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Exploring the Role of Dieting Style in Nutritional and Psychological Health Among College Women

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EXPLORING THE ROLE OF DIETING STYLE IN NUTRITIONAL AND PSYCHOLOGICAL HEALTH AMONG COLLEGE WOMEN

by

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ABSTRACT

The current study aimed to profile styles of eating among dieting and non-dieting college-aged women, and to explore the extent to which dieting attitudes were associated with both nutritionally healthy eating and psychological well-being. A latent profile analysis was conducted using indicators of self-reported intuitive eating, binge eating, and two psychometric measures of dietary restraint; various measures of eating restraint were utilized to potentially capture distinct characteristics of dieting, such as self-discipline and disinhibition (Polivy et al., 2020; Stice et al., 2010). Four distinct probabilistic profiles emerged, indicating that individuals within the study population could be meaningfully categorized as Intuitive Eaters, Unconcerned Eaters, Moderate Dieters, or Heavy Dieters. These profiles significantly differed on psychological measures of well-being, body appreciation, impulsivity, self-efficacy, and food choice motivation. However, no group differences were observed in regard to nutritional literacy and dietary intake. As endorsement of dieting attitudes increased, so too did incidence of negative outcomes such as depressed mood and binge-eating. These results suggest that intuitive eating attitudes are inversely related to the harmful effects of dietary restriction.

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INTRODUCTION

<u>Background</u>

As the prevalence of overweight and obesity grows, so too does the diet industry. Although a 2019 market report projected a 9% decline in the U.S. weight loss market due to temporary Covid-19 closures of weight loss centers and medical programs, market segments catering to self-managed dieting options have prospered (Market Data LLC, 2020). In 2020, the industry was valued at $71 billion, in part due to flourishing sales for meal replacement shakes and bars, low-calorie frozen entrees, virtual weight loss apps, and multi-level marketing diet programs. Individuals are increasingly turning to weight loss methods they can practice at home without the guidance of medical professionals. Though caloric restriction is the most common tactic for weight loss, evidence indicating its viability for long-term weight loss is scant (Ohsiek & Williams, 2011; Ulen et al., 2008). In general, those who successfully lose weight from dieting are likely to gain it back after several years. The human body's vigilant homeostatic maintenance may even result in additional weight gain beyond an individual's pre-dieting baseline (Sumithran & Proietto, 2012), spurring Sisyphean cycles of restriction, temporary weight loss, and subsequent regain. A series of failed diet attempts may damage an individual's self-esteem (Polivy & Herman, 2002) and potentially exacerbate susceptibility towards disordered eating behaviors (Favaro et al., 2003; Quinn et al., 2020).

In order to lose weight, dieters typically modify their diet in an attempt to be "healthier". For example, dieters may improve their nutritional knowledge to make more nutritional food choices. In some non-dieters, lack of basic nutritional knowledge may be a barrier towards healthy eating (Hiza et al., 2013; Yahia et al., 2016), while other non-dieters likely possess some

nutritional knowledge that they simply choose not to apply to their own eating habits. Considering that the vast majority of Americans are far from meeting federal dietary recommendations (Krebs-Smith et al., 2010), it is important to discern whether individuals follow certain styles of eating based off of nutritional knowledge, or in spite of it. If nutrition and knowledge thereof are *not* a key component of eating style, then one's psychological relationship with food and eating may be even more worthwhile for exploration.

What is a "Dieter"?

At any given time, a significant number of people are on a diet. A National Center for Health Statistics (NCHS) data brief spanning 2013-2016 (Martin & Ogden, 2018) found that 49.1% of U.S. adults had attempted to lose weight in the last year, with a higher percentage of those being women (56.4%). The most reported methods were "eating less food" (62.9%), exercising (62.9%), and increasing fruit and vegetable intake (50.4%). Concerningly, almost 36% of normal or underweight women surveyed were attempting to lose weight. Frequent motivations for weight loss are to improve general health and to enhance appearance, with young adult females more likely to endorse the latter (Lemon et al., 2014). Individual differences in type or degree of motivation, attitudes, personality, behaviors, ability, self-esteem, and rationale (such as for health versus aesthetics) add considerable nuance to the construct of "dieting".

Matters are further complicated when considering that some dieters appear to succeed in their efforts to lose weight (at least, initially), while others do not (James, 2009). This could be a reflection of their ability to suppress food intake across substantial periods of time. Although various validated psychometric measures of eating restraint exist, not all of them may be equally suited to capture "successful" dieters. For example, it has been suggested that the Restraint Scale (RS; Herman & Polivy, 1980) is well suited for identifying dieters prone to disinhibitory eating.

Eating disinhibition, or loss of control (LOC) eating has been shown to be heightened in some

individuals following periods of caloric restriction (Ruderman, 1986) and is a significant risk

factor for disordered eating (Latner et al., 2007). In contrast, the Dutch Eating Behavior

Questionnaire (DEBQ) and Three Factor Eating Questionnaire (TFEQ) are suggested to be more

attuned towards identifying dieters more successful at losing weight (Polivy et al., 2020). A

review by Mills and colleagues (Mills et al., 2018) examined personality profiles of dieters

characterized by either the RS, DEBQ, or TFEQ and found notable trait variations for these

dieters across the scales. Dieters identified by scoring high on the RS were found to be prone to

eating disinhibition, guilt, body dissatisfaction, high neuroticism, and low self-esteem. In

comparison, dieters identified by the DBEQ and TFEQ were characterized as perfectionistic,

high in self-esteem, and more adept at restricting caloric intake without subsequent LOC eating.

Thus, one approach to meaningfully assess "dieting", is to distinguish different classes of dieters

across multiple measures of eating restraint. Though the DEBQ and TFEQ are both hypothesized

to capture the same class of "successful" dieters, the DEBQ was chosen for the current study

because each item measure is scored with a Likert-like scale; the resulting continuous variables

are better suited for analyses utilized in the current study.

An individual's motivation for beginning a diet is an important predictor of whether the

dieter will succeed in losing weight (Mroz et al., 2018). Literature suggests that dieting for

promoting personal health, well-being, and exercise ability predicts the adoption of healthy

weight loss behaviors, successful weight loss, and long-term weight loss maintenance (Santos et

al., 2015; Silva et al., 2011), while appearance-motivated dieting is predictive of high body

dissatisfaction, low self-esteem, and unsuccessful weight loss (Thome & Espelage, 2007;

Vartanian et al., 2012). Notably, appearance goals for weight loss were found to be significantly

correlated with binge eating episodes during dieting and with a significantly higher prevalence of life-time dieting attempts (Schaumberg et al., 2016; Williamson et al., 2007). The desire to lose weight to improve one's appearance may result in disinhibition, as reflected by the RS (but perhaps not the DBEQ or TFEQ). Assessing motivation for dieting may provide predictive insight towards the potential weight loss of a given dieting attempt.

An individual might engage in food restriction or other weight loss behavior without consciously identifying as a "dieter". Terms like "watching what one eats" or "eating healthy" are often used to describe restraint towards food and heightened attention towards food choice (Belon, 2016). Research investigating restrained eating should not rely exclusively on single-item questions regarding current dieting status (i.e., "Are you currently on a diet?"). Behavioral measures of weight control and self-reports of feelings surrounding eating can help form a more cohesive picture of the ways individuals engage in weight management, regardless of whether they personally identify as a "dieter" (Schaumberg et al., 2016; Williamson et al., 2007).

The Effect of Diet on Psychological Well-Being

According to the Food Marketing Institute (2009), the number of food products offered in typical supermarkets increased from an average of 8,948 to nearly 47,000 between 1975 and 2008. Given such a vast assortment from which to choose, individual Americans vary greatly in food preferences and availability (Darmon & Drewnowski, 2015; Kant & Graubard, 1999). People interested in losing weight via dieting have an impressive array of eating options. Many diets typically focus on limiting intake of certain macronutrients (e.g., carbohydrates, lipids) and increasing intake of others (e.g., proteins), while some diets encourage eating more (or less) fruits and vegetables, animal products, unprocessed or raw foods, juices, etc. (Freedman et al., 2001). Because the human body utilizes the macro- and micronutrients found in food both as

energy sources and building blocks for physiological processes (such as tissue generation), diet influences one's functionality as living organisms on the most basic biological level (Alberts et al., 2002). In addition, diet directly determines the composition of the human gut microbiome, a community of over 100,000 trillion microorganisms that contribute to the digestion and defense of the gastrointestinal tract (Zmora et al., 2019). The gut microbiome exerts substantial influence on host metabolism and may participate in the development of fat mass in the body (Cani & Delzenne, 2011), however, simple dietary improvements are viable means to improve microbiome diversity, composition, and function (Nagpal et al., 2019).

Considerable evidence points towards the impact of poor diet on heightened risk for and severity of both physiological and psychological illness. Micha and colleagues (2017) found that suboptimal diet was associated with nearly 50% of all American deaths due to cardiometabolic diseases such as heart disease, stroke, and diabetes in 2012. Low-grade chronic system inflammation, a contributing factor to most non-communicable diseases (including diabetes, obesity, cardiovascular diseases, cancers, etc.) is strongly moderated by diet composition (Phillips et al., 2019). Unsurprisingly, psychopathological outcomes such as depression and anxiety also are linked to inflammatory response (Berk et al., 2013; Rammal et al., 2008). Pro-inflammatory cytokines were found in elevated concentrations in patients with eating disorders, particularly those diagnosed with anorexia nervosa (AN) and bulimia nervosa (BN) (Dalton et al., 2018). Complementing this research, Seitz and colleagues discovered that patients with AN possess significantly altered microbiomes compared to non-disordered eaters. This reduced diversity and abundance of microorganisms is suggested to impact gut permeability and inflammation, and could contribute to depressive, anxious, and disordered eating symptoms (Butler et al., 2021; J. Seitz et al., 2019).

A diet rich in healthy foods such as plant oils, whole grains, fish, fruits, vegetables, nuts, legumes, and unprocessed meat is inversely associated with depression risk (Lang et al., 2015). In contrast, unhealthy western dietary patterns high in refined and fried food, sweetened beverages, and high-fat snacks are associated with increased risk of depression in longitudinal studies (Lang et al., 2015). It is important for future research to discern whether poor diet is causal to compromised mental health, or whether underlying illness is a precursor to inadequate eating. Regardless, it seems likely that perpetuating unhealthy eating habits exacerbates undesirable psychological and physiological outcomes.

Dieting and Risk Factors for Disordered Eating

Dieting is a risk factor for eating disorders, and a history of self-imposed dieting, particularly during adolescence, partially predicts subsequent disordered eating behavior (Cena et al., 2017; Hilbert et al., 2014). Longitudinal studies spanning 1-2 years demonstrated that approximately 35% of "normal dieting" participants (i.e., individuals endorsing trying to lose weight, but scoring under the critical threshold for problematic eating as defined by the Eating Attitudes Test [EAT]) developed problematic dieting behaviors. Additionally, 20-30% of pathological dieters (that is, individuals scoring above the critical threshold on the EAT screening measure) had developed partial or full syndrome eating disorders by the end of the follow-up period (King, 1989, 1991; Patton, 1988; Patton et al., 1990). Furthermore, many dieters do not undertake just one diet during their lifetime. An emerging pattern of dieting, weight loss, and subsequent weight regain has been observed in laboratory and naturalistic settings (Ernsberger & Koletsky, 1999). Metabolic changes that occur during intentional weight loss prime the body to regain weight to maintain homeostasis, often at a faster rate than would be seen had dieting not occurred at all (Evert & Franz, 2017). Dieters who initially were successful

at weight reduction must either continue restrictive habits to maintain weight loss for the long-term, or initiate another diet to recover lost ground. Weight-cycling in the general population has been estimated to occur in 20-55% of women and is associated with increased metabolic and cardiovascular risk (Montani et al., 2015).

Lifetime dieting frequency is positively related to body dissatisfaction, depression, and eating disorder symptomology in young adult females (Ackard et al., 2002). Low self-esteem often motivates individuals to begin a diet (Stice et al., 2002), despite the fact that an extended state of caloric restriction is typically aversive to most people (Dirks & Leeuwenburgh, 2006), and simply thinking about one's current diet can be unpleasant. Female dieters who were experimentally primed to think about their diets reported poorer self-esteem and higher body shape concerns (Sarfan et al., 2019). Nonetheless, many individuals are able to practice dietary restraint without developing disordered eating behaviors (Schaumberg et al., 2016). Thus, research is needed to determine what characteristics these dieters possess that may be protective against eating pathology, and whether these traits are fosterable in both self-imposed diets *and* scientifically validated and monitored weight loss programs.

A final risk of dieting crucial to the scope of the current study is the tendency for restrained eating to culminate in binge behavior (Andrés & Saldaña, 2014). Restraint theory, initially proposed by Herman and Mack (1975), suggests that one's eating behavior is the result of both physiological and psychological factors. Specifically, humans experience physical hunger from an unfilled stomach but have a degree of cognitive control over what and how much they decide to consume. Herman and Polivy's boundary model of eating behavior (1984) illustrates how disinhibited eating may occur in those who are consciously restricting food. While dieting, individuals may exert deliberate appetitive control over what they consume such

that they stop eating short of reaching satiety. If their rigid discipline is compromised by influences such as stress, alcohol, or a taste of "forbidden" food, disinhibition may be triggered (Hofmann et al., 2014; Vartanian et al., 2020; Ward & Mann, 2000). This often leads to binge eating. In such cases the desire to overeat surpasses the cognitive control of dieters, their imposed boundary of how much should be eaten while on a diet, and even the physical boundary of satiety, an outcome aptly termed the "what-the-hell" effect (Herman & Polivy, 1984).

Although myriad psychological factors are hypothesized to contribute to disinhibited eating, negative urgency and self-efficacy are of particular interest within the boundary model of eating behavior. When dieters experience negative emotions in their daily lives, the manner in which they respond to these sensations may influence whether they choose to abandon their diet or persevere. Negative urgency, which refers to the tendency to act rashly under aversive conditions with the intention of mitigating them (Cyders & Smith, 2007), has been shown to facilitate binge eating behavior (Racine et al., 2017; Wolz et al., 2017). Weight gain over time also increases with trait impulsivity (Bénard et al., 2017; Sutin et al., 2013). Accordingly, many weight loss programs emphasize mindfulness as an intervention to help regulate emotionally-driven eating (Olson & Emery, 2015).

Self-efficacy, or one's personal sense of agency, is a psychological factor that is derived from the correspondence between the intentions of an individual's actions versus their outcomes (Riddle et al., 2015). Increasing self-efficacy is associated with the adoption and persistence of a variety of positive health behaviors (Bandura, 2004), including weight loss (Nezami et al., 2016). Self-efficacy has been hypothesized to have an interaction effect with dietary restraint on binge behavior, such that individuals higher in self-efficacy may be less likely to binge while dieting (Linardon, 2018). Dieters who feel more in control of their ability to regulate eating behavior

may be more successful in losing weight. Individuals high in self-efficacy may also be less likely to diet in the first place, because conceivably they feel more control over their eating and therefore do not experience the need for deliberate restraint. Both self-efficacy and negative urgency may affect individuals' propensity towards starting or maintaining a diet. By evaluating these constructs alongside measurements of dieting behavior, it will be possible to examine differences in personality traits among those currently on a diet versus those who are not. Further, exploring self-efficacy and negative impulsivity may contribute to our understanding of why some dieters are successful in weight loss while others are not (Stotland & Zuroff, 1991).

A final construct of interest within the scope of the current study is intuitive eating. This particular style of eating calibrates a person's ability to recognize and respond to both physiological and psychological hunger cues (Tribole & Resch, 2012). Rather than following prescriptive rules on what and when to eat, individuals are encouraged to self-monitor their appetite. The four elements that comprise the philosophy behind intuitive eating include: unconditional permission to eat, eating for physical instead of emotional reasons, reliance on internal cues of hunger and satiety, and body-food choice congruence (i.e., making food choices based on how they will affect physiological sensations, energy levels, nutritional cravings). Intuitive eating habits have been linked to various indicators of psychological health and decreased dieting behaviors (Smith & Hawks, 2013). Intuitive eating also has been found to be protectively associated with lower odds of binge eating over an 8-year period (Hazzard et al., 2021). Extant literature is not conclusive regarding whether individuals who endorse intuitive eating also engage in nutritionally healthy eating. Some studies suggest that middle-aged intuitive eaters may regularly consume more healthy foods such as fruits and vegetables (Christoph et al., 2021), but this effect was not observed in middle-aged adults in a laboratory

setting (Ruzanska & Warschburger, 2020) or among college students who scored high on the Intuitive Eating Scale (Barad et al., 2019). Though intuitive eating may steer eaters away from problematic binge eating or yo-yo dieting, its overall utility may be questionable if adherents adopt a nutritionally suboptimal diet.

<u>Nutritional Knowledge</u>

A relevant factor to consider when comparing eating behaviors among individuals is baseline nutritional knowledge. Is a better understanding of dietetics conducive to actually improving one's diet? In general, the literature suggests that nutritional knowledge is indeed correlated with a healthier diet (Geaney et al., 2015; Koch et al., 2021), though this effect is likely modified by socioeconomic status such that diet quality is further improved in individuals with a greater income and educational background (Beydoun & Wang, 2008; Carbonneau et al., 2021). Additionally, better nutritional knowledge is negatively correlated with body fat mass (Akkartal & Gezer, 2020). Still, concerns about elevated levels of nutritional knowledge are raised, given that many patients with eating disorders are quite knowledgeable about food and diet composition because of personal preoccupations endemic to their illness. Although it has been shown that individuals with anorexia nervosa (and to a lesser extent, bulimia nervosa) score higher in questionnaires of nutritional knowledge compared to controls, typically the bulk of their expertise regards the caloric content of foods (Beaumont et al., 1981; Laessle et al., 1988). In addition, 15-25% of participants in these samples knew less than matched controls, implying that nutritional knowledge is not essential for the development of disordered eating. Further, increasing nutritional knowledge has not been shown to increase the incidence of eating disorders, at least among college students studying nutrition and dietetics (Agopyan et al., 2019; Mealha et al., 2013; Reinstein et al., 1992). Thus, it appears that for most people, improving

awareness about nutrition and diet composition can help guide healthier eating habits without promoting disordered eating. Though improvements in nutritional knowledge seen in those undertaking weight-loss diets may improve healthy eating, this consideration must be evaluated alongside the potential psychological complications of dieting.

The Current Study

The goal of the current study was to identify different attitudes and styles of eating among college-aged women, and to compare nutritional knowledge, diet quality, and psychological well-being among these groups. Because different restrained eating questionnaires may identify diverse types of restrained eaters, defining the construct of "dieting" remains elusive in the current literature (Polivy et al., 2020). For example, "restrained eaters" scoring highly on the DEBQ were hypothesized to be more successful in weight loss and less susceptible to disinhibited eating than those scoring highly on the RS (Polivy et al., 2020). The current study used the Dutch Eating Behavior Questionnaire (DEBQ), Restraint Scale (RS), Binge Eating Scale (BES), and Intuitive Eating Scale-2 (IES-2) to create eating profiles based on the different motivations, behaviors, attitudes, and abilities among eaters reflected by each measure. Eating profiles were subjectively named based on overarching trends across the different indicator means.

To assess prior nutritional knowledge, participants were administered the Nutritional Literary Assessment (NLit). Typical diet composition was assessed using the National Cancer Institute's Dietary Screener Questionnaire (DSQ) and Percentage Energy from Fat Screener (PEFS). Comparisons of adequacy of dietary composition and nutritional knowledge were made among dieting classes and with non-dieters distinguished by latent profile analysis. Finally, to inspect potential differences in psychological well-being among profiles, groups were compared

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using measures of food choice motivation, depression, body appreciation, impulsivity, self-esteem, and self-efficacy.

The intention of the current study was to facilitate a deeper understanding of what constitutes a "dieter", specifically compared to individuals who choose not to diet. It is likely that different types of dieters *and* non-dieters engage in many different eating-related behaviors; this study aimed to determine whether these behaviors were correlated with healthy or suboptimal dietary choices and prior nutritional knowledge. Importantly, the current study hoped to elucidate relationships between eating behaviors, nutritional intake, and psychological well-being. If emerging dieting styles were found to be associated with differences in diet quality, nutritional knowledge, and positive or risky psychological factors, future interventions could be designed to improve guidelines for self-monitored dieting. If certain characteristics were found to be more highly correlated with one dieting style over another, clinicians could potentially use these associations to predict the type of dieting their client was prone to adopt. This could allow the development of disordered eating behavior to be monitored more closely.

Hypotheses

Aim 1: The current study assessed dieting and non-dieting behaviors and attitudes across the DEBQ, RS, BES, and IES-2, and latent profile analysis was used to generate classes of dieters and non-dieters. Three prospective profiles were predicted to emerge from LPA.

Hypothesis 1.1: A profile for "successful" dieters (D_S group) would emerge. This eating profile would consist of individuals who currently endorse being on a diet and score highest on the DEBQ compared to other groups, particularly on the restrained eating subscale. D_S eaters would score lower on the RS compared to other dieting groups and non-dieters, because they were predicted to be less prone to disinhibitory eating while

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dieting. These eaters would also score low on the BES and would endorse less binge eating and emotional eating compared to the D_D group. High intuitive eating was not predicted.

Hypothesis 1.2: A profile for dieters prone to disinhibited eating (D_D group) would emerge, consisting of individuals who currently endorsed being on a diet. It was anticipated that D_D eaters would report improving physical appearance as motivation for dieting. This group was predicted to score moderately on the DEBQ, with higher scores on the emotional eating subscale. It was expected that D_D eaters would score higher on the RS overall compared to D_S eaters. It was also predicted that D_D eaters would endorse moderate to high binge-eating behavior via the BES compared to D_S dieters. Dieters from this class would be expected to score higher on the IES compared to D_S dieters (particularly on the "unconditional permission to eat" subscale), but lower compared to non-dieters.

Hypothesis 1.3: Non-dieters would score low on both the RS and DEBQ compared to dieters of both classes. It was anticipated that low to moderate binge eating and intuitive eating would be observed among non-dieters at a base rate similar to that typically observed in female college students.

Aim 2: Dieters (i.e., emergent classes within this category) and non-dieters would vary in general nutritional knowledge and dietary composition.

Hypothesis 2.1: Individuals profiled as members of the D_S group would have the greatest amount of general nutritional knowledge as measured by the NLit compared to other eating style profiles. It was predicted that D_S eaters would have dietary intakes higher in

fiber but lower in added sugar and fat compared to other groups. D$_S$ eaters were predicted

to have a diet higher in fruits, vegetables, and whole grains compared to other groups.

Hypothesis 2.2: Individuals profiled as members of the D$_D$ group would have a moderate

amount of general nutritional knowledge compared to other eating style profiles. It was

predicted that D$_D$ eaters would eat a more energy-dense diet compared to D$_S$ eaters, but

less than non-dieters. It was predicted that fruit and vegetable consumption would be

similar to those of D$_S$, but that overall diet would be higher in added sugar and fat, given

the potential contribution of disinhibited eating outside of discrete mealtimes.

Hypothesis 2.3: Non-dieting individuals would have the lowest amount of general

nutritional knowledge compared to other eating style profiles. Diet composition was

predicted to be representative of the typical Western diet, that is, it was anticipated that a

large contribution to overall diet would come from added fats and sugars found in more-

highly processed foods.

Aim 3: Differences between dieting profiles and non-dieters would appear among psychological

measures of depression (PHQ-9), body appreciation (BAS-2), food choice motivation (FCQ),

impulsivity (S-UPPS-P), self-esteem (RSE), and self-efficacy (GSE). Differences in BMI and

endorsement of dieting behaviors (DCWC) would also be examined.

Hypothesis 3.1: Individuals profiled as members of the D$_S$ group were predicted to have

moderately low body appreciation but were not predicted to endorse high levels of

depression compared to D$_D$ dieters. D$_S$ eaters were predicted to make food choices based

on health and weight control. It was anticipated that eaters within this class would have

low impulsiveness (i.e., negative urgency) specifically compared to dieters in the D$_D$

group. It was also predicted they would have the highest degree of self-efficacy among dieters and non-dieters.

Hypothesis 3.2: Individuals profiled as members of the D_D group were predicted to have the lowest body appreciation of the prospective groups. Higher levels of depression were also predicted. D_D dieters were expected to make food choices based on health, weight control, and mood. It was anticipated that dieters within this class would have the highest levels of impulsiveness, particularly negative urgency, among classes. It was also predicted that this group would have low self-efficacy, especially when compared to D_S eaters. This group was predicted to have the highest BMI among profiles.

Hypothesis 3.3: Non-dieters were predicted to show base rate levels of depression, self-esteem, and moderate-to-low levels of body appreciation consistent with what is found in the literature for each measure. It was anticipated that non-dieters would choose food based on sensory appeal, price, convenience, mood, and familiarity. It was predicted that members of this group would show moderate impulsiveness as well as self-efficacy compared to other groups. This group was predicted to have the lowest BMI among profiles.

METHOD

<u>**Participants**</u>

       A total of 281 undergraduate women from the University of New Mexico participated in this study. Inclusion criteria were that participants would be female, between the ages of 18 and 25, and fluent in English. Participants were excluded if they were currently pregnant or did not have reliable access to internet. A total of 322 potential participants were screened for the study. Of those screened, a total of 41 were excluded. The reasons included failing to complete all questionnaires in the study (n = 40) or being a male (n =1). Participants were recruited via advertisement on the SONA Experiment Management System, a secure university-specific research credits signup system. All participants received one research credit for their involvement in this online study.

<u>**Measures**</u>

       Demographics. A demographic questionnaire (Appendix A) designed by the researchers asked participants to self-report their identified gender, biological gender, age, height, weight, marital status, number of children, sexual orientation, race, ethnicity, education level, zip code (as a proxy for socioeconomic status), history of eating disorder treatment, and age of puberty onset.

