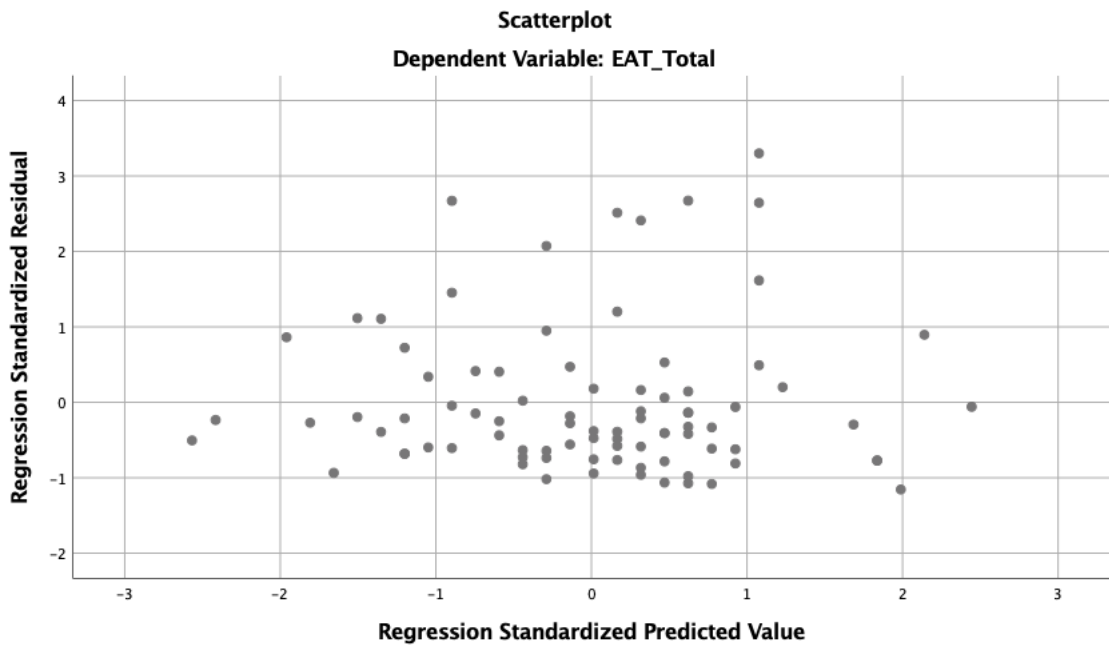


Figure 11

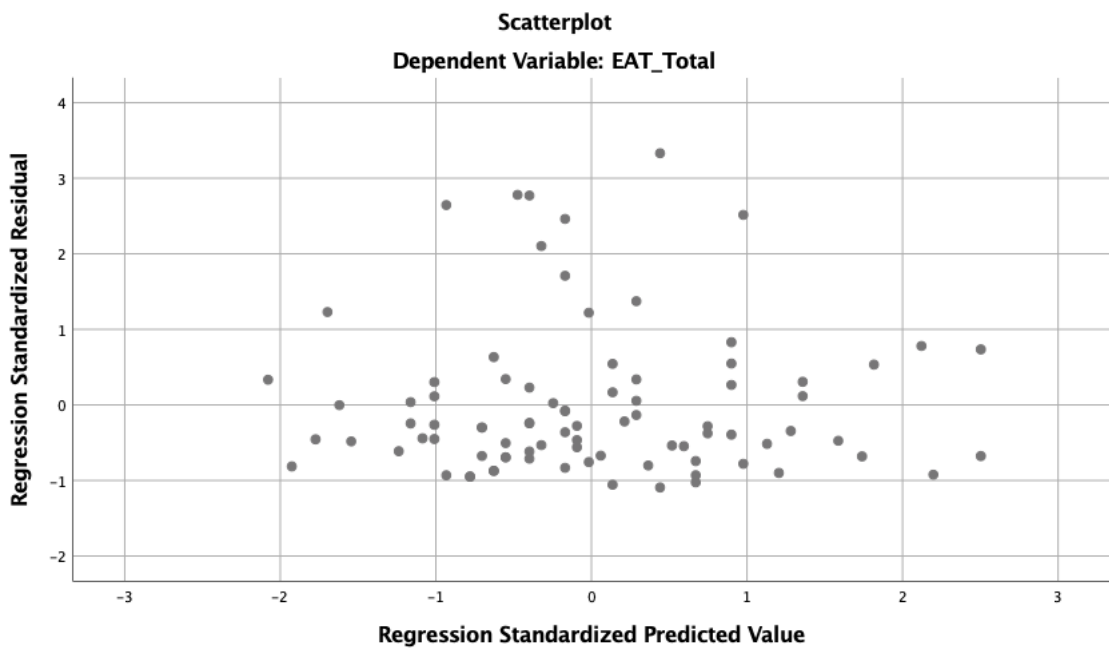


Figure 12

