DISSERTATION

A LATENT PROFILE ANALYSIS OF INTUITIVE EATING BEHAVIORS RELATED TO WELLBEING, EATING BEHAVIORS, AND PHYSICAL ACTIVITY DURING THE EARLY COVID-19 PANDEMIC

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ABSTRACT

A LATENT PROFILE ANALYSIS OF INTUITIVE EATING BEHAVIORS RELATED TO WELLBEING, EATING BEHAVIORS, AND PHYSICAL ACTIVITY DURING THE EARLY COVID-19 PANDEMIC

Intuitive eating (IE) is a promising approach to improve eating behaviors that is primarily focused on eating in attunement with one's internal signals of hunger and satiety. Intuitive eating is related to an array of benefits including improved physical and mental health; however, many gaps exist in the IE literature. The current work utilized a novel approach in the IE context, a latent profile analysis (LPA) of 947 adults, to identify common patterns of responses to the four subscales of IE during the early COVID-19 pandemic, a time period currently understudied in the IE field. The study employed independent LPAs for two subsamples (n = 446 undergraduate students and n = 501 community members) to detect potential differences in model structure. The derived profiles were then used to test associations between COVID-19-related changes in dietary behaviors and weight concern, gender, weight loss attempts, physical activity, and mental health. LPAs of the combined sample resulted in a four-profile model. This model structure was not replicated in the undergraduate and community subsamples which showed notably different profile solutions. The two undergraduate profiles distinguished patterns of responses that were associated with lower overall (Low) and moderately high (Mod-high) levels of IE. Men were more likely to be in the Mod-High profile compared to women and the Low profile was associated with higher amounts depression, anxiety and weight loss attempts, increases in food eaten during the COVID-19 pandemic, and higher probabilities of increased weight concern

during the pandemic. The community subsample showed a four-profile solution. 1: high levels of Unconditional Permission to Eat (UPE) and low levels of Eating for Physical Rather than Emotional Reasons (EPR), Reliance on Hunger and Satiety Cues (RHSC), and Body-Food Choice Congruence (B-FCC), which was related to increases in amount of food eaten, depression, and anxiety, and higher probabilities of increases in weight concern compared to the other profiles. 2: moderately high levels of UPE and very low levels of EPR, RHSC, and B-FCC, which showed the highest rates of weight loss attempts as well as high probabilities of increased weight concern. 3: moderate to high levels of all 4 IE subscales characterized by fewer weight loss attempts than profiles 1 and 2. 4: highest overall levels of IE which had the most stability in their weight concern compared to the other profiles. There were no gender differences between the four profiles of the community subsample and there were no associations with physical activity in either the undergraduate or community subsamples' profiles. These findings support the hypothesis that multiple, distinct profiles of IE exist and have unique relationships with health-related behaviors and outcomes. However, profile structures did vary between the undergraduate and community subsamples, suggesting limited generalizability between the two groups. Together, results suggest that IE levels both globally and in specific, naturally-occurring combinations of subscales are differentially related to eating and dieting behaviors, body image, and mental health. In application, findings suggest there may be benefits to recognizing varying patterns of IE to create tailored techniques for interventions seeking to increase these adaptive eating behaviors. Future research should continue to employ person-centered approaches alongside variable-centered ones to study more diverse populations and non-pandemic conditions.

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DEDICATION

I dedicate this work to the educators in my life who fostered the curiosity and resilience I needed to complete this project and degree.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: GENERAL INTRODUCTION

Introduction

Intuitive eating (IE) is an anti-diet approach to health that focuses on attunement with one's internal hunger and satiety cues to guide decisions about when, what, and how much to eat (Tribloe & Resch, 2020). Intuitive eating further advocates for nutritional decisions that are in alignment with the body's energetic needs. Like many other weight-neutral approaches, IE is often referred to as "adaptive" eating as it focuses on the positive aspects of one's eating behaviors and body image rather than maladaptive eating behaviors. The IE lens parallels paradigms prevalent in positive psychology, and shows similar related benefits in wellbeing psychologically, physiologically, and socially (Bruce & Ricciardelli, 2016; Van Dyke & Drinkwater, 2014).

While IE stems from earlier body positive and anti-diet movements, only in the last few years has the study of the construct become a burgeoning effort in the field of eating behaviors. However, there is still much to learn about the IE. The most widely used measure of IE, the IE-2, was adapted in 2015 and has since been used in hundreds of studies, elucidating some of the correlates of IE (Tylka & Kroon Van Diest, 2013). The scale consists of four subscales that broadly encompass the four aims of IE: 1) Unconditional Permission to Eat both desired foods and when hungry, 2) Eating for Physical Rather than Emotional Reasons, 3) Reliance on Internal Cues of Hunger and Satiety when making decisions on amount of food and timing of eating, and 4) Body-Food Choice Congruence which addresses how food eaten relates to our body's nutritional and energetic needs. Taken together, these four subscales generate a total score for IE (Tylka & Kroon Van Diest, 2013).

Studies show that total IE scores are related to benefits such as lower depression and anxiety, weight stability, lower blood pressure and triglycerides, positive coping skills, and optimism among other factors (see Bruce & Ricciardelli, 2016; Van Dyke & Drinkwater, 2014 for reviews). However, associations tend to differ between subscales. For example, Eating for Physical Rather than Emotional Reasons has moderately strong inverse relationships with depression and anxiety whereas Unconditional Permission to Eat, Reliance on Internal Cues of Hunger and Satiety, and Body-Food Choice Congruence have small to negligible associations with mental health outcomes. Moreover, a paucity of studies has explored how individual subscales contribute to variation in wellbeing outcomes. Identifying the most potent factors of IE could benefit intervention efforts by directing health professionals toward the most effective methods to possibly improve the wellbeing of their clients and patients.

Intuitive eating has shown mixed associations with other health behaviors such as physical activity, despite activity being one of the principles covered in the foundational IE program (see Van Dyke & Drinkwater, 2014 for review); in IE the focus is on moving one's body for joy and health rather than for weight loss (Tribloe & Resch, 2020). Understanding how facets of adaptive eating are related to physical activity may further benefit intervention efforts seeking to maximize the efficacy of multiple behavior changes.

Moreover, limited research has assessed how the interactions of different subscales might be associated with body image and eating behaviors like weight loss attempts, concerns about weight, and food intake. A deeper understanding of these outcomes would provide meaningful context to the IE literature and allow for further comparisons, particularly in the realm of disordered eating recovery programs.

Much of the previous work with IE has been conducted among undergraduate students and women yet scant research has directly compared undergraduate samples to those of the general public (Bruce & Ricciardelli, 2016; Van Dyke & Drinkwater, 2014). Distinguishing potential differences or commonalities among people of a range of genders and backgrounds is useful in determining who may benefit from specific interventions.

The current work utilizes a statistical approach (latent profile analysis; LPA) novel to IE research to address several key deficits in the extant IE literature. Scores on the four IE subscales were used to generate unique profiles of IE that arise among a large group comprised of undergraduate students and community-dwelling, non-student adults. Next, I conducted independent LPAs of the undergraduate and community population subsamples to investigate whether the initial latent profiles I derived accurately characterize both groups. Gender differences were then tested for derived profiles. Finally, I analyzed associations between the latent profiles and several health behaviors and wellbeing outcomes (e.g., physical activity, weight loss attempts, depression).

The data used in this study are taken from a larger data set assessing health behaviors during the COVID-19 pandemic and thus offer novel findings regarding IE in a pandemic context. This work provides a compelling snapshot of adaptive eating behaviors during times of increased stress and social isolation. The findings generated provide foundational work on distinct profiles of IE and can serve as a meaningful comparison to IE measured in a non-pandemic context.

The COVID-19 pandemic is a fascinating time to study health behaviors as it has resulted in an upheaval of daily routines and experiences around the globe. This is evidenced by the 35.7% pooled prevalence rate of sleep problems (Jahrami et al., 2021), as well as decreases in

physical activity and increases in sedentary behaviors (Stockwell et al., 2021) during the COVID-19 lockdown. Further, a large portion of individuals around the world reported changes in the amount and type of food they consumed, the frequency of eating, and other specified eating behaviors such as binge eating, emotional eating, and restrictive eating (under review: Johnson et al., 2022) which are all relevant to the IE literature.

Mental health concerns have also been on the rise during the COVID-19 pandemic (see Brooks et al., 2020 for review). One meta-analysis showed that roughly 1 in 3 people in the general population reported depression (33.7%), anxiety (31.9%) or stress (29.6%) during the COVID-19 pandemic (Salari et al., 2020). In addition to the psychosocial and regulatory changes that impact mental health, research suggests that those who contract COVID-19 may suffer neurological and neuropsychiatric problems (Roy et al., 2021).

Despite the abundance of research characterizing the impacts of COVID-19, questions still remain in key areas of health. This is of particular relevance as experts suggest that COVID-19 is simply one manifestation of pandemic-promoting human behaviors (Wiebers & Feigin, 2020). Further understanding of mental health and health behaviors during the global COVID-19 outbreak can provide heightened awareness of the impacts of future pandemics and inform public health efforts.

As of this writing, very few studies assess IE behaviors during the COVID-19 pandemic. Through robust LPA analyses, this work sought to identify naturally occurring patterns of IE behaviors in the general adult population. Specifically, the current work addresses the following key limitations in the field by making several novel contributions to the field of IE:

Table 1. *Summary of Key Limitations of Previous IE Research and Contributions of the Present Research*

Limitation	Contribution
Research characterizing relationships among IE subscales uses variable-centered approaches and often lacks distinction between subscales.	I used a novel, person-centered statistical analysis within the IE field to characterize patterns of heterogeneity in subscale measures in adult samples.
As of this writing, very few studies have investigated IE during the COVID-19 pandemic.	I assessed IE and IE profiles for samples gathered during the COVID-19 pandemic, allowing for future comparative analyses.
Many studies of IE use undergraduate student samples and very few assess similarities and differences between undergraduate and community subsamples.	I evaluated potential differences in IE and IE profiles among undergraduate and community subsamples.
No studies have used person-centered approaches to study gender differences in IE.	I investigated similarities and divergences among genders in IE profile probabilities.
The evidence linking IE to physical activity is mixed. It is unclear how subscales may be differentially related.	I analyzed if/how IE profiles differ on physical activity measures, potentially shedding light on the mechanism behind mixed results in this area.
Research shows that certain subscales of IE are related to measures of well-being;	I explored how IE and derived profiles relate to measures of well-being.

however, it is possible that a mixture of certain subscale scores might have stronger associations with certain outcomes.

Consistent with these contributions, this work aims to determine:

1. Whether multiple IE profiles exist in a combined sample of undergraduate students and community members.
2. Whether profile model structures differ between undergraduate and community subsamples.
3. Whether people of different genders differ in IE profiles.
4. Whether profiles differ on variables related to depression, anxiety, weight loss attempts, changes in weight concern, physical activity, and changes in amount of food consumed.

A Note About Language

Terms related to BMI classifications such as "obese," "obesity," "overweight", "normal weight", etc. will appear in quotations in this work. While commonly used in health literature, BMI and the classifications dependent on the measure come with a host of problematic implications. Given the natural variations in body sizes for individuals of equal BMI and the evidence showing that body size is not a true indicator of health or fitness, it is evident that BMI is a poor health measure and descriptor of body shape (Gonzalez et al., 2014; Harrison, 2019; Herbert et al., 2013; Tomiyama et al., 2016; Wildman et al., 2008).

Further, evidence suggests that by pathologizing larger bodies, we may be focusing on a symptom rather than cause of negative health outcomes (Emmer et al., 2020; Puhl et al., 2020; Tomiyama et al., 2018a). Weight stigma and discrimination in the medical field create disparities

in treatment that can be linked to increased negative outcomes for individuals in bigger bodies (Alberga et al., 2019; Brochu et al., 2018; Mensinger et al., 2018; Tomiyama et al., 2018b). Weight-teasing and internalized fatphobia further create negative mental health outcomes (Mensinger et al., 2018; Tomiyama et al., 2018b).

All this said, anti-diet researchers stray from using such pathologizing language to honor body size diversity and promote health regardless of weight status. The current work is rooted in an anti-diet lens and will thus solely use terminology related to BMI where relevant in the literature.

CHAPTER 2: INTUITIVE EATING - A PROMISING APPROACH TO HEALTH

Intuitive Eating is a theoretical framework that promotes adaptive eating behaviors and an anti-diet approach to health (Tribloe & Resch, 2020). As a holistic program, IE cultivates mindsets and behaviors that enhance one's relationship with their mind, body, food, and physical activity. Consisting of 10 principles (see Appendix A for a list), IE uses anti-diet methods to help individuals release restrictions around food (apart from those that are medically necessary such as avoiding gluten for individuals with Celiac disease), develop and rely on their interoceptive awareness of bodily sensations such as hunger and satiety cues to guide their eating, create satisfying and distraction-free eating experiences, enjoy joyful movement and exercise, and consider "gentle" nutrition (Tribloe & Resch, 2020). Intuitive Eating deviates from traditional weight-based approaches by emphasizing the benefits of positive eating behaviors that rely on the body's intuitive needs and signals regardless of weight status.

While research on IE is in its relative infancy compared to other evidence-based health strategies, more than 125 scholarly articles have explored the construct over the past 15 years (Tribloe & Resch, 2020). Evidence suggests that IE is associated with health benefits including higher levels of: food variety eaten, HDL (often referred to as "good cholesterol"), and weight stability, better diabetes management, and lower levels of: triglycerides, blood pressure, weight cycling, disordered eating, loss-of-control eating, and binge eating (Van Dyke & Drinkwater, 2014). Additionally, IE is related to several psychologically beneficial outcomes such as higher life satisfaction, self-esteem, well-being, optimism, body appreciation and acceptance, proactive coping, psychological hardiness, unconditional self-regard, and lower levels of self-silencing,

weight bias internalization, body dissatisfaction, perfectionism, depression, and anxiety (Bruce & Ricciardelli, 2016; Linardon et al., 2021).

Why Study Adaptive Eating and Non-Diet Approaches to Health?

Research on eating behaviors focuses substantial efforts on understanding and ameliorating maladaptive behaviors ranging from common hypo-or hyperphagia (under or overeating) to the clinical and lethal incidences of eating disorders (Tylka & Wilcox, 2006). Such exclusive focus on problematic tendencies and pathologies limits the scope through which we understand the daily human experience of eating. Moreover, in communicating and implementing findings, such studies might perpetuate feelings of dejection and personal dissatisfaction among the populations the research seeks to help.

Adaptive behaviors, while granted less empirical attention, can play a significant role in human well-being (Seligman & Csikszentmihalyi, 2000). The burgeoning field of positive psychology has shown great success in identifying and amplifying such behaviors in ways that connect us to senses of alignment, authenticity, fulfillment, appreciation, and joy. Positive eating behaviors provide a potential mechanism to both improve and maintain high levels of physical health, while cultivating attunement to one's individualized needs (Bruce & Ricciardelli, 2016; Linardon et al., 2021; Van Dyke & Drinkwater, 2014). Importantly, adaptive eating should not merely be conceptualized as the absence of pathology; it is related to benefits that extend far beyond relieving the ails of maladaptive eating.

In addition to a focus on problematic eating, the dominant narrative of health research today places considerable emphasis on weight status as a primary indicator of health, often noting weight loss as a success measure for health behaviors and citing efforts to prevent or reverse "obesity." However, intentional, sustainable, long-term weight loss in the absence of

disordered eating patterns and/or persistent preoccupation with food and exercise is an empirical rarity (Blood, 1996). Moreover, dieting, the alteration of one's diet to be restrictive in food type, timing, amount, etc. with the aim of weight loss, can be harmful physically, mentally, and socially (Harrison, 2019).

People diet for a variety of reasons such as goals to improve health (with weight as a standard), better alignment with the thin-ideal of beauty, and to have a sense of control or structure over their daily routines (Harrison, 2019). The pursuit of health through weight loss or restrictive weight maintenance is a widely studied topic in the fields of nutrition and behavioral medicine. These efforts are largely supported by the well-documented *associations* between weight status and a host of negative health outcomes such as diabetes and heart disease. However, it is critical to realize that these risk factors are correlational in nature and the assumption of causality can be a harmful one to make.

A growing body of literature suggests that the health outcomes once thought to be caused by a bigger body size may actually be better explained through social determinants of health such as food environments, socioeconomic status, and most significantly, weight-based stigma and discrimination (Harrison, 2019). People in larger bodies not only face the chronic stress of macro and microaggressions in their everyday lives, but well-documented disparities in critical health-related context such as medical appointments and procedures (Tomiyama et al., 2018b). This is largely consequential as the displacement of genuine health concerns on body size or weight status can lead people in large bodies to experience increased mental health concerns and inappropriate treatment plans. Moreover, personal discomfort or experiences of prejudice may limit the degree to which individuals in larger bodies utilize spaces that promote health behaviors, such as those meant for physical activity or that offer diverse, healthy foods.

Anti-diet approaches recognize body diversity and prioritize health rather than a metric of body size or weight. These programs show the strong potential of success as they are related to positive benefits to one's physical and mental wellbeing (Bruce & Ricciardelli, 2016; Van Dyke & Drinkwater, 2014). Intuitive eating provides one viable framework to measure and implement these anti-diet strategies.

Creating, Refining, and Measuring Intuitive Eating

The book "Intuitive Eating" was first published in 1995 by Evelyn Tribole and Elyse Resch. Concerned by the incidence of weight cycling seen in their patients, the two registered dietitians began to research the growing anti-diet movement (Tribole & Resch, 1995; Tribole & Resch, 2020). Indeed, anti-diet approaches were not a new idea, even in the early 1990s when diets were on the rise and the United States was on the brink of what would be termed globally as an "obesity epidemic" (Brownell, 1991; Caballero, 2007).

Foundational Research Influencing Intuitive Eating and its Shift in Focus

The foundations of the anti-diet approach arose from both the feminist and fat acceptance movements popular throughout the 1960s and into the 1980s (Diamond, 1985; Garner, 1995; Polivy et al., 1986; Polivy & Herman, 1985). In many ways, dieting was (is) a method often used to meet the beauty standards perpetuated by thin idealism. Anti-diet movements not only emphasized how women's bodies were the disproportionate focus of the societal pressures to adhere to the slim standard, but how a growing body of literature was indicating the diets did not, in fact, lead to stable weight loss. The culmination of this evidence was documented in the National Institutes of Health's (NIH) 1992 report on Methods for Voluntary Weight Loss and Control, which noted the lack of long-term effectiveness for weight-loss strategies (Fletcher et al., 1992).