       Dieting status. Six items were generated to assess for current and lifetime dieting status, motivation, and success (Appendix B). These items were created in order to ask binary questions with the option to elaborate more if necessary. Participants were asked whether they were currently dieting, if their motivation was to become healthier or change their appearance, whether they had attempted (and succeeded) in dieting in the past, whether they currently adhered to a diet plan (e.g., keto, paleo) or if they had any dietary restrictions.

Measures Used as LPA Indicators (Aim 1)

Restraint Scale (**RS**; Herman & Polivy, 1980). The RS is a 10-item measure used to assess dieting for weight loss or maintenance (Appendix C). The RS measures both weight fluctuation and subjective concern for dieting and has been shown to be a meaningful predictor for disinhibitory eating (van Strien et al., 2007). RS items are answered either using an ordinal or a ratio scale (e.g., "How often are you dieting?" ["Never", "Rarely", "Sometimes", "Usually", "Always"] and "In a typical week, how much does your weight fluctuate?" ["0-1 lbs.", "1.1-2 lbs.", "2.1-3 lbs.", "3.1-5 lbs.", "5.1+ lbs."], respectively). Higher RS scores are prospectively associated with fluctuating body weight and failed attempts at dieting (Heatherton et al., 1991). The RS has been shown to have good internal consistency in normal-weight non-disordered eating individuals, with slightly lower alpha levels in overweight and eating-disordered groups. The RS also has good reliability in college students (Lowe & Thomas, 2009; Wardle, 1987). This scale was included so that self-reported scores of restrained eating could be compared alongside DEBQ scores within the same individual to further elucidate which aspects of eating are accounted for by each instrument. Cronbach's alpha for this scale within the current study was 0.82.

Dutch Eating Behavior Questionnaire (**DEBQ;** van Strien et al., 1986). The DEBQ is a 33-item measure (Appendix D) divided among three subscales that assess restrained eating (deliberate weight control behavior, e.g., "Do you try to eat less at mealtimes than you would like to eat?"), emotional eating (the desire or drive to eat in response to unpleasant emotions, e.g., "Do you have a desire to eat when you are feeling lonely?"), and external eating (the consumption of food in the presence of food-related stimuli, e.g., "If you have something delicious to eat, do you eat it straight away?"). Responses to items are made using a 5-point

Likert type scale (1 = "never", 5 = "very often"). Several studies have shown that the DEBQ is negatively associated with caloric intake, and potentially with fat and sugar intake (Wardle, 1987). Psychometric studies have shown that the DEBQ has high internal consistency and validity among college students (Lowe & Thomas, 2009). This scale was included so that self-reported scores of restrained eating could be compared alongside RS scores within the same individual. Cronbach's alpha for this scale within the current study was 0.95.

Binge Eating Scale (**BES;** Gormally et al., 1982). The BES is a 16-item questionnaire used to assess binge eating behavior (Appendix E). For each item, participants are asked to choose the short response answer that applies best to them among three to four total responses regarding eating behavior. For example, one item states, "I feel so ashamed about overeating that I pick times to overeat when I know no one will see me. I feel like a 'closet eater.'" Higher scores on the BES indicate higher prevalence of bingeing behavior, such that scores greater than 18 indicate moderate bingeing, and scores above 27 indicate severe bingeing. Although originally designed for use with obese individuals, the BES has been shown to be reliable and valid in normal weight adult women from the general population (Duarte et al., 2015), as well as in university students (Escrivá-Martínez et al., 2019). Cronbach's alpha for this scale within the current study was 0.92.

Intuitive Eating Scale (IES-2; Tylka & Kroon Van Diest, 2013). The IES-2 is a 23-item questionnaire (Appendix F) that measures four factors of intuitive eating: eating for physical reasons rather than emotional reasons, unconditional permission to eat, reliance on hunger and satiety cues, and body-food choice congruence. Using a 5-point scale (1 = "strongly disagree", 5 = "strongly agree"), participants with higher scores indicate greater levels of intuitive eating. A sample question is, "I trust my body to tell me how much to eat". The IES-2 is shown to be both

reliable and valid in college students, is positively correlated with body appreciation and self-esteem, and is negatively related to eating disorder pathology (Tylka & Kroon Van Diest, 2013). Cronbach's alpha for this scale within the current study was 0.86.

Measures of Nutritional Knowledge and Average Dietary Composition (Aim 2)

Nutritional Literacy Assessment Instrument (**NLit**; Gibbs & Chapman-Novakofski, 2013). The original NLit is a 64-item assessment (Appendix G) that measures an individual's ability to use nutrition information and skills to make healthy eating choices. The NLit includes subcategories regarding portion sizing, consumer skills, reading food labels, and knowledge of energy sources from food. Higher scores indicate better nutritional literacy, with nominal categories of "Likelihood of Poor Nutritional Literacy", "Possibility of Poor Nutritional Literacy", and "Possibility of Good Nutritional Literacy". Creators of the NLit have also validated a shortened, 42-item version of the NLit that was used in the present study. Content validity, predictive criterion validity, and reliability were confirmed in American adults with chronic disease (Gibbs et al., 2018).

NHANES Dietary Screener Questionnaire (**DSQ**; National Cancer Institute, 2004). The DSQ is a 26-item screener (Appendix H) that assesses the frequency of food and drink consumption in the past month. The DSQ is designed to capture intakes of fruits and vegetables, dairy, whole grains/fiber, red and processed meat, and added sugars by asking participants about a wide variety of dietary items and their frequency of consumption. The DSQ was used in the National Health and Nutrition Examination Survey (NHANES) in 2009-2010, and mean intakes were found to agree closely with 24-hour food recalls (Thompson et al., 2017). A validity and reliability study of the DSQ found that estimated mean servings of fruits and vegetables was

about the same compared with 24-hour recall values, with fairly strong test-retest coefficients (Shim et al., 2011; Yaroch et al., 2012).

  Percentage Energy from Fat Screener (**PEFS**; National Cancer Institute, 1996) The PEFS is a brief 16-item screener (Appendix I) developed to estimate an individual's typical percent energy intake from dietary fat. Participants are asked how frequently they have consumed common fatty foods within the last year. The PEFS was evaluated alongside a 120-item food frequency questionnaire and 24-hour food recalls and was found to be moderately consistent (Napolitano & Hayes, 2010; Thompson et al., 2008).

Measures to Assess Psychological Well-Being (Aim 3)

  Food Choice Questionnaire (FCQ; Steptoe et al., 1995). The FCQ is a 9-factorial, 36-item measure (Appendix J) that captures the intrinsic and extrinsic motivations of consumers while making general food choices. Originally introduced as a 5-point scale, a more robust version of the FCQ (Prescott et al., 2002) asks participants to answer these items on a 7-point Likert-type scale (1 = "extremely unimportant", 7 = "extremely important"). This measure has demonstrated good internal consistency (Jáuregui-Lobera & Bolaños Ríos, 2011), validity, and reliability (Markovina et al., 2015) across numerous countries and in American college students (Pearcey & Zhan, 2018). In the proposed study, the "Ethical Concern" factor has been removed due to reported low internal consistency (Fotopoulos et al., 2009). Three novel items were added with the intention of capturing motivation for additional health-related aspects of food choice: "It is important to me that the food I eat on a typical day is minimally processed", "It is important to me that the food I eat on a typical day fuels me for daily activities", "It is important to me that the food I eat on a typical day is low in refined or added sugars (such as cane sugar)". Cronbach's alpha for this scale within the current study was 0.92.

Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001). The

PHQ-9 is a nine-item measure of depression symptoms and severity (Appendix K). Participants

are asked to consider the extent to which they have experienced certain problems over the past

two weeks (e.g., "little interest or pleasure in doing things") using a 4-point Likert type scale (0=

"Not at all", 3 = "Nearly every day"). Items are designed to correspond with DSM-5 criteria for

major depressive disorders (APA, 2013). Increasing scores for this measure indicate mild,

moderate, moderately severe, and severe depression, respectively (Kroenke et al., 2001). The

PHQ-9 has been shown to be a reliable and valid measure of depressive symptoms among

college students across ethnic groups (Keum et al., 2018). Cronbach's alpha for this scale within

the current study was 0.92.

Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015). The BAS-2 is a

10-item measure that asks participants to reflect on the extent to which they appreciate or hold

their bodies in positive esteem. A sample item is, "I appreciate the different and unique

characteristics of my body" (Appendix L). A 5-point Likert-type scale (1 = "never", 5 = "always")

is used. Higher scores indicate higher body appreciation. The BAS-2 has been shown to be

internally consistent, have good construct validity, and test-retest viability (Tylka & Wood-

Barcalow, 2015). Cronbach's alpha for this scale within the current study was 0.96.

UPPS-P Impulsive Behavior Scale Short Version (S-UPPS-P; Lynam, 2013). The

UPPS-S was originally developed to assess five distinct facets of impulsivity: sensation seeking,

lack of premeditation, lack of perseverance, negative urgency, and positive urgency (Cyders &

Smith, 2007; Whiteside & Lynam, 2001). The short version consists of 20 items such as, "I tend

to act without thinking when I am really excited" (Appendix M), rated on a 4-point Likert scale (1 =

"Disagree strongly", 4 = "Agree strongly"), with higher scores indicated higher impulsivity. The

UPPS-S has been shown to replicate internal consistency of the full UPPS-P and is reliable and valid in college students (Cyders et al., 2014; Dugré et al., 2019; Xue et al., 2017). Cronbach's alpha for this scale within the current study was 0.81.

General Self-Efficacy Scale (GSE; Schwarzer & Jerusalem, 1995). The GSE is a 10-item measure that evaluates an individual's generalized expectations of self-efficacy, or the belief that they are capable of enacting change and influence within their own lives (Appendix N). The GSE uses a four-point Likert-like scale (1= "Not at all true", 4 = "Exactly true") with higher scores indicating higher self-efficacy. This scale has been shown to be unidimensional, with high reliability and validity in samples across 25 countries (Scholz et al., 2002). Cronbach's alpha for this scale within the current study was 0.87.

Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1989). The RSE is a 10-item measure assessing state self-esteem, or the way one feels about or evaluates oneself at a given point in time (Appendix O). Participants are asked to reflect on current feelings using a 4-point Likert-type scale from 1 ("Strongly Disagree") to 4 ("Strongly Agree"), with higher scores indicating higher self-esteem. The RSE shows high reliability and strong convergent validity for women in college and community samples (Robins et al., 2001). Cronbach's alpha for this scale within the current study was 0.90.

Daily Checklist of Weight Control (DCWC; Smith et al., 2022). The DCWC is a measure of weight control strategies utilized by participants in the past 24 hours (Appendix P). This scale was included in the current study to assess for specific dieting behavior in participants who endorse dieting. Participants are asked to respond "Yes" or "No" to engaging in 14 weight control behaviors, falling into two subscales of "Consumption-Reduction Strategies" and "Health-Focused

Strategies". The DCWC has been shown to have good construct validity, internal consistency, and time invariance in a diverse college sample (Smith et al., 2022).

Table 1.

Categorization of Survey Measures Used.

Measures Used for LPA Indicators	Measures of Nutritional Knowledge and Average Dietary Composition	Measures to Assess Psychological Well-Being
Restraint Scale (**RS**)	Nutritional Literacy Assessment Instrument (**NLit**)	Food Choice Questionnaire (**FCQ**)
		Patient Health Questionnaire-9 (**PHQ-9**)
Dutch Eating Behavior Questionnaire (**DEBQ**)	NHANES Dietary Screener Questionnaire (**DSQ**)	Body Appreciation Scale-2 (**BAS-2**)
Binge Eating Scale (**BES**)	Percentage Energy from Fat Screener (**PEFS**)	UPPS-P Impulsive Behavior Short Scale (**S-UPPS-P**)
Intuitive Eating Scale -2 (**IES**)		General Self -Efficacy Scale (**GSE**)
		Rosenberg Self-Esteem Scale (**RSE**)
		Daily Checklist of Weight Control (**DCWC**)

Procedure

Recruited participants were given a URL link and asked to complete all assessment measures administered via the online survey platform Opinio. Participants were screened for eligibility via answers to the demographic questions at the beginning of the study. If a participant selected that they were born biologically male, were not fluent in English, fell outside the study's age range, or endorsed being pregnant, they were removed from the final dataset. The order in which measures were presented were randomized within the survey but were identical for each

participant due to technical limitations within the survey platform. Specifically, measure presentation was pseudo-randomized such that all measures were assigned a number, and the numbers were randomized without replacement to create an order of presentation. Measures were subsequently coded categorically based on the general theme of the measure (i.e., 'Eating Behavior' [e.g., DEBQ, RS, and BES], 'Dietary Intake' [e.g., DSQ, PEFS], or 'Personal Attributes' [e.g., RSE and PHQ-9]). If two measures sharing the same category were presented one after the other, one measure was hand-removed and replaced with a measure of a different category, such that no two theme categories were presented back-to-back. The intention of this approach to measure presentation was to mitigate participant fatigue regarding a specific theme. All measures were administered in a single session of approximately one hour. Once participants completed the questionnaires, they were subsequently awarded research credit.

Data Analytic Strategy

Latent profile analyses (LPA), a type of factor mixture model, were conducted to estimate categorical latent variables of discrete dieting profiles (i.e., latent classes) that were indicated by observed continuous variables (Gibson, 1959; Spurk et al., 2020). The LPA model employed by the current study was formed from variables (or indicators) from the RS, DEBQ, BES, and IES-2. Specifically, global scores for the RS, BES, and IES-2 were used because global scores for these measures are interpretable as a unitary construct. The RS and BES are scored using totals from the measure, while the IES-2 is scored using an average. The three subscales of the DEBQ (emotional eating, external eating, and restricted eating) were included in the LPA individually because scores on these subscales are typically interpreted rather than the global score. Scores from each DEBQ subscale are typically reported as averages. LPAs were conducted using MPlus version 8.8 (Muthén & Muthén), where number of initial stage random

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starts and number of final stage optimizations for the class analysis model were 2000 and 1000, respectively.

Several factors were considered when evaluating which LPA model best fit the data. The Bayesian Information Criterion (BIC) is one of the most commonly used methods for model selection and is based on the maximum likelihood estimates of the model parameters for selecting "the most parsimonious and correct model" (Tein et al., 2013), where a lower BIC is indicative of greater parsimony. A Lo-Mendell-Rubin adjusted LRT test was used to compare models of multiple class numbers, such that lower p values indicated whether a model with class size *k* was a better fit than a model with class size *k-1*. A bootstrap likelihood ratio test (BLRT) was used to estimate the distribution of the log likelihood difference, resulting in a p value that was also used to compare increase in model fit between *k* and *k-1* models (Spurk et al., 2020). Finally, entropy among models was compared, such that higher entropy (reaching a max value of 1) indicates higher capability of the model to output well-separated profiles. An entropy value greater than 0.8 has been suggested to indicate strong model fit (Clark & Muthén, 2009).

Figure 1.

An SEM Path Model for the Indicator Variables Utilized in Current Study's LPA
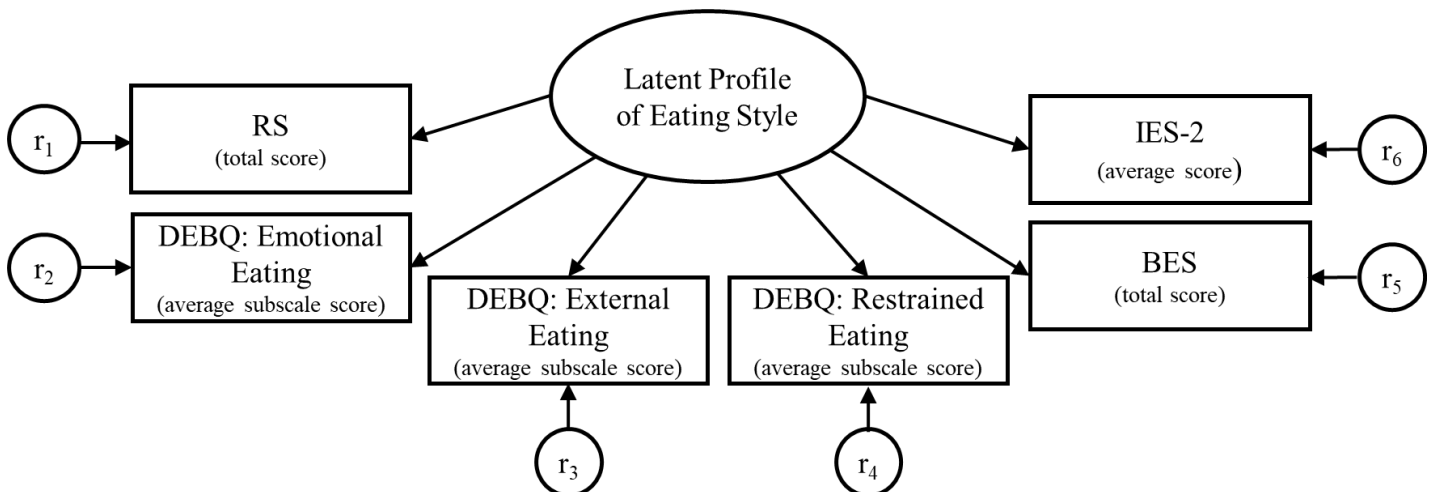
Predicted profiles of eating styles are described in **Aim 1, Hypotheses 1.1-1.3**. Classes identified by LPA were then compared for differences in dietary composition (DSQ and PEFS) and nutritional knowledge (NLit) using one-way ANOVAs and applying a Bonferroni correction (**Aim 2, Hypotheses 2.1-2.3**). Finally, in accordance with **Aim 3**, profiles were compared for differences on multiple psychological measures (FCQ, PHQ-9, BAS-2, S-UPPS-P, GSE, RSE, DCWC) via one-way ANOVAs using a Bonferroni correction. All ANOVA analyses were conducted using SPSS version 23 (IBM).

Power Analyses

Current literature is limited in regard to determining statistical power for latent profile analyses, and no straightforward formula to estimate required sample size for LPA currently exists (Ferguson et al., 2020). Sample size is contingent on the number of profiles and the distance between them, which cannot be well-assessed prior to conducting the study. Estimations can be made using Monte Carlo simulations, however, a recent scoping review of 46 published LPA studies found that none of the studies utilized this method (Spurk et al., 2020). Several simulation experiments have suggested a rule of thumb that samples between 300 and 500 participants are acceptable (Nylund et al., 2007; Peugh & Fan, 2015). Tein and colleagues (Tein et al., 2013) examined statistical power for LPA and found that the distance between latent profiles (that is, the standardized distance between mean values of the indicators) was one of the largest determinants of power compared to other sample characteristics. Meehl and Yonce (1996) found that large class separation, that is, 1.5 or 2 SD separations between latent classes for each indicator produced good taxon validity. This consideration was made when selecting a final LPA model.

RESULTS

Characteristics of the Sample

Pairwise deletion was used to handle missing data. A participant's data was entirely omitted from analyses if they failed to reach the end of the study (n = 49). Participants who neglected to answer one or more items in a subscale or measure were also excluded from subscale-specific or measure-specific analyses. The vast majority of survey items were answered (99.48%). However, due to unintentional error by the author, a single item was initially omitted from the published IES-2 (item 23, one of three items corresponding to the Body-Food Choice Congruence subscale). For approximately 78% of the final sample, a mean of captured responses to the item (n=62) was manually imputed.

The final sample consisted of 281 undergraduate women who had a mean age of 19.1 (*SD* =1.42) and a mean BMI of 23.9 (*SD* = 4.67). Approximately 60.9% of the sample reported a BMI in the normal range, 34.9% reported a BMI in the overweight range, and 4.3% reported a BMI in the underweight range. While the majority of the sample identified as female (n= 271, 96.4%), a small proportion of the sample (n = 10, 3.6%) identified as either genderqueer or gender non-conforming. These participants were included in analyses because every participant endorsed being assigned female at birth. Most participants reported never having been married (n = 255, 90.7%).

Regarding ethnicity and race, approximately half of the sample identified as of Hispanic or Latino origin (n = 129, 45.9%), while almost a third identified as White (n = 88. 31.3%). Eight percent of participants identified as Asian (n = 23), 6.4% identified as American Indian/Alaska Native (n = 18), and 6.0% identified as Black (n = 17). Two percent of the study population identified as "other" or preferred not to disclose (n = 6). Though the majority of participants

reported never being diagnosed with an eating disorder (n = 258, 91.8%), approximately 8.2% (n = 23) did report a diagnosis in their lifetime. Seven percent (n = 19) of participants had received treatment for their eating disorder. In the current sample, approximately 44.5% (n = 125) of women believed themselves to be overweight, while 8.9% (n= 25) believed themselves to be underweight. The majority of participants did not endorse being on a weight-loss diet (n = 224, 79.7%), though a slight majority did endorse "watching what they ate" (n = 161, 57.3%). See Table 2 for an overview of demographic characteristics of the study sample.

Table 2.

Participant Characteristics (N = 281)

Demographic Categories	Frequency	Percentage	*M*	*SD*	Range
Age			19.09	1.415	18-24
BMI			25.18	4.668	16.78 – 41.96
Gender Identity					
Female	271	96.4			
Genderqueer/Non-conforming	10	3.6			
Marital Status					
Never married	255	90.7			
Cohabitating but not married	23	8.2			
Separated	2	0.7			
Married and living with partner	1	0.4			
Ethnicity and Race					
Hispanic or Latinx	129	45.9			
White	88	31.3			
Asian	23	8.2			
American Indian/Alaska Native	18	6.4			
Black or African American	17	6.0			
Other/Unknown	6	2.1			
Past Eating Disorder Diagnosis					
No	258	91.8			
Yes	23	8.2			
Past Eating Disorder Treatment					
No	262	93.2			
Yes	19	6.8			
Perception of being overweight					
No	156	55.5			
Yes	125	44.5			
Perception of being underweight					
No	256	91.1			
Yes	25	8.9			
Currently on a diet to lose weight					
No	224	79.7			
Yes	57	20.3			
Currently "watching what I eat"					
Yes	161	57.3			
No	103	36.7			

Latent Profiles of Eating Style and Attitudes

Aim 1: The initial aim of the current study was to use LPA to estimate profiles of eating style and attitudes among participants. As described previously, latent profiles were modeled using self-report scores on the Restraint Scale (RS), Dutch Eating Behavior Questionnaire (DEBQ), Binge Eating Scale (BES), and Intuitive Eating Scale (IES-2). Two viable LPA models were observed, consisting of three and four classes sizes, respectively. A Lo-Mendell-Rubin adjusted LRT test found that the 3-class model was significantly better than a 2-class model at a p value of .0062. In comparison, an LRT test found that a 4-class model was not significantly better than the 3-class model ($p = .0715$), though the alpha value suggests that the former model may approach superiority given a larger sample size. Importantly, the Bayesian Information Criterion (BIC) for the 3-class and 4-class models was 5993.694 and 5966.395, respectively. A bootstrap likelihood ratio test (BLRT) was used to approximate the p value of the LRT for both class models; for both the 3-class and 4-class models, $p < .0001$, indicating both models are significantly better than the K-1 class model (McLachlan, 1987). Entropy for all tested models was greater than 0.08. Please see Table 3 below describing model fit for class models of various sizes.

Table 3.

Comparison of LPA Class Models Tested

# of Classes	AIC	BIC	Entropy	Adjusted LRT value	LRT p value	BLRT p value
2	6021.074	6090.203	0.867	512.634	0.0000	<0.0001
3	5899.096	5993.694	0.844	132.617	0.0062	<0.0001
4	5846.329	5966.395	0.819	65.117	0.0715	<0.0001
5	5799.784	5945.318	0.804	59.050	0.4302	<0.0001

Given that the 3-class model and the 4-class model are both credibly supported by methods for evaluating model fit, substantive interpretation of each was used to select a final model. In the 3-class model, two of three classes (Classes 2 and 3) had mean RS scores greater than 15. Literature regarding the psychometrics of the RS have classified scores greater than 15 as indicative of restrained eating (Roefs et al., 2005). For the same two of the three classes (Classes 2 and 3), average DEBQ scores were higher than previously reported norms for college women (i.e., $DEBQ_{emotional} = 2.57 \pm 0.07$, $DEBQ_{restrained} = 3.00 \pm 0.07$, $DEBQ_{external} = 3.07 \pm 0.05$) across the three subscales (Nolan et al., 2013). Finally, the same two of the three classes (Classes 2 and 3) demonstrated average intuitive eating scores below norms for college women (i.e., 3.37 $\pm$ 0.50; Tylka & Kroon Van Diest, 2013). The third class demonstrated average IES-2 scores slightly higher than reported norms for college women, but within one standard deviation. Finally, one class in the given model self-reported heavy binge eating (Class 2), classified by BES scoring guidelines that rate scores greater than 27 as indicative of heavy binge eating (with scores <17 indicating non-bingeing and scores of 18-26 indicating moderate bingeing; Marcus et al., 1988). Table 4 shows means for each of the indicator variables used to generate the 3-class model.

Table 4.

Mean Estimates and Standard Error of the 3-class LPA Model Tested

Indicator Variable	Class 1	Class 2	Class 3
RS	8.94 (0.70)	22.56 (0.76)	16.61 (0.71)
$DEBQ_{emotional}$	1.74 (0.08)	3.71 (0.21)	2.74 (0.12)
$DEBQ_{restrained}$	1.76 (0.11)	3.95 (0.17)	3.12 (0.12)
$DEBQ_{external}$	2.82 (0.08)	3.57 (0.12)	3.23 (0.07)
IES-2	3.75 (0.05)	2.59 (0.09)	3.15 (0.05)
BES	6.27 (0.70)	27.20 (2.36)	15.38 (0.96)

Note. Restraint Scale (RS), Dutch Eating Behavior Questionnaire (DEBQ), Intuitive Eating Scale-2 (IES-2), Binge Eating Scale (BES).