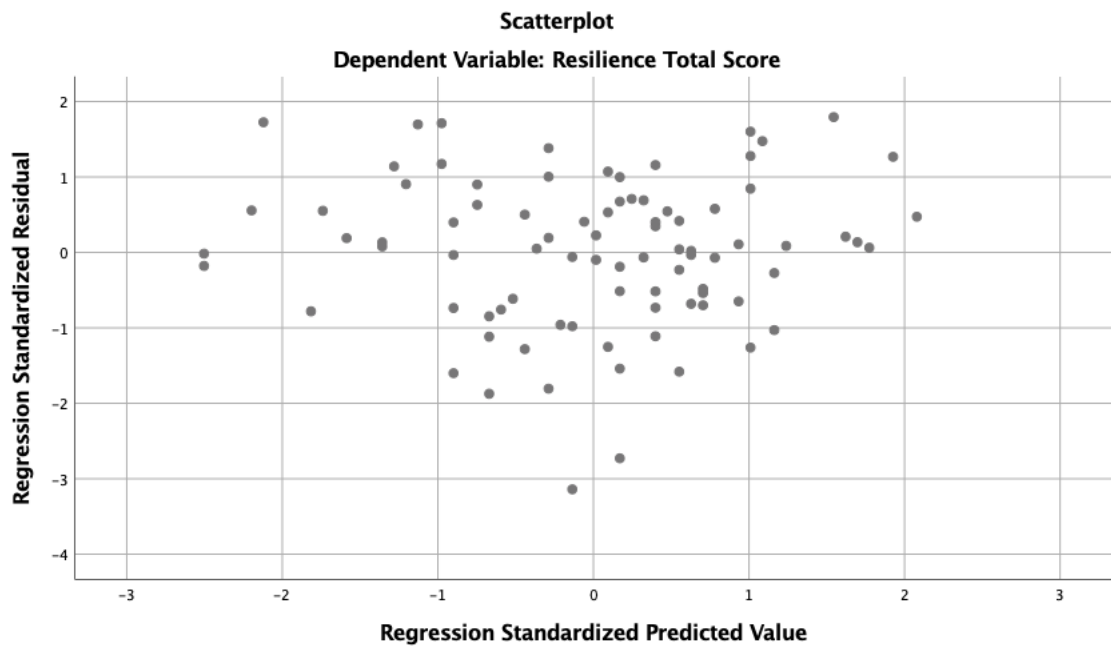


Figure 13

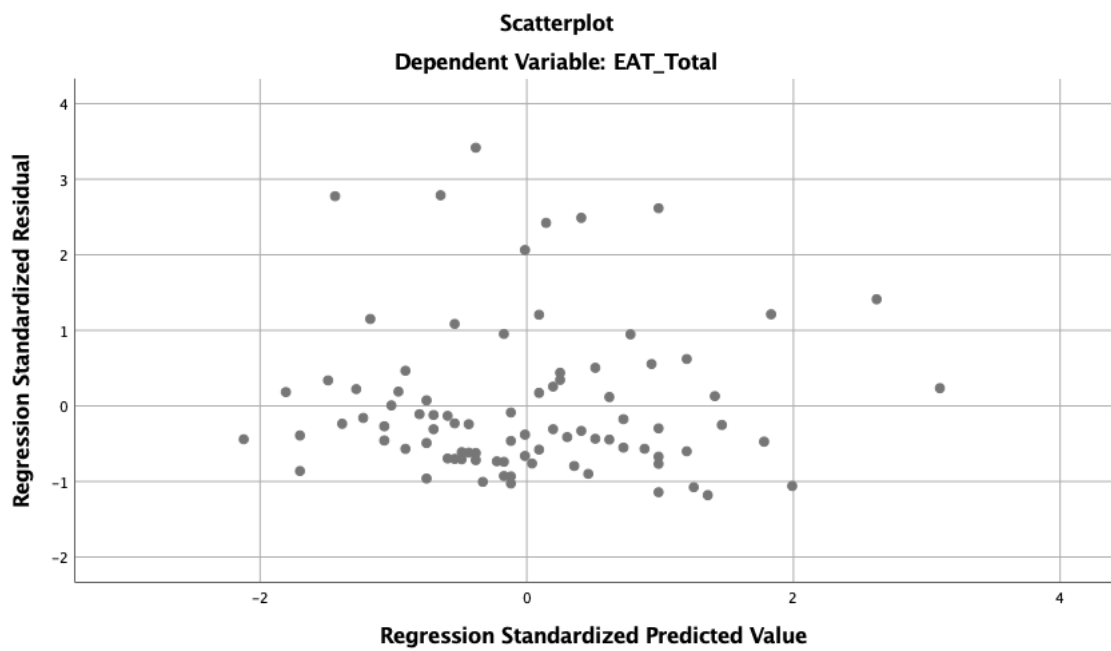


Figure 14

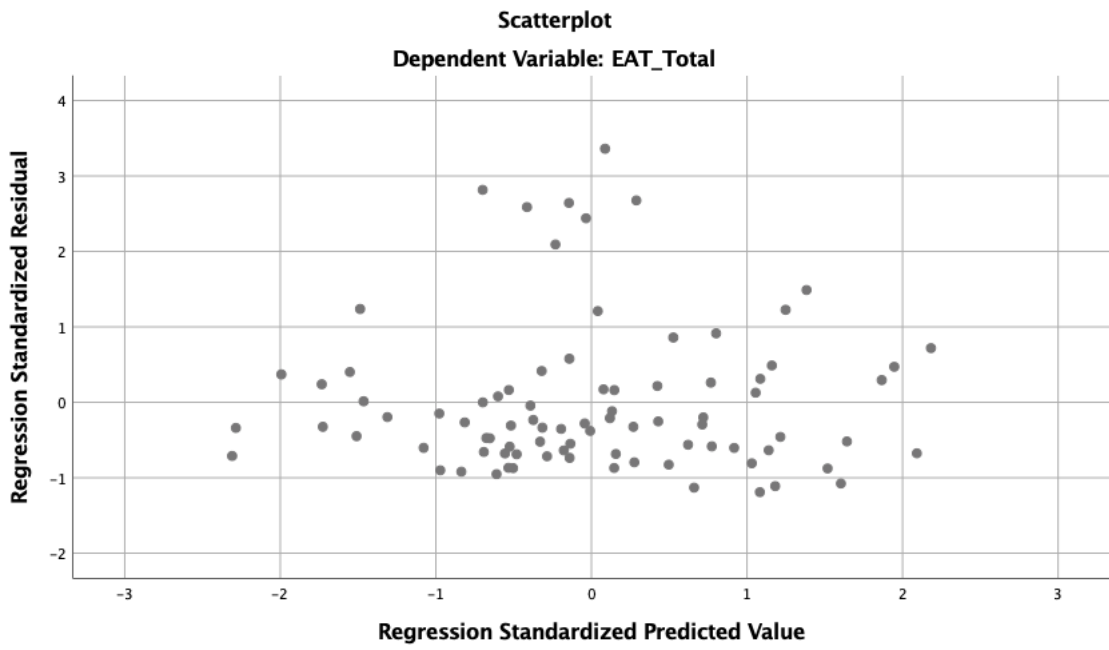