The early 1980s showed a marked increase in the number of scholars weighing in on the inefficacy of dieting in the popular press. From the seminal book *Diets Don't Work* (Schwartz, 1982), which recommended a foundational form of "intuitive eating," to *The Dieter's Dilemma* (Bennett & Gurin, 1982), and *Breaking the Diet Habit* (Polivy & Herman, 1983), researchers attempted to shift emphasis away from blanket weight loss goals to focus on the relatively newer "set-point" or "natural weight" alternatives. Many of these initial publications focused on the relationship between restriction and binging behaviors and argued that in the absence of dieting many individuals would encounter weight loss as a side-effect. For example, in *Overcoming Overeating*, Hirschmann and Munter (1988) emphasized how dieting and chronic restriction lead to overeating, a leading factor in "obesity." To ameliorate the negative impacts of the diet mentality, they recommended that individuals focus on their natural cues for eating, heal emotional contributors to compulsive overeating, and bring pleasure back into their eating experiences (Hirschmann & Munter, 1988).

Intuitive Eating, the book and program, drew substantial influence from the researchers noted above, among others, and similarly noted the aim of helping their readers achieve a "natural weight that fits you" (Tribole & Resch, 1995). It would be many years before the field of anti-diet researchers would adopt fully weight-neutral approaches. Today, IE has been updated with a defined focus on body diversity (Tribloe & Resch, 2020). IE remains one of the most formative influences of the anti-diet movement (Harrison, 2019).

Measuring IE

Scientific support of IE as a distinct, adaptive eating style began in the early 2000s. The first measure of IE was developed in 2004 and consisted of four subscales: 1) intrinsic eating, 2) extrinsic eating, 3) anti-dieting, and 4) self-care (Hawks et al., 2004). Foundational work with

this scale showed that higher IE scores were associated with better cardiovascular health, lower BMI, and higher levels of pleasure associated with food and eating (Hawks et al., 2005).

The most widely used scale for IE, however, was created in 2006 by Tracy Tylka, currently the leading researcher on IE (Tylka, 2006). Originally only validated in a sample of undergraduate women, the IE Scale (IES) consisted of three subscales, including: 1) Unconditional Permission to Eat both desired foods and when hungry, 2) Eating for Physical Rather than Emotional Reasons, and 3) Reliance on Internal Cues of Hunger and Satiety when making decisions on amount of food and timing of eating. The IES showed more robust validations than the previously developed scale, and higher total IE scores were associated with many benefits including higher body satisfaction, self-esteem, proactive coping, and optimism (Avalos & Tylka, 2006; Tylka, 2006).

An updated version of the scale, the IES-2, expanded on the original by introducing a fourth subscale, Body-Food Choice Congruence (addresses how food eaten translates to feelings within the body to satisfy our nutrition and energetic needs), and providing validation in men as well as women (Tylka & Kroon Van Diest, 2013). In the validating study, total IE scores showed positive relationships with body appreciation, self-esteem, life satisfaction, and positive affect, and were negatively associated with BMI, disordered eating, body surveillance, body shame, thin ideal internalization, poor interoceptive awareness, and negative affect (Tylka & Kroon Van Diest, 2013).

While total IE scores are associated with numerous physical and psychological health factors, subscales tend to vary in the magnitude of associations. The current study sought to identify distinct patterns of response to the four IE subscales and assess how those resulting profiles relate to measures of psychological well-being, changes in eating behaviors and weight

concern, and levels of physical activity. Further, this study sought to assess potential gender differences in the derived profiles. Inherent to these aims is the expectation that the subscale constructs of IE would differentially influence the outcome variables of interest. However, IE research has noteworthy limitations in its assessment of individual subscales. The review of the literature below summarizes current findings and highlights gaps in the relevant research.

Intuitive eating and Psychological Wellbeing

Studies show that IE is associated with myriad psychological health benefits. Total IE scores contributed unique variance, above and beyond eating disorder symptomatology, in measures of optimism, unconditional positive regard, psychological hardiness, social problem solving, self-esteem, positive affect, and proactive coping (Tylka, 2006; Tylka & Kroon Van Diest, 2013).

Despite growing evidence associating IE with positive mental health, findings from subscale analyses suggest that some dimensions of IE are more strongly tied to positive outcomes than others (Camilleri et al., 2015; Daundasekara et al., 2017; Duarte et al., 2016; Mendes, 2014). These nuances in the IE subscales are useful to probe to further identify characteristics of IE that might contribute to positive psychological well-being.

Depression

Results from a recent meta-analysis on the psychological correlates of IE show that total IE scores have significant negative associations with depression at small to moderate levels of magnitude (r= -.29, 95% CI [-.38, -.21]; Linardon et al., 2021). These results are maintained over time; one longitudinal study that followed a diverse sample of adolescents (mean age of 14.5 years) into their young adult years (mean age of 22.2 years) found that both higher baseline levels of IE and increased levels of IE at an 8-year follow-up were predictive of reduced

depression levels in addition to higher self-esteem and body satisfaction, and fewer maladaptive eating behaviors (Hazzard et al., 2020). Moreover, IE was shown to significantly moderate the relationship between depression and binge eating behaviors in a Portuguese study (Duarte et al., 2016).

Evidence suggests that IE subscales vary in the strength of their association with depressive symptoms. Consistently, Eating for Physical Rather than Emotional Reasons shows the strongest, albeit still small to moderate, negative relationships with depression with correlation coefficients ranging from -.26 to -.32 (Camilleri et al., 2015; Daundasekara et al., 2017; Duarte et al., 2016; Mendes, 2014). In fact, Eating for Physical Rather than Emotional Reasons seems to possibly be the driving factor linking IE scores to depression, often having stronger correlation with depressive symptoms than total scores or other subscales (Camilleri et al., 2015; Duarte et al., 2016; Mendes, 2014). Given that nearly all the work done in this area is correlational, it is reasonable to suggest that this reliable negative association could be related to higher rates of emotional eating among those experiencing depression. However, it is also possible that reduced externalized eating may help assuage some of the felt impacts of low mood and thus lead to lower levels of reported depression.

Unconditional Permission to Eat and Reliance on Internal Cues of Hunger and Satiety have variable relationships with depression. Most studies show a small to negligible negative relationship with depression with correlation coefficients ranging from -.14 to .03 (Camilleri et al., 2015; Duarte et al., 2016; Mendes, 2014). The strongest associations were seen in a study of pregnant women that found significant small negative relationships between perinatal depression and Unconditional Permission to Eat (r= -.22) and Reliance on Internal Cues of Hunger and Satiety (r= -.22; Daundasekara et al., 2017).

Body-Food Choice Congruence is probably the most understudied subscale as it is the most recently developed. Among studies that do assess Body-Food Choice Congruence, there seems to be a small negative association with depression ranging from *r*= -.12 to -.17. The study that showed the strongest negative relationship with depression (r= -.17) was in a sample of waitresses (Szymanski & Feltman, 2015).

Evidence relating depression to intuitive eating suggests a moderate association that seems to be largely driven by the Eating for Physical Rather than Emotional Reasons subscale. The current work tested how patterns of subscale responses relate to depression outcomes, thereby increasing our understanding of how these different factors may function together in their associations with positive outcomes.

Anxiety

A recent meta-analysis showed that IE has a moderate, negative relationship (*r*= -.34, CI [-.45, -.23]) with anxiety symptomology (Linardon et al., 2021). While these findings represent all studies of IE and anxiety, the mean masks significant variability among studies, with some showing little to no relationship (Herbert et al., 2013).

Similar to the research on depression, few studies assess anxiety's relationship with specific IE subscales. Among those that do measure subscales, there are mixed findings. For example, one study showed that total IE and all subscales had a moderate to strong relationship with anxiety among women (Total score *r*=-.61, Reliance on Internal Cues of Hunger and Satiety *r*=-.52, Eating for Physical Rather than Emotional Reasons *r*=-.47, Unconditional Permission to Eat = *r*=-.43, and Body-Food Choice Congruence *r*=-.29) but smaller correlations in men (Total score *r*=-.39, Eating for Physical Rather than Emotional Reasons *r*=-.37, Reliance on Internal

Cues of Hunger and Satiety *r*=-.23, Unconditional Permission to Eat = *r*=-.17, and Body-Food Choice Congruence *r*=-.15; van Dyck et al., 2016).

Similar to depression, relationships with anxiety seem to be stronger for the Eating for Physical Rather than Emotional Reasons subscale than for other subscales. Mendes (2014) found anxiety had significant small negative associations between the Eating for Physical Rather than Emotional Reasons subscale (*r*= -.20) and total score (*r*= -.15) and very small, albeit significant, relationships with Unconditional Permission to Eat (*r*= -.05), Reliance on Internal Cues of Hunger and Satiety (*r*= -.03), and Body-Food Choice Congruence (*r*= -.06); Duarte et al. (2016) also found that Eating for Physical Rather than Emotional Reasons had the strongest negative relationship (*r*= -.24) with anxiety, above and beyond the total score (*r*= -.19), Unconditional Permission to Eat (*r*= -.08), Reliance on Internal Cues of Hunger and Satiety (*r*= -.06 non-significant), and Body-Food Choice Congruence (*r*= -.06). However, one study found no significant relationship to anxiety for any individual subscale (Herbert et al., 2013).

Finally, one study assessed IEs relationship with a specific type of anxiety related to physical appearance. Researchers found that social physique anxiety had a moderate to strong relationship with total IE scores (*r*= -.63), Eating for Physical Rather than Emotional Reasons (*r*= -.56), Reliance on Internal Cues of Hunger and Satiety (*r*= -.52), Body-Food Choice Congruence (*r*= -.40), and Unconditional Permission to Eat (*r*= -.21) once again highlighting Eating for Physical Rather than Emotional Reasons' strong relationship with anxiety (Akırmak et al., 2021).

Given the previous findings in this area, it seems Eating for Physical Rather than Emotional Reasons may be a contributor to the common negative relationship between IE and anxiety. Some evidence also suggests differences between genders. The current work aimed to

further identify patterns of IE behaviors related to anxiety and elucidate potential differences between people of different genders.

Intuitive eating and Dieting and Weight Concern

Despite the fact the IE is associated with lower BMI (Linardon et al., 2021) and both weight stability (Tylka et al., 2019) and weight loss (Leahy et al., 2017; Nogué et al., 2019), rejecting the diet mentality and weight-related measures of health are core principles of IE (Tribloe & Resch, 2020). This is most strongly represented on the IES-2 measure in the Unconditional Permission to Eat subscale which measures the extent to with individuals do not restrict the types, amount, or timing of food consumed. Reliance on Internal Cues of Hunger and Satiety is also inversely related to dieting as dietary restraint is related to external guidelines rather than reliance on internal feelings of hunger and satiety (Tribloe & Resch, 2020).

One of the most commonly studied aspects of dieting is dietary restraint which has a strong negative relationship with IE scores (Anderson et al., 2016; Denny et al., 2013; Smith et al., 2020). Dieting might also include other types of unhealthy weight control or disordered eating behaviors such as fasting, eating very little food, smoking more, skipping meals, or using a food substitute (Denny et al., 2013). Evidence shows that intuitive eating is related to decreased levels of disordered eating behaviors (Anderson et al., 2016) and less dieting overall (Bruce & Ricciardelli, 2016). These findings, which relate IE to reduced odds of engaging in unhealthy weight control behaviors, are supported in longitudinal studies as well (Christoph et al., 2021; Hazzard et al., 2020).

When assessing subscale differences, studies consistently show Unconditional Permission to Eat has the strongest negative relationship with dietary restraint (as high as r= -.75; Anderson et al., 2015). Studies show that Unconditional Permission to Eat has stronger

relationships with dietary restraint than the total IES-2 scores (Anderson et al., 2016; Smith et al., 2020). Relationships between dietary restraint and the remaining subscales tend to be more modest; Eating for Physical Rather than Emotional Reasons has *r*s between -.19 and-.29 and Reliance on Internal Cues of Hunger and Satiety has *r*s between -.21 and -.24 (Akırmak et al., 2018; Smith et al., 2020). Body-Food Choice Congruence tends to have a small-to-negligible positive relationship (*r*s between .06 and .13) with dietary restraint, likely due to its emphasis on nutrition (Akırmak et al., 2018; Smith et al., 2020).

Other work has shown that certain subscales of the IES-2 may be related to specific outcomes of dieting and disordered eating. One study using one Reliance on Internal Cues of Hunger and Satiety item, "I stop eating when I am full," showed that women who scored higher on this item were less likely to report chronic dieting (5 or more attempts per year) and binge eating. Unhealthy weight control measures are associated with lower agreement with the Reliance on Internal Cues of Hunger and Satiety item "'I trust my body to tell me how much to eat" (Christoph et al., 2021; Denny et al., 2013).

Dieting is often motivated though concerns about weight spurred on by the internalization of thin ideals (Smith et al., 2020). As such, concerns about one's body and eating behaviors are inversely related to intuitive eating (Carrard et al., 2021). In fact, one of the most-frequently applied and best-supported theories of IE, the acceptance model of IE, incorporates factors of body appreciation and internal body orientation (Avalos & Tylka, 2006; Linardon et al., 2021). Positive body image and acceptance are significantly related to lower rates of disordered eating and psychological distress (Patrick et al., 2011). Thus, intuitive eating may be related to further improvements in well-being potentially through the reduction of weight concerns.

The current study assessed how intuitive eating profiles relate to dieting and changes in weight concern during the COVID-19 pandemic. Given the negative outcomes related to dieting and poor body image, it is important to identify IE profiles associated with a reduction in these incidences. This work may help inform prevention efforts in disordered eating treatment.

Intuitive eating and Food Intake

A paucity of research has assessed how IE is related to amount of food eaten and results tend to be mixed; Camilleri et al. (2017) showed that energy intake was inversely associated with scores on the Eating for Physical Rather than Emotional Reasons and Reliance on Internal Cues of Hunger and Satiety subscales and positively correlated with scores on the Unconditional Permission to Eat subscale while Ruzanska and Warschburger (2020) found no relationship between total IE scores and laboratory food intake.

Many studies investigate intake of specific food types. For example, one study showed that Unconditional Permission to Eat was the strongest predictor of food intake, with higher scores predicting poorer diet quality in both women ($r = -0.29$, $p < .001$) and men ($r = -0.33$, $p < .001$) (Horwath et al., 2019). Eating for Physical Rather than Emotional Reasons was negatively associated with fast food (women $r = -0.10$, $p < .001$; men $r = -0.11$, $p < .001$) and sweet consumption ($r = -0.13$, $p < .001$ for women and men). Dietary quality was positively related to Reliance on Internal Cues of Hunger and Satiety ($r = 0.12$, $p < .001$) and Eating for Physical Rather than Emotional Reasons ($r = 0.14$, $p < .001$) in women (Horwath et al., 2019). However, variables related to specific foods consumed are not the focus of the current work.

Other related eating styles such as mindful eating (focusing non-judgmentally on the present moment while eating) and attentive eating (focusing on internal cues for hunger and

satiety while eating) are related to reduced food intake (Higgs, 2015; Robinson et al., 2014; Warren et al., 2017). This suggests that similar finding might be possible for IE eating profiles.

Relatively little research explores how IE is related to amount of food one consumes. Given that IE is reliant on internal rather than external cues for food consumption, it is likely the case that higher overall IE will be related to stability in food consumption during the COVID-19 pandemic. While it is not yet clear how this will be related to certain subscales, it is likely that Eating for Physical Rather than Emotional Reasons and Reliance on Internal Cues of Hunger and Satiety will be most related to changes in dietary intake.

Intuitive eating and Physical Activity

Anecdotal evidence suggests that people who have implemented IE principles feel increased motivation to make other positive health-related changes (Tribloe & Resch, 2020). This has been supported by some intervention work aimed to promote eating based on internal cues; physical activity behavior and physical activity enjoyment increase with interventions, even after long-term follow-ups (see Schaefer & Magnuson, 2014 for a review).

However, there is a paucity of empirical evidence to support that adaptive eating behaviors as measured by the IES/IES-2 are related to other behaviors impactful to one's health such as engaging in physical activity. In fact, one 2014 review concluded that there was no discernable link between IE and physical activity (Van Dyke & Drinkwater, 2014). Further studies have shown tenuous links and suggest that there may be possible variation in the relationships between physical activity and individual IE subscale. These limited findings are discussed below.

When studied, the relationship between IE and physical activity is often linked through the cognitive mechanism of motivation. Just as there are many reasons why someone may

choose to restrict food choices and rely on external rather than internal cues (reducing their IE), individuals' motivations for engaging in physical activity vary. For example, some use physical activity for weight loss or maintenance while others engage in physical activity for health and enjoyment or other reasons outside of weight regulation.

Preliminary evidence from a sample of physically active, middle-aged women from New Zealand suggests that IE is higher among those who report engaging in physical activity for reasons not related to weight loss compared to those who engage in PA with weight-loss motivations. This relationship is strongest for the Unconditional Permission to Eat subscale (r= -.33) and total score (r= -.30), while it was smaller for Eating for Physical Rather than Emotional Reasons (r= -.19) and Reliance on Internal Cues of Hunger and Satiety (r= -.13), and Body-Food Choice Congruence was not measured (Carraça et al., 2019). Similarly, in a study of undergraduate women and men appearance-based exercise motives were significantly inversely related to IE (Tylka & Homan, 2015). However, the study did not find a significant relationship between functional motives to exercise and IE. Finally, one study of adolescents used a revised version of the IES (the Intuitive Eating Scale for Adolescents-Revised (IESA-R)) and found participants who were exercising to lose weight scored higher on Eating for Physical Rather than Emotional Reasons and lower on Unconditional Permission to Eat (no significant differences on Reliance on Internal Cues of Hunger and Satiety; Body-Food Choice Congruence not measured) (Moy et al., 2013).