Substantive interpretation of means across the 3 classes indicate a class of non-dieting

eaters (Class 1, n = 111), highly restrictive/binge eaters (Class 2, n = 37), and moderately

restrictive eaters with near-threshold binge eating tendencies (Class 3, n = 133). In sum, this

model would suggest that nearly 61% (n= 170) of the current sample was restricting their eating,

at least moderately. Though only about 20% of the sample reported being currently on a diet

with the intention of losing weight, 57% also endorsed "watching what they eat", which may be

a subvert proxy for dieting behaviors. Notably, the 3-class model does not account for the

potential existence of a class of women who are highly intuitive eaters.

In comparison, examining the group means across indicator variables in the 4-class

model reveals a more nuanced interpretation of emerging eating style profiles. Table 5 shows

means for each of the indicator variables used to generate the 4-class model, which will be

discussed in more detail below.

Table 5.

Mean Estimates and Standard Error of the 4-class LPA Model Tested.

Indicator Variable	Class 1	Class 2	Class 3	Class 4
RS	7.09 (0.98)	11.29 (0.93)	17.43 (0.68)	22.67 (0.88)
DEBQ$_{emotional}$	1.33 (0.07)	2.09 (0.12)	2.88 (0.11)	3.78 (0.26)
DEBQ$_{restrained}$	1.44 (0.14)	2.18 (0.16)	3.30 (0.10)	3.96 (0.20)
DEBQ$_{external}$	2.69 (0.15)	2.93 (0.10)	3.29 (0.07)	3.60 (0.15)
IES-2	4.06 (0.09)	3.49 (0.04)	3.09 (0.051)	2.53 (0.08)
BES	3.62 (0.43)	9.04 (0.92)	16.55 (1.02)	28.10 (1.99)

Note. Restraint Scale (RS), Dutch Eating Behavior Questionnaire (DEBQ), Intuitive
Eating Scale-2 (IES-2), Binge Eating Scale (BES).

Substantive interpretation of estimated means for each class within the 4-class model

overlaps with that of the 3-class model to some degree. Importantly, an additional, distinct eating

profile emerged; Class 1 demonstrated means on both measures of restrained eating significantly

lower than existing norms for college women, no notable binge eating tendencies, and an intuitive eating average greater than one standard deviation above the average previously reported for college women. A total of 44 women (approximately 15.7%) were statistically assigned to Class 1. This class is unique from the "non-dieting" group from the 3-class model because it implies that individuals in this category report not only eating without restriction, but also eating highly intuitively.

Class 2 of the 4-class model (n = 88, 31.3% of subjects) was characterized by an RS score not indicative of restricted eating, as well as DEBQ subscale scores below previously reported averages among college women. Self-reported intuitive eating was slightly higher than previously reported averages, but still within a standard deviation of the mean. Total score on the BES within this class was not indicative of binge eating. Of note, all means in this class were marginally higher than the comparable class in the 3-class model (Class 3); however, rather than being on the cusp of restrictive eating, members of this profile appear to endorse eating in a somewhat unconcerned manner. Subthreshold scores on restraint measures and a moderate IES-2 score suggest that Class 2 individuals are not limiting intake and trend towards eating in a way that may be more congruent with biological hunger.

Class 3 within the 4-class model was the most common profile uncovered with LPA (n = 116, 41.3% of subjects). This class had an average RS total score higher than 15, indicating restricted eating. Scores on the subscales of the DEBQ corroborate this trend, such that each subscale mean was significantly greater than previously reported norms for college women. In addition, the IES-2 mean for this profile was below averages among college women in prior literature. Research from Burnette (Burnette & Mazzeo, 2020) notes that scores close to 2.93 may be indicative of sub-threshold eating disorders as measured from the Eating Disorder

Diagnostic Screener (EDDS; Stice et al., 2000). On the BES, this class reported potential binge behavior slightly below the measure's cut-off score for moderate bingeing (i.e., total scores of 18-26). This class is similar to Class 3 within the 3-class model, such that individuals in this profile endorse some restricted eating without significant binge eating. These individuals may hypothetically be considered to be "at-risk" dieters, that is, those that restrict but do not compensate via binge eating. Within this LPA model, Classes 2 and 3 are made up of participants largely captured in Class 3 in the 3-class model.

Class 4 within the 4-class model is comparable to the Class 2 observed in the 3-class model. In addition, Class 4 in the 4-class model captured 33 participants (approximately 11.7% of the sample), while Class 2 in the 3-class model captured 37. In a similar vein, participants categorized into this class reported the highest degree of restriction, with an average RS score far above the measure's 15-point threshold. Similarly, DEBQ subscales were all significantly higher than averages of college women reported in prior literature. In particular, the DEBQ$_{restrained}$ subscale average for this class was similar to subscale averages reported for women diagnosed with anorexia nervosa (3.79 ± 0.91, from Wardle, 1986; 4.08 ± 0.68, from Kiezebrink et al., 2009). Class 4 estimated averages for the DEBQ$_{emotional}$ and DEBQ$_{external}$ subscales were also similar to or greater than subscale scores reported from women diagnosed with bulimia nervosa (DEBQ$_{emotional}$ = 3.83 ± 0.94, DEBQ$_{external}$ = 3.45 ± 0.86, from Wardle, 1986). Regarding the IES-2, scores were far below previously reported averages for college women, as well as below those reported by college women with sub-threshold eating disorders. The BES estimated average for this group was indicative of heavy binge eating behavior.

In summary, though initial hypotheses predicted the emergence of three eating style classes ("successful" dieters, dieters prone to disinhibited eating, and non-dieters), both the 3-

class and 4-class models differed in terms of mean levels of the indicators for the estimated profiles. The 3-class model suggested a group of highly restricted and binge-prone eaters, eaters with moderate restriction, and non-dieters with a normative degree of intuitive eating expected from college women. This model, though statistically viable, was passed over in favor of the 4-class model, which was both statistically viable and substantively interpretable. The 4-class model appeared to preserve the 3 classes observed in the 3-class model (i.e., heavily restricted eaters prone to binge eating, a more moderate group of restricted eaters, and relatively "unconcerned" eaters) while also capturing a profile of highly intuitive eaters. Inclusion of this group provided a more interpretable comparison between individuals who restrict versus those who rarely do. The 4-class model allowed for a greater breadth of comparisons to be made amongst distinctive eating profiles. Additionally, good taxon validity was suggested by >2 SD differences between each mean indicator variable for each of the four classes. For this reason, Hypotheses 1.1-1.3 approximated the actual LPA classes observed, though notably, no group of "successful" dieters was readily interpretable. Instead, self-reported binge eating behaviors increased as dietary restraint increased across all four groups. Higher group means on the RS were unilaterally positively associated with higher means on the DEBQ subscales.

To allow for comparisons of eating style profiles in Aims 2 and 3, the four classes were categorized as follows: Intuitive Eaters (IE; Class 1), Unconcerned Eaters (UE; Class 2), Moderate Restrictors (MR; Class 3), and Heavy Restrictors (HR; Class 4). For the results that follow, the individuals who were *predicted* to fall into each class were analyzed as exclusive members of said class. In the sections that follow, over 30 hypotheses were tested to explore differences in the measures administered among the 4 classes; a Bonferroni correction was used for each ANOVA in order to control for false positive results from multiple comparisons. Level

of significance was set at $p < .0083$ (or .05/6), given that six pairwise comparisons were made within each one-way ANOVA.

Class Comparisons of Nutritional Literacy and Dietary Content

Aim 2: The secondary aim of this study was to compare latent profiles of eating styles in order to see if they differed in nutritional literacy and self-reported diet. The Nutritional Literacy Questionnaire (NLit) was used to assess nutritional literacy, and the average score for the entire sample was 30.1 ($SD = 6.2$), indicating the possibility of poor nutritional literacy. Results from a one-way ANOVA with Bonferroni correction showed that NLit means for each of the four latent profiles were not significantly different, $F(3, 277) = 1.21$, $p = .31$. All ANOVA results for this Aim can be seen on Table 6.

In order to estimate typical dietary intake, the Dietary Screener Questionnaire (DSQ) was used for average daily consumption of fruits and vegetables, dairy, added sugar, whole grains, and fiber, while the Percent Energy from Fat Screener (PEFS) was used to estimate daily percent calories from fat. Average fruit and vegetable intake for the entire sample was 2.07 ($SD = 0.54$) cups per day. A one-way ANOVA with Bonferroni correction found no significant difference in fruit and vegetable consumption across the four latent profiles, $F(3, 276) = 1.30$, $p = .276$. Average daily dairy consumption for the entire sample was 1.35 ($SD = 0.38$) cups. A one-way ANOVA with Bonferroni correction found no significant differences in dairy consumption across the latent profiles, $F(3, 277) = 2.34$, $p = .074$. Though non-significant, daily dairy consumption varied across classes, with the Intuitive Eater group consuming the most and Heavy Restrictors consuming the least. Average daily consumption of added sugar per day across the entire sample was 15.07 ($SD = 4.73$) teaspoons. A one-way ANOVA with Bonferroni correction found no significant difference in added sugar consumption across the latent profiles, $F(3, 277) =$

0.48, $p = .70$. Average daily consumption of whole grains among the entire sample in grams was 40.89 ($SD = 8.70$). A one-way ANOVA with Bonferroni correction found no significant difference in whole grains consumption when comparing the latent profiles, F(3, 277) = 0.53, $p = .98$. Average daily consumption of fiber across the entire sample was 14.20 ($SD = 2.51$) grams per day. A one-way ANOVA with Bonferroni correction found no significant difference in fiber consumption across the latent profiles, F(3, 276) = 0.94, $p = .42$. Average daily percentage of energy from fat among the entire sample was approximately 39.6% ($M = 0.40$, $SD = 0.10$). A one-way ANOVA with Bonferroni correction found no significant difference in percentage energy from fat among the latent profiles, F(3, 277) = 2.07, $p = .10$.

Given the non-significant differences in both nutritional literacy scores and dietary consumption estimates across latent profiles, Hypotheses 2.1-2.3 were not validated by the current study.

Table 6.

One-Way ANOVAs Comparing the LPA Classes Across Aim 2 Study Measures

		Means			
Scale	F	Intuitive Eaters ($n = 44$)	Unconcerned Eaters ($n = 88$)	Moderate Restrictors ($n = 116$)	"Heavy Restrictors" ($n = 33$)
NLit (total score)	1.21	29.63[a]	30.28[a]	29.65[a]	30.11[a]
DSQ – fruits and vegetables (cups/day)	1.30	2.04[a]	2.00[a]	2.09[a]	2.21[a]
DSQ – dairy (cups/day)	2.34	1.49[a]	1.33[a]	1.34[a]	1.29[a]
DSQ – added sugar (teaspoons/day)	0.48	14.74[a]	15.14[a]	15.35[a]	14.33[a]
DSQ – whole grains (grams/day)	0.05	41.19[a]	40.71[a]	41.02[a]	40.58[a]
DSQ – fiber (grams/day)	0.94	14.00[a]	13.95[a]	14.30[a]	14.72[a]

| PEFS – (% energy from fat/day) | 2.07 | 40.73^a | 37.46^a | 40.70^a | 40.40^a |

Note: NLit = Nutritional Literacy Assessment, DSQ = Dietary Screener Questionnaire, PEFS = Percent Energy from Fat Screener. For one-way ANOVAs, all *p*s <.0083 to account for Bonferroni correction, and *df*=3. Post hoc tests were conducted using pairwise comparisons. Shared superscripts within each row indicate no significant difference between groups.

Class Comparisons of BMI, Diet Behaviors, and Psychological Measures

Aim 3: The final aim of this study was to compare emergent LPA profiles for differences in BMI, endorsement of dieting behaviors (i.e., single-item questions of dieting status), and endorsement of various psychological constructs. A comprehensive table of means and F-scores for each class across all measures can be found at the end of the section (Table 9).

A one-way ANOVA was used to compare BMI among the four latent profiles, and a significant difference was observed, F(3, 277) = 13.07, *p* < .0001. A Bonferroni post hoc test revealed that the mean BMIs for the IE class (21.67, *SD* = 3.47) and the UE class (22.79, *SD* = 3.90) were significantly lower than those of the MR class (24.90, *SD* = 4.72) and HR class (26.98, *SD* = 5.41). Means for the IE and UE classes were not significantly different from each other, nor were means for the MR and HR classes (Figure 2).

Figure 2.

BMI Means for Each of the LPA Classes.
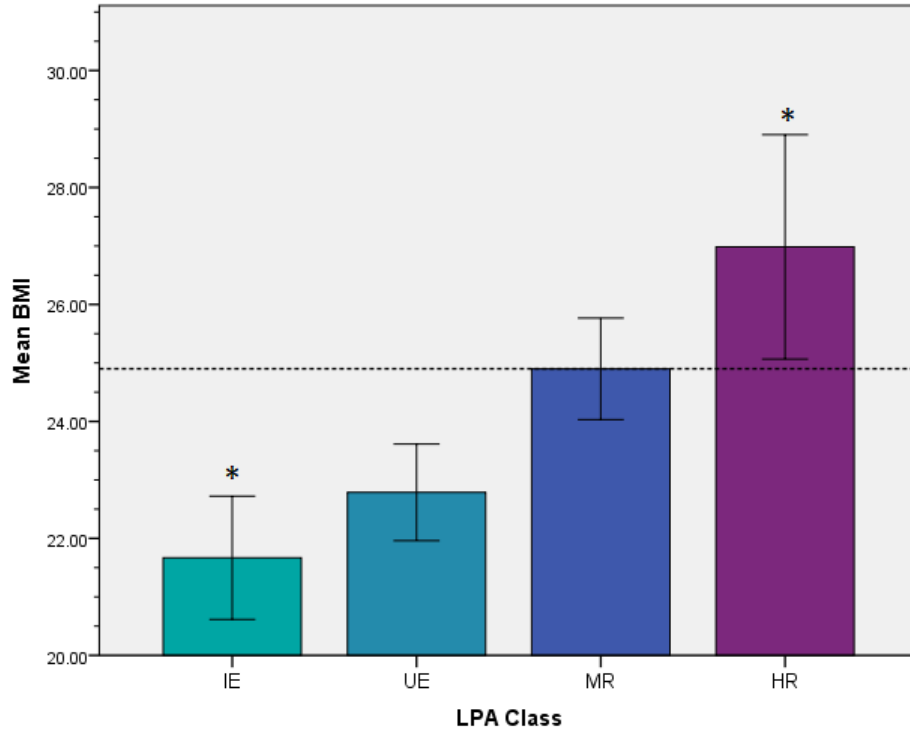
Note: IE =Intuitive Eaters, UE = Unconcerned Eaters, MR = Moderate Restrictors, HR = Heavy Restrictors. Error bars are 95% confidence intervals. Dotted line represents threshold for "normal" BMI (24.9 kg/m^2).

Latent profiles were compared for differences in current and past endorsement of dieting. When comparing the propensity of current dieting, a one-way ANOVA was statistically significant, $F(3, 277) = 17.34$, $p < .001$. A Bonferroni post hoc test found that the percentage of women who endorsed being "currently on a diet with the intention of losing weight" was significantly higher in the MR class (20.7%; $M = 0.207$, $SD = 0.41$) and HR class (60.6%; $M = 0.606$, $SD = 0.50$) compared to the IE class (2.3%; $M = 0.023$, $SD = 0.15$) and UE class (13.6%;

M = 0.136, *SD* = 0.35). Neither MR and HR classes were significantly different from each other,

nor were IE and UE classes (Figure 3).

Figure 3.

Percentage of Members Endorsing Current Dieting for Each of the LPA Classes
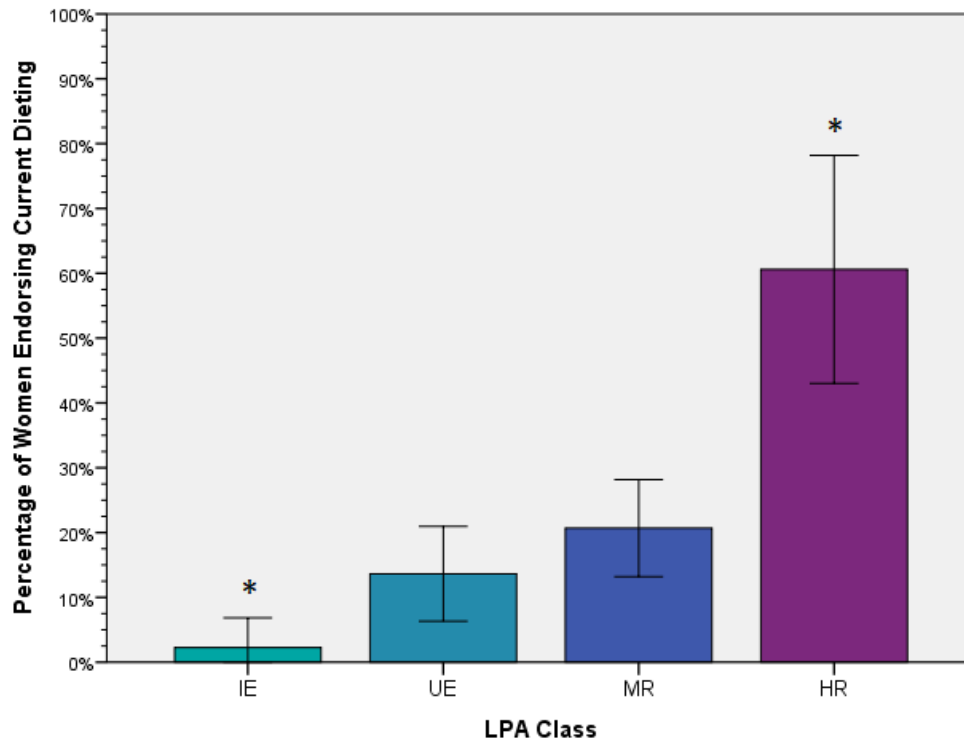
Note: Confidence intervals set at 95%. IE = Intuitive Eaters, UE = Unconcerned Eaters, MR = Moderate Restrictors, HR = Heavy Restrictors.

To explore the motivations for dieting among latent classes, a chi-square test goodness of

fit was used. The proportion of subjects who reported dieting for appearance versus for health

reasons differed by latent class, X^2 (6, *N* = 281) = 60.114, *p* < .0001, with members of both the

IE and UE classes each more frequently opting towards dieting to become healthier, compared to

members in either the MR or HR classes who were more concerned with dieting to change their

appearance (see Table 7. for participant counts).

Table 7.

Percentages and Counts of Dieting Motivation Among Participants Within Each LPA Class

	"Not currently dieting"	"Dieting to change appearance"	"Dieting to become healthier"
IE class (n= 44)	84.1% (n = 37)	4.5% (n = 2)	11.4% (n = 5)
UE class (n = 88)	69.3% (n = 61)	12.5% (n = 11)	18.2% (n = 16)
MR class (n = 116)	44.0% (n = 51)	40.5% (n = 47)	15.5% (n = 18)
HR class (n = 33)	18.2% (n = 6)	66.7% (n = 22)	15.2% (n = 5)

When comparing the propensity of past dieting, a one-way ANOVA was statistically significant, $F(3, 277) = 24.04$, $p < 0.000$. A Bonferroni post hoc test ($p < .0083$) found that the percentage of women who endorsed ever being on a weight-loss diet was significantly higher in the MR class (74.1%; $M = 0.741$, $SD = 0.44$) and HR class (93.9%; $M = 0.939$, $SD = 0.24$) compared to both the IE class (20.5%; $M = 0.205$, $SD = 0.41$) and UE class (50.0%; $M = 0.500$, $SD = 0.50$). Neither MR nor HR classes were significantly different from each other.

Participants were asked whether or not they had successfully lost weight from past diets, as well as whether or not they were able to maintain that weight loss into the present. To test whether response varied among eating profiles, two chi-square tests of goodness of fit were conducted. The proportion of subjects who reported having successfully lost weight from dieting differed by latent class, $X^2 (6, N = 281) = 58.763$, $p < .0001$ (see Table 8 for participant counts).

Those in the either the MR or HR classes endorsed having successfully lost weight more

frequently than individuals in either the IE or UE classes.

Table 8.

Percentages and Counts of Self-Reported Dieting Outcomes Among Participants within Each LPA Class

	"Have never been on a diet"	**"Did not successfully lose weight"**	**"Successfully lost weight"**
IE class (n =44)	72.7% (n = 32)	15.9% (n = 7)	11.4% (n = 5)
UE class (n =88)	45.5% (n = 40)	19.3% (n = 17)	35.2% (n = 31)
MR class (n =116)	22.4% (n = 26)	25.0% (n = 29)	52.6% (n = 61)
HR class (n =33)	3.0% (n = 1)	21.2% (n = 7)	75.8% (n = 25)

As predicted, the proportion of subjects who reported having since regained the weight

they lost from dieting also differed by latent class, X^2 (6, $N = 281$) = 49.881, $p < .0001$. Percent

of weight loss unsuccessfully maintained was significantly higher in the MR and HR groups

compared to the IE and UE groups (see Table 9 for participant counts).

Table 9.

Percentages and Counts of Self-Reported Dieting Weight Loss Maintenance Among Participants Within Each LPA Class

	"Have never been on a diet"	"Did not maintain weight loss"	"Did maintain weight loss"
IE class (n =44)	68.2% (n = 30)	25.0% (n = 11)	6.8% (n = 3)
UE class (n=88)	43.2% (n = 38)	42.0% (n = 37)	14.8% (n = 13)
MR class (n =116)	23.3% (n = 27)	53.4% (n = 62)	23.3% (n = 27)
HR class (n =33)	3.0% (n = 1)	81.8% (n = 27)	15.2% (n = 5)

When comparing the propensity of participants who endorsed currently "watching what they eat", a one-way ANOVA was statistically significant, $F(3, 260) = 13.55$, $p < .0001$. A Bonferroni post hoc test ($p < .0083$) found that the percentage of women who endorsed watching what they ate was significantly higher in the MR class (75.5%; $M = 0.755$, $SD = 0.43$) and HR class (85.2%; $M = 0.852$, $SD = 0.36$) compared to the IE class (31.8%; $M = 0.318$, $SD = 0.47$) and UE class (50.6%; $M = 0.506$, $SD = 0.50$). Neither MR and HR classes were significantly different from each other, nor were IE and UE classes.

When comparing the number of participants who endorsed ever having an eating disorder diagnosis, a one-way ANOVA was statistically significant, $F(3, 277) = 9.99$, $p < .0001$. A Bonferroni post hoc test found that the percentage of women who endorsed a past eating disorder diagnosis was significantly higher in the HR class (30.3%; $M = 0.303$, $SD = 0.47$) compared to the MR class (7.8%; $M = 0.078$, $SD = 0.27$), IE class (6.8%; $M = 0.068$, $SD = 0.26$), and UE class

(1.1%; M = 0.011, SD = 0.107). The MR, IE, and UE classes were not significantly different in terms of past eating disorder diagnosis.

When comparing the number of participants who self-identified as overweight, a one-way ANOVA was statistically significant, F(3, 277) = 22.45, *p* < .0001. A Bonferroni post hoc test (*p* < .0083) found that the percentage of women who identified as overweight was significantly higher in the HR class (87.9%; *M* = 0.879, *SD* = 0.33) compared to the MR class (54.3%; *M* = 0.543, *SD* = 0.50), IE class (11.4%; *M* = 0.114, *SD* = 0.32) and UE class (31.8%; *M* = 0.318, *SD* = 047). As predicted, the MR class had a significantly higher percentage compared to the IE and UE classes, while the IE class and the UE class were not significantly different (Figure 4).

When comparing the number of participants who self-identified as overweight *despite* reporting a BMI in the normal range, a one-way ANOVA was statistically significant, F(3, 277) = 6.70, *p* < .0001. A Bonferroni post hoc test found that the percentage of women who mistakenly identified as overweight was significantly higher in the HR class (36.4%; *M* = 0.364, S*D* = 0.49) compared to the MR class (14.7%; *M* = 0.147, *SD* = 0.36), IE class (2.3%; *M* = 0.023, *SD* = 0.15) and UE class (11.4%; *M* = 0.114, *SD* = 0.32). No significant differences between the IE, UE, and MR classes were observed (Figure 5). Results from all ANOVAs for Aim 3 can be found in Tables 10 and 11.

Figures 4 & 5.