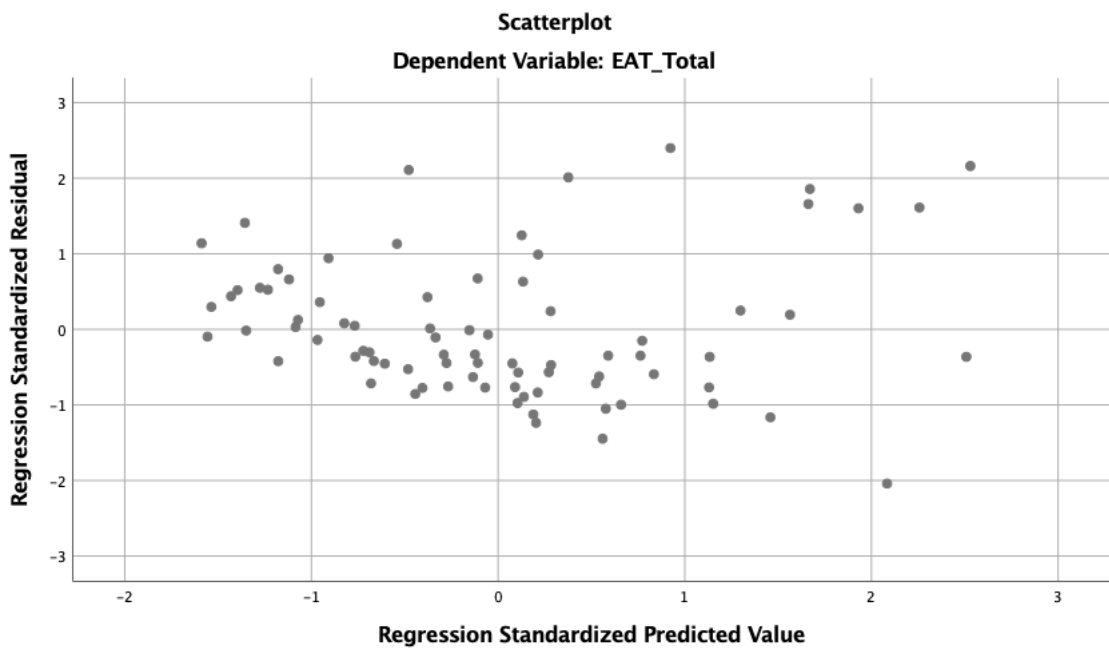


Figure 15



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