The remaining studies assessing IE and physical activity used the measure created by Hawks et al, 2004. While this is not the measure used in the current study, we can still gain meaningful insights into the IE and physical activity relationship. If fact, these studies suggest a complex and variable relationship between IE and physical activity. One sample of

undergraduate men showed that intuitive eaters (scoring above the median on the Hawks IE scale) compared to non-intuitive eaters had higher levels of external and introjected regulation as measured by the Behavioral Regulation in Exercise Questionnaire (Gast et al., 2012). However, there were no differences in intrinsic regulation, suggesting that IE may be related to the beginning stages of motivation for physical activity, but not to higher levels of motivation. These findings contrast with a study conducted among college women that showed that intuitive eaters as compared to non-intuitive eaters had higher levels of intrinsic regulation motivation and introjected regulation (Nielson, 2009). However, this study also found that higher levels of IE were not related to differences in physical activity maintenance. Once more, given the differences between the Hawks et al., 2004 measure and the now dominant IES-2 scale, it is difficult to determine whether these results can accurately inform the IE construct as it is widely studied.

There is scant research investigating the relationship between IE and physical activity. Of the studies that exist, only 3 examine the relationship on the granular level of specific subscales. Moreover, all studies directly assessing intuitive eating use motivational measures of physical activity rather than actual measures of frequency and/or intensity. This work sought to fill this research gap by assessing how derived profiles of IE subscales relate to actual levels of physical activity.

Intuitive eating and Gender

All studies cited below used a binary analysis of gender comparing women with men.

The recent meta-analysis by Linardon et al. (2021) found significant differences in intuitive eating scores based on gender with a moderate pooled effect size ($d = 0.39$; 95% CI = 0.23, 0.48, $p < .001$). The studies showed that women reported lower IE scores than men. It was

further found that these gender differences were strongest in samples with high proportions of "Caucasian" (White) individuals (Linardon et al., 2021). As previously mentioned, there are also gender differences seen in relationships with IE and other variables such as anxiety or physical activity (Gast et al., 2012; Nielson, 2009; van Dyck et al., 2016).

Studies show that gender differences are maintained by subscale. In one study, women reported significantly lower scores than men on Eating for Physical Rather than Emotional Reasons (M_{women}= 3.46 vs M_{men}= 3.95, p <.001), Unconditional Permission to Eat (M_{women}= 3.45 vs M_{men}= 3.67, p= .001), and Reliance on Internal Cues of Hunger and Satiety (M_{women}= 3.51 vs M_{men}= 3.61 p= .022). There was not a significant difference between women and men on the Body-Food Choice Congruence subscale (Duarte et al., 2016). However, one study showed significantly lower scores for women than men on Body-Food Choice Congruence (M= 3.36 vs M= 3.54, p =.002) as well as the remaining subscales including Eating for Physical Rather than Emotional Reasons (M= 3.46 vs M= 4.12, p <.001), Unconditional Permission to Eat (M= 3.30 vs M= 3.61, p< .001), and Reliance on Internal Cues of Hunger and Satiety (M= 3.27 vs M= 3.50 p= .001). An additional study found that significantly more men than women reported trusting their body to tell them what to eat. No differences were found between women and men for stopping eating when full (Denny et al., 2013).

Results with adolescent samples show additional gender differences by subscale; one study showed Reliance on Internal Cues of Hunger and Satiety was higher in girls than boys (p < .001; (Moy et al., 2013) and another found that Eating for Physical Rather than Emotional Reasons was lower in girls than boys (Dockendorff et al., 2012).

Given the evidence of IE subscale differences by gender, it is reasonable to assume that subscale profiles may vary based on gender. Thus, I used gender as an antecedent variable in my analyses.

Conclusion

Intuitive eating is founded on anti-diet, weight neutral approaches to eating and health. The original program contains 10 principles (see Appendix A) ranging from rejecting the diet mentality, to enjoyment-based physical activity and eating with a gentle consideration of nutritional needs (without restriction or constraint). The most widely used IE measure, the IES-2, incorporates several key principles into 4 separate subscales. The majority of the IE research using these scales assesses predictors and outcomes related to the total IES score, however, some variance has been shown among individual subscales. Therein lies the potential for unique combinations of IE subscales that are most associated with outcomes in weight related attitudes and actions, food intake, psychological wellbeing, and physical activity. Further, an abundance of evidence shows that IE and its subscales vary between women and men; thus, gender is an important possible predictor of IE behaviors. The aim of this work was to identify common patterns of IE behaviors in undergraduate and community subsamples to investigate profiles associated with the health behaviors and outcomes.

CHAPTER 3: UNDERSTANDING THE CONTEXT - COVID-19 AND 2020

The year 2020 played host to myriad disruptive forces to people's daily lives including, most significantly, the rise of the COVID-19 pandemic and the restrictions put in place to quell its spread. In this chapter I provide a foundational understanding of the COVID-19 pandemic and associated outcomes for mental health, eating behaviors, and physical activity.

An Overview of COVID-19

In late December of 2019, doctors in Wuhan city of the Hubei province of China were faced with outbreaks of pneumonia stemming from unknown causes (Wang et al., 2020). International health authorities watched in distress as the novel coronavirus was isolated from patients and implicated in the resulting disease, now called COVID-19. Caused by the highly contagious SARS coronavirus 2 (SARS-CoV-2), COVID-19 is a severe acute respiratory syndrome that exhibits a wide range of presentations from asymptomatic to severe illness and death (Centers for Disease Control and Prevention, 2021)..

The COVID-19 pandemic has spread to over 220 countries and territories causing an unprecedented upheaval of daily routines for individuals around the globe. Efforts to mitigate the spread of the novel coronavirus have encompassed an array of government responses including mass quarantines, stay-at-home restrictions, travel limitations, closures of public areas including schools and businesses, cancelation of public events, and shutdowns of public transportation (Ritchie et al., 2020). The virus and the widely-mandated lockdowns used to prevent its spread left people with limited access to care and support, caused a host of economic and social stressors, and impacted mental health around the world (Brooks et al., 2020a; Ritchie et al., 2020).

Stressors, Mental Health, and Wellbeing During the Early COVID-19 Pandemic

I start with a discussion of stressors, mental health, and wellbeing as each of these is directly related to health behaviors such as eating and physical activity (Devonport et al., 2019; Peluso & Guerra de Andrade, 2005).

There are several stressors related to the early COVID-19 pandemic. Stress related to the pandemic itself included fears for one's safety, risk, and threat of contagion (Hamouche, 2020). These fears are often generalized to one's close social network ties such as friends and family members. Perceptions of safety and risk of contagion were amplified by increased levels of media coverage (Rubin & Wessely, 2020). Moreover, this fear regarding one's safety has been shown to increase one's risk for adverse mental health outcomes (Brooks et al., 2020a).

Information overload was a common reported stressor as news coverage offered competing messaging around the severity and risk of the pandemic (Hamouche, 2020). Misinformation and rumors create an atmosphere of mistrust among the general public leading to a reduced capacity to manage stress (Brooks et al., 2020a; McCauley et al., 2013). In fact, media exposure during the pandemic is positively related to poor mental health such as depression and anxiety (Gao et al., 2020).

Stigma related to being perceived to be Asian (from the area associated with where the virus originated), a person who has contracted COVID-19, and healthcare workers caused large-scale feelings of social exclusion (Brooks et al., 2020a; Hamouche, 2020). These feelings of social isolation are further linked to negative mental health outcomes (Brooks et al., 2018). Those who were quarantined were at risk of loneliness, boredom, and anger; experiencing quarantines has been linked to long-term impacts on psychological health and wellbeing (Brooks

et al., 2020a; Xiang et al., 2020). The negative effects of quarantine seem to increase in proportion of the duration (Brooks et al., 2020a).

Due to mass closures of businesses and workplaces there were additional stressors of financial insecurity, job insecurity, working from home, and burnout. Higher levels of psychological distress were reported among people who lost their jobs or otherwise stopped working during the pandemic (Zhang et al., 2020). Concern about the pandemic's effects on employment was one of the top stressors causing serious distress among adults in the early COVID-19 pandemic (McGinty et al., 2020). Additionally, telework (working from home) led to feelings of isolation and blurred the boundaries of private and professional life (Hamouche, 2020). Burnout, which refers to exhaustion from repeated stress that affects one's mental, emotional and physical wellbeing, was also rampant during the early COVID-19 pandemic. While much of the COVID-19 burnout research focuses on healthcare professionals, there is evidence that burnout was experienced in multiple occupational settings (Hamouche, 2020; Sharma et al., 2020).

Parents during the early pandemic were further impacted by changes to the school and childcare sectors (Kalluri et al., 2021). The burden of caring for children during the pandemic exacerbated the previously-documented gender differences in home care with many women reducing hours or working the "double shift" to care for children while maintaining a job (Sevilla & Smith, 2020). The evidence suggests that this disparity largely impacts the wellbeing and career prospects of women. Further, parental stress and burnout is related to higher levels of child maltreatment and abuse (Brown et al., 2020; Griffith, 2020).

Given these overlapping pressures, COVID-19 has been classified as a traumatic stressor linked to substantial levels of psychological distress and reduced well-being (Bridgland et al.,

2021; Brooks et al., 2020a). Anger and other negative emotions were often reported, though some research suggests that this is related to pre-COVID-19 levels of emotional distress (Shanahan et al., 2020). Further research shows that young adults were the most likely to incur the negative impacts of COVID-19 related stress with higher levels of negative affect, lower levels of positive affect, and less frequent experiences with positive events compared to middle-age and older adults (Klaiber et al., 2021). Finally, while COVID-19 stressors were associated with higher levels of rumination and negative stress consequences relative to pre-pandemic levels, psychological support buffered some of the negative impacts (Ye et al., 2020). This indicates that those with stronger social supports, intimate relationships, self-care, and coping strategies fared better under pandemic conditions that those with lower levels of psychological supports.

Eating Behaviors During the Early COVID-19 Pandemic

I conducted a comprehensive international review of 71 articles from over 30 countries and found small-to-moderate changes in eating behaviors during the early COVID-19 pandemic (under review; Johnson et al., 2022). Aggregated findings showed that nearly half (49.1%) of participants sampled (n=12,567) reported no change in the amount of food eaten during the pandemic with the next largest group (31%) being those with increased consumption overall. Similarly, most did not report changes in the frequency of eating, but when eating frequency did change, it tended to increase for meals and snacks (Johnson et al., 2022).

Consumption of specific foods often varied by type (Johnson et al., 2022). For fruits and vegetables, legumes, white breads/pastas, homemade pastries, and snacks (general as well as sweet, savory, and salty snacks), participants reported stable or increased consumption. Decreased consumption was reported for specific vegetables such as dark green leafy vegetables.

For dark breads/grains, meats (including red meats and processed meats), seafood/fish, frozen foods, and fast food, participants tended to either report no change or decreased consumption. Many of these increases and decreases could be at least partly explained by reduced access to restaurants during COVID-related lockdowns. Indeed, increased consumption was found for homemade foods in general (and for specific categories of homemade foods, such as pizza and sweets). However, purchasing and consumption behaviors might have shifted more minutely in certain categories due to perceptions of COVID-19 risk and transmission. For example, people fearing COVID-19 infection may be less likely to buy fruits and vegetables but may also be keener to purchase and consume peelable vitamin A-rich fruits.

Healthy eating showed decidedly mixed results (Johnson et al., 2022). Most self-reported perceptions of dietary patterns during COVID-19-showed stable levels of healthy eating; however, when eating behaviors did change or were assessed with researcher-generated measures (as opposed to self-report) a similar number of studies reported increases and decreases in healthy eating during the pandemic compared to before.

Considering reasons for eating, emotions, and moods such as depression, stress, fear, anger, and boredom were all related to changes in eating behaviors, often being an increase in consumption (Johnson et al., 2022). Cravings, weight control, and body image were also associated with eating behavior changes. Eating more frequently with family and friends and increased exposure to food cues were both related to an increase in food consumption whereas food insecurity was typically related to a decrease in food consumption. Increases in available time showed mixed results as some individuals reported cooking healthier meals more often and skipping meals less often while others used their leisure time to bake which was one of the top reported factors for eating less healthfully during the pandemic.

Findings show that binge eating, uncontrolled/out of control eating, overeating, and emotional eating tended to increase, and restrictive eating tended to remain stable or increase during the COVID-19 pandemic compared to before (Johnson et al., 2022). Changes in meal skipping and fasting varied by region and by study with some findings showing increases in meal skipping, often due to financial concerns, and some studies showing no change or a decrease in meal skipping.

To date, there are still very few studies investigating of IE during the COVID-19 pandemic. One study found that during the COVID-19 pandemic, IE was positively related to education and negatively related to body mass index (BMI; Sanlier et al., 2021). Another study aligned with previous findings showing gender differences in IE behaviors during the pandemic such that men had higher IE scores (Jackson et al., 2022). Continued research such as the current work are important in understanding IE in pandemic conditions.

Physical Activity During the Early COVID-19 Pandemic

Considering the current work, it is critical to understand the overall changes in physical activity occurring during the early COVID-19 pandemic to make informed conclusions about the associations of intuitive eating profiles.

Systematic reviews assessing the early COVID-19 pandemic show that overall physical activity levels dropped while sedentary behaviors increased regardless of measures used and subpopulations studied (Stockwell et al., 2021; Violant-Holz et al., 2020). Findings show that those with eating disorders had a different experience of the COVID-19 pandemic as they were the only subpopulation noted as not having decreases in physical activity and increased levels of sedentary behaviors (Stockwell et al., 2021). These findings might suggest an interesting

interplay to the current work as pathological eating behaviors tend to be inversely related to intuitive eating scores.

Physical activity levels may have played a protective role in the mental health outcomes associated with the COVID-19 pandemic (Violant-Holz et al., 2020). While lower amounts of physical activity were related to higher levels of depression, anxiety, and stress, higher levels of physical activity were associated with greater emotional stability. Further, those who exercised one or more times per day were more likely to report better sleep and somatization symptoms (Violant-Holz et al., 2020).

Conclusion

The COVID-19 pandemic disrupted daily routines around the world. Fear of COVID-19 and responses to the mandates put in place to prevent its spread were associated with considerable decrements in mental health and wellbeing across numerous populations. Further, changes in eating behaviors and physical activity suggest that altered lifestyles might have shifted to be less healthful (e.g., increased amount/frequency of eating and snacking and decreases in overall physical activity). Very few studies have assessed IE behaviors during the COVID-19 pandemic. Studying the prevalence and characteristic patterns of IE during this time period can inform public health intervention to promote positive eating behaviors for similar crises such as future pandemics.

CHAPTER 4: GENERAL METHODS

Participants

A total of 1,141 adult participants were recruited via a "community" online survey release (n= 642) and through participation with the psychology "undergraduate" research pool of a western undergraduate institution (n=499). After exclusionary criteria (see Figure 1) were applied, the final sample consisted of 947 adults (community = 53%, n=501; undergraduate = 47%, n=446). See Table 2 for a summary of demographics both of the combined sample and by subsample. Overall, most respondents identified as White (86.9%), ciswomen (68.2%), non-Hispanic/Latinx/Chicanx (82.1%) and reported living in Colorado (73.9%), California (5.3%), Georgia (3.5%), Illinois (2.1%) and Texas (2%). In total, participants hailed from 38 states.

Community participants completed the survey on a volunteer basis and were not compensated. Undergraduate participants received research credit as a part of a university psychology course. All participants were invited to submit their email addresses to be considered for future, compensated studies.

Measures

Data were collected as part of a larger study. Only measures used in the current study will be reported below. Please see Appendix B for a reduced survey of the following relevant measures.

Demographics

At the start of the survey, participants reported on several demographics. The following will be used in the current study: location of residence (country and state/territory), age, gender, race, and ethnicity.

Weight Loss Attempts

Participants responded "yes" or "no" to the following questions measuring weight loss attempts: "During the past 12 months, have you tried to lose weight?" and "Are you currently trying to lose weight?"

Weight Concern Related to COVID-19

Participants indicated if (and how) their level of concern over their weight changed as a result of the COVID-19 pandemic by selecting one of the following four choice options "No, I am not concerned about my weight," "No, my concern about my weight has not increased or decreased," "Yes, my concern about my weight has INCREASED," or "Yes, my concern about my weight has DECREASED."

Changes in Food Consumption During COVID-19

Self-reported changes in the amount of food consumed since the onset of the COVID-19 outbreak were assessed using a 5-point bipolar Likert scale with the following range: "1- decreased a lot," "3- no change" "5-increased a lot."

Intuitive Eating During COVID-19

Participants were instructed to respond to the Intuitive Eating Scale-Two (IES-2) by selecting the responses which best characterize their attitudes or behaviors during the COVID-19 outbreak. The IES-2 was a refinement of the original IES scale and is one of the most widely used measures of intuitive eating. The scale has been validated in women and men with strong internal consistency reliability (alphas ranging from .85 to .92 for the total scale and all subscales) and has been successfully applied to both undergraduate and community subsamples (Tylka et al., 2019; Tylka & Kroon Van Diest, 2013).

The IE total scale consists of 23 items (Appendix B questions X-X) with 5 response options, “1-strongly disagree,” “2-disagree,” “3-neutral,” “4-agree,” “5-strongly agree.” The IES-2 offers both a total IE score, and measures of the following four subscales.

Unconditional Permission to Eat. uses 6 items and measures avoidance of food restriction (i.e., one’s refusal to “forbid” groups of food) and the unconditional willingness to eat food in response to hunger (rather than ignoring hunger). Sample items include “If I am craving a certain food, I allow myself to have it” and “I do NOT follow eating rules or dieting plans that dictate what, when, and/or how much to eat.”

Eating for Physical Rather Than Emotional Reasons. consists of 8 items and measures the extent to which food is consumed as a response to physical hunger levels instead of being used to alleviate or distract from emotional states like boredom or anxiety. Sample items include “I find myself eating when I’m feeling emotional (e.g., anxious, depressed, sad), even when I’m not physically hungry [reverse scored]” and “I am able to cope with my negative emotions (e.g., anxiety, sadness) without turning to food for comfort.”

Reliance on Hunger and Satiety Cues. reflects the degree to which individuals use their internal bodily cues to inform what and how much to eat and is measured using 6 items. Sample items include “I trust my body to tell me what to eat” and “I rely on my fullness (satiety) signals to tell me when to stop eating.”

Body-Food Choice Congruence. expresses how one’s food choices align with the nutritional and functional needs of their bodies using 3 items. Sample items include “I mostly eat foods that give my body energy and stamina” and “Most of the time, I desire to eat nutritious foods.”