Percentage of Members who Self-Identified as Overweight Among Each of the LPA Classes
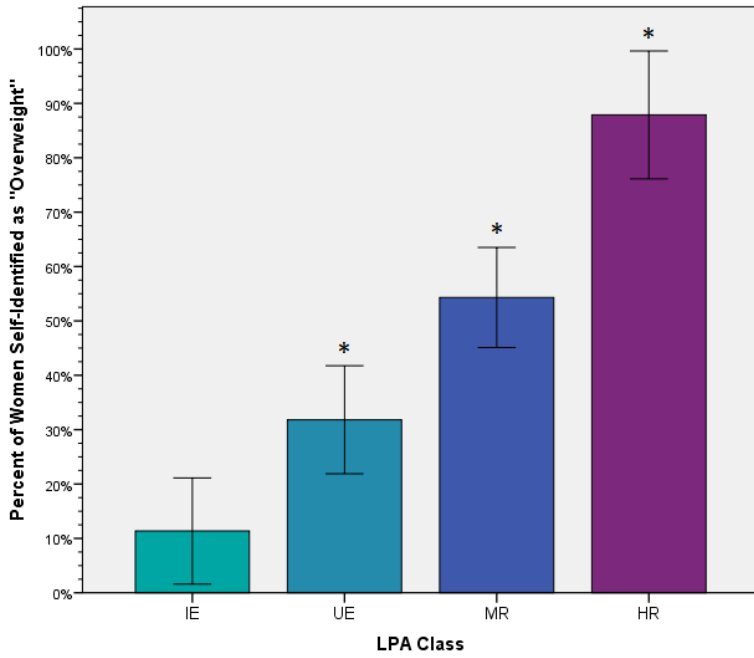
Percentage of Members who Self-Identified as Overweight Despite Normal BMI Among Each of the LPA Classes

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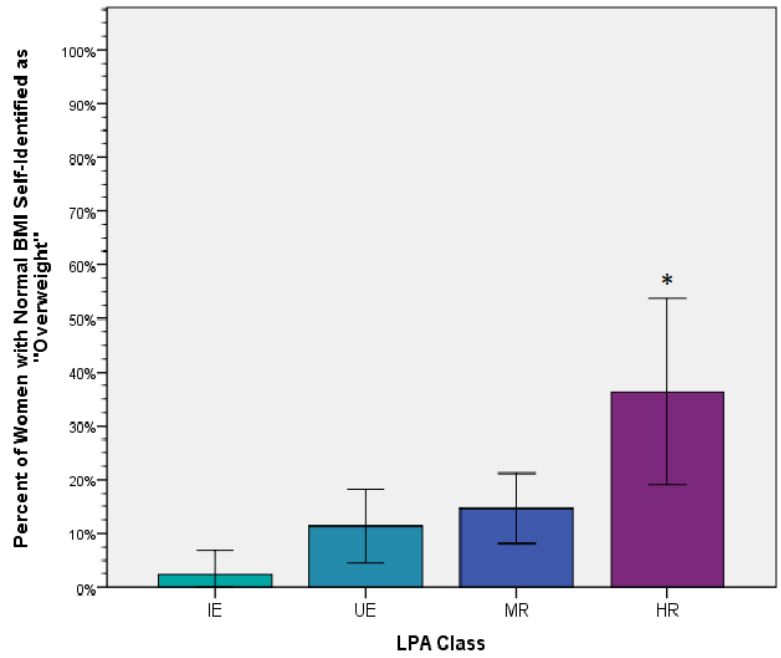
Note: Confidence intervals were set at 95%. IE = Intuitive Eaters, UE = Unconcerned Eaters, MR = Moderate Restrictors, HR = Heavy Restrictors.

Table 10.

One-Way ANOVAs Comparing the LPA Classes Across Diet Endorsement Items

Comparison	F	Intuitive Eaters	Unconcerned Eaters	Moderate Restrictors	"Heavy Restrictors"
		(*n* = 44)	(*n* = 88)	(*n* = 116)	(*n* = 33)
BMI (kg/m^2)	13.07	21.67[a]	22.79[a]	24.90[b]	26.98[b]
Currently dieting	17.34	2.3%[a]	13.6%[ab]	20.7%[b]	60.6%[c]
Have dieted in the past	24.04	20.5%[a]	50.0%[b]	74.1%[c]	93.9%[c]
"Watching" what one eats	13.55	31.8%[a]	50.6%[a]	75.5%[b]	85.2%[b]
Eating Disorder Dx	9.99	6.8%[a]	1.1%[a]	7.8%[a]	30.3%[b]
Self-identified as overweight	22.45	11.4%[a]	31.8%[a]	54.3%[b]	87.9%[c]
Self-identified as overweight despite normal BMI	6.70	2.3%[a]	11.4%[a]	14.7%[a]	36.4%[b]

Note: BMI = body/mass index. For one-way ANOVAs, all *p*s <.05. Post hoc tests were conducted using pairwise comparisons. Shared superscripts within each row indicate no significant difference between groups.

Participants were asked what motivated them to choose the food they eat on a daily basis. The Food Choice Questionnaire (FCQ) assesses the importance of the following factors that influence food choice: health, sensory appeal, price, convenience, mood, natural content, weight control, and familiarity. A one-way ANOVA was used to compare differences in food choice motivation among classes for each individual factor. No significant differences in motivation across factors was observed, except for weight control, $F(3, 274) = 13.661$, $p < .0001$. A Bonferroni post hoc test ($p < .0083$) found that participants in the MR class (*M*= 4.5, *SD* = 1.2) and HR class (*M*= 4.9, *SD* = 1.3) were significantly more motivated to choose food for the

purpose of weight control, compared to participants in the IE class (M= 3.4, SD = 1.2) and UE class (M= 3.9, SD = 1.2). Please refer to Table 9 for class comparisons.

Latent profiles were compared for differences in Patient Health Questionnaire-9 (PHQ-9) scores. A one-way ANOVA found that PHQ-9 scores differed significantly among the eating style profiles, $F(3, 277) = 20.257$, $p < .0001$. A Bonferroni post hoc test ($p < .0083$) found that the HR class (M= 15.6, SD = 6.5) was significantly different from the MR class (M= 10.6, SD = 6.4), UE class (M= 9.3, SD = 6.3), and IE class (M= 4.7, SD = 5.4). The UE class was significantly different from the IE class, but no difference was observed between the MR and UE classes (Table 9). The UE class reported mild depression, the MR class reported moderate depression, and the HR class indicated moderately severe depression (Figure 6).

Figure 6.

Patient Health Questionnaire-9 (PHQ-9) Total Scores Among Each of the LPA Classes
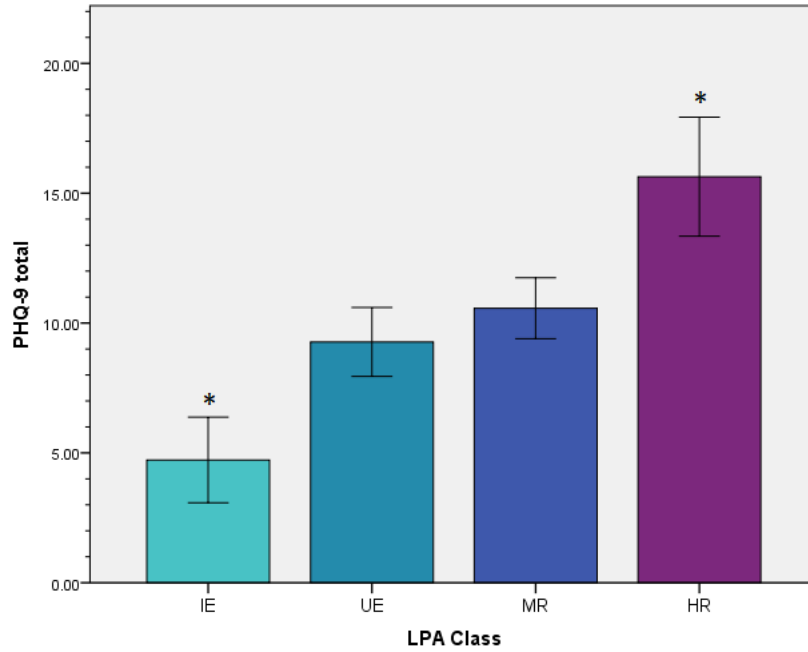
Note: Confidence interval error bars set at 95%. IE = Intuitive Eaters, UE = Unconcerned Eaters, MR = Moderate Restrictors, HR = Heavy Restrictors.

Latent profiles were compared for differences in Body Appreciation Scale (BAS) average scores. A one-way ANOVA found that BAS scores were significantly different among profiles, $F(3, 277) = 19.202$, $p < .0001$. A Bonferroni post hoc test ($p < .0083$) found that all four groups had significantly different BAS scores, such that the IE class ($M= 4.3$, $SD = 0.8$) reported higher levels of body satisfaction than the UE class ($M= 3.5$, $SD = 0.8$), which was in turn higher than the MR class ($M= 3.2$, $SD = 0.9$), followed by the HR class ($M= 2.6$, $SD = 0.7$). See Figure 7 and Table 11 for class comparisons.

Figure 7.

Body Appreciation Scale (BAS) Average Scores Among Each of the LPA Classes
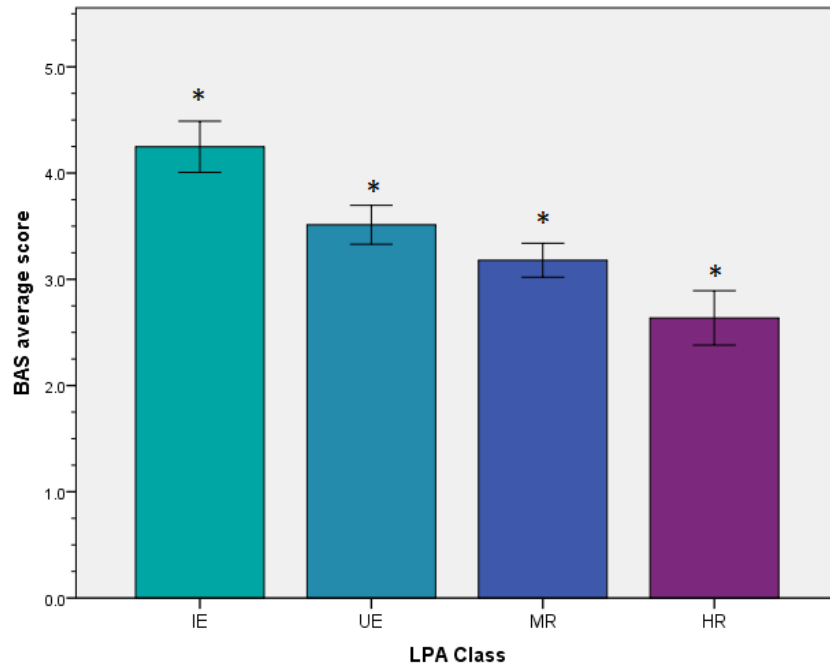
Note: Confidence interval error bars set at 95%. IE = Intuitive Eaters, UE = Unconcerned Eaters, MR = Moderate Restrictors, HR = Heavy Restrictors.

Impulsivity was measured using the Short UPPS-P (S-UPPS-P), which consists of five subscales measuring multiple facets: Negative Urgency, Lack of Premeditation, Lack of Perseverance, Sensation Seeking, and Positive Urgency. A multivariate ANOVA was used to assess differences among latent profiles across each of the five subscales. Negative Urgency was significantly different among profiles, $F(3, 277) = 28.764$, $p < .0001$. A Bonferroni post hoc test found that all four groups had significantly different Negative Urgency averages, such that the IE class ($M = 1.2$, $SD = 0.6$) reported lower levels of Negative Urgency than the UE class ($M = 2.3$, $SD = 0.6$), which was in turn lower than the MR class ($M = 2.6$, $SD = 0.6$), followed by the HR class ($M = 3.0$, $SD = 0.52$). Please see Table 11 for class comparisons.

A multivariate ANOVA found that Positive Urgency was significantly different among profiles, $F(3, 277) = 10.644$, $p < .0001$. A Bonferroni post hoc test found that the HR group ($M = 2.3$, $SD = 0.7$) was significantly higher compared to the MR group ($M = 2.1$, $SD = 0.7$), which was significantly higher than the UE group ($M = 1.8$, $SD = 0.62$). The IE group ($M = 1.7$, $SD = 0.6$) and UE group were not significantly different from each other (Table 11). Overall, no significant difference was observed among latent classes for the Lack of Premeditation, Lack of Perseverance, and Sensation Seeking subscales, $p = .048$, $p = .416$, and $p = .640$, respectively.

A one-way ANOVA was used to test for differences in General Self-Efficacy (GSE) Scale average scores among the latent profiles. No significant difference was observed at the level of the Bonferroni correction ($p = .0083$), as $F(3, 277) = 2.878$. $p = .036$.

A one-way ANOVA was used to test for differences in Rosenberg Self Esteem (RSE) Scale total scores among the latent profiles. A significant difference was observed, $F(3, 268) = 22.921$. $p < .0001$. A Bonferroni post hoc test found that the IE group ($M = 22.1$, $SD = 6.4$) had significantly higher self-esteem scores compared to the UE group ($M = 17.3$, $SD = 5.5$). The UE and MR group were not significantly different, though the mean self-esteem score in the MR group ($M = 15.9$, $SD = 5.5$) was significantly higher than that of the HR group ($M = 11.9$, $SD = 4.6$).

A one-way ANOVA was used to test for differences between latent profiles in the number of weight control behaviors utilized, as endorsed on the Diet Checklist of Weight Control (DCWC). A significant difference was observed, $F(3, 277) = 23.174$. $p < .0001$. A Bonferroni post hoc test ($p = .0083$) found that number of weight control behaviors used was significantly different across three groups, such that the HR group ($M = 6.1$, $SD = 2.6$) reported using the most behaviors, followed by the MR ($M = 4.3$, $SD = 3.0$) group and UE group ($M = $

2.8, *SD* = 2.3). The UE group and IE (*M* = 1.7, *SD* = 2.4) group were not statistically different

from each other (Figure 8). To see all LPA group means for each scale and subscales used,

please see Table 11.

Figure 8.

*Means of Total Diet and Weight Control Behaviors (DCWC) Endorsed Among Each of the LPA Classes*
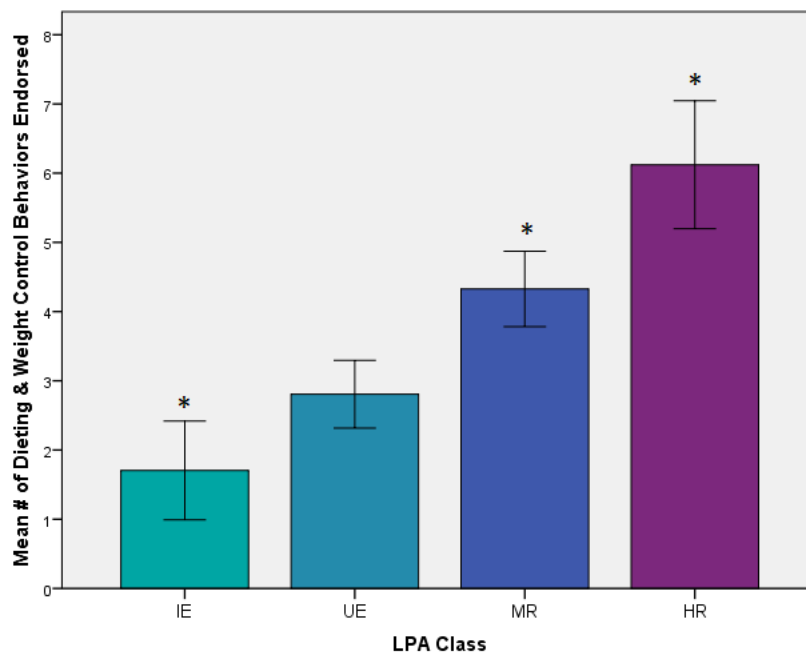
Note: Confidence interval error bars set at 95%. IE = Intuitive Eaters, UE = Unconcerned Eaters, MR = Moderate Restrictors, HR = Heavy Restrictors.

Table 11.

One-Way ANOVAs Comparing the LPA Classes Across Aim 3 Study Measures

		Means			
Scale	F	Intuitive Eaters	Unconcerned Eaters	Moderate Restrictors	"Heavy Restrictors"
		($n = 44$)	($n = 88$)	($n = 116$)	($n = 33$)
FCQ – mood (mean score)	2.10	4.43[a]	4.78[a]	4.88[a]	4.89[a]
FCQ – convenience (mean score)	1.67	4.69[a]	5.04[a]	5.06[a]	5.19[a]
FCQ – natural content (mean score)	1.22	3.82[a]	4.21[a]	4.21[a]	4.06[a]
FCQ – weight control (mean score)	13.66	3.35[a]	3.88[a]	4.45[b]	4.86[b]
FCQ – price (mean score)	2.43	4.90[a]	5.27[a]	5.37[a]	5.60[a]
FCQ – familiarity (mean score)	0.87	4.29[a]	4.59[a]	4.58[a]	4.36[a]
FCQ – sensory appeal (mean score)	1.53	4.92[a]	5.28[a]	5.21[a]	5.06[a]
FCQ – health (mean score)	0.52	5.02[a]	4.87[a]	4.93[a]	4.73[a]
PHQ-9 (total score)	20.26	4.73[a]	9.27[b]	10.64[b]	15.64[c]
BAS-2 (mean score)	27.17	4.25[a]	3.51[b]	3.18[b]	2.64[c]
S-UPPS-P – negative urgency (mean score)	28.76	1.81[a]	2.30[b]	2.56[b]	3.01[c]
S-UPPS-P – lack of perseverance (mean score)	0.95	1.81[a]	1.80[a]	1.76[a]	1.93[a]
S-UPPS-P – lack of premeditation (mean score)	2.67	1.73[a]	1.83[a]	1.90[a]	2.05[a]

S-UPPS-P – sensation seeking (mean score)	0.56	2.56[a]	2.57[a]	2.67[a]	2.56[a]
S-UPPS-P – positive urgency (mean score)	10.64	1.66[a]	1.82[a]	2.12[b]	2.34[b]
GSE (mean score)	2.88	3.15[a]	2.96[a]	2.98[a]	2.85[a]
RSE (total score)	22.92	22.12[a]	17.39[b]	15.88[b]	11.91[c]
DCWC (total score)	23.174	1.70[a]	2.81[a]	4.33[b]	6.12[c]

Note: BMI = body/mass index, FCQ = Food Choice Questionnaire, PHQ-9 = Patient Health Questionnaire-9, BAS-2 = Body Appreciation Scale-2, S-UPPS-P = UPPS-P Impulsive Behavior Short Scale, GSE = General Self-Efficacy Scale, RSE = Rosenberg Self-Esteem Scale, DCWC = Daily Checklist of Weight Control. For one-way ANOVAs, all ps <.0083 to account for Bonferroni correction, and df=3. Post hoc tests were conducted using pairwise comparisons. Shared superscripts within each row indicate no significant difference between groups.

DISCUSSION

<u>**Overview**</u>

The current study explored self-reported eating behaviors and beliefs among college women in order to identify subpopulations of individuals who adhered to distinct styles of eating. Classification was based on tendency towards dietary restriction, binge-eating, and intuitive eating. Probabilistic profiles were statistically generated such that four distinct groups of dieters and non-dieters were discovered. These profiles were subsequently compared against each other for differences across several domains: nutritional knowledge, dietary intake, BMI, and constructs of psychological welfare (i.e., depression, food choice motivation, body appreciation, impulsivity, self-esteem, self-efficacy, and weight control strategies).

Latent profile analysis (LPA) is an effective tool for detecting trends within potential subpopulations using continuous variable indicators (Jason & Glenwick, 2016). The indicators selected for the current study were chosen to align with the eating disorder continuum framework (Mintz et al., 1997), which posits that disturbed eating occurs along a spectrum. Two dietary restraint measures (the RS and DEBQ) were used to account for the broad strokes of the continuum, and to acknowledge the conjecture that each might measure distinct elements of dieting behavior (Polivy et al., 2020). The BES was incorporated because of the clear correlation between restriction and binge eating (Freeman & Gil, 2004; Woods et al., 2010). Recent work in positive psychology has suggested that the polar opposite of pathology is not merely the *absence* of pathology. Thus, the presence of adaptive eating behaviors that promote well-being (Steck et al., 2004), such as IE, were examined as they may potentially expand the eating disorder continuum in a more positive, protective direction.

The current study aimed to probabilistically classify individuals' eating styles. Once assigned to a class, participants were compared across measures of nutritional literacy (NLit), dietary composition (DSQ, PEFS), and psychological constructs relevant to dieting and well-being (FCQ, PHQ-9, BAS-2, S-UPPS-P, GSE, RSE, DCWC). This study explored multiple characteristics that may potentially differentiate dieters, non-dieters, and intuitive eaters from one other.

Participants

Data collected from 281 female college undergraduates were used in this study. The average age of participants was 19 with an average BMI of 25.2, placing them at the low end of the overweight category. Approximately half of the sample identified as of Hispanic or Latinx origin, a third identified as White, and the remaining identified as Asian, American Indian/Alaska Native, Black, or "other". Within the sample, 20% of participants endorsed the single-item question that they were currently dieting in order to lose weight. Although the majority of participants did not report a prior eating disorder diagnosis, 8% did, most frequently indicating either anorexia nervosa or bulimia nervosa.

Aim 1 Findings

Four distinct profiles of eating styles were observed via LPA and were subjectively designated as an intuitive eating class (IE; 15.7% of sample), an "unconcerned" eating/non-dieting class (UE; 31.3% of sample), a moderately restrictive dieting class (MR; 41.3% of sample), and a heavily restrictive dieting class (HR; 11.7% of sample). This four-class model was selected instead of a similar three-class model because although both were statistically viable choices, the four-class model offered more substantive interpretation. Specifically, the

four-class model produced a class of intuitive eaters who were subsumed by a more general "non-dieting class" that emerged from the three-class model.

Contrary to Hypotheses 1.1 and 1.2, no profiles for "successful" dieters or disinhibited-eating-prone dieters were identified. Previous literature has suggested that although the RS and DEBQ both aim to measure individuals attempting to restrict caloric intake for weight loss, each scale may capture different components of restraint (Heatherton et al., 1998; Laessle et al., 1989; Van Strien, 1999). Predictions for the current study speculated that these distinctions would be evident in LPA-generated profiles of dieting individuals, such that a group of "successful" dieters would have higher DEBQ scores and lower RS scores compared to a potential group of disinhibited dieters, who would in turn have higher RS scores and lower DEBQ scores. This was not the case.

The LPA model used in the current study distinguished two classes of "dieters", who both scored above the RS cut-off, indicating restricted eating. Both the Moderate Restrictor (MR) and Heavy Restrictor (HR) classes had the greatest DEBQ subscale scores among the four classes. The HR class showed higher DEBQ$_{restrained}$ and DEBQ$_{external}$ scores compared to available norms for women with diagnoses of anorexia nervosa and bulimia nervosa, whereas the MR class did not exceed theses norms on any of the DEBQ subscales. Beyond measures of restraint, the IES-2 may also be sensitive towards detecting subthreshold EDs in college women; while the HR class scored over the IES-2 cut-off indicating disturbed eating, the MR class did not. Finally, BES scores for the MR class did not meet the cut-off score for moderate bingeing, while the HR class indicated heavy binge eating behavior. These findings support the continuum model of eating disorders in that two escalating levels of restraint severity were observed: the MR class appeared to consist of individuals who engaged in dieting behavior to a moderate degree, while

the HR class appeared to capture heavy dieters at risk of (or even currently suffering from) disordered eating. Though causality cannot be inferred from the current cross-sectional study, other longitudinal research has strongly suggested that individuals using unhealthy weight-control behaviors are at greater risk of eventually developing an eating disorder (Heatherton & Polivy, 1992; Neumark-Sztainer et al., 2006). Thus, it is quite possible that an individual in the MR class may gradually develop behaviors over time consistent with the HR class.

In accordance with Hypothesis 1.3, a class of "unconcerned" eaters (UE) was identified. This profile contained the greatest number of members. Members of this class showed relatively low RS, DEBQ, and BES scores, and their average IES-2 score was on par with IE norms across college women (Tylka & Kroon Van Diest, 2013). Members of this class did not endorse limiting food intake. Interestingly, an additional class of non-dieters were observed in the current study's LPA model. These intuitive eaters (IE) scored the lowest on the RS, DEBQ, and BES compared to any other group, and non-surprisingly, boasted the greatest IES-2 scores. These findings coincide with prior research indicating that greater propensity of intuitive eating is negatively correlated with weight control behaviors and binge eating among young adults (Christoph et al., 2021).

Aim 2 Findings

Hypotheses 2.1 through 2.3 predicted that dieting profiles would show the greatest amount of nutritional literacy as measured by the NLit, while non-dieters would show the lowest. Contrary to predictions, there was no significant difference among the four groups. In fact, mean scores for each of the four profiles indicated "possibility of poor nutrition literacy" (Gibbs et al., 2018). This same nutritional literacy label was applied recently to 68% of the sample of female students at a Midwestern university (Shach, 2020). Overall, the literature suggests that college

students generally have much room for improving their nutritional understanding (Dissen et al., 2009; Unsworth, 2012; Yahia et al., 2016).

Aim 2 of the current study also predicted that different eating style profiles would endorse varied diet compositions, as measured by the Dietary Screener Questionnaire (DSQ) and Percentage Energy from Fat Screener (PEFS). This was not observed. There were no notable differences among the four profiles in the estimated amount of daily fruits, vegetables, dairy, added sugar, whole grains, and fiber consumed. Overall, the vast majority of the sample reported not following multiple USDA Dietary Guidelines. On average, participants reported consuming approximately 15 teaspoons of added sugar a day (compared to the recommended maximum of 12.5 teaspoons), 41 grams of whole grains (recommended: 48 grams), two cups of fruit and vegetables (recommended: at least 3.5 cups), and 14 grams of fiber per day (recommended: 21-25 grams). Average daily percentage of energy from fat was 40% for participants across the entire sample, regardless of class membership. USDA Dietary Guidelines for 2020-25 suggest that between 20 and 35% of an adult's daily calories should come from fat. The dietary composition of the participants sampled is consistent with that of other U.S. college students (Rana et al., 2022).

Young adults attending college are at major risk of weight gain. A 2015 meta-analysis found that, on average, a majority of students (60.9%) gained weight during freshman year, and that these individuals typically gained around 7.5 pounds (Vadeboncoeur et al.). The largest contributors to weight gain have been projected to be living alone, increased alcohol use, "all-you-can-eat" meal plans, and increased emotional eating due to stress (de Vos et al., 2015). Crucially, restrained eating has also been linked to college weight gain, particularly among individuals who live on campus (Pliner & Saunders, 2008). Though not all students gain weight

during their time in college, it appears that the trend may often occur regardless of dieting status. If this is the case, then we might not expect to see salient differences in diet composition among those endorsing different styles of eating. It is also possible that the screeners used in the current study were not sensitive enough to catch modest differences in food intake for our sample size. Given that screeners are typically shorter and less detailed than dietary assessment techniques such as daily food dairies, some quantitative accuracy will necessarily be lost. In addition, individuals often demonstrate different degrees of recall accuracy that can be influenced by how much the food was enjoyed, whether or not it was eaten mindfully, and if the eater was on a low-fat diet (Fries et al., 1995; Seitz et al., 2021; Wansink, 2010).