Physical Activity

An adapted version of the International Physical Activity Questionnaire (IPAQ; Craig et al., 2017) was used to assess participants' physical activity. Participants reported the frequency and duration of vigorous activity, moderate activity, and walking over the last week. Examples of vigorous activity include heavy lifting, aerobics, and fast bicycling whereas activities such as bicycling at a regular pace, carrying light loads, or doubles tennis would be considered moderate activity. Walking included all sources including the amount done at home, work, for recreation, and for leisure. Duration for each activity was measured in 15-minute intervals ranging from 0 to more than 120 minutes, and the median amount for each interval in each intensity category was used to calculate each participant's Metabolic Equivalent of Tasks (MET) minutes per week (MET-min/week). This was used as a continuous variable for analysis.

Depression

Nineteen items from the Center for Epidemiologic Studies Depression Scale (CESD; Radloff, 1977) were used to measure depression. Participants were asked to respond based on how they felt or behaved over the past week on a four-point scale with the following cut points: 1-"rarely or none of the time (less than 1 day)", 2- "Some or a little of the time (1-2 days)," 3- "Occasionally or a moderate amount of time (3-4 days)," and 4- "Most or all of the time (5-7 days)". A sample item is "I thought my life had been a failure." A mean score of the 19 items was used to create a continuous variable for depression.

Anxiety

The seven-item General Anxiety Disorder-7 (GAD-7; Radloff, 1977) scale was used to measure anxiety among participants. The measure asked individuals to reflect on the last two weeks and indicate how frequently they have been bothered by problems such as "trouble

relaxing." Participants responded on a four-point scale with the following cut points: 1- "not at all," 2- "several days," 3- "more than half the days," and 4- "nearly every day." While scoring for the GAD-7 is typically additive with scores indicating minimal to severe anxiety categories, the current study utilized a continuous rather than categorical scoring method.

Procedure

The study protocol (#20-10025H) was approved by the Institutional Review Board of Colorado State University (see Appendix C).

Survey responses were collected during a 4-week period from April 23rd to May 21st, 2020. Community subsample survey participants were invited to complete this study via postings on social media, email listservs, and through snowball referrals. Undergraduate participants accessed the study via their university's online research pool to satisfy a portion of their required research participation. Upon entering the survey, participants agreed to the consent statement (see Appendix D) informing them of the purpose of the study and their ability to terminate the survey at any time without penalty. The survey took approximately 30 minutes to complete. At the conclusion of the survey, participants were debriefed (see Appendix E) and were given the opportunity to submit their email for future follow-up studies.

Table 2. *Summary of Demographics by Sampling Group*

		Combined sample (n=947)		Undergraduate subsample (n=446)		Community subsample (n=501)	
		Mean	SD	Mean	SD	Mean	SD
Age		28.69	13.75	19.74	2.21	36.70	14.77
		n	%	n	%	n	%
		Response n=906		Response n=431		Response n=475	
Gender	Ciswomen	618	68.21	258	59.86	360	75.79
	Transwomen	1	0.11	1	0.23	0	0
	Genderqueer	12	1.32	3	0.70	9	1.90
	Transman	2	0.22	1	0.23	1	0.21
	Cismen	254	28.04	154	35.73	100	21.05
	Prefer not to answer	19	2.10	14	3.25	5	1.05
		Response n=944		Response n=445		Response n=499	
Race	Indigenous	11	1.17	9	2.02	2	0.40
	Black/African American	19	2.01	11	2.47	8	1.60
	Asian American	24	2.54	11	2.47	13	2.31
	White	820	86.86	369	82.92	451	90.39
	Prefer not to answer	29	3.07	18	4.04	11	2.20
	Multiracial	41	4.34	27	6.07	14	2.81
		Response n=880		Response n=424		Response n=456	
Ethnicity	Hispanic	87	9.89	64	15.09	23	5.04
	Latino/a/x	24	2.73	14	3.30	10	2.19
	Chicano/a/x	6	0.68	4	0.94	2	0.44
	Non-Hispanic/Latinx/Chicanx	722	82.05	316	74.53	406	89.04
	Prefer not to answer	41	4.66	26	6.13	15	3.29
		Response n=947		Response n=446		Response n=501	
Location	Colorado	690	72.86	348	78.03	342	68.26
	California	50	5.28	27	6.05	23	4.60
	Georgia	33	3.48	0	0	33	6.59
	Illinois	20	2.11	12	2.70	8	1.60
	Texas	19	2.01	12	2.70	7	1.40
	Arizona	14	1.48	2	0.45	12	2.40
	Other	121	12.78	45	10.09	76	15.17

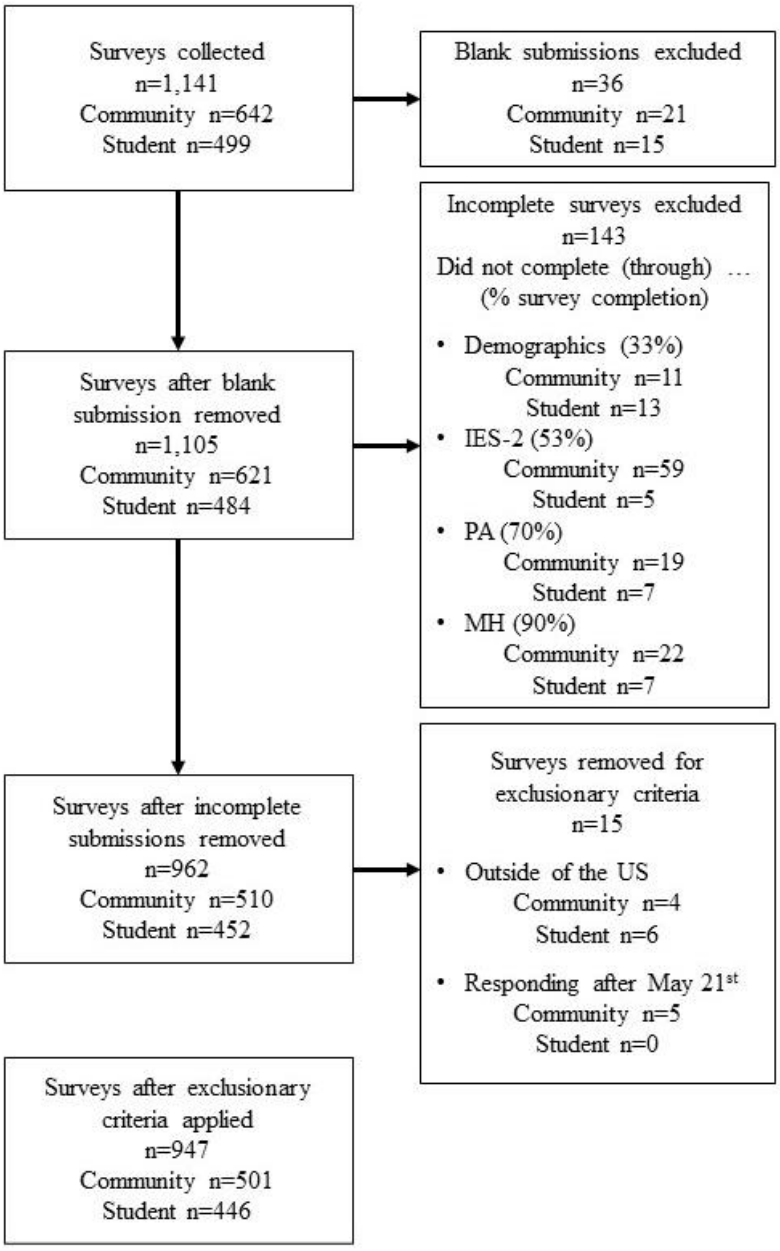

Figure 1. *Flow Diagram for Study Enrollment by Sample Group*
Note. IES-2= the revised intuitive eating scale, PA= physical activity, MH= mental health including depression and anxiety. All included participants also completed through the measures of food intake, dieting, and weight concern.

CHAPTER 5: ANALYTIC APPROACH

Descriptive Techniques

I conducted analyses to generate descriptive statistics by sample group, distributions of my four latent profile indicators, and a bivariate correlation table for key variables of interest.

Profiles of Intuitive Eating

The first aim of this project was to determine if distinct profiles of responses exist for four IE indicators: Unconditional Permission to Eat, Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Body-Food Choice Congruence.

Structural Equation Mixture Modeling Trials

The subscales used to derive the profiles of IE are, themselves, latent variables therefore I started by conducting exploratory analyses in an attempt to consider the latent nature of these variables. Specifically, a series of structural equation mixture models were conducted in which factors of each subscale were created and included in an overarching mixture model. These models failed to converge. Considering that the IE scale and its subscales are usually scored as means (Tylka & Kroon Van Diest, 2013), the present analyses of latent profile analyses were conducted using mean scores for each of the subscales.

Baseline Latent Profile Analysis (LPA)

To start, a baseline model was used to detect profiles of participants' responses to IE subscales during the COVID-19 pandemic. All analyses were run using Mplus version 8.7 (L. K. Muthén & Muthén, 1998-2017). Participants who did not complete measures of relevant variables were eliminated from analyses. Therefore, analyses were conducted under the assumption that missing data points were missing at random and utilized full information

maximum likelihood (FIML) to account for missingness (Schafer & Graham, 2002). FIML takes into account missingness and addresses it by calculating parameters using all available information.

One to eight-profile models were consecutively assessed for model fit based on the following four indices: 1) The Lo-Mendell-Rubin likelihood ratio test of model fit (LMR; Lo et al., 2001) which compares fit between a model with k-classes and a model with k-1 classes such that a significant *p*-value indicates the k-class model is an improvement over the k-1 model. Conversely, a non-significant p-value indicates the more parsimonious model (k-1) may be sufficient. 2) The Bayesian Information Criterion (BIC; Schwarz, 2007) which indicates the tradeoff between maximizing the likelihood ratio statistic and increased model parameters. In determining model fit, the model with the lowest BIC is preferred (B. O. Muthén & Muthén, 2000). 3) Entropy values which range from 0 to 1 and are an indicator of classification quality. Higher entropy values indicate higher model classification quality, with values above 0.8 being commonly recognized as sufficient (Celeux & Soromenho, 1996; Jung & Wickrama, 2008). 4) Matrices of the average latent class probabilities for the most likely latent class membership by latent class (ALC-Prob) which are used to gauge the discreteness of the profiles generated in the model. Models with good fit have values in the primary diagonal that are close to 1 and values in the off-diagonal portions closer to 0.

Final model selection was determined through consideration of model fit indices, parsimony, and interpretability.

Comparative Models for Undergraduate and Community Samples

The second aim of this project was to determine whether profile model structures differ between undergraduate and community subsamples. To achieve this aim, I employed identical

procedures to those mentioned above to fit LPA models for the undergraduate subsample and the community subsample independently. Models were considered interpretably similar if they consisted of the same number of profiles and had a Cohen's D of less than 0.2 indicating similar means across profiles. Given that these models *were* interpretably different, I maintained separate models and progressed with the auxiliary variable analyses described below for each subsample independently.

Antecedent Auxiliary Variable of Latent Profiles

I assessed gender as an antecedent auxiliary variable using Vermunt's 3-step approach (Vermunt, 2010). This statistical procedure starts by estimating the final model of latent profiles before "assigning" participants to one of the latent profiles based on their scores on the latent indicators. It is important to note that profile assignment is probability-based and that there is no true profile that captures an individual's response. Finally, the assigned latent profiles were regressed onto gender. Given that there were six response options for gender, dummy codes were used to perform the regression analysis.

Distal Outcomes Associated with the Latent Profiles

To examine distal outcomes of latent profiles I utilized the Bolck, Croons, and Hagenaars's (BCH) method (Bolck et al., 2004). Conducted simultaneously with the LPA, the BCH method takes into consideration participants' probabilistic class membership thereby controlling for error in the overall and pairwise comparisons conducted using the Wald tests (Clark & Muthén, 2009). Wald tests compare latent groups using chi-square analyses.

I drew conclusions from the pairwise tests by assessing the *p* value of the chi-square test with results of less than .05 as the cutoff for statistical significance. I determined effect size using Cramer's V, an established index for effect sizes in chi-square analyses. The recommended

Cramer's V cutoffs for a chi-square with 1 degree of freedom are .1 for small effects, .3 for medium effects, and .5 for large effects (Cohen, 1988).

To determine profile associations with the categorical outcome variable of weight concern, I utilized the DCAT method which is similar to the BCH method and provides a contingency table for distal outcomes and latent profiles. The resulting chi-square tests were interpreted using the same cut points described above.

RESULTS

Descriptive Statistics

Descriptive statistics for latent profile indicators both in the combined sample and by subsample are presented in Table 3 and distributions of the indicators can be found in Figure 2.

Results showed that people had relatively moderate levels of total IE and the four subscales. The lowest mean was for Reliance on Hunger and Satiety Cues and the highest mean was for Body-Food Choice Congruence.

Slightly over half of participants reported weight loss attempts and overall, participants reported a slight increase in the amount of food consumed in the early COVID-19 pandemic. The largest proportion of people (39%) responded that they had increased concern about their weight while the next largest group (31%) said that their weight concern remained the same. About 26% of people reported no concern for their weight.

Overall, participants reported low to moderate levels of physical activity, moderate levels of depression, and mild to moderate levels of anxiety.

Bivariate Correlations

See Table 4 for correlations of key variables of interest. Findings are also summarized below.

Overall, there were moderate to strong correlations between total IES-2 scores and each of the individual subscales. IE showed significant small to moderate negative relationships with weight loss attempts, increases in the amount of food eaten during the early COVID-19 pandemic, depression, and anxiety.

Table 3. *Descriptive Statistics for Key Variables by Sampling Group*

		Combined sample (n=947)	Undergraduate subsample (n=446)	Community subsample (n=501)
Variable		*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Total IES-2		3.38 (0.51)	3.37 (0.49)	3.38 (0.52)
UPE		3.37 (0.68)	3.30 (0.71)	3.42 (0.66)
EPR		3.22 (0.83)	3.23 (0.82)	3.21 (0.85)
RHSC		3.33 (0.78)	3.40 (0.76)	3.27 (0.79)
BFCC		3.59 (0.83)	3.55 (0.83)	3.62 (0.83)
WL attempts		0.56 (0.45)	0.52 (0.46)	0.60 (0.45)
Δ Food Amount		3.31 (0.90)	3.33 (0.97)	3.29 (0.83)
Physical Activity (MET min/wk)		567.85 (369.41)	596.91 (391.54)	542.54 (347.63)
Depression		2.14 (0.51)	2.39 (0.26)	1.92 (0.57)
Anxiety		2.23 (0.79)	2.46 (0.69)	2.03 (0.82)
		n (%)	n (%)	n (%)
Weight Concern	No Concern	246 (25.98)	144 (32.29)	102 (20.36)
	Concern did not change	296 (31.26)	101 (22.65)	195 (38.92)
	Concern increased	369 (38.97)	182 (40.81)	187 (37.33)
	Concern decreased	36 (3.80)	19 (4.26)	17 (3.39)

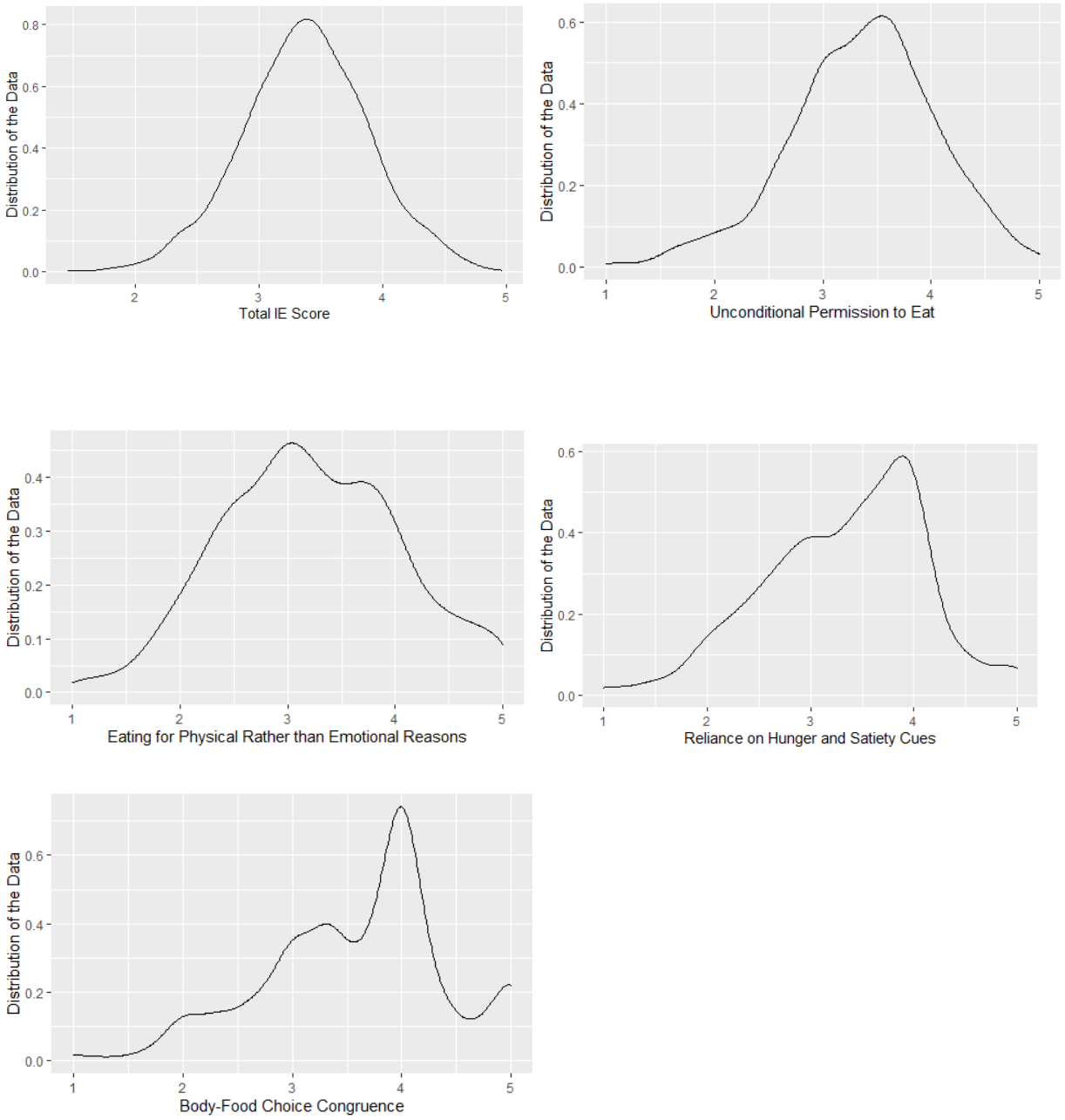

Figure 2. *Density Plots for the Distributions of the IE Total Score and Four Latent Profile Indicators*

All IE subscales were significantly correlated, with the Unconditional Permission to Eat and Body-Food Choice Congruence subscales having the only (albeit very small) negative relationship.