Aim 3 Findings

The final aim of this study predicted that dieting and non-dieting profiles would vary in regard to BMI, endorsement of dieting behaviors, depression, body appreciation, food choice motivation, self-esteem, self-efficacy, and impulsivity. Indeed, many differences were observed among individuals designated as intuitive eaters, unconcerned eaters, moderate restrictors, and heavy restrictors.

Body mass index and dieting status. Mean BMI was significantly different among each group, such that the IE profile had the lowest and the HR had the highest. Average BMIs for MR and HR classes indicated overweight. An exploration of current and past dieting behavior for each profile potentially sheds light on this trend. In response to a single-item question, "Are you currently on a diet with the intention of losing weight?", percent of positive endorsement increased among each latent profile. Approximately 2% of IE group members, 14% of UE group members, 21% of MR group members, and 61% of HR members reported dieting during the administration of the survey. When current dieters among each class were asked what their

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motivation for weight loss was, the majority of IE and UE class members reported "dieting to become healthier". In contrast, the majority of dieters in the MR and HR classes reported "dieting to change appearance". Finally, participants were asked whether they had *ever* initiated a diet in the past. Findings from this study are congruent with the longstanding belief that dietary restriction is a robust predictor of future weight gain, given that the proportion of individuals who had tried dieting was greater in profiles that endorsed more restriction (Fothergill et al., 2016; Lowe et al., 2006, 2013; Siahpush et al., 2015; Tiggemann, 2004), particularly when it is motivated by desire to change one's appearance rather than to become healthier (Putterman & Linden, 2004). Given that latent profiles in this study emerged partly due to a range of mean scores on two restraint questionnaires, we could reasonably expect to see frequency of dieting behavior correspond in tandem.

It is important to note, however, that the constructs of dietary restraint and weight-loss dieting are not universally considered to be synonymous. Some would argue that dietary restraint is better defined as "the *cognitive effort* to restrict food intake, regardless of the behavioral outcome of this effort" (Schaumberg et al., 2016). Citing the fact that some individuals *are* able to successfully lose weight and maintain the change, they suggest that not all exertion of restraint is predictive of rebound disinhibited eating. They argue that measures of restraint such as the RS conflate these two correlates of weight-loss dieting, such that restrained eating may really be serving as an *indicator* for the tendency to overeat rather than an antecedent (Johnson et al., 2012). Schaumberg and colleagues (2016) argue that when restraint successfully produces weight loss it is indicative of an individual's ability to self-regulate.

The current study challenges this perspective, such that scores on both the RS and the DEBQ restrained eating subscale were significantly higher across latent profiles. Taken alone,

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this DEBQ subscale does not contain items assessing disinhibited eating, corroborating the perspective that the DEBQ is a measure of "successful" dieting. However, members of the HR class who were categorized as such because of their high scores on both the RS *and* DEBQ$_{restrained}$ subscale also demonstrated the highest self-reported binge eating behavior. While some might prefer to view restraint as purely a cognitive construct, effectively manifested via self-regulation, this study suggests that a practical distinction between the two is trivial. Though restraint and self-regulation may both be operationalized through the behavior of dieting, the current data strongly suggest that in general, those who report a greater degree of restrained eating also tend to report a greater degree of disinhibited eating (Linardon et al., 2021). Future research should aim to clarify the specific domains (e.g., eating, emotion, impulsivity) in which self-regulation is protective or harmful with regard to the etiology of disordered eating.

Endorsement of "watching". Observed in the present study was a significant difference in the extent to which each profile endorsed "watching what they ate". Prior literature has suggested that this terminology is sometimes used to indicate a degree of weight control behavior that is not consciously considered to meet the threshold for "dieting" (McLaughlin et al., 2018). Both the MR and HR classes were more likely to describe their eating in this way compared to IE and UE classes. If self-regulation and restraint were readily differentiable, we might expect to see greater endorsement of "watching" in the IE group, given that the first step of self-regulation involves deliberate self-monitoring, *and* intuitive eating relies on internal awareness and self-regulation by nature (Lovan et al., 2021; Ruzanska & Warschburger, 2019). Interestingly, the IE group endorsed the least amount of "watching", suggesting that the body- and self-awareness inherent to intuitive eating are fundamentally different than the type of self-monitoring involved in weight loss or maintenance. In contrast to observing the way one's body feels before and after

eating (that is, eating intuitively), those who "watch what they eat" may rely on cognitive rules to guide their eating in a manner similar to dieters (Boon et al., 2011). For example, avoiding carbohydrates, postponing meals, or eating smaller portions are cognitive decisions that often override feelings of physical hunger. Rigid control over eating at the expense of satiety has reliably shown to increase the likelihood of subsequent disinhibited eating (Neumark-Sztainer, 2006; Stewart et al., 2002; Westenhoefer et al., 1999). In turn, disinhibition has been implicated in eating disorder development and severity (Bryant et al., 2008; Gowers & Shore, 2018).

Eating disorders and weight control. Indeed, the HR group that endorsed the most disinhibited eating (as well as the most "watching") also reported the highest percentage (30%) of members previously diagnosed with an eating disorder. Prior research has shown that individuals with threshold and sub-threshold eating disorders use more self-regulatory strategies to lose and maintain weight compared to individuals without eating disorders (Kitsantas et al., 2010). This was corroborated in the current study by an increase of average number of dieting/weight control strategies used amongst each separate profile. Latent profiles did not differ in food choice motivation, save for the MR and HR profiles who both endorsed being significantly more motivated to choose foods that helped them control their weight compared to IE and UE groups.

Body appreciation. In the current study, each latent profile demonstrated different, increasing degrees of self-perception of overweight status. This trend was similarly observed among participants who were, in fact, within the normal BMI range. These findings suggest that propensity towards restraint and dieting are correlated with self-perception, even when such perceptions are inaccurate. In order to acknowledge potential protective factors against poor body image, the current study investigated potential positive feelings women might have towards

their bodies by using the Body Appreciation Scale (BAS-2) (Tylka et al., 2015). Each latent profile reflected significantly different degrees of body appreciation, such that the least-restrictive IE group had the highest and the HR group had the lowest. These findings are consistent with previous research indicating that increases in body appreciation have been found to predict improvements in intuitive eating (Andrew et al., 2016). A recent systematic review and meta-analysis found that body appreciation was negatively correlated with restraint and other eating pathology (Linardon et al., 2022).

Self-esteem and depression. One interpretation of the current results is that women who appreciate their bodies are less likely to want to change them via caloric restriction. They may then pay greater attention to honoring their body's physiological needs via intuitive eating. The Linardon meta-analysis also found that body appreciation was positively associated with self-esteem, even after controlling for the influence of negative body image. Thus, body appreciation seems to reflect more than the absence of poor body image—it may actively interrelate with self-esteem in its own right. Each latent profile reflected significantly different degrees of self-esteem, such that the least-restrictive IE group had the highest and the HR group had the lowest. Profiles with the highest self-esteem also had the lowest depression scores, and vice versa. Both constructs have been shown to be reliable mediators of disordered eating (Brechan & Kvalem, 2015). Women with low self-esteem are more likely to have begun dieting during adolescence (Barker & Bornstein, 2009), and such dieting is correlated with increased depressive symptoms even after controlling for body weight (Eldredge et al., 1990; Kagan & Squires, 1983). Further, women with higher levels of depression are more likely to use unhealthy dieting strategies over healthy ones (Gillen et al., 2011). Depressive symptoms reliably increased alongside the number of weight fluctuations incurred by dieting across a lifetime (Puhl & Reinka, 2020). To

corroborate this, members of the current study's HR group showed the greatest endorsement of the experience of weight fluctuations as measured by the RS. In turn, an average of their PHQ-9 scores indicated the possibility of moderately severe depression.

Self-efficacy. Self-efficacy, the tendency to feel confident in one's ability to exercise control over one's own life (Bandura, 1999), has been nominated as one potential moderator for successful weight-loss. Pre-intervention diet and exercise self-efficacy, as well as increased self-efficacy during the weight-loss intervention, have been shown to be strong predictors of weight loss (Byrne et al., 2012). Within the current study, IE class members reported the highest degree of self-efficacy, while the HR class reported the lowest self-efficacy compared to all other groups. These findings align with prior work that has shown that improving intuitive eating skills in college students also bolstered feelings of general and eating-specific self-efficacy (Loughran et al., 2018). Less clear is the relationship between restraint, binge eating, and self-efficacy. The current study found that higher restraint endorsement was mostly likely to occur in individuals who also demonstrated greater symptoms of binge eating and lower feelings of self-efficacy. Previous research has found that poorer self-efficacy was predictive of binge eating severity among individuals who expressed both rigid restraint (e.g., inflexible self-imposed diet rules) and flexible restraint (e.g., using portion control to regulate body weight while still enjoying a variety of foods) (Linardon, 2018). Within the same study, however, flexible restraint eaters with moderate to strong-self efficacy reported the most elevated binge eating scores. These findings led the author to suggest that a 'flexible' approach to weight management may somehow maintain binge eating among women who otherwise feel quite confident in their ability to control their overeating.

Indeed, other research suggests that rigid and flexible control overlap substantially, hindering the descriptive utility of the terminology (Tylka et al., 2015). Though self-efficacy may influence an individual's confidence to begin (and sustain) many health-promoting changes, results from the current study indicate that it appears to suffer in individuals who are prone to heavy restrictive dieting. In comparison, the designated subpopulation of intuitive eaters in this study expressed the highest degree of self-efficacy and the lowest degree of dietary restraint among participants.

Impulsivity. The final psychological construct explored in the current study was impulsivity, particularly negative urgency. Negative urgency, the tendency to act rashly in response to negative emotions, has been found to moderate the association between dietary restraint and binge eating (Emery et al., 2013). Within the scope of the current study, latent profiles higher in dietary restraint also showed elevated negative urgency. These findings indicate that the most severe dieters are also the most negatively urgent, though a directional relationship cannot be assumed. Interestingly, there was also a difference among latent profiles in positive urgency, the tendency to act impulsively in response to positive emotions, such that positive urgency increased alongside escalating degrees of restraint. Indeed, current literature suggests that both negative and positive urgency may not constitute separate aspects of impulsivity, and that differentiating the two conceptually is unnecessary (Billieux et al., 2021). The current study suggests that restrained individuals may be more reactive to their emotions in general, regardless of specific affect state.

Limitations and Strengths

Interpretation of this study's overall findings should be considered in the light of several limitations. First, the data were collected only from undergraduate women in the Southwestern

U.S., which may limit generalizability to other groups such as males, individuals not currently attending college, women outside of the study's age range, or those with differing races or ethnicities. Next, these data were collected during the Covid-19 pandemic. It is quite possible that increased hardship in other realms of life may have contributed to participants' ratings of constructs like depression or even binge eating symptomatology, which were found to have increased within the U.S. population during this period (Freizinger et al., 2022).

Several methodological aspects of the current study may also incur limitations in interpretability. Most importantly, the cross-sectional design of the study precludes the exploration of causal relationships. In addition, a larger sample size could more adequately answer questions of differences in nutritional intake among latent profiles, given that the sensitivity of these measures is limited compared to methods such as having participants complete daily food diaries. It is also possible that different indicator variables could have been chosen to produce the latent profiles. Given that many measures of dietary restraint exist, it is likely that some degree of nuance is inherent in the use of each one, potentially biasing the profiles formed.

Limitations exist regarding the innate flaw of using BMI as a measure of weight status, as well as the definitional nature of "dieting". BMI is not a direct measure of body fat, and as such, individuals with greater muscle density and a healthy body fat percentage may be incorrectly coded as overweight (Rothman, 2008). Future research would be better served by measuring body fat more adequately, such as a ratio of waist circumference to height (Jansen et al., 2004). Another limitation arises when considering the potential of participant shame that may come from self-identifying as a "dieter", as well as the ambiguity of the term overall. Though the survey was anonymous, it is possible that individuals may have felt ashamed to acknowledge

their eating practices, or may have felt a conscious or unconscious desire not to subscribe to the moniker of "dieter" (Stewart et al., 2006; Vartanian et al., 2007).

The current study had several strengths. First, the study population was quite diverse, with the majority of participants (66.5%) identifying as non-White. In addition, the overwhelming majority of survey items were completed, contributing to a robust dataset. Though the standard practice of using a single-item question to assess current dieting status was utilized (Neumark-Sztainer et al., 1998), this study also categorized participants into latent profiles quantitatively. This element of the study potentially facilitated the capture of highly restrained participants, regardless of their subjective, binary endorsement of current dieting. Through the use of LPA, profiles were generated in a statistically optimized manner, circumventing potential researcher bias. This categorization method produced substantially distinct subpopulations that varied greatly on the myriad of measures employed in the current study.

Summary and Clinical Implications

This study used latent profile analysis to classify participants' styles of eating based on their self-reported tendencies to restrain, binge, and eat intuitively. The results provide evidence that there are distinct subpopulations of women who vary in the degree to which they approach (and ignore) the construct of dieting. Furthermore, endorsement of these various attitudes can be correlated to specific psychological traits like depression, body appreciation, self-esteem, self-efficacy, and weight perception. Specifically, four latent profiles were observed, consisting of groups classified as intuitive eaters (IE), unconcerned eaters (UE), moderate restrictors (MR), or heavy restrictors (HR).

The IE class was notable for the lowest average restraint and binge eating among participants, and the highest degree of intuitive eating. On average, IE group members had the

lowest BMI, lowest percentage of members currently dieting, and lowest percentage of members who had ever dieted in their lifetimes. They were also the least likely to perceive themselves as overweight regardless of current weight status. The IE profile demonstrated the lowest depression scores compared to all other groups, the highest body appreciation, highest self-esteem, and highest self-efficacy. These individuals also endorsed the least amount of positive and negative urgency, and the lowest number of weight control strategies utilized.

The unconcerned eater group was largely characterized by low restraint, low binge eating, and a degree of intuitive eating that would reasonably be expected in a normative sample of undergraduate women. Compared to the IE group, on average UE members endorsed slightly more depression (though well within the normal range), less body appreciation, less self-esteem, and less self-efficacy. Average BMI was in the normal range. Approximately half of these participants had been on a diet at some point in their lives, though the majority were not currently dieting.

The moderate restrictors and heavy restrictors demonstrated average scores on both restraint scales indicative of restrictive eating. In particular, HR members endorsed DEBQ subscale average scores comparable to those of women receiving treatment for a diagnosed eating disorder. Indeed, the majority of HR members endorsed current dieting, and nearly a third had received a prior eating disorder diagnosis. Both groups had average BMI scores in the overweight range, and intuitive eating was far below population norms. The MR group was just below the cusp for binge eating on the Binge Eating Scale, while the HR group far exceeded this cut-off. Trends observed in the MR group were exaggerated in the HR group, including increased reports of depressive symptoms, poor self-esteem, minimal body appreciation, low self-efficacy, and greater urgency. Overall, members of the MR group endorsed some concerning

diet behaviors, while the HR group appeared to be comprised of members who had a significant history of dieting and eating disturbances.

Results from this study reinforce the growing body of evidence suggesting that dieting behavior is tightly linked with disordered eating pathology, and that the severity of this pathology may correlate with increasing intensity of restriction. In the future, clinicians may want to closely monitor related psychological constructs to determine if clients who are dieting are at risk of developing pathological eating behaviors. For example, changes in body appreciation, self-esteem, self-efficacy, and depressive symptomology may each coincide with incidence of disturbed eating. Future research should identify the relationships and potential pathways among these variables. This study also reinforces literature suggesting that, although nutritional literacy may be improved in an undergraduate population, it is not necessary or sufficient for psychologically healthy eating. A better alternative might be to encourage a developed intuition towards food choices that make one's body *feel* good, instead of reiterating societal misconceptions about what should or should not be eaten in order to *look* good. In the light of this study, it appears even more evident that *how* we eat (and not just *what* we eat) is deeply tied to how we see ourselves.

APPENDIX A. DEMOGRAPHIC QUESTIONNAIRE

1. Your age: _____Years

2. Height: _____ (ft.) _____ (in.)   Weight: _____ (lbs.)

3. Pant size: _____   Brand of pants (for reference): _____

4. What is your marital status? (*Please select one*)
   1. Married & living with partner
   2. Married but not living with partner
   3. Cohabitating with partner but not married
   4. Never married
   5. Divorced
   6. Separated
   7. Widowed

5. What sex were you assigned at birth, such as on an original birth certificate?
   A. Male
   B. Female

6. How do you describe yourself?
   A. Female
   B. Trans Female/Trans Woman
   C. Genderqueer/Nonconforming
   D. Different Identity

7. What is your current zip code? _____

8. Ethnicity and race
   A. **Ethnicity**: Are you of Hispanic, Latino, or Spanish origin?
      1. No, not of Hispanic, Latino, or Spanish origin
      2. Yes, Mexican, Mexican American, or Chicano
      3. Yes, Puerto Rican
      4. Yes, Cuban
      5. Yes, another Hispanic, Latino, or Spanish origin
      6. Unknown
   B. **Race**: Which category best describes your race?
      1. American Indian/Alaska Native
      2. Asian
      3. Black or African American
      4. Native Hawaiian/Other Pacific Islander
      5. White
      6. Some other race (Please indicate: _____)
9. What is your highest level of education? (*Please select one*)
   1. Completed junior year in high school (11th grade)
   2. Graduated from high school (12th grade) or GED
   3. Completed at least 1 year of college

4. Completed an associate's degree or equivalent (2 years of college)
5. Completed 3 years of college
6. Completed a bachelor's degree or equivalent (4 years of college)
7. Completed some graduate school (but did not receive a degree)
8. Completed a master's degree
9. Other (please specify) _____

10. What is your current employment status? (*Please select one*)

1. Work 40 hours or more a week
2. Work fewer than 40 hours a week
3. Homemaker
4. Unemployed

11. Have you ever been diagnosed with an eating disorder?

No

Yes (Please specify: _____)

12. Have you ever received treatment for an eating disorder?

No
Yes

13. Do you think you are *currently* overweight?

No
Yes (If so, how many pounds do you think you should lose _____?)

14. Do you think you are *currently* underweight?

No
Yes (If so, how many pounds do you think you should gain _____?)

15. Please indicate your age when you had your first menstrual period. _____.

16. How did you see yourself before puberty?

Very underweight
Slightly underweight
Average
Slightly overweight
Very overweight

APPENDIX B. CURRENT DIET STATUS

1. Are you currently on a diet (for example, reducing calories or portion size, avoiding certain foods) with the intention of losing weight?

      1. Yes

      2. No

2. If you selected "No" (not currently dieting) for the previous question, are you currently "watching what you eat"?

      1. Yes

      2. No

3. Are you currently adhering to a specific type of diet?

      1. Yes

      2. No

4. If you selected "Yes", how would you best describe your diet (e.g., vegetarian, vegan, Keto, Paleo, Whole30, lactose intolerance, Celiac's disease, nut allergy)? _____

5. If you are dieting, which of the options below would you say is your primary motivation for losing weight?

      1. To become healthier.

      2. To change my appearance.

6. Have you attempted to diet in the past?

      1. No

      2. Yes (If so, approximately how many times have you attempted to diet in your lifetime? ____)

7. During past diets, were you ever able to successfully lose weight?

      1. Yes

      2. No

      3. Have never been on a diet.

8. If you have dieted in the past and successfully lost weight, have you maintained your weight loss (that is, not regained weight) into the present?

      1. Yes

      2. No

      3. Have never been on a diet.

APPENDIX C. RESTRAINT SCALE

1. How often are you dieting?
□ Never
□ Rarely
□ Sometimes
□ Usually
□ Always

2. What is the maximum amount of weight (in pounds) you have ever lost within one month?
□ 0–4
□ 5–9
□ 10–14
□ 15–19
□ 20+

3. What is your maximum weight gain within a week?
□ 0–1
□ 1.1–2
□ 2.1–3
□ 3.1–5
□ 5.1+

4. In a typical week, how much does your weight fluctuate?
□ 0–1
□ 1.1–2
□ 2.1–3
□ 3.1–5
□ 5.1+

5. Would a weight fluctuation of five pounds affect the way you live your life?
□ Not at all
□ Slightly
□ Moderately
□ Extremely

6. Do you eat sensibly in front of others and splurge alone?
□ Never
□ Rarely
□ Often
□ Always

7. Do you give too much time and thought to food?
□ Never
□ Rarely
□ Often
□ Always

8. Do you have feelings of guilt after overeating?
□ Never
□ Rarely
□ Often

□ Always

9. How conscious are you of what you're eating?
□ Not at all
□ Slightly
□ Moderately
□ Extremely

10. How many pounds over your desired weight were you at your maximum weight?
□ 0–1
□ 1–5
□ 6–10
□ 11–20
□ 21+

APPENDIX D. DUTCH EATING BEHAVIOR QUESTIONNAIRE

	Never	Seldom	Sometimes	Often	Very Often
1. If you have put on weight, do you eat less than you usually do?	1	2	3	4	5
2. Do you try to eat less at mealtimes than you would like to eat?	1	2	3	4	5
3. How often do you refuse food or drink offered because you are concerned about your weight?	1	2	3	4	5
4. Do you exactly watch what you eat?	1	2	3	4	5
5. Do you deliberately eat foods that are slimming?	1	2	3	4	5
6. When you have eaten too much, do you eat less than usual the following day?	1	2	3	4	5
7. Do you deliberately eat less in order not to become heavier?	1	2	3	4	5
8. How often do you try not to eat between meals because you are watching your weight?	1	2	3	4	5
9. How often in the evening do you try not to eat because you are watching your weight?	1	2	3	4	5
10. Do you take into account your weight with what you eat?	1	2	3	4	5
11. Do you have the desire to eat when you are irritated?	1	2	3	4	5
12. Do you have the desire to eat when you have nothing to do?	1	2	3	4	5
13. Do you have a desire to eat when you are depressed or discouraged?	1	2	3	4	5
14. Do you have a desire to eat when you are feeling lonely?	1	2	3	4	5
15. Do you have a desire to eat when somebody lets you down?	1	2	3	4	5
16. Do you have a desire to eat when you are cross?	1	2	3	4	5

17. Do you have a desire to eat when you are expecting something unpleasant to happen?	1	2	3	4	5
18. Do you get the desire to eat when you are anxious, worried, or tense?	1	2	3	4	5
19. Do you have a desire to eat when things are going against you or when things have gone wrong?	1	2	3	4	5
20. Do you have a desire to eat when you are frightened?	1	2	3	4	5
21. Do you have a desire to eat when you are disappointed?	1	2	3	4	5
22. Do you have the desire to eat when you are emotionally upset?	1	2	3	4	5
23. Do you have a desire to eat when you are bored or restless?	1	2	3	4	5
24. If food tastes good to you, do you eat more than usual?	1	2	3	4	5
25. If food smells and looks good, do you eat more than usual?	1	2	3	4	5
26. If you see or smell something delicious, do you have a desire to eat it?	1	2	3	4	5
27. If you have something delicious to eat, do you eat it straight away?	1	2	3	4	5
28. If you walk past the baker, do you have the desire to buy something delicious?	1	2	3	4	5
29. If you walk past a snack bar or a café, do you have the desire to buy something delicious?	1	2	3	4	5
30. If you see others eating, do you also have the desire to eat?	1	2	3	4	5
31. Can you resist eating delicious foods?	1	2	3	4	5
32. Do you eat more than usual when you see other people eating?	1	2	3	4	5
33. When you are preparing a meal, are you inclined to eat something?	1	2	3	4	5

APPENDIX E. BINGE EATING SCALE

Below are groups of statements about behavior, thoughts, and emotional states. Please indicate which statement in each group best describes how you feel.

1.
- I don't feel self-conscious about my weight or body size when I'm with others.
- I feel concerned about how I look to others, but it normally does not make me feel disappointed with myself.
- I do get self-conscious about my appearance and weight which makes me feel disappointed in myself.
- I feel very self-conscious about my weight and frequently, I feel intense shame and disgust for myself. I try to avoid social contacts because of my self-consciousness.

2.
- I don't have any difficulty eating slowly in the proper manner.
- Although I seem to "gobble down" foods, I don't end up feeling stuffed because of eating too much.
- At times, I tend to eat quickly and then, I feel uncomfortably full afterwards.
- I have the habit of bolting down my food, without really chewing it. When this happens I usually feel uncomfortably stuffed because I've eaten too much.

3.
- I feel capable to control my eating urges when I want to.
- I feel like I have failed to control my eating more than the average person.
- I feel utterly helpless when it comes to feeling in control of my eating urges.
- Because I feel so helpless about controlling my eating I have become very desperate about trying to get in control.

4.
- I don't have the habit of eating when I'm bored.
- I sometimes eat when I'm bored, but often I'm able to "get busy" and get my mind off food.
- I have a regular habit of eating when I'm bored, but occasionally, I can use some other activity to get my mind off eating.
- I have a strong habit of eating when I'm bored. Nothing seems to help me break the habit.

5.
- I'm usually physically hungry when I eat something.
- Occasionally, I eat something on impulse even though I really am not hungry.
- I have the regular habit of eating foods, that I might not really enjoy, to satisfy a hungry feeling even though physically, I don't need the food.
- Although I'm not physically hungry, I get a hungry feeling in my mouth that only seems to be satisfied when I eat a food, like a sandwich, that fills my mouth. Sometimes, when I eat the food to satisfy my mouth hunger, I then spit the food out so I won't gain weight.

6.
- I don't feel any guilt or self-hate after I overeat.
- After I overeat, occasionally I feel guilt or self-hate.
- Almost all the time I experience strong guilt or self-hate after I overeat.

7.
- I don't lose total control of my eating when dieting even after periods when I overeat.
- Sometimes when I eat a "forbidden food" on a diet, I feel like I "blew it" and eat even more.
- Frequently, I have the habit of saying to myself, "I've blown it now, why not go all the way" when I overeat on a diet. When that happens I eat even more.
- I have a regular habit of starting strict diets for myself, but I break the diets by going on an eating binge. My life seems to be either a "feast" or "famine."

8.
- I rarely eat so much food that I feel uncomfortably stuffed afterwards.
- Usually about once a month, I eat such a quantity of food, I end up feeling very stuffed.
- I have regular periods during the month when I eat large amounts of food, either at mealtime or at snacks.
- I eat so much food that I regularly feel quite uncomfortable after eating and sometimes a bit nauseous.

9.
- My level of calorie intake does not go up very high or go down very low on a regular basis.
- Sometimes after I overeat, I will try to reduce my caloric intake to almost nothing to compensate for the excess calories I've eaten.
- I have a regular habit of overeating during the night. It seems that my routine is not to be hungry in the morning but overeat in the evening.
- In my adult years, I have had week-long periods where I practically starve myself. This follows periods when I overeat. It seems I live a life of either "feast or famine."

10.
- I usually am able to stop eating when I want to. I know when "enough is enough."
- Every so often, I experience a compulsion to eat which I can't seem to control.
- Frequently, I experience strong urges to eat which I seem unable to control, but at other times I can control my eating urges.
- I feel incapable of controlling urges to eat. I have a fear of not being able to stop eating voluntarily.

11.
- I don't have any problem stopping eating when I feel full.
- I usually can stop eating when I feel full but occasionally overeat leaving me feeling uncomfortably stuffed.

- I have a problem stopping eating once I start and usually I feel uncomfortably stuffed after I eat a meal.
- Because I have a problem not being able to stop eating when I want, I sometimes have to induce vomiting to relieve my stuffed feeling.

12.
- I seem to eat just as much when I'm with others (family, social gatherings) as when I'm by myself.
- Sometimes, when I'm with other persons, I don't eat as much as I want to eat because I'm self-conscious about my eating.
- Frequently, I eat only a small amount of food when others are present, because I'm very embarrassed about my eating.
- I feel so ashamed about overeating that I pick times to overeat when I know no one will see me. I feel like a "closet eater."

13.
- I eat three meals a day with only an occasional between meal snack.
- I eat 3 meals a day, but I also normally snack between meals.
- When I am snacking heavily, I get in the habit of skipping regular meals.
- There are regular periods when I seem to be continually eating, with no planned meals.

14.
- I don't think much about trying to control unwanted eating urges.
- At least some of the time, I feel my thoughts are pre-occupied with trying to control my eating urges.
- I feel that frequently I spend much time thinking about how much I ate or about trying not to eat anymore.
- It seems to me that most of my waking hours are pre-occupied by thoughts about eating or not eating. I feel like I'm constantly struggling not to eat.

15.
- I don't think about food a great deal.
- I have strong cravings for food but they last only for brief periods of time.
- I have days when I can't seem to think about anything else but food.
- Most of my days seem to be pre-occupied with thoughts about food. I feel like I live to eat.

16.
- I usually know whether or not I'm physically hungry. I take the right portion of food to satisfy me.
- Occasionally, I feel uncertain about knowing whether or not I'm physically hungry. At these times it's hard to know how much food I should take to satisfy me.
- Even though I might know how many calories I should eat, I don't have any idea what is a "normal" amount of food for me.

APPENDIX F. INTUITIVE EATING SCALE-2

Directions: For each item, please circle the answer that best characterizes your attitudes or behaviors.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I try to avoid certain foods high in fat, carbohydrates, or calories.	1	2	3	4	5
I find myself eating when I'm feeling emotional (e.g., anxious, depressed, sad), even when I'm not physically hungry.	1	2	3	4	5
If I am craving a certain food, I allow myself to have it.	1	2	3	4	5
I get mad at myself for eating something unhealthy.	1	2	3	4	5
I find myself eating when I am lonely, even when I'm not physically hungry.	1	2	3	4	5
I trust my body to tell me when to eat.	1	2	3	4	5
I trust my body to tell me what to eat.	1	2	3	4	5
I trust my body to tell me how much to eat.	1	2	3	4	5
I have forbidden foods that I don't allow myself to eat.	1	2	3	4	5
I use food to help soothe my negative emotions.	1	2	3	4	5
I find myself eating when I am stressed out, even when I'm not physically hungry.	1	2	3	4	5
I am able to cope with my negative emotions (e.g., anxiety, sadness) without turning to food for comfort.	1	2	3	4	5
When I am bored, I do NOT eat just for something to do.	1	2	3	4	5
When I am lonely, I do NOT turn to food for comfort.	1	2	3	4	5
I find other ways to cope with stress and anxiety than by eating.	1	2	3	4	5
I allow myself to eat what food I desire at the moment.	1	2	3	4	5
I do NOT follow eating rules or dieting plans that dictate what, when, and/or how much to eat.	1	2	3	4	5
Most of the time, I desire to eat nutritious foods.	1	2	3	4	5
I mostly eat foods that make my body perform efficiently (well).	1	2	3	4	5
I mostly eat foods that give my body energy and stamina.	1	2	3	4	5

I rely on my hunger signals to tell me when to eat.	1	2	3	4	5
I rely on my fullness (satiety) signals to tell me when to stop eating.	1	2	3	4	5
I trust my body to tell me when to stop eating.	1	2	3	4	5

APPENDIX G. NUTRTIONAL LITERACY ASSESMENT (42-ITEM)

Nutrition and Health

Directions: Choose the best answer for the questions below.

1. Foods such as _____ should be included often in a healthy diet.

A. red meat
B. butter
C. whole grains
D. refined grains

2. An example of an energy-dense food is _____.

A. ice cream
B. air-popped popcorn
C. an orange
D. raw carrot sticks

3. Nutrient dense foods, such as _____ should be consumed most often.

A. regular soda
B. French fries
C. an orange
D. apple juice

4. Broccoli is one example of a food that is _____-dense.

A. energy
B. protein
C. nutrient
D. calorie

5. Which meal is the most nutrient-dense?

A. 3 oz. hamburger on wheat bun, 20 potato chips, 8 oz. lowfat milk
B. 1 cup of spaghetti with meat sauce, 1 slice garlic bread, 8 oz. lowfat milk
C. 3 oz. skinless chicken, 1 cup steamed green beans, 8 oz. lowfat milk
D. 4 oz. pork chop, 1/2 cup steamed white rice, 8 oz. lowfat milk

6. An example of an energy-dense beverage is _____.

A. Diet soda
B. Lemonade
C. Black coffee
D. Unsweetened tea

7. Which of the following foods is most likely to be highest in sodium?

A. canned tomato soup
B. frozen corn

C. fresh squeezed orange juice
D. strawberries

Energy Sources in Food: These questions concern carbohydrate, protein and fat, the nutrients that supply energy to the body.

Directions: Use what you know about nutrition to answer the following questions.

1. The calories in foods like olive oil and butter come from their high _____ content.

A. vitamin E
B. carbohydrate
C. protein
D. fat

2. The _____ found in fresh-squeezed orange juice is a type of carbohydrate.

A. sugar
B. calcium
C. starch
D. folate

3. Which group of foods provides the most protein?

A. bread, rice, noodles
B. banana, applesauce, broccoli
C. pork chop, egg, cheese
D. peanut butter, olive oil, salad dressing

4. Which group of foods provides the most fat?

A. rice, corn tortilla, saltine crackers
B. potato, pear, milk
C. carrots, avocado, yogurt
D. mayonnaise, margarine, almonds

5. If your doctor asked you to eat less fat, which food should you eat less often?
A. black beans
B. regular salad dressing
C. potatoes
D. bread

6. Olive oil is more healthful than margarine because:
A. it is natural.
B. it is lower in fat.
C. it is lower in calories.
D. it has more healthful types of fat.

Household Food Measurement

Sometimes we eat food in the right amounts as advised by nutrition experts and sometimes we choose smaller or larger portions than might be best to achieve a healthy diet. For each food in question, choose what you think is the right portion size. This portion may or may not be the amount you usually eat. The portion amounts given in the question are also shown in pictures.

1. Pictured at left is a glass that contains 8 (eight) ounces of milk. Is this:

A. more than one (1) portion?
B. less than one (1) portion?
C. about right for one (1) portion?

2. Pictured at left is 1 (one) cup of rice. Is this:

A. more than one (1) portion?
B. less than one (1) portion?
C. about right for one (1) portion?

3. Pictured at right is one (1) cup of strawberries. Is this:

A. more than one (1) portion?
B. less than one (1) portion?
C. about right for one (1) portion?

4. The spaghetti and meat sauce pictured at left includes two (2) cups of cooked pasta and 1 cup of meat sauce. Two cups of cooked pasta is:

A. more than one (1) portion?
B. less than one (1) portion?

6. Pictured at right is 1/2 (one-half) cup of black beans. Is this:

A. more than one (1) portion?
B. less than one (1) portion?
C. about right for one (1) portion?

3 ounces

5 ounces

8 ounces

9. Using the photos above, choose the right portion for a hamburger patty:

A. 3 ounces
B. 5 ounces
C. 8 ounces

Food Label and Numeracy

This Nutrition Facts Panel at right is taken from the back of a container of macaroni and cheese.

1. How many calories will you eat if you eat the **whole container**?

A. 250 calories
B. 500 calories
C. 700 calories
D. 750 calories

2. If you are limiting your total fat intake to 65 grams per day, and you eat one (1)cup of macaroni and cheese, what is the highest amount of total fat you can eat from other food sources?

A. 33 grams
B. 47 grams
C. 53 grams
D. 57 grams

3. How many grams of total carbohydrate would you eat in 2 cups of macaroni and cheese?

A. 31 grams
B. 45 grams
C. 62 grams
D. 75 grams

4. If you eat 1/2 cup of this macaroni and cheese, how many grams of total fat would you eat?

A. 2 grams
B. 4 grams
C. 6 grams
D. 8 grams

5. If you are advised to eat 45 grams of carbohydrate per meal, and eat 1 serving of macaroni and cheese, how many grams of total carbohydrate should you eat from another food at the same meal?

A. 9 grams
B. 10 grams
C. 14 grams
D. 20 grams

Nutrition Facts

Serving Size 1 cup (228g)
Servings Per Container about 2

Amount Per Serving

Calories 250   Calories from Fat 110

	% Daily Value*
Total Fat 12g	**18**%
Saturated Fat 3g	**15**%
Trans Fat 3g	
Cholesterol 30mg	**10**%
Sodium 470mg	**20**%
Total Carbohydrate 31g	**10**%
Dietary Fiber 0g	**0**%
Sugars 5g	
Proteins 5g	
Vitamin A	4%
Vitamin C	2%
Calcium	20%
Iron	4%

* Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

For educational purposes only. This label does not meet the labeling requirements described in 21 CFR 101.9.

6. If your doctor has advised you to limit your total fat intake to 60 grams per day, what percentage of your day's intake have you eaten in one serving of this macaroni and cheese?

A. 10%
B. 15%
C. 18%
D. 20%

Food groups
This is a list of foods. Using the chart below, write the name of each food in the food group in which it belongs according to its nutrition value. Example: *bread* (see below)

apple
cheese
pork chop
carrots
noodles
flour tortilla
butter
lemonade

Grains	Vegetables	Fruits	Protein	Dairy	Fats & Oils	Added Sugars
bread						

Consumer Skills

Directions: Choose the best answer for the questions that follow.

1. If calories are equal for one serving of each food, which provides the most healthful nutrients overall?

A. Applesauce with no sugar added
B. Apple

C. Applesauce with no sugar added is equal to an apple in nutrition.

2. If Calories are equal for one serving of each food, which food would make the most nutritious snack?

A. fruit snacks made with real fruit
B. raisins
C. Fruit snacks made with real fruit are equal to raisins in nutrition.

3. If portions are equal, which meat is lower in fat content?

A. Beef Strip Steak
B. Beef Sirloin Steak
C. Beef strip steak and beef sirloin steak are equal in fat content.

4. Which beverage provides more calories per 8 (eight) ounces (1 fluid cup)?

A. Fat-free milk
B. 100% apple juice
C. Fat-free milk and 100% apple juice are equal in calories.

5. Which green bean option is lowest in sodium content?

A. canned green beans
B. frozen green beans
C. Canned green beans and frozen green beans are equal in sodium content

6. Which type of salad greens provides the most nutrition?

A. Iceberg lettuce
B. Kale
C. Iceberg lettuce and kale are equal in nutrition

7. Which section on a food label provides the best information about sugar content?

A. Nutrition Facts Panel

B. Package states "No sugar added"

C. The nutrition facts panel and the package stating "no sugar added" are equal sources of information

8. If calories are equal, which food provides the best nutrition?

A. Blueberries

B. Berry juice

C. Blueberries and berry juice are equal in nutrition.

9. Which section on a food label provides the best information for choosing a whole grain food?

A. Package states "Whole Grain"

B. Ingredients list

C. The package statement "whole grain" and ingredients list are equal sources of nutrition information.

APPENDIX H. DIETARY SCREENER QUESTIONNAIRE

These questions are about foods you ate or drank during the past month, that is, the past 30 days. When answering, please include meals and snacks at home, at work or school, in restaurants, and anyplace else. Mark an **x** to indicate your answer.

1.   How old are you (in years)?
_____ years

2.   Are you male or female?
-Male
-Female

3.During the past month, how often did you eat hot or cold cereals? Mark one.   .

-Never (go to question 4.)
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2-3 times per day
-4-5 times per day
-6 or more times per day

4. During the past month, what kind of cereal did you usually eat? Print cereal.

_____

5. If there was another kind of cereal that you usually ate during the past month, what kind was it?
        Print cereal, if none leave blank.

_____

6. During the past month, how often did you have any milk (either to drink or on cereal)? Include regular milks, chocolate or other flavored milks, lactose-free milk, buttermilk. Please do not include soy milk or small amounts of milk in coffee or tea. Mark one.

-Never (go to question 8.)
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week

-5-6 times per week
-1 time per day
-2-3 times per day
-4-5 times per day
-6 or more times per day

7. During the past month, what kind of milk did you usually drink? Mark one.   .
-Whole or regular milk
-2% fat or reduced-fat milk 1%, ½%, or low-fat milk
-Fat-free, skim or nonfat milk
-Soy milk
-Other kind of milk   (Print milk.)

_____

8. During the past month, how often did you drink regular soda or pop that contains sugar? Do not include diet soda. Mark one.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2-3 times per day
-4-5 times per day
-6 or more times per day

9. During the past month, how often did you drink 100% pure fruit juices such as orange, mango, apple, grape and pineapple juices? Do not include fruit-flavored drinks with added sugar or fruit juice you made at home and added sugar to. Mark one.   .

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2-3 times per day
-4-5 times per day
-6 or more times per day

10. During the past month, how often did you drink coffee or tea that had sugar or honey added to it? Include coffee and tea you sweetened yourself and presweetened tea and coffee drinks such as Arizona Iced Tea and Frappuccino. Do not include artificially sweetened coffee or diet tea.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2-3 times per day
-4-5 times per day
-6 or more times per day

11. During the past month, how often did you drink sweetened fruit drinks, sports or energy drinks, such as Kool-Aid, lemonade, Hi-C, cranberry drink, Gatorade, Red Bull or Vitamin Water? Include fruit juices you made at home and added sugar to. Do not include diet drinks or artificially sweetened drinks.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day 2-3 times per day
-4-5 times per day
-6 or more times per day

12. During the past month, how often did you eat fruit? Include fresh, frozen or canned fruit. Do not include juices.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

13. During the past month, how often did you eat a green leafy or lettuce salad, with or without other vegetables?

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

14. During the past month, how often did you eat any kind of fried potatoes, including french fries, home fries, or hash brown potatoes?

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

15. During the past month, how often did you eat any other kind of potatoes, such as baked, boiled, mashed potatoes, sweet potatoes, or potato salad?

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

16. During the past month, how often did you eat refried beans, baked beans, beans in soup, pork and beans or any other type of cooked dried beans? Do not include green beans.

-Never
-1 time last month
-2-3 times last month
-1 time per week 2
-times per week
-3-4 times per week
-5-6 times per week
-1 time per day

-2 or more times per day

17. During the past month, how often did you eat brown rice or other cooked whole grains, such as bulgur, cracked wheat, or millet? Do not include white rice.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

18. During the past month, not including what you just told me about (green salads, potatoes, cooked dried beans), how often did you eat other vegetables?

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
- 2 or more times per day

19. During the past month, how often did you have Mexican-type salsa made with tomato?

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

20. During the past month, how often did you eat pizza? Include frozen pizza, fast food pizza, and homemade pizza.

-Never
-1 time last month
-2-3 times last month
-1 time per week

-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

21. During the past month, how often did you have tomato sauces such as with spaghetti or noodles or mixed into foods such as lasagna? Do not include tomato sauce on pizza.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

22. During the past month, how often did you eat any kind of cheese? Include cheese as a snack, cheese on burgers, sandwiches, and cheese in foods such as lasagna, quesadillas, or casseroles. Do not include cheese on pizza.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

23. During the past month, how often did you eat red meat, such as beef, pork, ham, or sausage? Do not include chicken, turkey, or seafood. Include red meat you had in sandwiches, lasagna, stew, and other mixtures. Red meats may also include veal, lamb, and any lunch meats made with these meats.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

24. During the past month, how often did you eat any processed meat, such as bacon, lunch meats, or hot dogs? Include processed meats you had in sandwiches, soups, pizza, casseroles, and other mixtures. Processed meats are those preserved by smoking, curing, or salting, or by the addition of preservatives. Examples are: ham, bacon, pastrami, salami, sausages, bratwursts, frankfurters, hot dogs, and spam.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

25. During the past month, how often did you eat whole grain bread including toast, rolls and in sandwiches? Whole grain breads include whole wheat, rye, oatmeal and pumpernickel. Do not include white bread.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

26. During the past month, how often did you eat chocolate or any other types of candy? Do not include sugar-free candy.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

27. During the past month, how often did you eat doughnuts, sweet rolls, Danish, muffins, pan dulce, or pop-tarts? Do not include sugar-free items.

-Never
-1 time last month

-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

28. During the past month, how often did you eat cookies, cake, pie or brownies? Do not include sugar-free kinds.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
- 5-6 times per week
-1 time per day
-2 or more times per day

29. During the past month, how often did you eat ice cream or other frozen desserts? Do not include sugar-free kinds.

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
- 5-6 times per week
-1 time per day
-2 or more times per day

30. During the past month, how often did you eat popcorn?

-Never
-1 time last month
-2-3 times last month
-1 time per week
-2 times per week
-3-4 times per week
-5-6 times per week
-1 time per day
-2 or more times per day

APPENDIX I. PERCENTAGE ENERGY FROM FAT SCREENER

1. Think about your eating habits over the past 12 months. About how often did you eat or drink each of the following foods? Remember breakfast, lunch, dinner, snacks, and eating out. Blacken in only one bubble for each food.

	Never	Less than Once Per Month	1-3 Times Per Month	1-2 Times Per Week	3-4 Times Per Week	5-6 Times Per Week	1 Time Per Day	2 or More Times Per Day
Cold cereal								
Skim milk, on cereal or to drink								
Eggs, fried or scrambled in margarine, butter, or oil								
Sausage or bacon, regular-fat								
Margarine or butter on bread, rolls, pancakes								
Orange juice or grapefruit juice								
Fruit (not juices)								
Beef or pork hot dogs, regular-fat								
Cheese or cheese spread, regular-fat								
French fries, home fries, or hash brown potatoes								
Margarine or butter on vegetables, including potatoes								
Mayonnaise, regular-fat								
Salad dressing, regular-fat								
Rice								
Margarine, butter, or oil on rice or pasta								

2. Over the past 12 months, when you prepared foods with margarine or ate margarine, how often did you use a reduced-fat margarine?
-Didn't use margarine

-Almost never
-About ¼ of the time
-About ½ of the time
-About ¾ of the time
-Almost always or always

3. Overall, when you think about the foods you ate over the past 12 months, would you say your diet was high, medium, or low in fat?
-High
-Medium
-Low

APPENDIX J. FOOD CHOICE QUESTIONNAIRE

It is important to me that the food I eat on a typical day…	Extremely Unimportant	Unimportant	Slightly Unimportant	Neither Unimportant nor Important	Slightly Important	Important	Extremely Important
1. Is easy to prepare	1	2	3	4	5	6	7
2. Contains no additives	1	2	3	4	5	6	7
3. Is low in calories	1	2	3	4	5	6	7
4. Tastes good	1	2	3	4	5	6	7
5. Contains natural ingredients	1	2	3	4	5	6	7
6. Is not expensive	1	2	3	4	5	6	7
7. Is low in fat	1	2	3	4	5	6	7
8. Is familiar	1	2	3	4	5	6	7
9. Is high in fiber and roughage	1	2	3	4	5	6	7
10. Is nutritious	1	2	3	4	5	6	7
11. Is easily available in shops and supermarkets	1	2	3	4	5	6	7
12. Is good value for money	1	2	3	4	5	6	7
13. Cheers me up	1	2	3	4	5	6	7
14. Smells nice	1	2	3	4	5	6	7
15. Can be cooked very simply	1	2	3	4	5	6	7
16. Helps me cope with stress	1	2	3	4	5	6	7
17. Helps me control my weight	1	2	3	4	5	6	7
18. Has a pleasant texture	1	2	3	4	5	6	7

19. Fuels me for daily activities	1	2	3	4	5	6	7
20. Is minimally processed	1	2	3	4	5	6	7
21. Is like the food I ate when I was a child	1	2	3	4	5	6	7
22. Contains a lot of vitamins and minerals	1	2	3	4	5	6	7
23. Contains no artificial ingredients	1	2	3	4	5	6	7
24. Keeps me awake/alert	1	2	3	4	5	6	7
25. Looks nice	1	2	3	4	5	6	7
26. Helps me relax	1	2	3	4	5	6	7
27. Is high in protein	1	2	3	4	5	6	7
28. Takes no time to prepare	1	2	3	4	5	6	7
29. Keeps me healthy	1	2	3	4	5	6	7
30. Is good for my skin/teeth/hair/nails etc.	1	2	3	4	5	6	7
31. Makes me feel good	1	2	3	4	5	6	7
32. Is low in refined or added sugars (such as cane sugar found in many soft drinks)	1	2	3	4	5	6	7
33. Is what I usually eat	1	2	3	4	5	6	7
34. Helps me cope with life	1	2	3	4	5	6	7
35. Can be bought in shops close to where I live or work	1	2	3	4	5	6	7
36. Is cheap	1	2	3	4	5	6	7

APPENDIX K. PATIENT HEALTH QUESTIONNAIRE-9

Directions: Over the last 2 weeks, how often have you been bothered by any of the following symptoms?

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	0	1	2	3
Feeling down, depressed, or hopeless	0	1	2	3
Trouble falling or staying asleep, or sleeping too much	0	1	2	3
Feeling tired or having little energy	0	1	2	3
Poor appetite or overeating	0	1	2	3
Feeling bad about yourself – or that you are a failure or have let yourself or your family down	0	1	2	3
Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult

APPENDIX L. BODY APPRECIATION SCALE-2

Directions: Please indicate whether the question is true about you never, seldom, sometimes, often, or always

	Never	Seldom	Sometimes	Often	Always
I respect my body.	1	2	3	4	5
I feel good about my body.	1	2	3	4	5
I feel that my body has at least some good qualities.	1	2	3	4	5
I take a positive attitude towards my body.	1	2	3	4	5
I am attentive to my body's needs.	1	2	3	4	5
I feel love for my body.	1	2	3	4	5
I appreciate the different and unique characteristics of my body.	1	2	3	4	5
My behavior reveals my positive attitude toward my body; for example, I hold my head high and smile.	1	2	3	4	5
I am comfortable in my body.	1	2	3	4	5
I feel like I am beautiful even if I am different from media images of attractive people (e.g., models, actresses/actors).	1	2	3	4	5

APPENDIX M. UPPS-P IMPULSIVE BEHAVIOR SCALE SHORT VERSION

Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement. If you **Agree Strongly** circle 1, if you **Agree Somewhat** circle 2, if you **Disagree somewhat** circle 3, and if you **Disagree Strongly** circle 4. Be sure to indicate your agreement or disagreement for every statement below.

	Agree strongly	Agree somewhat	Disagree somewhat	Disagree strongly
1. I generally like to see things through to the end.	1	2	3	4
2. My thinking is usually careful and purposeful.	1	2	3	4
3. When I am in great mood, I tend to get into situations that could cause me problems.	1	2	3	4
4. Unfinished tasks really bother me.	1	2	3	4
5. I like to stop and think things over before I do them.	1	2	3	4
6. When I feel bad, I will often do things I later regret in order to make myself feel better now.	1	2	3	4
7. Once I get going on something I hate to stop.	1	2	3	4
8. Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.	1	2	3	4
9. I quite enjoy taking risks.	1	2	3	4
10. I tend to lose control when I am in a great mood.	1	2	3	4
11. I finish what I start.	1	2	3	4
12. I tend to value and follow a rational, "sensible" approach to things.	1	2	3	4
13. When I am upset I often act without thinking.	1	2	3	4
14. I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.	1	2	3	4
15. When I feel rejected, I will often say things that I later regret.	1	2	3	4
16. I would like to learn to fly an airplane.	1	2	3	4

17. Others are shocked or worried about the things I do when I am feeling very excited.	1	2	3	4
18. I would enjoy the sensation of skiing very fast down a high mountain slope.	1	2	3	4
19. I usually think carefully before doing anything.	1	2	3	4
20. I tend to act without thinking when I am really excited.	1	2	3	4

APPENDIX N. GENERAL SELF-EFFICACY SCALE

	Not true at all	Hardly true	Moderately true	Exactly true
1. I can always manage to solve difficult problems if I try hard enough.	1	2	3	4
2. If someone opposes me, I can find the means and ways to get what I want.	1	2	3	4
3. It is easy for me to stick to my aims and accomplish my goals.	1	2	3	4
4. I am confident that I could deal efficiently with unexpected events.	1	2	3	4
5. Thanks to my resourcefulness, I know how to handle unforeseen situations.	1	2	3	4
6. I can solve most problems if I invest the necessary effort.	1	2	3	4
7. I can remain calm when facing difficulties because I can rely on my coping abilities.	1	2	3	4
8. When I am confronted with a problem, I can usually find several solutions.	1	2	3	4
9. If I am in trouble, I can usually think of a solution.	1	2	3	4
10. I can usually handle whatever comes my way.	1	2	3	4

APPENDIX O. ROSENBERG SELF-ESTEEM SCALE

Directions: Below is a list of statements dealing with your general feelings about yourself. Please indicate how strongly you agree or disagree with each statement.