All subscales showed a significant negative relationship with weight loss attempts, with Unconditional Permission to Eat showing the strongest correlation and Body-Food Choice Congruence showing the weakest correlation. Increases in the amount of food eaten during the early COVID-19 pandemic were most negatively related to Eating for Physical Rather than Emotional Reasons. Reliance on Hunger and Satiety Cues and Body-Food Choice Congruence also showed very small, significant negative correlations. Changes in the amount of food eaten also showed a very small significant positive correlation with weight loss attempts such that increased weight loss attempts were related to increased food intake.

Physical activity had a very small negative correlation with Unconditional Permission to Eat and very small positive correlations with Eating for Physical Rather than Emotional Reasons and Body-Food Choice Congruence.

Depression was significantly negatively correlated with all subscales except Reliance on Hunger and Satiety Cues. Eating for Physical Rather than Emotional Reasons had the strongest correlation. Depression also showed a strong positive relationship with changes in the amount of food eaten. Anxiety had significant negative relationships with all IE subscales and, similar to depression, had the strongest correlations with Eating for Physical Rather than Emotional Reasons. Anxiety was also positively related to changes in the amount of food eaten and had a strong, significant positive relationship with depression.

Table 4. *Bivariate Correlations of Key Variables of Interest*

	TotIE	UPE	EPR	RHSC	BFCC	WL	ΔFAmt	MET	Depress	Anxious
TotIE	1									
UPE	0.50***	1								
EPR	0.73***	0.15***	1							
RHSC	0.78***	0.31***	0.38***	1						
BFCC	0.63***	-0.05***	0.32***	0.36***	1					
WL	-0.38***	-0.37***	-0.27***	-0.29***	-0.09*	1				
ΔFAmt	-0.21***	0.03	-0.35***	-0.09***	-0.10***	0.05*	1			
MET	0.06	-0.09*	0.09*	0.05	0.10*	-0.01	-0.03	1		
Depress	-0.22***	-0.08*	-0.29***	-0.06	-0.12***	0.04	0.19***	0	1	
Anxious	-0.25***	-0.10**	-0.33***	-0.10***	-0.13***	0.13***	0.17***	-0.05	0.72***	1

Note. * p<.05, ** p<.01, *** p<.001. TotIE = total scores on the Intuitive Eating Scale 2; UPE= Unconditional Permission to Eat; EPR= Eating for Physical Rather than Emotional Reasons; RHSC = Reliance on Hunger and Satiety Cues; BFCC = Body-Food Choice Congruence; WL = weight loss attempts; ΔFAmt = changes in the amount of food eaten during the COVID-19 pandemic; MET = physical activity measured in metabolic equivalent task (MET) minutes/week; Depress = depression scores; Anxious = Anxiety scores.

Profiles of Intuitive Eating

Combined Sample Baseline LPA

Model fit and selection. The fit statistics for the one though eight-profile models are summarized in Table 5.

Assessing the models' LMR statistics, the two-profile model was an improvement over the one-profile model. The three-profile model was not an improvement over the two-profile model, but the four-profile model was superior to the three-profile model. The five and six-profiles showed no improvements. The seven-profile model was a better fit than the six-profile model, and the eight-profile model showed no improvement over the seven-profile model. Considering BIC and entropy, there was increased model fit with increasing number of profiles. Looking next at the ALC-Prob, there were dips moving from the two-profile to the three-profile models and again moving to the four-profile model. There is a modest increase in the five-profile model with probability ranges increasing with additional added profiles.

Considering the percent of sample by profile, notably small profile sizes begin to emerge in the five-profile model and continue through the higher-profile models. Thus, while the seven-profile model had superior fit statistics, its grouping was not suitable for substantive interpretation.

Taken together, the four-profile model showed a significant LMR, suggesting superior fit to the three-profile model and it had the lowest BIC of the remaining profiles under consideration. The four-profile model also had the highest entropy of the one through four-profile models, though entropy levels were low overall. Lastly, the ALC-prob was relatively low, yet still in a reasonable range for classification (see section on areas of profile overlap).

The strongest argument for the four-profile model is interpretability. Compared to the two-profile model, the four-profile distinguishes beyond profiles of "slightly high" and "slightly low" overall IE levels. The four-profile model uncovers underlying opposing patterns in responses to Unconditional Permission to Eat and Body-Food Congruence among the other

Table 5. *Comparative Model Fit Statistics for Latent Profile Analysis in the Combined Sample*

	Overall Model Fit							
	1-class	2-class	3-class	**4-class**	5-class	6-class	7- class	8 class
LMR (*p*-value)	-	277.14 (.000)	74.99 (.115)	**94.99 (.004)**	49.71 (0.394)	44.63 (0.584)	102.14 (.003)	49.67 (0.10)
BIC	8900.28	8649.32	8606.40	**8542.91**	8526.02	8514.35	8443.50	8447.60
Entropy	1.00	.604	0.667	**0.673**	0.706	0.744	0.873	0.858
ALC-Prob	-	0.86-0.89	0.81-0.86	**0.75-0.83**	0.78-0.84	0.79-0.89	0.80-0.98	0.76-0.98
% sample/profile								
1	947 (100%)	335 (35.4%)	216 (22.8%)	**120 (12.7%)**	137 (14.5%)	120 (12.7%)	9 (1.0%)	74 (7.8%)
2		612 (64.6%)	647 (68.3%)	**606 (64%)**	101 (10.7%)	68 (7.2%)	86 (9.1%)	87 (9.2%)
3			84 (8.9%)	**126 (13.3%)**	573 (60.5%)	391 (41.3%)	77 (8.1%)	345 (36.4%)
4				**95 (10%)**	48 (5.1%)	228 (24.1%)	347 (36.6%)	22 (23.2%)
5					88 (9.3%)	85 (9.0%)	47 (5.0%)	47 (5%)
6						55 (5.8%)	273 (28.8%)	255 (26.9%)
7							108 (11.4%)	9 (1.0%)
8								108 (11.4%)

Note. LMR = Lo-Mendell-Rubin likelihood ratio test of model fit; BIC = Bayesian Information Criterion; ALC-Prob = average latent class probabilities for the most likely latent class membership by latent class. The best model fit is shown in bold.

subscales. These findings align with the literature that shows these two scales often have a significant, small to moderate negative relationship (Duarte et al., 2016; Tylka et al., 2019).

Description of the four-profile model. The four profiles derived can be described as 1) High in Body-Food Choice Congruence and low in Unconditional Permission to Eat, Eating for Physical Rather than Emotional Reasons, and Reliance on Hunger and Satiety Cues (High BFCC, Low Other), 2) moderate in subscales of IE (Moderate), Average in Unconditional Permission to Eat and low in Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Body-Food Choice Congruence (Average UPE, Low Other), and high on subscales of IE (High). A visualization of means by profile can be found in Figure 3.

The High BFCC, Low Other profile was 12.7% of the sample and was characterized by high levels of Body-Food Choice Congruence (the mean for this group was 0.405 SDs above the mean for the combined sample), and lower levels of Unconditional Permission to Eat (1.040 SDs below) Reliance on Hunger and Satiety Cues (0.986 SDs below), and Eating for Physical Rather than Emotional Reasons (0.283 SDs below).

The largest profile (64%) was the Moderate profile with most participants falling around average on the four indicators. The mean of Body-Food Choice Congruence was 0.046 SDs below the combined sample mean, Eating for Physical Rather than Emotional Reasons was 0.066 SDs above, Unconditional Permission to Eat was 0.149 SDs above and Reliance on Hunger and Satiety Cues was 0.264 SDs above.

The next largest profile (13.3%), Average UPE, Low Other, was characterized by average levels of Unconditional Permission to Eat (.047 SDs above), and very low levels of Eating for Physical Rather than Emotional Reasons (0.986 SDs below), Reliance on Hunger and Satiety Cues (1.232 SDs below) and Body-Food Choice Congruence (1.224 SDs below).

Lastly, the High profile (10% of participants) showed moderately high levels of Unconditional Permission to Eat (0.381 SDs above the average for the combined sample) and

very high levels of Body-Food Choice Congruence (0.987 SDs above), Eating for Physical Rather than Emotional Reasons (1.01 SDs above), and Reliance on Hunger and Satiety Cues (1.165 SDs above).

Areas of profile overlap. Assessing the ALC-prob indices, the strongest source of profile overlap was with the Moderate profile. Those with a most likely membership in the High profile had a .178 probability of being assigned to the Moderate profile. This parallels the remaining profiles; those with the most likely membership in the High BFCC, Low Other and the Average UPE, Low Other profile had .172 and .104 respective probabilities of being assigned to the Moderate profile. Those with the most likely membership in the Moderate profile had a .083 probability of being assigned to the High profile and a 0.058 probability of being assigned to the High BFCC, Low Other profile.

Overlap between the Moderate and High profiles is likely best explained by comparable scores on Unconditional Permission to Eat, which was the lowest of the subscales in the High profile (means of 3.47 in the Moderate profile and 3.63 in the High profile). Further, lower distinction between the Moderate profile and the High BFCC, Low Other profile probably stemmed from close responses on Reliance on Hunger and Satiety Cues (means of 3.28 and 2.99 respectively) and Body Food Choice Congruence (means of 3.55 and 3.93 respectively). Finally, the Moderate profile and Average UPE, Low Other profile had very similar scores on Unconditional Permission to Eat (means of 3.47 and 3.40 respectively).

Apart from the Moderate profile, there was also overlap between the High BFCC, Low Other profile and the Average UPE, Low Other profile such that those who had the most likely membership in the Average UPE, Low Other profile had a .086 probability of being assigned to the High BFCC, Low Other profile. Diminished distinctiveness of these two profiles is

presumably a result of comparably lower scores in Eating for Physical Rather than Emotional Reasons and Reliance on Hunger and Satiety Cues in both profiles.

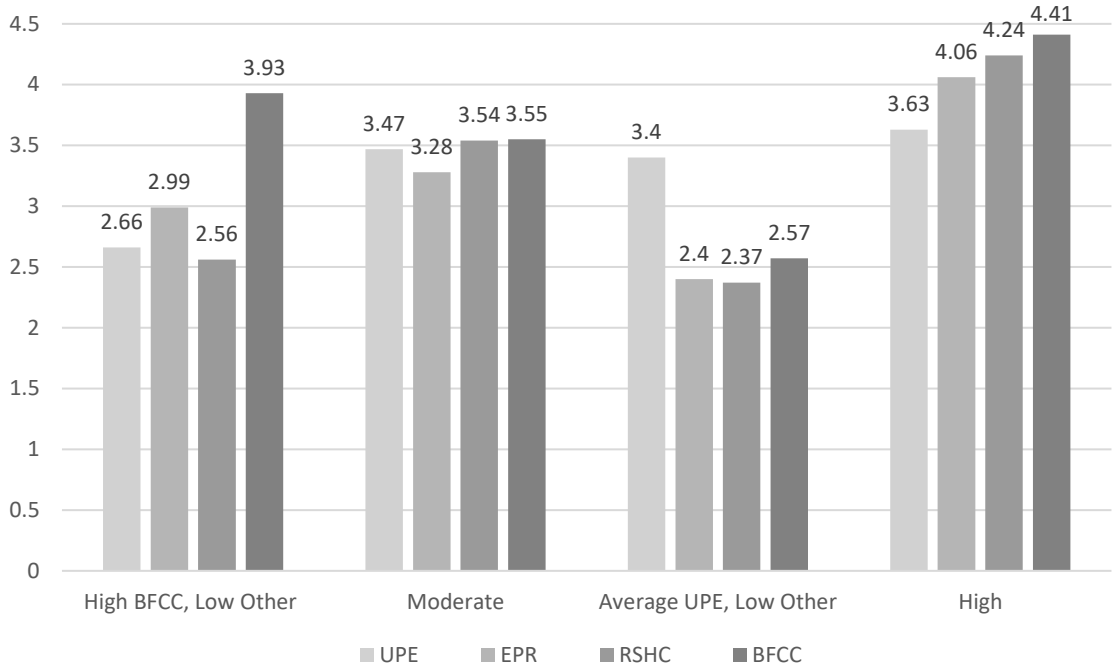

Figure 3. *Estimated Means of Variables Defining the Latent Profiles by Profile for Combined Sample*
Note. UPE= Unconditional Permission to Eat; EPR= Eating for Physical Rather than Emotional Reasons; RHSC = Reliance on Hunger and Satiety Cues; BFCC = Body-Food Choice Congruence. Average UPE, Low Other refers to the profile with Average Unconditional Permission to Eat and Low Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Body-Food Choice Congruence; High BFCC, Low Other refers to the profile with High Body-Food Choice Congruence and Lower levels of Unconditional Permission to Eat, Eating for Physical Rather than Emotional Reasons, and Reliance on Hunger and Satiety Cues; Mod-High is the profile associated with moderate to high levels of IE subscales; High refers to the profile high on IE subscales.

Undergraduate Subsample LPA

Model fit and selection. The fit statistics for the one though eight-profile models for the undergraduate subsample are summarized in Table 6.

Considering LMR statistics, the second-profile model was shown to be a significant improvement over the single class model. No improvement was suggested as the three and four-profile models were added. The five-profile model was shown to be an improvement over the four-profile model, and no improvements were seen in the six to seven-profile models. Lastly, the eight-profile model was shown to be superior to the seven-profile model. Similar to the baseline model, BIC and entropy levels improved as additional profiles were added to the model. Lastly, the ALC-Prob were fairly consistent for the first four profiles with slight increases in the five and six-profile models before eventually leveling out in the seven and eight-profile models.

Once more, looking at the percent of sample by profile, considerably small profile sizes begin to emerge in the four-profile model and continue decrease through the higher-profile models. Thus, while the five and eight-profile models had superior fit statistics, their groupings were not suitable for substantive interpretation.

When taken overall, the two-class model is the best solution for the undergraduate subsample. To start, the LMR showed that the two-profile model was a superior fit to the single class model. Next, there is a breakdown profile sizes beginning at four profiles. While the two-class model had a slightly higher BIC and lower entropy, the LMR test showed no improvement in the three-profile model. Lastly, the ALC-prob were comparable between the two and three-profile models with the two-profile having a lower minimum and a higher maximum compared to the three-profile model (see areas of profile overlap for more ALC-prob results). Thus, this

parsimonious and interpretable model with adequate profile sizes (73.1% and 26.9%) was selected for the undergraduate subsample.

Table 6. *Comparative Model Fit Statistics for Latent Profile Analysis in the Undergraduate Subsample*

	Overall Model Fit							
	1-class	**2-class**	3-class	4-class	5-class	6-class	7-class	8-class
LMR (*p*-value)	-	**114.76 (.001)**	40.53 (.374)	55.47 (.422)	48.66 (.006)	71.27 (.270)	49.22 (.242)	69.00 (.016)
BIC	4205.28	**4117.25**	4105.89	4079.10	4059.35	4031.57	4011.24	3994.90
Entropy	1.00	**0.644**	0.702	0.711	0.795	0.859	0.899	0.922
ALC-Prob	-	**0.82-0.92**	0.84-0.87	0.83-0.88	0.86-0.90	0.88-0.95	0.86-1	0.86-1
% sample/class								
1	446 (100%)	**120 (26.9%)**	64 (14.4%)	20 (4.5%)	34 (7.6%)	33 (7.4%)	4 (0.9%)	4 (0.9%)
2		**326 (73.1%)**	346 (77.6%)	209 (46.7%)	19 (4.3%)	27 (6.1%)	30 (6.7%)	23 (5.2%)
3			36 (8.1%)	188 (42.2%)	144 (32.3%)	184 (41.3%)	31 (7.0%)	37 (8.3%)
4				29 (6.5%)	217 (48.7%)	144 (32.3%)	179 (40.1%)	176 (39.5%)
5					32 (7.2%)	36 (8.1%)	25 (5.6%)	20 (4.5%)
6						22 (4.9%)	141 (31.6%)	139 (31.2%)
							36 (8.1%)	35 (7.8%)
								12 (2.7%)

Note. LMR = Lo-Mendell-Rubin likelihood ratio test of model fit; BIC = Bayesian Information Criterion; ALC-Prob = average latent class probabilities for the most likely latent class membership by latent class. The best model fit is shown in bold.

Description of the two-profile model. The two profiles of the undergraduate subsample can be described as 1) low (Low) and 2) moderately high (Mod-High) scores on the IE subscales overall. A visualization of means by profile can be found in Figure 4.

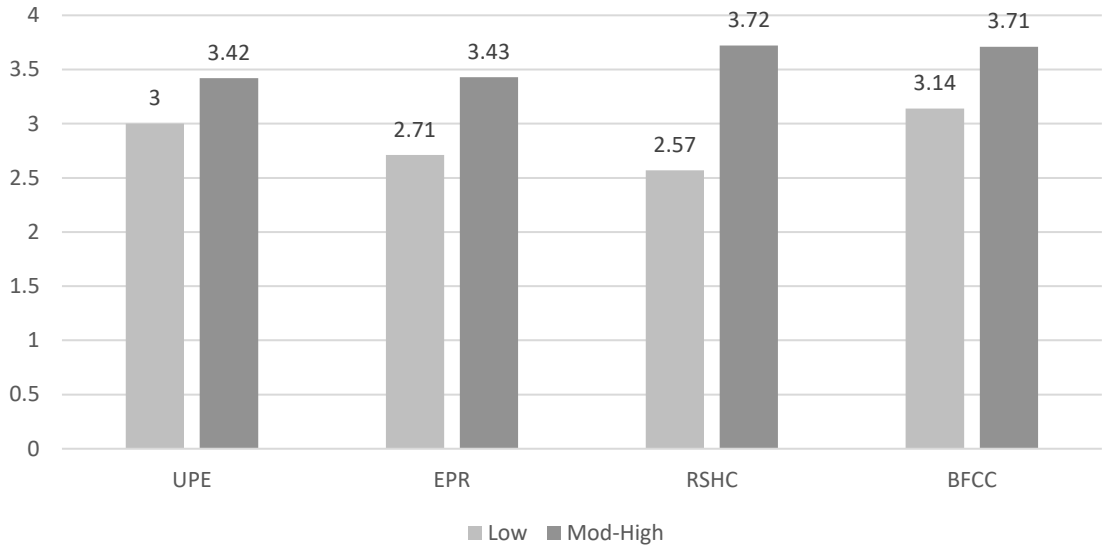

Figure 4. *Estimated Means of Variables Defining the Latent Profiles by Profile for Undergraduate Subsample*
Note. UPE= Unconditional Permission to Eat; EPR= Eating for Physical Rather than Emotional Reasons; RHSC = Reliance on Hunger and Satiety Cues; BFCC = Body-Food Choice Congruence. Low is the profile associated with lower levels on all IE subscales. Mod-High is the profile associated with moderate to high levels of IE subscales.