	Strongly Disagree	Disagree	Agree	Strongly Agree
On the whole, I am satisfied with myself.	1	2	3	4
At times, I think I am no good at all.	1	2	3	4
I feel that I have a number of good qualities.	1	2	3	4
I am able to do things as well as most other people.	1	2	3	4
I feel I do not have much to be proud of.	1	2	3	4
I certainly feel useless at times.	1	2	3	4
I feel that I'm a person of worth, at least on an equal plane with others.	1	2	3	4
I wish I could have more respect for myself.	1	2	3	4
All in all, I am inclined to feel that I am a failure.	1	2	3	4
I take a positive attitude toward myself.	1	2	3	4

APPENDIX P. DAILY CHECKLIST OF WEIGHT CONTROL

Directions: Please check any behaviors you have used in the past 24 hours

☐   Ate fewer calories/ate less than usual
☐   Snacked less than usual
☐   Decreased fat intake in food (as compared to usual)
☐   Ate less sugar than usual
☐   Ate less meat than usual
☐   Ate fewer carbohydrates than usual
☐   Ate many small meals
☐   Skipped breakfast/lunch/dinner
☐   Performed moderate or intense exercise
☐   Ate low-calorie foods
☐   Counted calories
☐   Used green tea or diet teas
☐   Recorded/monitored the food you ate (such as in an app, or a list)
☐   Weighed yourself to watch your weight
☐   Took diet pills
☐   Made yourself vomit
☐   Used laxatives

REFERENCES

Ackard, D. M., Croll, J. K., & Kearney-Cooke, A. (2002). Dieting frequency among college females: Association with disordered eating, body image, and related psychological problems. *Journal of Psychosomatic Research*, *52*(3), 129–136. https://doi.org/10.1016/S0022-3999(01)00269-0

Agopyan, A., Kenger, E. B., Kermen, S., Ulker, M. T., Uzsoy, M. A., & Yetgin, M. K. (2019). The relationship between orthorexia nervosa and body composition in female students of the nutrition and dietetics department. *Eating and Weight Disorders: EWD*, *24*(2), 257–266. https://doi.org/10.1007/s40519-018-0565-3

Akkartal, Ş., & Gezer, C. (2020). Is nutrition knowledge related to diet quality and obesity? *Ecology of Food and Nutrition*, *59*(2), 119–129. https://doi.org/10.1080/03670244.2019.1675654

Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., & Walter, P. (2002). How cells obtain energy from food. *Molecular Biology of the Cell. 4th Edition.* https://www.ncbi.nlm.nih.gov/books/NBK26882/

Andrés, A., & Saldaña, C. (2014). Body dissatisfaction and dietary restraint influence binge eating behavior. *Nutrition Research*, *34*(11), 944–950. https://doi.org/10.1016/j.nutres.2014.09.003

Andrew, R., Tiggemann, M., & Clark, L. (2015). Predictors of intuitive eating in adolescent girls. *Journal of Adolescent Health*, *56*(2), 209–214. https://doi.org/10.1016/j.jadohealth.2014.09.005

Bandura, A. (2004). Health Promotion by social cognitive means. *Health Education & Behavior*, *31*(2), 143–164. https://doi.org/10.1177/1090198104263660

Bandura, A., Freeman, W. H., & Lightsey, R. (1999). Self-Efficacy: The Exercise of Control. *Journal of Cognitive Psychotherapy*, *13*(2), 158–166. https://doi.org/10.1891/0889-8391.13.2.158

Barad, A., Cartledge, A., Gemmill, K., Misner, N. M., Santiago, C. E., Yavelow, M., & Langkamp-Henken, B. (2019). Associations between intuitive eating behaviors and fruit and vegetable intake among college students. *Journal of Nutrition Education and Behavior*, *51*(6), 758–762. https://doi.org/10.1016/j.jneb.2019.03.010

Barker, E. T., & Bornstein, M. H. (2010). Global self-esteem, appearance satisfaction, and self-reported dieting in early adolescence. *The Journal of Early Adolescence*, *30*(2), 205–224. https://doi.org/10.1177/0272431609332936

Beaumont, P. J., Chambers, T. L., Rouse, L., & Abraham, S. F. (1981). The diet composition and nutritional knowledge of patients with anorexia nervosa. *Journal of Human Nutrition*, *35*(4), 265–273. https://doi.org/10.3109/09637488109143052

Bénard, M., Camilleri, G. M., Etilé, F., Méjean, C., Bellisle, F., Reach, G., Hercberg, S., & Péneau, S. (2017). Association between impulsivity and weight status in a general population. *Nutrients*, *9*(3), Article 3. https://doi.org/10.3390/nu9030217

Berk, M., Williams, L. J., Jacka, F. N., O'Neil, A., Pasco, J. A., Moylan, S., Allen, N. B., Stuart, A. L., Hayley, A. C., Byrne, M. L., & Maes, M. (2013). So depression is an inflammatory disease, but where does the inflammation come from? *BMC Medicine*, *11*(1), 200. https://doi.org/10.1186/1741-7015-11-200

Beydoun, M. A., & Wang, Y. (2008). Do nutrition knowledge and beliefs modify the association of socio-economic factors and diet quality among US adults? *Preventive Medicine*, *46*(2), 145–153. https://doi.org/10.1016/j.ypmed.2007.06.016

Billieux, J., Heeren, A., Rochat, L., Maurage, P., Bayard, S., Bet, R., Besche-Richard, C., Challet-Bouju, G., Carré, A., Devos, G., Flayelle, M., Gierski, F., Grall-Bronnec, M., Kern, L., Khazaal, Y., Lançon, C., Lannoy, S., Michael, G. A., Raffard, S., … Baggio, S. (2021). Positive and negative urgency as a single coherent construct: Evidence from a large-scale network analysis in clinical and non-clinical samples. *Journal of Personality*, *89*(6), 1252–1262. https://doi.org/10.1111/jopy.12655

Boon, B., Stroebe, W., Schut, H., & Jansen, A. (1998). Food for thought: cognitive regulation of food intake. *British Journal of Health Psychology*, *3*(1), 27–40. https://doi.org/10.1111/j.2044-8287.1998.tb00553.x

Brechan, I., & Kvalem, I. L. (2015). Relationship between body dissatisfaction and disordered eating: Mediating role of self-esteem and depression. *Eating Behaviors*, *17*, 49–58. https://doi.org/10.1016/j.eatbeh.2014.12.008

Bryant, E. J., King, N. A., & Blundell, J. E. (2008). Disinhibition: Its effects on appetite and weight regulation. *Obesity Reviews*, *9*(5), 409–419. https://doi.org/10.1111/j.1467-789X.2007.00426.x

Burnette, C. B., & Mazzeo, S. E. (2020). An uncontrolled pilot feasibility trial of an intuitive eating intervention for college women with disordered eating delivered through group and guided self-help modalities. *International Journal of Eating Disorders*, *53*(9), 1405–1417. https://doi.org/10.1002/eat.23319

Butler, M. J., Perrini, A. A., & Eckel, L. A. (2021). The role of the gut microbiome, Immunity, and neuroinflammation in the pathophysiology of eating disorders. *Nutrients*, *13*(2), Article 2. https://doi.org/10.3390/nu13020500

Byrne, S., Barry, D., & Petry, N. M. (2012). Predictors of weight loss success. Exercise vs. Dietary self-efficacy and treatment attendance. *Appetite*, *58*(2), 695–698. https://doi.org/10.1016/j.appet.2012.01.005

Cani, P. D., & Delzenne, N. M. (2011). The gut microbiome as therapeutic target. *Pharmacology & Therapeutics*, *130*(2), 202–212. https://doi.org/10.1016/j.pharmthera.2011.01.012

Carbonneau, E., Lamarche, B., Provencher, V., Desroches, S., Robitaille, J., Vohl, M.-C., Bégin, C., Bélanger, M., Couillard, C., Pelletier, L., Bouchard, L., Houle, J., Langlois, M.-F., Corneau, L., & Lemieux, S. (2021). Associations between nutrition knowledge and overall diet quality: the moderating role of sociodemographic characteristics: results from

the PREDISE Study. *American Journal of Health Promotion: AJHP*, *35*(1), 38–47.

https://doi.org/10.1177/0890117120928877

Cena, H., Stanford, F. C., Ochner, L., Fonte, M. L., Biino, G., Giuseppe, R. D., Taveras, E., &

Misra, M. (2017). Association of a history of childhood-onset obesity and dieting with

eating disorders. *Eating Disorders*, *25*(3), 216–229.

https://doi.org/10.1080/10640266.2017.1279905

Christoph, M. J., Hazzard, V. M., Järvelä-Reijonen, E., Hooper, L., Larson, N., & Neumark-

Sztainer, D. (2021). Intuitive eating is associated with higher fruit and vegetable intake

among adults. *Journal of Nutrition Education and Behavior*, *53*(3), 240–245.

https://doi.org/10.1016/j.jneb.2020.11.015

Clark, S., & Muthén, B. (2009). *Relating Latent Class Analysis Results to Variables not Included*

in the Analysis.

Cooper, M. J., Wells, A., & Todd, G. (2004). A cognitive model of bulimia nervosa. *The British*

Journal of Clinical Psychology, *43*(Pt 1), 1–16.

https://doi.org/10.1348/014466504772812931

Cyders, M. A., Littlefield, A. K., Coffey, S., & Karyadi, K. A. (2014). Examination of a Short

Version of the UPPS-P Impulsive Behavior Scale. *Addictive Behaviors*, *39*(9), 1372–

1376. https://doi.org/10.1016/j.addbeh.2014.02.013

Cyders, M. A., & Smith, G. T. (2007). Mood-based rash action and its components: positive and

negative urgency. *Personality and Individual Differences*, *43*(4), 839–850.

https://doi.org/10.1016/j.paid.2007.02.008

Dalton, B., Bartholdy, S., Robinson, L., Solmi, M., Ibrahim, M. A. A., Breen, G., Schmidt, U., &

Himmerich, H. (2018). A meta-analysis of cytokine concentrations in eating disorders.

Journal of Psychiatric Research, *103*, 252–264.

https://doi.org/10.1016/j.jpsychires.2018.06.002

Darmon, N., & Drewnowski, A. (2015). Contribution of food prices and diet cost to

    socioeconomic disparities in diet quality and health: A systematic review and analysis.

    Nutrition Reviews, *73*(10), 643–660. https://doi.org/10.1093/nutrit/nuv027

de Vos, P., Hanck, C., Neisingh, M., Prak, D., Groen, H., & Faas, M. M. (2015). Weight gain in

    freshman college students and perceived health. *Preventive Medicine Reports*, *2*, 229–

    234. https://doi.org/10.1016/j.pmedr.2015.03.008

Dirks, A. J., & Leeuwenburgh, C. (2006). Caloric restriction in humans: Potential pitfalls and

    health concerns. *Mechanisms of Ageing and Development*, *127*(1), 1–7.

    https://doi.org/10.1016/j.mad.2005.09.001

Dissen, A. R., Policastro, P., Quick, V., & Byrd-Bredbenner, C. (2011). Interrelationships among

    nutrition knowledge, attitudes, behaviors and body satisfaction. *Health Education*,

    111(4), 283–295. https://doi.org/10.1108/09654281111144256

Duarte, C., Pinto-Gouveia, J., & Ferreira, C. (2015). Expanding binge eating assessment:

    Validity and screening value of the Binge Eating Scale in women from the general

    population. *Eating Behaviors*, *18*, 41–47. https://doi.org/10.1016/j.eatbeh.2015.03.007

Dugré, J. R., Giguére, C.-É., Percie du Sert, O., Potvin, S., Dumais, A., & Signature, C. (2019).

    The psychometric properties of a Short UPPS-P Impulsive Behavior Scale among

    psychiatric patients evaluated in an emergency setting. *Frontiers in Psychiatry*, *10*.

    https://doi.org/10.3389/fpsyt.2019.00139

Eldredge, K., Wilson, G. T., & Whaley, A. (1990). Failure, self-evaluation, and feeling fat in

    women. *International Journal of Eating Disorders*, *9*(1), 37–50.

    https://doi.org/10.1002/1098-108X(199001)9:1<37::AID-EAT2260090105>3.0.CO;2-3

Emery, R. L., King, K. M., Fischer, S. F., & Davis, K. R. (2013). The moderating role of negative

    urgency on the prospective association between dietary restraint and binge eating.

    Appetite, *71*, 113–119. https://doi.org/10.1016/j.appet.2013.08.001

Ernsberger, P., & Koletsky, R. J. (1999). Biomedical rationale for a wellness approach to obesity: an alternative to a focus on weight loss. *Journal of Social Issues*, *55*(2), 221–260. https://doi.org/10.1111/0022-4537.00114

Escrivá-Martínez, T., Galiana, L., Rodríguez-Arias, M., & Baños, R. M. (2019). The Binge Eating Scale: structural equation competitive models, invariance measurement between sexes, and relationships with food addiction, impulsivity, binge drinking, and body mass index. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.00530

Evert, A. B., & Franz, M. J. (2017). Why weight loss maintenance is difficult. *Diabetes Spectrum*, *30*(3), 153–156. https://doi.org/10.2337/ds017-0025

Favaro, A., Ferrara, S., & Santonastaso, P. (2003). The spectrum of eating disorders in young women: A prevalence study in a general population sample. *Psychosomatic Medicine*, *65*(4), 701–708. https://doi.org/10.1097/01.psy.0000073871.67679.d8

Ferguson, S. L., G. Moore, E. W., & Hull, D. M. (2020). Finding latent groups in observed data: A primer on latent profile analysis in Mplus for applied researchers. *International Journal of Behavioral Development*, *44*(5), 458–468. https://doi.org/10.1177/0165025419881721

Fothergill, E., Guo, J., Howard, L., Kerns, J. C., Knuth, N. D., Brychta, R., Chen, K. Y., Skarulis, M. C., Walter, M., Walter, P. J., & Hall, K. D. (2016). Persistent metabolic adaptation 6 years after "The Biggest Loser" competition. *Obesity*, *24*(8), 1612–1619. https://doi.org/10.1002/oby.21538

Fotopoulos, C., Krystallis, A., Vassallo, M., & Pagiaslis, A. (2009). Food Choice Questionnaire (FCQ) revisited. Suggestions for the development of an enhanced general food motivation model. *Appetite*, *52*(1), 199–208. https://doi.org/10.1016/j.appet.2008.09.014

Freedman, M., King, J., & Kennedy, E. (2001). Popular diets: a scientific review. *Obesity Research*, *9*, 1S-40S.

Freeman, L. M. Y., & Gil, K. M. (2004). Daily stress, coping, and dietary restraint in binge eating. *International Journal of Eating Disorders*, *36*(2), 204–212. https://doi.org/10.1002/eat.20012

Freizinger, M., Jhe, G. B., Dahlberg, S. E., Pluhar, E., Raffoul, A., Slater, W., & Shrier, L. A. (2022). Binge-eating behaviors in adolescents and young adults during the COVID-19 pandemic. *Journal of Eating Disorders*, *10*(1), 125. https://doi.org/10.1186/s40337-022-00650-6

Fries, E., Green, P., & Bowen, D. J. (1995). What did I eat yesterday? Determinants of accuracy in 24-hour food memories. *Applied Cognitive Psychology*, *9*(2), 143–155. https://doi.org/10.1002/acp.2350090204

Geaney, F., Fitzgerald, S., Harrington, J. M., Kelly, C., Greiner, B. A., & Perry, I. J. (2015). Nutrition knowledge, diet quality and hypertension in a working population. *Preventive Medicine Reports*, *2*, 105–113. https://doi.org/10.1016/j.pmedr.2014.11.008

Gibbs, H., & Chapman-Novakofski, K. (2013). Establishing content validity for the Nutrition Literacy Assessment Instrument. *Preventing Chronic Disease*, *10*, E109. https://doi.org/10.5888/pcd10.120267

Gibbs, H. D., Ellerbeck, E. F., Gajewski, B., Zhang, C., & Sullivan, D. K. (2018). The Nutrition Literacy Assessment Instrument is a valid and reliable measure of nutrition literacy in adults with chronic disease. *Journal of Nutrition Education and Behavior*, *50*(3), 247-257.e1. https://doi.org/10.1016/j.jneb.2017.10.008

Gibson, W. A. (1959). Three multivariate models: factor analysis, latent structure analysis and latent profile analysis. *Psychometrika*, *24*, 229–252. https://doi.org/10.1007/BF02289845

Gillen, M. M., Markey, C. N., & Markey, P. M. (2012). An examination of dieting behaviors among adults: Links with depression. *Eating Behaviors*, *13*(2), 88–93. https://doi.org/10.1016/j.eatbeh.2011.11.014

Gormally, J., Black, S., Daston, S., & Rardin, D. (1982). The assessment of binge eating

    severity among obese persons. *Addictive Behaviors*, *7*(1), 47–55.

    https://doi.org/10.1016/0306-4603(82)90024-7

Gowers, S. G., & Shore, A. (2001). Development of weight and shape concerns in the aetiology

    of eating disorders. *The British Journal of Psychiatry*, *179*(3), 236–242.

    https://doi.org/10.1192/bjp.179.3.236

Hazzard, V. M., Telke, S. E., Simone, M., Anderson, L. M., Larson, N. I., & Neumark-Sztainer,

    D. (2021). Intuitive eating longitudinally predicts better psychological health and lower

    use of disordered eating behaviors: Findings from EAT 2010–2018. *Eating and Weight*

    Disorders - Studies on Anorexia, Bulimia and Obesity, *26*(1), 287–294.

    https://doi.org/10.1007/s40519-020-00852-4

Heatherton, T. F., & Polivy, J. (1992). Chronic dieting and eating disorders: a spiral model. In

    The Etiology Of Bulimia Nervosa. Taylor & Francis.

Heatherton, T. F., Polivy, J., & Herman, C. P. (1991). Restraint, weight loss, and variability of

    body weight. *Journal of Abnormal Psychology*, *100*(1), 78–83.

    https://doi.org/10.1037/0021-843X.100.1.78

Herman, C. P., & Polivy, J. (1984). A boundary model for the regulation of eating. *Research*

    Publications - Association for Research in Nervous and Mental Disease, *62*, 141–156.

Hilbert, A., Pike, K. M., Goldschmidt, A. B., Wilfley, D. E., Fairburn, C. G., Dohm, F.-A., Walsh,

    B. T., & Striegel Weissman, R. (2014). Risk factors across the eating disorders.

    Psychiatry Research, *220*(1), 500–506. https://doi.org/10.1016/j.psychres.2014.05.054

Hiza, H. A. B., Casavale, K. O., Guenther, P. M., & Davis, C. A. (2013). Diet quality of

    Americans differs by age, sex, race/ethnicity, income, and education level. *Journal of the*

    Academy of Nutrition and Dietetics, *113*(2), 297–306.

    https://doi.org/10.1016/j.jand.2012.08.011

Hofmann, W., Adriaanse, M., Vohs, K. D., & Baumeister, R. F. (2014). Dieting and the self-control of eating in everyday environments: an experience sampling study. *British Journal of Health Psychology*, *19*(3), 523–539. https://doi.org/10.1111/bjhp.12053

James, L. C. (2009). Why do some people lose weight and keep it off? Ten common steps for successful weight loss over the lifespan. In *Handbook of Obesity Intervention for the Lifespan* (pp. 85–92). Springer. https://doi.org/10.1007/978-0-387-78305-5_7

Janssen, I., Katzmarzyk, P.T., Ross, R. (2004.) Waist circumference and not body mass index explains obesity-related health risk, *The American Journal of Clinical Nutrition*, 79(3), 379–384, https://doi.org/10.1093/ajcn/79.3.379

Jason, L., & Glenwick, D. (2016). *Handbook of Methodological Approaches to Community-based Research: Qualitative, Quantitative, and Mixed Methods*. Oxford University Press.

Johnson, F., Pratt, M., & Wardle, J. (2012). Dietary restraint and self-regulation in eating behavior. *International Journal of Obesity*, *36*(5), 665–674. https://doi.org/10.1038/ijo.2011.156

Kagan, D. M., & Squires, R. L. (1983). Dieting, compulsive eating, and feelings of failure among adolescents. *International Journal of Eating Disorders*, *3*(1), 15–26. https://doi.org/10.1002/1098-108X(198323)3:1<15::AID-EAT2260030103>3.0.CO;2-0

Kant & Graubard. (1999). Variability in Selected Indexes of Overall Diet Quality. *International Journal for Vitamin and Nutrition Research*, *69*(6), 419–427. https://doi.org/10.1024/0300-9831.69.6.419

Katsoulis, M., Lai, A. G., Diaz-Ordaz, K., Gomes, M., Pasea, L., Banerjee, A., Denaxas, S., Tsilidis, K., Lagiou, P., Misirli, G., Bhaskaran, K., Wannamethee, G., Dobson, R., Batterham, R. L., Kipourou, D.-K., Lumbers, R. T., Wen, L., Wareham, N., Langenberg, C., & Hemingway, H. (2021). Identifying adults at high-risk for change in weight and BMI in England: A longitudinal, large-scale, population-based cohort study using electronic

health records. *The Lancet Diabetes & Endocrinology*, *9*(10), 681–694. https://doi.org/10.1016/S2213-8587(21)00207-2

Keum, B. T., Miller, M. J., & Inkelas, K. K. (2018). Testing the factor structure and measurement invariance of the PHQ-9 across racially diverse U.S. college students. *Psychological Assessment*, *30*(8), 1096–1106. https://doi.org/10.1037/pas0000550

King, M. B. (1989). Eating disorders in a general practice population. Prevalence, characteristics and follow-up at 12 to 18 months. *Psychological Medicine. Monograph Supplement*, *14*, 1–34. https://doi.org/10.1017/s0264180100000515

King, M. B. (1991). The natural history of eating pathology in attenders to primary medical care. *International Journal of Eating Disorders*, *10*(4), 379–387. https://doi.org/10.1002/1098-108X(199107)10:4<379::AID-EAT2260100402>3.0.CO;2-I

Kitsantas, A., Gilligan, T. D., & Kamata, A. (2003). College women with eating disorders: self-regulation, life satisfaction, and positive/negative affect. *The Journal of Psychology*, *137*(4), 381–395. https://doi.org/10.1080/00223980309600622

Koch, F., Hoffmann, I., & Claupein, E. (2021). Types of nutrition knowledge, their socio-demographic determinants and their association with food consumption: results of the NEMONIT Study. *Frontiers in Nutrition*, *8*. https://doi.org/10.3389/fnut.2021.630014

Krebs-Smith, S. M., Guenther, P. M., Subar, A. F., Kirkpatrick, S. I., & Dodd, K. W. (2010). Americans do not meet federal dietary recommendations. *The Journal of Nutrition*, *140*(10), 1832–1838. https://doi.org/10.3945/jn.110.124826

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Laessle, R. G., Schweiger, U., Daute-Herold, U., Schweiger, M., Fichter, M. M., & Pirke, K. M. (1988). Nutritional knowledge in patients with eating disorders. *International Journal of*

Eating Disorders, *7*(1), 63–73. https://doi.org/10.1002/1098-108X(198801)7:1<63::AID-EAT2260070107>3.0.CO;2-I

Lang, U. E., Beglinger, C., Schweinfurth, N., Walter, M., & Borgwardt, S. (2015). Nutritional aspects of depression. *Cellular Physiology and Biochemistry*, *37*(3), 1029–1043. https://doi.org/10.1159/000430229

Latner, J. D., Hildebrandt, T., Rosewall, J. K., Chisholm, A. M., & Hayashi, K. (2007). Loss of control over eating reflects eating disturbances and general psychopathology. *Behaviour Research and Therapy*, *45*(9), 2203–2211. https://doi.org/10.1016/j.brat.2006.12.002

Lemon, S. C., Rosal, M. C., Zapka, J., Borg, A., & Andersen, V. (2009). Contributions of Weight Perceptions to Weight Loss Attempts: Differences by Body Mass Index and Gender. *Body Image*, *6*(2), 90–96. https://doi.org/10.1016/j.bodyim.2008.11.004

Lemon, S. C., Schneider, K. L., Wang, M. L., Liu, Q., Magner, R., Estabrook, B., Druker, S., & Pbert, L. (2014). Weight loss motivations: a latent class analysis approach. *American Journal of Health Behavior*, *38*(4), 605–613. https://doi.org/10.5993/AJHB.38.4.14

Linardon, J. (2018). The relationship between dietary restraint and binge eating: Examining eating-related self-efficacy as a moderator. *Appetite*, *127*, 126–129. https://doi.org/10.1016/j.appet.2018.04.026

Linardon, J., Messer, M., Shatte, A., Skvarc, D., Rosato, J., Rathgen, A., & Fuller-Tyszkiewicz, M. (2021). Targeting dietary restraint to reduce binge eating: A randomised controlled trial of a blended internet- and smartphone app-based intervention. *Psychological Medicine,* 1-11. doi:10.1017/S0033291721002786

Linardon, J., McClure, Z., Tylka, T. L., & Fuller-Tyszkiewicz, M. (2022). Body appreciation and its psychological correlates: A systematic review and meta-analysis. *Body Image*, *42*, 287–296. https://doi.org/10.1016/j.bodyim.2022.07.003

Linardon, J., Tylka, T. L., & Fuller-Tyszkiewicz, M. (2021). Intuitive eating and its psychological correlates: A meta-analysis. *International Journal of Eating Disorders*, *54*(7), 1073–1098. https://doi.org/10.1002/eat.23509

Loughran, T. J., Harpel, T., Vollmer, R., & Schumacher, J. (2018). Effectiveness of intuitive

　　eating intervention through text messaging among college students. *College Student*

　　Journal, *52*(2), 232–244.