In the Low profile (26.9% of sample), there were low levels of all subscales. Reliance on Hunger and Satiety Cues was the lowest with a mean 1.092 SDs below the mean of the undergraduate subsample overall. Eating for Physical Rather than Emotional Reasons was 0.634 SDs below, Body-Food Choice Congruence was 0.494 SDs below and Unconditional Permission to Eat was 0.423 SDs below.

In the Mod-High profile (73.1% of sample), there were slightly higher than average scores for each of the subscales. The highest score was for Reliance on Hunger and Satiety Cues with a mean that was 0.421 SDs above the average for the undergraduate subsample. Eating for Physical Rather than Emotional Reasons was the next highest with 0.244 above followed by Body-Food Choice Congruence at 0.193 SDs above. Lastly, the mean for Unconditional Permission to Eat was 0.169 above the mean of the undergraduate subsample.

Areas of Profile Overlap. Lower classification quality as indicated by the ALC-prob and entropy is related to the overlap in profile structures. Those with the most likely membership in the Low profile had a .184 probability of being assigned to the Mod-High profile. For those with the most likely membership in the Mod-High profile, there was a .082 probability of being associated with the Low profile. These findings are probably related to similarities in the Unconditional Permission to Eat (means of 3.00 and 3.42 respectively) and Body-Food Choice Congruence (means of 3.14 and 3.71 respectively) across profiles.

Community Subsample LPA

Model fit and selection. The fit statistics for the one though eight-profile models for the community subsample are summarized in Table 7.

The LMR statistics for the latent profiles indicate that there was sequential improvement in model fit moving from a single profile model to a four-profile. Specifically, the two-profile model was superior to the one-profile model, there was significant improvement in the three-profile model, and the four-profile model was an enhancement over the three-profile model. LMR statistics reach significance again supporting the seven-profile model over the six-profile model, and the eight-profile model was not an improvement. BIC decreased with each additional profile added to the model up to the four-profile model; the BIC increased moving from a four-profile model to a five-profile model and continued to increase from there.

Entropy levels increased up to the four-profile model, dipped in the five-profile model, and showed modest increases in models of profiles six through eight. The ALC-Prob decreased moving from the two to three-profile models and improved moving into the four-profile model. The five and six-profile models had slightly lower ALC-Prob, there was an improvement in the seven-profile model and then a decrease in the eight-profile model.

Table 7. *Comparative Model Fit Statistics for Latent Profile Analysis in the Community Subsample*

	Overall Model Fit							
	1-class	2-class	3-class	**4-class**	5-class	6-class	7-class	8-class
LMR (p-value)	-	175.15 (.000)	65.40 (.005)	**50.17 (.016)**	18.67 (.449)	20.57 (.986)	19.05 (.041)	16.52 (.593)
BIC	4720.15	4570.45	4534.03	**4513.34**	4525.14	4535.00	4546.42	4563.16
Entropy	1.00	0.593	0.623	**0.672**	0.670	0.687	0.751	0.716
ALC-Prob	-	0.88-0.88	0.77-0.86	**0.8-0.85**	0.75-0.86	0.73-0.84	0.72-0.93	0.70-8.4
% sample/class								
1	501 (100%)	233 (46.5%)	93 (18.6%)	**80 (16.0%)**	77 (15.4%)	4 (0.8%)	29 (5.8%)	4 (0.8%)
2		268 (53.5%)	255 (50.9%)	**95 (19.0%)**	92 (18.4%)	47 (9.4%)	54 (10.8%)	110 (22.0%)
3			153 (30.5%)	**277 (55.2%)**	246 (49.1%)	108 (21.6%)	72 (1.4%)	5 (1%)
4				**49 (9.8%)**	33 (6.6%)	230 (45.9%)	149 (30.0%)	178 (35.5%)
5					53 (10.6%)	69 (13.8%)	170 (33.9%)	45 (9.0%)
6						43 (8.6%)	8 (1.6%)	83 (17.6%)
7							19 (3.8%)	43 (8.6%)
8								33 (6.6%)

Note. LMR = Lo-Mendell-Rubin likelihood ratio test of model fit; BIC = Bayesian Information Criterion; ALC-Prob = average latent class probabilities for the most likely latent class membership by latent class. The best model fit is shown in bold.

In terms of the percent of the sample by profile, insufficiently small groups start to emerge in the six-profile model, leaving models of profiles one through five available for meaningful interpretation.

Altogether, the four-profile model is the best fit for the community subsample LPA. The LMR statistic suggest it is the best model of the one through five-profile models. Similarly, the

BIC was lowest in the four-profile model, and the four-profile model had the highest entropy of the one through five-profile models. The ALC-Prob of the four-profile model also showed modest improvements over the three and five-profile models. Lastly, the percent of the sample by profile was within an acceptable range with the smallest profile being 9.8% of the sample and the largest profile being 55.3%. See areas of profile overlap for more details on classification quality (ALC-prob).

Description of the four-profile model. The four profiles of the community subsample are quite similar to the combined sample profiles. Together, they can be described as having 1) High scores on Unconditional Permission to Eat and Low scores on Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Body-Food Choice Congruence (High UPE, Low Other), 2) High scores on Body-Food Choice Congruence and Lower scores on Unconditional Permission to Eat, Eating for Physical Rather than Emotional Reasons, and Reliance on Hunger and Satiety Cues (High BFCC, Low Other), 3) moderate to high scores on the IE subscales (Mod-High), and 4) high scores on the IE subscales (High). A visualization of means by profile can be found in Figure 5.

The High UPE, Low Other profile was 16% of the sample and was related to moderately high levels of Unconditional Permission to Eat (the mean was .195 SDs above the mean for the community subsample), and very low levels of Eating for Physical Rather than Emotional Reasons (1.015 SDs below), Reliance on Hunger and Satiety Cues (1.128 SDs below) and Body-Food Choice Congruence (1.190 SDs below).

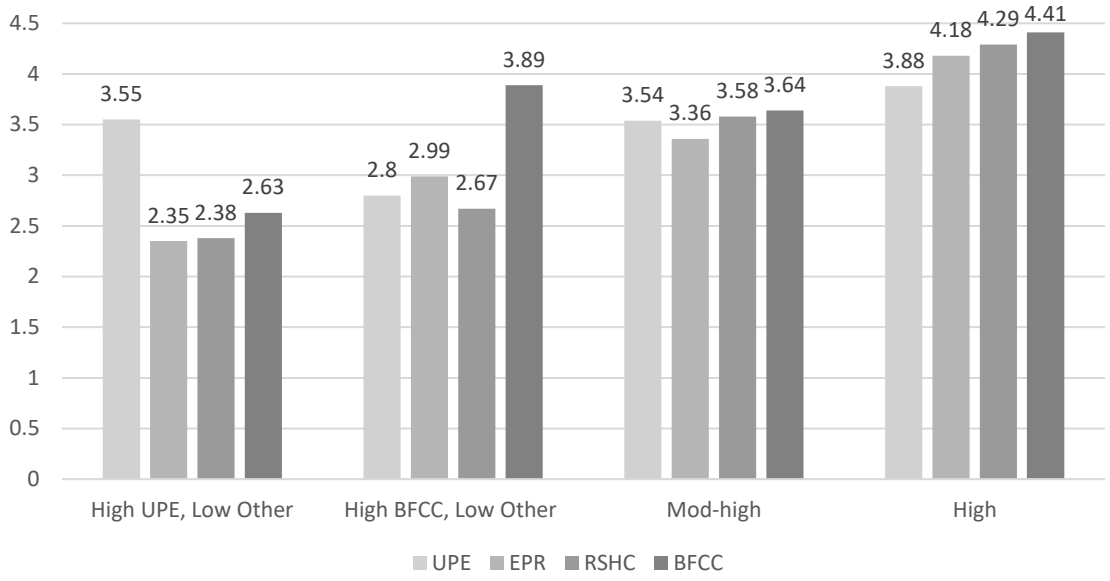

Figure 5. *Estimated Means of Variables Defining the Latent Profiles by Profile for Community Subsample*
Note. UPE= Unconditional Permission to Eat; EPR= Eating for Physical Rather than Emotional Reasons; RHSC = Reliance on Hunger and Satiety Cues; BFCC = Body-Food Choice Congruence. High UPE, Low Other refers to the profile with High Unconditional Permission to Eat and Low Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Body-Food Choice Congruence; High BFCC, Low Other refers to the profile with High Body-Food Choice Congruence and Lower levels of Unconditional Permission to Eat, Eating for Physical Rather than Emotional Reasons, and Reliance on Hunger and Satiety Cues; Mod-High is the profile associated with moderate to high levels of IE subscales; High refers to the profile high on IE subscales.

The High BFCC, Low Other profile was 19% of the sample and was characterized by high levels of Body-Food Choice Congruence (the mean for this group was 0.328 SDs above the mean for the community subsample), and lower levels of Unconditional Permission to Eat (0.945 SDs below), Reliance on Hunger and Satiety Cues (0.754 SDs below), and Eating for Physical Rather than Emotional Reasons (0.328 SDs below).

The largest profile (55.2%) was the Mod-High profile with most participants falling around or slightly higher than average on the four indicators. The mean of Body-Food Choice Congruence was 0.027 SDs below the community subsample mean, Eating for Physical Rather

than Emotional Reasons was 0.176 SDs above, Unconditional Permission to Eat was 0.182 SDs above and Reliance on Hunger and Satiety Cues was 0.387 SDs above.

Lastly, the High profile (9.8% of participants) showed high levels of Unconditional Permission to Eat (0.694 SDs above the mean for the community subsample) and very high levels of Body-Food Choice Congruence (0.948 SDs above), Eating for Physical Rather than Emotional Reasons (1.140 SDs above), and Reliance on Hunger and Satiety Cues (1.290 SDs above).

Areas of Profile Overlap. Similar to the combined sample, the more moderate profile had the strongest overlap with other profiles. For those with the most likely membership in the High profile, there was a .203 probability of being assigned to the Mod-High profile. Moreover, those with the most likely membership in the High BFCC, Low Other or the High UPE, Low Other profiles had a .143 and .051 respective probability of being assigned to the Mod-High profile. Finally, those with the most likely membership in the Mod-High profile had a .088 probability of being in the High BFCC, Low Other profile and a .073 probability of being in the High profile.

The Mod-High and High profile share overall profile structure such that levels of individual subscales did not vary much within profiles; all subscales in the Mod-High group hovered at or slightly above average scores on IE and all subscales in the High group were higher than the average. The closest subscale scores between the two profiles were for Unconditional Permission to Eat (means of 3.54 for the Mod-High profile and 3.88 for the High profile). Similarities between the Mod-High and High BFCC, Low Other profiles likely relate to the Body-Food Choice Congruence subscale; while the High BFCC, Low Other profile had a higher mean overall (M=3.89), Body-Food Choice Congruence was the subscale with the highest

mean the Mod-High profile (*M*=3.64). Finally, the smaller overlap between the Mod-High and High UPE, Low Other profiles is expected based on their very similar means on Unconditional Permission to Eat (means of 3.54 and 3.55 respectively).

One additional area of overlap was between the High UPE, Low Other and High BFCC, Low Other profiles. For those with the most likely membership in the High UPE, Low Other profile, there was a .101 probability of being assigned to the High BFCC, Low Other profile. For those with the most likely membership in the High BFCC, Low Other profile there was a .061 probability of being assigned to the High UPE, Low Other profile. Overlap between these two profiles is probably due to similar dips in Eating for Physical Rather than Emotional Reasons and Reliance on Hunger and Satiety Cues. The closest means between the two groups was in Reliance on Hunger and Satiety Cues (means of 2.63 and 2.67 respectively).

Antecedent Variables and Distal Outcome of the Undergraduate Subsample Latent Profiles

The undergraduate and community subsamples were found to be substantively different, so the remaining analyses were conducted with each subsample independently.

Gender as Antecedent Auxiliary Variable of the Latent Profiles in the Undergraduate Subsample

To start, I created dummy variables for gender, to include in the regression analysis with the nominal latent profile variable. I originally coded gender at six levels (ciswomen, transwomen, gender queer, transman, cisman, and prefer not to answer) with ciswomen as the reference group. Analyses of this six-level variable showed model breakdown when comparing ciswomen to transwomen and transmen. Thus, the gender variable was collapsed into women (cis and trans), gender queer, men (cis and trans), and prefer not to answer.

Latent profile membership was regressed on gender using the Vermunt 3-step approach and results showed that gender was significantly related to profile membership (i.e., the odds ratio 95% CI did not contain 1; see Table 8 below). Specifically, men had 2.120 higher odds of being in the Mod-High profile compared to women. See Table 9 for proportions of all six gender options by latent profile.

Table 8. *Gender as Antecedent Variable of Undergraduate Subsample Profile Membership*

Low Profile and Women as reference groups	Mod-High Profile Odds ratio [95% CI]
Gender queer	0.861 [0.034, 21.514]
Men	**2.120 [1.081, 4.155]**
Prefer not to answer	1.161 [0.233, 5.776]

Note. Low is the profile associated with lower levels on all IE subscales. Mod-High is the profile associated with moderate to high levels of IE subscales.

Distal Outcomes of the Latent Profiles in the Undergraduate Subsample

See Table 10 for a summary of means and standard errors of distal outcomes by latent profile.

Weight loss attempts (dieting). Pairwise equality tests of outcome means by profile showed that the two profiles differed significantly in weight loss attempts with a medium effect size ($\chi2(1) = 42.208$, $p<.001$, Cramer's V = .308). Specifically, the Low profile was associated with more weight loss attempts than the Mod-High profile.

Changes in amount of food eaten. Pairwise tests showed significant differences with a small effect size ($\chi2(1) = 5.407$, $p<.05$, Cramer's V = .110) in changes in the amount of food

Table 9. *Gender Proportions by Latent Profile in the Undergraduate Subsample*

	Low Profile (n=117) n (%)	Mod-High Profile (n=314) n (%)
Ciswomen	79 (67.52)	179 (57.01)
Transwomen	1 (0.85)	0 (0)
Gender queer	1 (0.85)	2 (0.64)
Transmen	1 (0.85)	0 (0.00)
Cismen	31 (26.50)	123 (39.17)
Prefer not to answer	4 (3.42)	10 (3.18)

Note. Profile n reflect the number of responses to the gender item for the profile rather than the total number of observations. Low is the profile associated with lower levels on all IE subscales. Mod-High is the profile associated with moderate to high levels of IE subscales.

Table 10. *Characteristics of Distal Outcomes by Latent Profile in the Undergraduate Subsample*

Outcome	Low Profile M (SE)	Mod-High Profile M (SE)
Weight loss attempts	0.796 (0.046)	0.410 (0.029)
Changes in amount of food eaten	3.580 (0.121)	3.235 (0.058)
Physical Activity (MET mins/wk.)	626.363 (61.827)	585.787 (29.607)
Depression	2.467 (0.033)	2.354 (0.016)
Anxiety	2.829 (0.082)	2.310 (0.041)

Note. Low is the profile associated with lower levels on all IE subscales. Mod-High is the profile associated with moderate to high levels of IE subscales.

eaten during the early COVID-19 pandemic; the Low profile was associated with increased food consumption relative to the Mod-High profile.

Physical activity. There were no significant differences found in the pairwise test for physical activity by latent profile $\chi2(1) = 0.286$, $p>.05$.

Depression. Pairwise tests showed significant differences of a small effect size between profiles on levels of depression such that the Low profile was associated with higher levels of depression $\chi2(1) = 7.901$, $p<.01$, Cramer's V = .133.

Anxiety. The Low profile was associated with significantly higher levels of anxiety compared to the Mod-High profile at a small to medium effect size, $\chi 2(1) = 26.529$, $p<.001$, Cramer's V = .244.

Weight Concern. DCAT analyses showed that there were significant differences with a small effect size between profiles regarding changes in weight concern during the COVID-19 pandemic $\chi 2(1) = 23.847$, $p<.001$, Cramer's V = .231. See Table 11 for probability statistics of changes in weight concern by profile. The Low profile was associated with high probabilities of increased weight concern, while the highest probability for the Mod-High group was no concern about weight. Both profiles had very low probabilities of decreased weight concern during the COVID-19 pandemic.

Table 11. *Probabilities of Changes in Weight Concern by Latent Profile in the Undergraduate Subsample*

Change in weight concern	Low Profile		Mod-High Profile	
	Prob (SE)	Odds ratio (SE)	Prob (SE)	Odds ratio (SE)
No concern	0.132 (0.043)	1.000 (0.000)	0.405 (0.044)	1.000 (0.000)
No change in concern	0.134 (0.057)	1.555 (0.935)	0.266 (0.029)	1.000 (0.000)
Concern increased	0.682 (0.072)	7.222 (3.681)	0.291 (0.046)	1.000 (0.000)
Concern decreased	0.052 (0.023)	4.182 (3.223)	0.038 (0.012)	1.000 (0.000)

Note. Low is the profile associated with lower levels on all IE subscales. Mod-High is the profile associated with moderate to high levels of IE subscales.

Antecedent Variables and Distal Outcome of the Community Subsample Latent Profiles

Gender as Antecedent Auxiliary Variable of the Latent Profiles in the Community Subsample

Once more, latent profiles were regressed on the four dummy-coded gender response options using Vermunt's 3-step approach. Analyses of this four-level variable showed model breakdown when comparing ciswomen to those preferring not to answer the gender item. The

latter option was removed from analyses. Results for latent profile associations with gender (women as the reference group) are summarized in Table 12. There were no significant differences in gender between the four latent profiles (i.e., all odds ratio 95% CIs contained 1). See Table 13 for proportions of all six gender options by latent profile.

Distal Outcomes of the Latent Profiles in the Community Subsample

A summary of all pairwise analyses for distal outcomes by latent profile can be found in Table 14.

Weight loss attempts. Pairwise comparisons showed significant, small differences in weight loss attempts by latent profile. Specifically, the High BFCC, Low Other profile was associated with the highest rates of weight loss attempts and was significantly higher compared to the Mod-High profile (a small effect size, Cramer's V = .157) and the High profile (a small effect size, Cramer's V = .224). The next highest profile in weight loss attempts was the High UPE, Low Other profile; this profile was associated with significantly more weight loss attempts than the Mod-High and High profiles with a small to medium effect size (Cramer's V = .245 and .300 respectively). The lowest weight loss attempts were seen in the High group; it showed a significant lower attempt rate than the Mod-High profile with a small effect size, Cramer's V = .112.

Table 12. *Gender as Antecedent Variable of Community Subsample Profile Membership*

Profile Reference Group	Gender (Women as reference)	High UPE, Low Other OR [95% CI]	High BFCC, Low Other OR [95% CI]	Mod-High OR [95% CI]	High OR [95% CI]
High UPE, Low Other	Gender queer	-	0.337 [0.013, 8.919]	0.156 [0.002, 13.375]	2.944 [0.416, 20.848]
	Men	-	0.661 [0.229, 1.906]	0.941 [0.439, 2.015]	1.135 [0.387, 3.326]
High BFCC, Low Other	Gender queer	2.969 [0.112, 78.629]	-	0.464 [0.002, 104.493]	8.742 [0.498, 153.530]
	Men	1.514 [0.525, 4.365]	-	1.424 [0.562, 3.604]	1.718 [0.560, 5.266]
Mod-High	Gender queer	6.401 [0.075, 547.948]	2.156 [0.010, 485.583]	-	18.844 [0.155, 2294.880]
	Men	1.063 [0.496, 2.278]	0.702 [0.277, 1.778]	-	1.207 [0.416, 3.503]
High	Gender queer	0.340 [0.048, 2.405]	0.114 [0.007, 2.009]	0.053 [0.000, 6.463]	-
	Men	0.881 [0.301, 2.583]	0.582 [0.190, 1.785]	0.829 [0.285, 2.406]	-

Note. High UPE, Low Other refers to the profile with High Unconditional Permission to Eat and Low Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Body-Food Choice Congruence; High BFCC, Low Other refers to the profile with High Body-Food Choice Congruence and Lower levels of Unconditional Permission to Eat, Eating for Physical Rather than Emotional Reasons, and Reliance on Hunger and Satiety Cues; Mod-High is the profile associated with moderate to high levels of IE subscales; High refers to the profile high on IE subscales.

Table 13. *Gender Proportions by Latent Profile in the Community Subsample*

	High UPE, Low Other (n=77) n (%)	High BFCC, Low Other (n=90) n (%)	Mod-High (n=261) n (%)	High (n=47) n (%)
Ciswomen	56 (72.72)	73 (81.11)	199 (76.25)	32 (68.09)
Transwomen	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Gender queer	2 (2.60)	1 (1.11)	3 (1.15)	3 (6.38)
Transmen	1 (1.30)	0 (0.00)	0 (0.00)	0 (0.00)
Cismen	16 (20.78)	16 (17.78)	57 (21.84)	11 (23.40)
Prefer not to answer	2 (2.60)	0 (0.00)	2 (0.77)	1 (2.13)

Note. Profile n reflect the number of responses to the gender item for the profile rather than the total number of observations. High UPE, Low Other refers to the profile with High Unconditional Permission to Eat and Low Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Body-Food Choice Congruence; High BFCC, Low Other refers to the profile with High Body-Food Choice Congruence and Lower levels of Unconditional Permission to Eat, Eating for Physical Rather than Emotional Reasons, and Reliance on Hunger and Satiety Cues; Mod-High is the profile associated with moderate to high levels of IE subscales; High refers to the profile high on IE subscales.

Table 14. *Results from Pair-wise Comparisons of Distal Outcomes by Profile in the Community Subsample*

Profile Reference Group		High UPE, Low Other M (SE) or $\chi2(1)$, *p*	High BFCC, Low Other M (SE) or $\chi2(1)$, *p*	Mod-High M (SE) or $\chi2(1)$, *p*	High M (SE) or $\chi2(1)$, *p*
High UPE, Low Other	WL attempt	0.738 (0.051)			
	Δ food eaten	3.763 (0.134)			
	Physical activity	403.443 (80.912)			
	Depression	2.249 (0.082)			
	Anxiety	2.450 (0.115)			
High BFCC, Low Other	WL attempt	$\chi2(3) = 3.342$, $p = .068$	0.876 (0.048)		
	Δ food eaten	**$\chi2(3) = 6.307$, $p < .05$**	3.302 (0.105)		
	Physical activity	$\chi2(3) = 1.767$, $p = .184$	541.191 (51.193)		
	Depression	**$\chi2(3) = 5.149$, $p < .05$**	1.970 (0.079)		
	Anxiety	**$\chi2(3) = 5.048$, $p < .05$**	2.059 (0.112)		
Mod-High	WL attempt	**$\chi2(3) = 12.413$, $p < .001$**	**$\chi2(3) = 30.176$, $p < .001$**	0.510 (0.037)	
	Δ food eaten	**$\chi2(3) = 13.692$, $p < .001$**	$\chi2(3) = 0.502$, $p = .478$	3.206 (0.061)	

	Physical activity	$\chi2(3) = 3.534$, $p = .060$	$\chi2(3) = 0.193$, $p = .661$	571.694 (35.125)	
	Depression	**$\chi2(3) = 19.645$, $p < .001$**	$\chi2(3) = 1.976$, $p = .160$	1.830 (0.043)	
	Anxiety	**$\chi2(3) = 15.457$, $p < .001$**	$\chi2(3) = 0.906$, $p = .341$	1.923 (0.063)	
High	WL attempt	**$\chi2(3) = 25.138$, $p < .001$**	**$\chi2(3) = 45.113$, $p < .001$**	**$\chi2(3) = 6.317$, $p < .05$**	0.266 (0.079)
	Δ food eaten	**$\chi2(3) = 17.799$, $p < .001$**	**$\chi2(3) = 3.975$, $p < .05$**	$\chi2(3) = 2.065$, $p = .151$	2.973 (0.132)
	Physical activity	$\chi2(3) = 1.513$, $p = .219$	$\chi2(3) = 0.067$, $p = .796$	$\chi2(3) = 0.458$, $p = .498$	522.476 (54.044)
	Depression	**$\chi2(3) = 14.102$, $p < .001$**	$\chi2(3) = 2.493$, $p = .114$	$\chi2(3) = 0.186$, $p = .666$	1.780 (0.095)
	Anxiety	**$\chi2(3) = 12.890$, $p < .001$**	$\chi2(3) = 1.810$, $p = .178$	$\chi2(3) = 0.297$, $p = .586$	1.836 (0.128)

Note. WL = weight loss; Δ food eaten = changes in the amount of food eaten during COVID-19; High UPE, Low Other refers to the profile with High Unconditional Permission to Eat and Low Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Body-Food Choice Congruence; High BFCC, Low Other refers to the profile with High Body-Food Choice Congruence and Lower levels of Unconditional Permission to Eat, Eating for Physical Rather than Emotional Reasons, and Reliance on Hunger and Satiety Cues; Mod-High is the profile associated with moderate to high levels of IE subscales; High refers to the profile high on IE subscales.

Changes in amount of food eaten. Pairwise tests showed differences of small magnitudes between profiles on changes in the amount of food eaten in the early COVID-19 pandemic. The High UPE, Low Other profile had significantly greater increases in food consumption compared to the High BFCC, Low Other (Cramer's V =.112), Mod-High (Cramer's V =.165), and High profiles (Cramer's V =.188) with small effect sizes. Further, the High BFCC, Low Other was associated with larger increases in consumption compared to the High profile with a negligible effect size, Cramer's V =.089.

Physical activity. There were no significant differences found in the pairwise tests comparing physical activity by latent profile.

Depression. Pairwise comparisons showed differences of small magnitudes between profiles on depression scores. The High UPE, Low Other profile was associated with significantly higher depression compared to the High BFCC, Low Other (Cramer's V =.101), Mod-High (Cramer's V =.198), and High profiles (Cramer's V =.168). There were no significant differences in the remaining profiles.

Anxiety. Similar to depression, differences of small effect sizes were seen in anxiety by latent profile. Once more, the High UPE, Low Other profile was associated with significantly higher anxiety than the High BFCC, Low Other (Cramer's V =.100), Mod-High (Cramer's V =.176), and High profiles (Cramer's V =.160). Once more, there were no significant differences between the other profiles.

Weight Concern. DCAT analyses showed that there were significant differences in weight concern between the latent profiles. See Table 15 for probability statistics of changes in weight concern by profile and Table 16 for corresponding chi-square, significance, and effect size statistics. Specifically, there were differences between all pairs except the High UPE, Low

Other and High BFCC, Low Other profiles. The High UPE, Low Other and High BFCC, Low Other profiles had the highest probability of responses indicating increased concerns about weight during the COVID-19 pandemic. The Mod-High profile had the highest probabilities for no change in weight concern followed by increase in weight concern. Finally, the High profile had the highest probability of endorsing no concern about weight or no change in weight concern.

Table 15. *Probabilities of Changes in Weight Concern by Latent Profile in the Community Subsample*

Changes in weight concern	High UPE, Low Other		High BFCC, Low Other		Mod-High		High	
	Prob (SE)	Odds ratio (SE)	Prob (SE)	Odds ratio (SE)	Prob (SE)	Odds ratio (SE)	Prob (SE)	Odds ratio (SE)
No concern	0.061 (0.057)	1.000 (0.000)	0.039 (0.020)	1.000 (0.000)	0.217 (0.073)	1.000 (0.000)	0.487 (0.056)	1.000 (0.000)
No change	0.256 (0.071)	5.298 (5.147)	0.392 (0.047)	12.580 (7.374)	0.458 (0.073)	2.655 (1.331)	0.387 (0.054)	1.000 (0.000)
Concern increased	0.683 (0.091)	43.292 (47.613)	0.515 (0.053)	50.631 (35.288)	0.267 (0.073)	4.749 (3.151)	0.126 (0.040)	1.000 (0.000)
Concern decreased	0.000 (0.000)	- -	0.054 (0.026)	- -	0.058 (0.039)	- -	0.000 (0.000)	1.000 (0.000)

Note. High UPE, Low Other refers to the profile with High Unconditional Permission to Eat and Low Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Body-Food Choice Congruence; High BFCC, Low Other refers to the profile with High Body-Food Choice Congruence and Lower levels of Unconditional Permission to Eat, Eating for Physical Rather than Emotional Reasons, and Reliance on Hunger and Satiety Cues; Mod-High is the profile associated with moderate to high levels of IE subscales; High refers to the profile high on IE subscales.

Table 16. *Chi-square Statistics, Significance, and Effect Sizes for Changes in Weight Concern by Latent Profile in the Community Subsample*

	Omnibus	High UPE, Low Other vs. High BFCC, Low Other	High UPE, Low Other vs. Mod-High	High UPE, Low Other vs. High	High BFCC, Low Other vs. Mod-High	High BFCC, Low Other vs. High	Mod-High vs. High
$\chi 2$	113.606	7.788	15.535	40.891	10.984	81.137	8.550
(*p*)	(<.001)	(0.051)	(0.001)	(<.001)	(0.012)	(<.001)	(0.036)
V	.476	.125	.176	.286	.148	.402	.131

Note. Effect sizes calculated using Cramer's V. High UPE, Low Other refers to the profile with High Unconditional Permission to Eat and Low Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Body-Food Choice Congruence; High BFCC, Low Other refers to the profile with High Body-Food Choice Congruence and Lower levels of Unconditional Permission to Eat, Eating for Physical Rather than Emotional Reasons, and Reliance on Hunger and Satiety Cues; Mod-High is the profile associated with moderate to high levels of IE subscales; High refers to the profile high on IE subscales.

DISCUSSION

The current work sought to determine whether multiple profiles of IE existed in a large sample of undergraduates and community members using a person-centered analysis novel to the study of IE. Further, it was of interest to determine whether the undergraduate and community subsamples would consist of interpretably similar profiles as those seen in the overall model. Lastly, this work aimed to determine how profiles relate to antecedent (i.e., gender) and distal outcome variables (i.e., weight loss attempts, changes in the amount of food consumed during the COVID-19 pandemic, physical activity, depression and anxiety levels, and changes in weight concern during the pandemic).

Distinct Intuitive Eating Profiles in a Combined Sample of Undergraduates and Community Members

Addressing the first aim, an LPA of the combined sample of undergraduates and community members was conducted. Results showed that a four-profile model was the best fit. The resulting profiles differentiated between those who had: 1) High levels of Body-Food Choice Congruence and Low levels of: Unconditional Permission to Eat, Eating for Physical Rather than Emotional Reasons, and Reliance on Hunger and Satiety Cues. (High BFCC, Low Other), 2) Moderate scores on the four IE subscales (Moderate), 3) Average levels of Unconditional Permission to Eat and Low levels of: Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Body-Food Choice Congruence (Average UPE, Low Other), and 4) High scores on the IE subscales (High). The Moderate profile was the largest, accounting for about 64% of the sample, showing that most individuals clustered around the average of the combined sample. This average score also tended to be slightly higher than

neutral in the IE scale, suggesting very slight tendencies toward IE in the combined sample. The next largest groups were the Average UPE, Low Other (13.3%) and High BFCC, Low Other (12.7%) profiles. About 10% of the sample was in the High profile. Findings lend support to the hypothesis that distinct profiles of IE exist within the general population of undergraduates and community members.

The resulting profiles offer a compelling picture of the overall distribution of IE responses. Specifically, it seems there may be distinctions in the relationship between Unconditional Permission to Eat, Body-Food Choice Congruence and the remaining subscales. The High BFCC, Low Other profile was associated with strong alignment between one's nutritional and energetic needs and their food choices. While Body-Food Choice Congruence is a characteristic of intuitive eating, previous research shows that it is also associated with higher levels of restrained eating (Akırmak et al., 2018; Smith et al., 2020), which is antithetical to many of the core tenets of IE and tends to have an inverse relationship with both IE overall and the remaining three subscales (Akırmak et al., 2018; Anderson et al., 2016; Denny et al., 2013; Smith et al., 2020). Thus, in isolation, high levels of Body-Food Choice Congruence can be characteristic of behaviors well outside of the IE paradigm. It is possible that this profile relates to response of people who may be higher in nutrition consciousness and relatively low in IE.

Similarly, the Average UPE, Low Other profile seems to be picking up on a distinct subgroup of individuals that tend to have average levels of Unconditional Permission to Eat, suggesting moderate levels of non-restriction around the types and amount of food they eat, but lower levels on the remaining IE subscales. This group likely has lower levels of restrictive eating (Anderson et al., 2016; Smith et al., 2020) but are more likely to eat in response to emotions rather than for physical reasons. They are also less likely to rely on their body's

internal cues that tell them when and how much to eat and are less inclined to eat in alignment with their body's nutritional and energetic needs. Thus, while individuals associated with this profile are likely to have "food freedom," they seem to lack many of the other behaviors associated with IE.

Taken together, the High BFCC, Low Other and Average UPE, Low Other profiles likely distinguish between two different patterns of low IE behaviors. Those associated with either group do not rely on their body's hunger and satiety cues to tell them when and what to eat, and they are both more likely to emotionally eat. Simply put, one group (Average UPE, Low Other) is more likely to eat what and when they want and the other is more likely to be focused on eating healthfully (High BFCC, Low Other). Neither captures all the behaviors at the core of IE and together, these groups make up about a quarter of the combined sample.

Similar or Different Profiles Between the Undergraduate and Community Subsamples

To achieve the second aim of understanding whether IE profiles differ among different population subgroups, independent LPAs were conducted for the undergraduate and community subsamples. Results showed that the subsamples were notably different in number of profiles and profile characteristics. This suggests that there may be differences in patterns of IE between undergraduate and community subsamples.

In the undergraduate subsample, two distinct profiles were derived that could be described as 1) scoring lower than average on the IE subscales (Low) and 2) scoring at moderate to high levels on the IE subscales (Mod-High). Most of the undergraduate subsample (73.1%) was associated with the Mod-High profile, while slightly over a quarter of the subsample was associated with the Low profile. Similar to the combined sample findings, this suggests that a sizeable portion of the subsample falls close to or slightly above the average of IE scores.

In the community subsample, four unique profiles emerged that were characterized by 1) High scores on Unconditional Permission to Eat and Low scores on: Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Body-Food Choice Congruence (High UPE, Low Other), 2) High scores on Body-Food Choice Congruence and Low scores on: levels of Unconditional Permission to Eat, Eating for physical rather than emotional reasons, and Reliance on Hunger and Satiety Cues, (High BFCC, Low Other), 3) Moderate to high scores on the IE subscales (Mod-High), and 4) High scores on the IE subscales (High). The majority of the sample (55%) was associated with the Mod-High profile. This is similar to the findings from both the combined sample and undergraduate subsample, with most individuals being probabilistically "assigned" to profiles characterized by moderate to moderately high levels of IE overall. The next largest proportion was associated with the High BFCC, Low Other profile with 19% of the sample falling into this profile. The remaining portions of the subsample were associated with the High UPE, Low Other (16%) and High profiles (10%).

Profiles from the community subsample share important characteristics with the profiles from the combined sample. Specifically, there is once more a distinction between those who are high on Body-Food Choice Congruence or Unconditional Permission to Eat relative to the low scores of the remaining subscales. Once more, these profiles are likely distinguishing between two different types of low intuitive eaters. Together, these groups make up roughly a third of the community subsample.

Distinctions and Similarities Between Profiles

The two profiles derived from the undergraduate subsample consisted of scores that were either globally low or globally moderate to high in IE. Overlap between these two profiles was

related to scores on Unconditional Permission to Eat and Body-Food Choice Congruence. Specifically, while these two subscales were comparably lower in the Low profile, they were the subscales with the closest means to the Mod-High profile.