Lovan, P., George, F., Campa, A., Huffman, F., & Coccia, C. (2022). The effect of mood change

　　and intuitive eating skills on self-regulation of food intake among undergraduate college

　　Students. *American Journal of Health Education*, *53*(3), 149–160.

　　https://doi.org/10.1080/19325037.2022.2048748

Lowe, M. R., Doshi, S. D., Katterman, S. N., & Feig, E. H. (2013). Dieting and restrained eating

　　as prospective predictors of weight gain. *Frontiers in Psychology*, *4*, 577.

　　https://doi.org/10.3389/fpsyg.2013.00577

Manjrekar, E., Schoenleber, M., & Mu, W. (2013). Shame aversion and maladaptive eating-

　　related attitudes and behaviors. *Eating Behaviors*, *14*(4), 456–459.

　　https://doi.org/10.1016/j.eatbeh.2013.08.012

Markovina, J., Stewart-Knox, B. J., Rankin, A., Gibney, M., de Almeida, M. D. V., Fischer, A.,

　　Kuznesof, S. A., Poínhos, R., Panzone, L., & Frewer, L. J. (2015). Food4Me study:

　　validity and reliability of Food Choice Questionnaire in 9 European countries. *Food*

　　Quality and Preference, *45*, 26–32. https://doi.org/10.1016/j.foodqual.2015.05.002

Martin, C. B., & Ogden, C. L. (2018). *Attempts to Lose Weight Among Adults in the United*

　　States, 2013–2016. 313, 8.

McLachlan, G. J. (1987). On bootstrapping the likelihood ratio test statistic for the number of

　　components in a normal mixture. *Journal of the Royal Statistical Society. Series C*

　　(Applied Statistics), *36*(3), 318–324. https://doi.org/10.2307/2347790

McLaughlin, E. A., Smith, J. E., Serier, K. N., Smith, J. M., Santistevan, D., & Simmons, J. D.

　　(2018). What does self-reported "dieting" mean? Evidence from a daily diary study of

　　behavior. *Appetite*, *127*, 79–86. https://doi.org/10.1016/j.appet.2018.04.016

Mealha, V., Ferreira, C., Guerra, I., & Ravasco, P. (2013). Students of dietetics & nutrition; a

    high risk group for eating disorders? *Nutricion Hospitalaria*, *28*(5), 1558–1566.

    https://doi.org/10.3305/nh.2013.28.5.6695

Mills, J. S., Weinheimer, L., Polivy, J., & Herman, C. P. (2018). Are there different types of

    dieters? A review of personality and dietary restraint. *Appetite*, *125*, 380–400.

    https://doi.org/10.1016/j.appet.2018.02.014

Mintz, L. B., O'Halloran, M. S., Mulholland, A. M., & Schneider, P. A. (1997). Questionnaire for

    Eating Disorder Diagnoses: Reliability and validity of operationalizing DSM—IV criteria

    into a self-report format. *Journal of Counseling Psychology*, *44*, 63–79.

    https://doi.org/10.1037/0022-0167.44.1.63

Montani, J.-P., Schutz, Y., & Dulloo, A. G. (2015). Dieting and weight cycling as risk factors for

    cardiometabolic diseases: Who is really at risk? *Obesity Reviews*, *16*(S1), 7–18.

    https://doi.org/10.1111/obr.12251

Mroz, J. E., Pullen, C. H., & Hageman, P. A. (2018). Health and appearance reasons for weight

    loss as predictors of long-term weight change. *Health Psychology Open*, *5*(2),

    2055102918816606. https://doi.org/10.1177/2055102918816606

Nagpal, R., Shively, C. A., Register, T. C., Craft, S., & Yadav, H. (2019). Gut microbiome-

    Mediterranean diet interactions in improving host health. *F1000Research*, *8*.

    https://doi.org/10.12688/f1000research.18992.1

Napolitano, M. A., & Hayes, S. (2010). Behavioral and psychological factors associated with 12-

    month weight change in a physical activity trial. *Journal of Obesity*, *2011*, e515803.

    https://doi.org/10.1155/2011/515803

Neumark-Sztainer, D., Jeffery, R. W., & French, S. A. (1997). Self-reported dieting: How should

    we ask? What does it mean? Associations between dieting and reported energy intake.

    International Journal of Eating Disorders, *22*(4), 437–449.

    https://doi.org/10.1002/(SICI)1098-108X(199712)22:4<437::AID-EAT9>3.0.CO;2-N

Neumark-Sztainer, D., Wall, M., Guo, J., Story, M., Haines, J., & Eisenberg, M. (2006). Obesity,

    disordered eating, and eating disorders in a longitudinal study of adolescents: how do

    dieters fare 5 years later? *Journal of the American Dietetic Association*, *106*(4), 559–

    568. https://doi.org/10.1016/j.jada.2006.01.003

Nezami, B. T., Lang, W., Jakicic, J. M., Davis, K. K., Polzien, K., Rickman, A. D., Hatley, K. E.,

    & Tate, D. F. (2016). The Effect of Self-Efficacy on Behavior and Weight in a Behavioral

    Weight Loss Intervention. *Health Psychology : Official Journal of the Division of Health*

    Psychology, American Psychological Association. https://doi.org/10.1037/hea0000378

Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in

    latent class analysis and growth mixture modeling: a Monte Carlo Simulation study.

    Structural Equation Modeling: A Multidisciplinary Journal, *14*(4), 535–569.

    https://doi.org/10.1080/10705510701575396

Ohsiek, S., & Williams, M. (2011). Psychological factors influencing weight loss maintenance:

    An integrative literature review. *Journal of the American Academy of Nurse Practitioners*,

    23(11), 592–601. https://doi.org/10.1111/j.1745-7599.2011.00647.x

Olson, K. L., & Emery, C. F. (2015). Mindfulness and weight loss: A systematic review.

    Psychosomatic Medicine, *77*(1), 59–67. https://doi.org/10.1097/PSY.0000000000000127

Patton, G. C. (1988). The spectrum of eating disorder in adolescence. *Journal of Psychosomatic*

    Research, *32*(6), 579–584. https://doi.org/10.1016/0022-3999(88)90006-2

Patton, G. C., Johnson-Sabine, E., Wood, K., Mann, A. H., & Wakeling, A. (1990). Abnormal

    eating attitudes in London schoolgirls--a prospective epidemiological study: Outcome at

    twelve month follow-up. *Psychological Medicine*, *20*(2), 383–394.

    https://doi.org/10.1017/s0033291700017700

Pearcey, S. M., & Zhan, G. Q. (2018). A comparative study of American and Chinese college

    students' motives for food choice. *Appetite*, *123*, 325–333.

    https://doi.org/10.1016/j.appet.2018.01.011

Peugh, J., & Fan, X. (2015). Enumeration index performance in generalized growth mixture

    models: a Monte Carlo Test of Muthén's (2003) hypothesis. *Structural Equation*

    Modeling: A Multidisciplinary Journal, *22*(1), 115–131.

    https://doi.org/10.1080/10705511.2014.919823

Phillips, C. M., Chen, L.-W., Heude, B., Bernard, J. Y., Harvey, N. C., Duijts, L., Mensink-Bout,

    S. M., Polanska, K., Mancano, G., Suderman, M., Shivappa, N., & Hébert, J. R. (2019).

    Dietary inflammatory index and non-communicable disease risk: a narrative review.

    Nutrients, *11*(8), Article 8. https://doi.org/10.3390/nu11081873

Pliner, P., & Saunders, T. (2008). Vulnerability to freshman weight gain as a function of dietary

    restraint and residence. *Physiology & Behavior*, *93*(1), 76–82.

    https://doi.org/10.1016/j.physbeh.2007.07.017

Polivy, J., & Herman, C. P. (2002). If at first you don't succeed: False hopes of self-change.

    American Psychologist, *57*(9), 677–689. https://doi.org/10.1037/0003-066X.57.9.677

Polivy, J., Herman, C. P., & Mills, J. S. (2020). What is restrained eating and how do we identify

    it? *Appetite*, *155*, 104820. https://doi.org/10.1016/j.appet.2020.104820

Prescott, J., Young, O., O'Neill, L., Yau, N. J. N., & Stevens, R. (2002). Motives for food choice:

    A comparison of consumers from Japan, Taiwan, Malaysia and New Zealand. *Food*

    Quality and Preference, *13*(7–8), 489–495. https://doi.org/10.1016/S0950-

    3293(02)00010-1

Putterman, E., & Linden, W. (2004). Appearance versus health: does the reason for dieting

    affect dieting behavior? *Journal of Behavioral Medicine*, *27*(2), 185–204.

    https://doi.org/10.1023/B:JOBM.0000019851.37389.a7

Quinn, D. M., Puhl, R. M., & Reinka, M. A. (2020). Trying again (and again): weight cycling and

    depressive symptoms in U.S. adults. *PLOS ONE*, *15*(9), e0239004.

    https://doi.org/10.1371/journal.pone.0239004

Racine, S. E., VanHuysse, J. L., Keel, P. K., Burt, S. A., Neale, M. C., Boker, S., & Klump, K. L. (2017). Eating disorder-specific risk factors moderate the relationship between negative urgency and binge eating: A behavioral genetic investigation. *Journal of Abnormal Psychology*, *126*(5), 481–494. https://doi.org/10.1037/abn0000204

Rammal, H., Bouayed, J., Younos, C., & Soulimani, R. (2008). Evidence that oxidative stress is linked to anxiety-related behaviour in mice. *Brain, Behavior, and Immunity*, *22*(8), 1156–1159. https://doi.org/10.1016/j.bbi.2008.06.005

Rana, Z. H., Frankenfeld, C. L., Kennedy, E. J., Bertoldo, J., De Jonge, L., & Cheskin, L. J. (2022). Why don't college freshmen meet the US dietary guidelines for added sugar, refined grains, sodium, and saturated fat? *Journal of American College Health*, *0*(0), 1–11. https://doi.org/10.1080/07448481.2021.2024213

Reinstein, N., Koszewski, W. M., Chamberlin, B., & Smith-Johnson, C. (1992). Prevalence of eating disorders among dietetics students: does nutrition education make a difference? *Journal of the American Dietetic Association*, *92*(8), 949–953.

Riddle, T. A., Rosen, H. J., & Morsella, E. (2015). Is that me? Sense of agency as a function of intra-psychic conflict. *The Journal of Mind and Behavior*, *36*(1/2), 27–46.

Robins, R. W., Hendin, H. M., & Trzesniewski, K. H. (2001). Measuring global self-esteem: Construct validation of a single-item measure and the Rosenberg Self-Esteem Scale. *Personality and Social Psychology Bulletin*, *27*(2), 151–161. https://doi.org/10.1177/0146167201272002

Roefs, A., Herman, C. P., Macleod, C. M., Smulders, F. T. Y., & Jansen, A. (2005). At first sight: How do restrained eaters evaluate high-fat palatable foods? *Appetite*, *44*(1), 103–114. https://doi.org/10.1016/j.appet.2004.08.001

Rothman, K. J. (2008). BMI-related errors in the measurement of obesity. *International Journal of Obesity*, *32*(3), Article 3. https://doi.org/10.1038/ijo.2008.87

Ruderman, A. J. (1986). Dietary restraint: A theoretical and empirical review. *Psychological Bulletin*, *99*(2), 247–262. https://doi.org/10.1037/0033-2909.99.2.247

Ruzanska, U. A., & Warschburger, P. (2020). How is intuitive eating related to self-reported and laboratory food intake in middle-aged adults? *Eating Behaviors*, *38*, 101405. https://doi.org/10.1016/j.eatbeh.2020.101405

Santos, I., Mata, J., Silva, M. N., Sardinha, L. B., & Teixeira, P. J. (2015). Predicting long-term weight loss maintenance in previously overweight women: A signal detection approach. *Obesity (Silver Spring, Md.)*, *23*(5), 957–964. https://doi.org/10.1002/oby.21082

Sarfan, L. D., Clerkin, E. M., Teachman, B. A., & Smith, A. R. (2019). Do thoughts about dieting matter? Testing the relationship between thoughts about dieting, body shape concerns, and state self-esteem. *Journal of Behavior Therapy and Experimental Psychiatry*, *62*, 7–14. https://doi.org/10.1016/j.jbtep.2018.08.005

Schaumberg, K., Anderson, D. A., Anderson, L. M., Reilly, E. E., & Gorrell, S. (2016). Dietary restraint: What's the harm? A review of the relationship between dietary restraint, weight trajectory and the development of eating pathology. *Clinical Obesity*, *6*(2), 89–100. https://doi.org/10.1111/cob.12134

Scholz, U., Doña, B. G., Sud, S., & Schwarzer, R. (2002). Is general self-efficacy a universal construct? Psychometric findings from 25 countries. *European Journal of Psychological Assessment*, *18*(3), 242–251. https://doi.org/10.1027/1015-5759.18.3.242

Seitz, B. M., Blaisdell, A. P., & Tomiyama, A. J. (2021). Calories count: Memory of eating is evolutionarily special. *Journal of Memory and Language*, *117*, 104192. https://doi.org/10.1016/j.jml.2020.104192

Seitz, J., Trinh, S., & Herpertz-Dahlmann, B. (2019). The Microbiome and Eating Disorders. *Psychiatric Clinics*, *42*(1), 93–103. https://doi.org/10.1016/j.psc.2018.10.004

Shim, R. S., Baltrus, P., Ye, J., & Rust, G. (2011). Prevalence, Treatment, and Control of Depressive Symptoms in the United States: Results from the National Health and

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Nutrition Examination Survey (NHANES), 2005–2008. *The Journal of the American Board of Family Medicine*, *24*(1), 33–38. https://doi.org/10.3122/jabfm.2011.01.100121

Siahpush, M., Tibbits, M., Shaikh, R. A., Singh, G. K., Sikora Kessler, A., & Huang, T. T.-K. (2015). Dieting increases the likelihood of subsequent obesity and BMI gain: results from a prospective study of an Australian national sample. *International Journal of Behavioral Medicine*, *22*(5), 662–671. https://doi.org/10.1007/s12529-015-9463-5

Silva, M. N., Markland, D., Carraça, E. V., Vieira, P. N., Coutinho, S. R., Minderico, C. S., Matos, M. G., Sardinha, L. B., & Teixeira, P. J. (2011). Exercise autonomous motivation predicts 3-yr weight loss in women. *Medicine and Science in Sports and Exercise*, *43*(4), 728–737. https://doi.org/10.1249/MSS.0b013e3181f3818f

Spurk, D., Hirschi, A., Wang, M., Valero, D., & Kauffeld, S. (2020). Latent profile analysis: A review and "how to" guide of its application within vocational behavior research. *Journal of Vocational Behavior*, *120*, 103445. https://doi.org/10.1016/j.jvb.2020.103445

Steck, E. L., Abrams, L. M., & Phelps, L. (2004). Positive psychology in the prevention of eating disorders. *Psychology in the Schools*, *41*(1), 111–117. https://doi.org/10.1002/pits.10143

Steils, N., & Obaidalahe, Z. (2020). "Social food": Food literacy co-construction and distortion on social media. *Food Policy*, *95*, 101932. https://doi.org/10.1016/j.foodpol.2020.101932

Steptoe, A., Pollard, T. M., & Wardle, J. (1995). Development of a measure of the motives underlying the selection of food: The food choice questionnaire. *Appetite*, *25*(3), 267–284. https://doi.org/10.1006/appe.1995.0061

Stewart, M.-C., Keel, P. K., & Schiavo, R. S. (2006). Stigmatization of anorexia nervosa. *International Journal of Eating Disorders*, *39*(4), 320–325. https://doi.org/10.1002/eat.20262

Stewart, T. M., Williamson, D. A., & White, M. A. (2002). Rigid vs. flexible dieting: association with eating disorder symptoms in nonobese women. *Appetite*, *38*(1), 39–44. https://doi.org/10.1006/appe.2001.0445

Stice, E., Presnell, K., & Spangler, D. (2002). Risk factors for binge eating onset in adolescent girls: A 2-year prospective investigation. *Health Psychology*, *21*(2), 131–138. https://doi.org/10.1037/0278-6133.21.2.131

Stice, E., Sysko, R., Roberto, C. A., & Allison, S. (2010). Are dietary restraint scales valid measures of dietary restriction? Additional objective behavioral and biological data suggest not. *Appetite*, *54*(2), 331–339. https://doi.org/10.1016/j.appet.2009.12.009

Stotland, S. (2012). Moderation: An alternative to restraint as a mode of weight self-regulation. *Eating Behaviors*, *13*(4), 406–409. https://doi.org/10.1016/j.eatbeh.2012.07.001

Stotland, S., & Zuroff, D. C. (1991). Relations between multiple measures of dieting self-efficacy and weight change in a behavioral weight control program. *Behavior Therapy*, *22*(1), 47–59. https://doi.org/10.1016/S0005-7894(05)80243-6

Sumithran, P., Prendergast, L. A., Delbridge, E., Purcell, K., Shulkes, A., Kriketos, A., & Proietto, J. (2011). Long-term persistence of hormonal adaptations to weight loss. *New England Journal of Medicine*, *365*(17), 1597–1604. https://doi.org/10.1056/NEJMoa1105816

Sumithran, P., & Proietto, J. (2012). The defence of body weight: A physiological basis for weight regain after weight loss. *Clinical Science*, *124*(4), 231–241. https://doi.org/10.1042/CS20120223

Sutin, A. R., Costa, P. T., Chan, W., Milaneschi, Y., Eaton, W. W., Zonderman, A. B., Ferrucci, L., & Terracciano, A. (2013). I know not to, but I can't help it: weight gain and changes in impulsivity-related personality traits. *Psychological Science*, *24*(7), 1323–1328. https://doi.org/10.1177/0956797612469212

Tein, J.-Y., Coxe, S., & Cham, H. (2013). Statistical Power to Detect the Correct Number of

    Classes in Latent Profile Analysis. *Structural Equation Modeling : A Multidisciplinary*

    Journal, *20*(4), 640–657. https://doi.org/10.1080/10705511.2013.824781

Thompson, F. E., Midthune, D., Kahle, L., & Dodd, K. W. (2017). Development and evaluation of

    the National Cancer Institute's Dietary Screener Questionnaire scoring algorithms. *The*

    Journal of Nutrition, *147*(6), 1226–1233. https://doi.org/10.3945/jn.116.246058

Thompson, F. E., Midthune, D., Williams, G. C., Yaroch, A. L., Hurley, T. G., Resnicow, K.,

    Hebert, J. R., Toobert, D. J., Greene, G. W., Peterson, K., & Nebeling, L. (2008).

    Evaluation of a short dietary assessment instrument for percentage energy from fat in an

    intervention study. *The Journal of Nutrition*, *138*(1), 193S-199S.

    https://doi.org/10.1093/jn/138.1.193S

Tiggemann, M. (2004). Dietary restraint and self-esteem as predictors of weight gain over an 8-

    year time period. *Eating Behaviors*, *5*(3), 251–259.

    https://doi.org/10.1016/j.eatbeh.2004.01.010

Tribole, E., & Resch, E. (2012). *Intuitive Eating, 3rd Edition*. Macmillan.

Tylka, T. L., Calogero, R. M., & Daníelsdóttir, S. (2015). Is intuitive eating the same as flexible

    dietary control? Their links to each other and well-being could provide an answer.

    Appetite, *95*, 166–175. https://doi.org/10.1016/j.appet.2015.07.004

Tylka, T. L., & Kroon Van Diest, A. M. (2013). The Intuitive Eating Scale-2: Item refinement and

    psychometric evaluation with college women and men. *Journal of Counseling*

    Psychology, *60*(1), 137–153. https://doi.org/10.1037/a0030893

Tylka, T. L., & Wood-Barcalow, N. L. (2015). The Body Appreciation Scale-2: Item refinement

    and psychometric evaluation. *Body Image*, *12*, 53–67.

    https://doi.org/10.1016/j.bodyim.2014.09.006

Ulen, C. G., Huizinga, M. M., Beech, B., & Elasy, T. A. (2008). Weight regain prevention.

    Clinical Diabetes, *26*(3), 100–113. https://doi.org/10.2337/diaclin.26.3.100

Vadeboncoeur, C., Townsend, N., & Foster, C. (2015). A meta-analysis of weight gain in first

year university students: Is freshman 15 a myth? *BMC Obesity*, *2*(1), 22.

https://doi.org/10.1186/s40608-015-0051-7

van Strien, T., Herman, C. P., Engels, R. C. M. E., Larsen, J. K., & van Leeuwe, J. F. J. (2007).

Construct validation of the Restraint Scale in normal-weight and overweight females.

Appetite, *49*(1), 109–121. https://doi.org/10.1016/j.appet.2007.01.003

Vartanian, L. R., Herman, C. P., & Polivy, J. (2007). Consumption stereotypes and impression

management: How you are what you eat. *Appetite*, *48*(3), 265–277.

https://doi.org/10.1016/j.appet.2006.10.008

Vartanian, L. R., Herman, C. P., & Polivy, J. (2020). Modeling of food intake among restrained

and unrestrained eaters. *Appetite*, *155*, 104811.

https://doi.org/10.1016/j.appet.2020.104811

Wansink, B. (2010). *Mindless Eating: Why We Eat More Than We Think*. Bantam Books.

Ward, A., & Mann, T. (2000). Don't mind if I do: Disinhibited eating under cognitive load. *Journal

of Personality and Social Psychology*, *78*, 753–763. https://doi.org/10.1037/0022-

3514.78.4.753

Wardle, J. (1987). Eating style: A validation study of the Dutch eating behaviour questionnaire in

normal subjects and women with eating disorders. *Journal of Psychosomatic Research*,

31(2), 161–169. https://doi.org/10.1016/0022-3999(87)90072-9

Westenhoefer, J., Stunkard, A. J., & Pudel, V. (1999). Validation of the flexible and rigid control

dimensions of dietary restraint. *International Journal of Eating Disorders*, *26*(1), 53–64.

https://doi.org/10.1002/(SICI)1098-108X(199907)26:1<53::AID-EAT7>3.0.CO;2-N

Whiteside, S. P., & Lynam, D. R. (2001). The Five Factor Model and impulsivity: Using a

structural model of personality to understand impulsivity. *Personality and Individual

Differences*, *30*(4), 669–689. https://doi.org/10.1016/S0191-8869(00)00064-7

Williamson, D. A., Martin, C. K., York-Crowe, E., Anton, S. D., Redman, L. M., Han, H., &
Ravussin, E. (2007). Measurement of dietary restraint: Validity tests of four
questionnaires. *Appetite*, *48*(2), 183–192. https://doi.org/10.1016/j.appet.2006.08.066

Wing, R. R., & Phelan, S. (2005). Long-term weight loss maintenance. *The American Journal of
Clinical Nutrition*, *82*(1), 222S-225S. https://doi.org/10.1093/ajcn/82.1.222S

Wolz, I., Granero, R., & Fernández-Aranda, F. (2017). A comprehensive model of food addiction
in patients with binge-eating symptomatology: The essential role of negative urgency.
Comprehensive Psychiatry, *74*, 118–124.
https://doi.org/10.1016/j.comppsych.2017.01.012

Woods, A. M., Racine, S. E., & Klump, K. L. (2010). Examining the relationship between dietary
restraint and binge eating: Differential effects of major and minor stressors. *Eating
Behaviors*, *11*(4), 276–280. https://doi.org/10.1016/j.eatbeh.2010.08.001

Xue, Z., Hu, Y., Wang, J., Huang, L., Liu, W., & Sun, F. (2017). Reliability and validity of the
short version of UPPS-P Impulsive Behavior Scale in college students. *Chinese Journal
of Clinical Psychology*, *25*(4), 662–666.

Yahia, N., Brown, C. A., Rapley, M., & Chung, M. (2016). Level of nutrition knowledge and its
association with fat consumption among college students. *BMC Public Health*, *16*(1),
1047. https://doi.org/10.1186/s12889-016-3728-z

Yahia, N., Wang, D., Rapley, M., & Dey, R. (2016). Assessment of weight status, dietary habits
and beliefs, physical activity, and nutritional knowledge among university students.
Perspectives in Public Health, *136*(4), 231–244.
https://doi.org/10.1177/1757913915609945

Yaroch, A. L., Tooze, J., Thompson, F. E., Blanck, H. M., Thompson, O. M., Colón-Ramos, U.,
Shaikh, A. R., McNutt, S., & Nebeling, L. C. (2012). Evaluation of three short dietary
instruments to assess fruit and vegetable intake: The National Cancer Institute's Food

Attitudes and Behaviors Survey. *Journal of the Academy of Nutrition and Dietetics*, *112*(10), 1570–1577. https://doi.org/10.1016/j.jand.2012.06.002

Zhang, F. F., Cudhea, F., Shan, Z., Michaud, D. S., Imamura, F., Eom, H., Ruan, M., Rehm, C. D., Liu, J., Du, M., Kim, D., Lizewski, L., Wilde, P., & Mozaffarian, D. (2019). Preventable cancer burden associated with poor diet in the United States. *JNCI Cancer Spectrum*, *3*(pkz034). https://doi.org/10.1093/jncics/pkz034

Zmora, N., Suez, J., & Elinav, E. (2019). You are what you eat: Diet, health and the gut microbiota. *Nature Reviews Gastroenterology & Hepatology*, *16*(1), Article 1. https://doi.org/10.1038/s41575-018-0061-2