Results from the undergraduate subsample are compelling when interpreted in the context of the combined sample and community subsamples. For example, in the four profiles derived from these two subsamples were two profiles related to either higher levels of Unconditional Permission to Eat or Body-Food Choice Congruence compared to the subscales of Eating for Physical Rather than Emotional Reasons and Reliance on Hunger and Satiety Cues. If these two profiles were combined, it would be reasonable to assume similarities to the Low profile in the undergraduate sample, supporting the argument that the High BFCC, Low Other and High/Average UPE, Low Other profiles may be differentiating between types of low intuitive eaters.

The High BFCC, Low Other and High/Average UPE, Low Other profiles have parallel low scores in Eating for Physical Rather than Emotional Reasons and Reliance on Hunger and Satiety Cues meaning the profiles are associated with externalized reasons for eating. That is, people associated with either profile are more likely to emotionally eat and not rely on internal cues when making decisions about eating. The peaks in either Unconditional Permission to Eat or Body-Food Choice Congruence suggest that there may be two different types of externalized eaters: 1) those who do not restrict the type or amount of food they eat and have little regard for nutrition in their food choices and 2) those who focus on nutrition while restricting their food choices.

While parallels might exist between the Low profile of the undergraduate sample and a blended version of the High BFCC, Low Other and High/Average UPE profiles in the combined

and community sample, distal outcome analyses suggest the distinction between profiles might be an important one to make. Of the two types of low intuitive eaters, those with peaks in Unconditional Permission to Eat had higher depression, anxiety, and increases in food intake during the early COVID-19 pandemic compared to those with peaks in Body-Food Choice Congruence.

Similarly, given the overlap between the Moderate/Mod-High and High profiles in the combined and community samples, it is reasonable to suggest that these profiles are comparable to the Mod-High profile in the undergraduate sample. Importantly, there *were* differences in outcomes for the Mod-High and High profiles derived in the community sample such that those associated with the Mod-High profile reported higher levels of weight loss attempts and higher odds of endorsing increased weight concern during the early COVID-19 pandemic. These differences lend support for the utility of the distinction between the Mod-High and High profiles in the community sample.

There were also similarities between the Moderate/Mod-High profiles and High BFCC, Low Other and High/Average UPE profiles. This overlap is best explained by the alikeness in either Unconditional Permission to Eat or Body-Food Choice Congruence between profiles. Despite the overlaps, there are still considerable interpretable differences between these profiles, namely that those in the Moderate and Mod-High profiles are *not* lower on EPR and RHSC. While the Moderate and Mod-High profiles share a similar mean with either the High BFCC, Low Other or High/Average UPE, Low Other profiles, they are associated with discernably different patterns of eating behaviors.

Taken together, the overlap between the Low and Mod-High profiles in the undergraduate sample, are likely explained through the spikes in Unconditional Permission to

Eat and Body-Food Choice Congruence witnessed in the four-profile models of the combined and community sub/samples. Further, the overlap between the High BFCC, Low Other and High/Average UPE, Low Other profiles seen in the combined and community sub/sample are likely explained through the similarly low levels in Eating for Physical Rather than Emotional Reasons and Reliance on Hunger and Satiety Cues. However, these similar means aid in our interpretation of what it means to be a low intuitive eater. Finally, while the Moderate/Mod-High and High groups have overlapping characteristics (similar distributions of all subscales within each profile), there are meaningful differences in outcomes between these two profiles, suggesting there may be a benefit in interpreting these profiles as distinct.

Gender as an Antecedent Variable of Profile Membership

Gender is one of the strongest known predictors of IE in the literature (Linardon et al., 2021). Specifically, women, compared to men, tend to have lower levels of IE behaviors in both undergraduate and community subsamples. To test whether gender was a significant antecedent variable of the IE profiles in the present research, Vermunt's 3-step approach was conducted with the gender variable. In both the undergraduate and community subsamples, the gender variable had to be collapsed for analyses to run properly.

In the undergraduate subsample, men were more likely to be in the Mod-High profile compared to women (gender categories include both cis and trans women and men). There were no differences in profile association between women and gender queer individuals or those who preferred not to answer the gender item. Overall, the Low profile had high proportions of ciswomen (67.5%), followed by cismen (26.5%). Comparatively, the Mod-High profile approached more balanced proportions of ciswomen (57%) and cismen (39.2%). One transwoman, one transman, and one gender queer individual were associated with the Low

profile and two gender queer individuals were associated with the Mod-high profile. These numbers are highly influenced by the gender proportions of the overall undergraduate subsample. It is also important to reiterate that these profile "assignments" are based on probabilistic profile membership and that no profile truly encompasses an individual's responses.

Findings from the undergraduate subsample align with the results previously seen in the literature with men being associated with higher levels of IE compared to women(see Linardon et al., 2021 for a meta-analysis). Specifically, women had significantly lower odds of being probabilistically associated with the Mod-High profile compared to men and the Low profile. Unfortunately, this study likely lacked the sample distribution needed to meaningfully assess potential differences with people identifying as trans or gender queer, thus it is still unclear how IE relates to genders outside of a binary perspective.

In the community subsample, comparative analyses were conducted between women, men, and gender queer participants and results showed that gender was not significantly associated with the four profiles. One possible explanation for these null findings is that gender may be more associated with globally high and low levels of IE. It is possible that the variance normally associated with lower levels of IE was divided between the High UPE, Low Other and High BFCC, Low Other profiles and the variance typically associated with higher levels of IE were split between the Mod-High and High profiles. Such divisions might have made it difficult to detect overall gender differences between profiles. It is also possible that a more nuanced interpretation of IE behaviors diminishes the importance of gender as a related variable. That is to say, perhaps gender differences are only seen at the gross level of the IE measure.

In terms of gender proportions, each of the four community profiles aligned closely with the gender proportions of the combined sample; ciswomen made up between 68.1% and 81.1%

of the profiles and cismen constituted between 17.8% and 21.8% of the profiles. There were no transwomen in the community subsample and the one transman was associated with the High UPE, Low Other profile. Two gender queer people were associated with the High UPE, Low Other profile, one with the High BFCC, Low Other profile and three each with the Mod-High and High profiles.

Distal Outcomes of Latent Profiles

In the undergraduate subsample, the Low profile was associated with higher rates of weight loss attempts, increased consumption of food during the early COVID-19 pandemic, higher levels of depression and anxiety and had higher probabilities of endorsing increased concern for weight during the COVID-19 pandemic compared to the Mod-High profile. There were no differences in physical activity by profile. These results align with the literature on IE with increased levels of IE related to lower levels of weight loss attempts, mental health concerns, and weight concern. This provides clearer evidence for IE being related to greater stability in food consumption rates, particularly in times of stress like that of the early COVID-19 pandemic. Given these results, it is likely that those in the Mod-High group were faring better to the challenges of the COVID-19 pandemic with lower levels of psychological distress and greater stability in their body image and eating behaviors.

In the community subsample, there were significant differences between profiles on all outcomes apart from physical activity. The High BFCC, Low Other profile was associated with the highest rates of weight loss attempts compared to all other profiles. These results align with the understanding that this profile is likely associated with higher nutritional consciousness without the other behaviors associated with IE. It is likely that the High BFCC, Low Other profile consists of those who practice dieting, likely with high levels of restraint and externalized

cues for what and when to eat. The High UPE, Low Other showed the next highest levels of weight loss attempts compared to the Mod-High and High profiles. This is interesting as this profile is associated with a greater lack of restrictions around what and when to eat and lower levels of aligning food choices with one's nutritional and energetic needs. It could be that individuals associated with this pattern seek weight loss but do not maintain some of the behaviors typically associated with dieting. That is, they might be attempting dieting behaviors and reporting that they are generally unable to maintain them. It is also possible that this profile is associated with weight loss strategies outside of those related to diet. Finally, the High profile had the lowest rates of weight loss attempts, compared to all other groups. This complements the standing literature on IE which generally shows negative associations with dieting behaviors (Anderson et al., 2016; Denny et al., 2013; Smith et al., 2020).

Considering changes in food consumption during the early COVID-19 pandemic, the High UPE, Low Other, High BFCC, Low Other, and Mod-high all had means that suggested slight to moderate increases in amount of food eaten. The mean of the High profile suggested no change in food consumption. Overall, the High UPE, Low Other profile had significantly higher increased consumption compared to all three remaining profiles. This stands to reason; as shown in the undergraduate subsample, stability in food consumption is related to higher levels of IE and the High UPE, Low Other group has unrestrained eating without the other associated IE behaviors. People associated with this profile tend to not have limitations on their food but are more likely to emotionally eat and externalize their cues for consumption. These combined characteristics would likely result in increased consumption, particularly in times of stress and increased negative emotions.

Levels of depression and anxiety showed similar distinctions between profiles; the High UPE, Low Other profile had significantly poorer mental health outcomes compared to the three other profiles. It is likely that this trend is related to other characteristics of the High UPE, Low Other profile outside of the high levels of Unconditional Permission to Eat. In the literature, Eating for Physical Rather than Emotional Reasons tends to have the strongest negative relationship with depression and anxiety, with most results suggesting negligible to modest relationships among the other subscales (Camilleri et al., 2015; Daundasekara et al., 2017; Duarte et al., 2016; Mendes, 2014). These results were replicated in the bivariate correlations of the current study. The High UPE, Low Other group has much lower levels of Eating for Physical Rather than Emotional Reasons compared to all other profiles, and likely showed the strongest dip in mental health measures because of it. While the differences are not significant, there are incremental decreases in mean scores from the High UPE, Low Other to the High BFCC, Low Other to the Mod-High to the High profiles. These trends correspond with the levels of Eating for Physical Rather than Emotional Reasons among other IE factors. Taken together, it is likely that global levels of IE or perhaps the Eating for Physical Rather than Emotional Reasons alone are driving the stronger associations with depression and anxiety in the High UPE, Low Other profile.

Results show that there are significant differences in changes in weight concern during the COVID-19 pandemic between all profile pairs except the High UPE, Low Other and High BFCC, Low Other profiles. Together, the High UPE, Low Other and High BFCC, Low Other profiles had the highest probabilities of increases in weight concern; the High UPE, Low Other profile was associated with a .68 probability of increased weight concern and the High BFCC, Low Other had a probability of .52. The next largest category for each of these two profiles was

no change in weight concern, showing that weight concern is still present among these groups, but showed no change. The Mod-High profile was most associated with no change in weight concern (a .46 probability) with the next highest probabilities being increased concern (.27 probability) and no concern about weight (.22 probability). The High profile was associated with the highest probability (.49) of no weight concern followed by no change in weight concern at a .39 probability. All profiles had either no or very little probability of decreased concern about weight during the early COVID-19 pandemic. These results are not surprising given the previous findings that concerns about one's body are inversely related to IE (Carrard et al., 2021) and that weight concerns were on the rise in the early stages of the COVID-19 pandemic (Jordan et al., 2021; Keel et al., 2020).Moreover, these findings might be related to those regarding depression and anxiety as positive body image is related to higher levels of mental health (Silva et al., 2019).

Limitations and Recommendations for Future Research

This study has several notable limitations. To start, all three selected models had lower levels of classification quality than would be ideal for mixture models such as these. Specifically, there appeared to be a trade-off between meaningful groupings (above 5% sample/profile) and the model's entropy and ALC-prob indices. While there is no absolute consensus on cutoff values for entropy, it is widely accepted that values above .8 are good for model classification. The current study discusses models with entropy as low as .644. However, some scholars indicate that final profile solutions need not rely on this index (Weller et al., 2020). Models are chosen in consideration of multiple fit indices, interpretability, and parsimony.

Lower classification quality is the result of overlapping characteristics between profiles. However, it could be argued that some of the similarities between the profiles discussed here

potentially aid in the interpretation and utility of the findings. For example, in the combined and community sub/samples, the High BFCC, Low Other and High/Average UPE, Low Other profiles share relatively low levels of Eating for Physical Rather than Emotional Reasons and Reliance on Hunger and Satiety Cues. While this similarity lowers the classification quality of the model overall, it also enables the differentiation of two types of low intuitive eaters, those who focus on nutrition and those who do not have restrictions in their food choices. Thus, lower classification quality would be reasonable to expect given the patterns seen here. Moreover, significant differences in distal outcomes suggest that the distinction between these profiles is likely meaningful. Finally, it is important to note that, taken together, other model fit indices and considerations of substantive profile sizes did support the selection of the models discussed.

While person-centered approaches have advantages, they are certainly not without their drawbacks. For example, the profiles derived in the current study may have limited generalizability as they may be context-dependent (Kusurkar et al., 2021). This is particularly important to consider as these data were collected at the start of the pandemic which disrupted individuals' daily lives. Thus, if profiles such as these are used to inform intervention work, it would be advisable to assess potential profile structures in the target population.

Another key limitation is the bias introduced by researcher interpretation of LPA results. It is possible to fall prey to naming fallacy in which interpretation and naming of profiles may not represent class membership accurately (Weller et al., 2020). This may be related to concision in the overall interpretation of groupings. For example, in the community subsample of the present study, the High UPE, Low Other and High BFCC, Low Other profiles emphasize the disproportionate levels of either Unconditional Permission to Eat or Body-Food Choice Congruence as relative to the other three remaining subscales. However, comparing the two

groups, one can see that while in the High BFCC, Low Other profile Unconditional Permission to Eat and Eating for Physical Rather than Emotional Reasons are lower than average and much lower than Body-Food Choice Congruence, they are a fair amount higher than the scores related to the High UPE, Low Other profile. When profile names simplify a complex pattern of responses, it is possible to misinterpret findings such that glaring differences obscure the influence of more nuanced deviations.

Several other limitations are associated with sampling and sample characteristics. To start, this study relied on convenience sampling for both subsamples studied. Further, there were noteworthy differences between the subsamples in age and location. The community subsample was not only older but had much more variability in age. While the majority of participants from both subsamples were located in Colorado, the undergraduate subsample consisted of students who attended school in a single city whereas participants from the community subsample varied more by location. The sample was also lacking in gender and racial/ethnic diversity. In the combined sample, 87% were white, 82% were non-Hispanic/Latinx/Chicanx, and 68% were ciswomen (28% cismen). For the current study, this limitation was seen most acutely in the introduction of gender as an antecedent variable. The sample consisted of very few individuals identifying as trans and gender queer, underpowering my ability to detect differences. This limits the conclusions that can be drawn about IE outside of a binary gender perspective. Given the known associations between IE and gender, there could be meaningful distinctions that are overlooked by under sampling gender-diverse groups. To reduce these combined limitations, future research should employ more representative sampling methods and expand research to include participants from under-studied populations. These improvements will be an important

step for future IE researchers as we aim to understand this construct in an inclusive and representative manner.

One additional way this study may lack generalizability is its context in a pandemic. Although there are benefits to studying IE behaviors during the COVID-19 pandemic, findings should be understood with consideration given to the unique circumstances related to this global health crisis. Of note, some distal outcome variables were known to have changed over the course of the pandemic (Brooks et al., 2020b; Johnson et al., 2022; Stockwell et al., 2021; Violant-Holz et al., 2020). For example, aggregate findings from 12 international studies found that 31% of individuals reported an increase in food consumption (Johnson et al., 2022). While changes in food consumption were shown to differ by profile in the current study, it is important to consider other key variables that might be influencing both variables of interest. One avenue for future research is to collect comparative samples at different points in the pandemic or post-pandemic context. For example, I will be conducting a follow-up study with a new undergraduate sample two years after the initial study.

Finally, given that the present work relies on survey data, I would be remiss to neglect the limitations and biases introduced in using self-report methods. In fact, there is some evidence of an accuracy gap between self-reported and actual eating behaviors. For instance, several studies have shown no relationship between one's caloric intake and dietary restraint over multi-week periods (Stice et al., 2004, 2007, 2010). It is possible that responses are more driven by individuals' aspirations for eating rather than their actual behaviors. This could be particularly damaging to the study of IE given the subscales related to emotional eating and attention to one's nutritional needs for food selection. It could be that social desirability or even a personal desire to affirm these behaviors sways responses to certain items or potentially whole subscales. Future

research should use designs such as ecological momentary assessments to gain a clearer understanding of potential differences between self-reported IE behaviors and real-time eating behaviors.

Strengths and Contributions

The current work is the first of its kind to apply person-centered, LPAs to the study of IE. Approaches such as these are beneficial as they can uncover hidden variability in responses to a combination of indicators. For example, in the combined sample and community subsample there are distinct subgroups with higher levels of Body-Food Choice Congruence or Unconditional Permission to Eat compared to the remaining subscales. These nuances would likely be undetected using variable-centered approaches. Thus, the typologies revealed here are a potent illustration of the complexity of the IE construct in the general population.

Likewise, the present study is among the first to explore IE in the context of the COVID-19 pandemic. Given the documented changes in eating and mental health during the pandemic (Brooks et al., 2020b; Johnson et al., 2022), it is important to understand how eating behaviors relate to food consumption stability and lower levels of psychological distress. The findings here show a potentially protective association between IE and changes in food consumption behaviors and concerns about one's weight. Results also suggest a positive relationship between these adaptive eating behaviors and favorable mental health.

This research advances the IE literature as one of very few studies that look at how stability/changes in one's food intake and physical activity relate to IE. The important contribution regarding food consumption showcases another potential associated benefit of higher levels of IE: food consumption stability in the face of environmental changes. Variable-centered approaches can be used to lend further support to these findings. This study also

provides more additional evidence for a lack of an association between IE and physical activity. This suggests that health behaviors related to adaptive eating and physical activity may be distinct.

Lastly, the current study had large enough subsamples to allow for the detection of differences of small and moderate effect sizes between profiles. While small effect sizes suggest that there is only a small magnitude of difference, they also support the value of further study with even larger and more diverse samples. There is the potential that other populations might derive profiles with more substantial differences. Further, the use of both community and undergraduate subsamples enabled comparative analyses that do suggest meaningful differences between the two groups. This is important to consider as researchers continue to generalize findings from undergraduate student samples to the general public.

Implications

Current findings show that there are unique profiles of IE in undergraduate and community subsamples and that profile structure differs between the two. Specifically, results suggest that there are patterns of IE that might be missed when using more global measures of IE. These divergences would be useful to consider when designing strategies to improve IE. For example, those who show lower levels of IE overall may actually vary in their specific presentation of IE subscale tendencies such as those seen in the High BFCC, Low Other and High UPE, Low Other profiles. These distinctions likely warrant more tailored techniques and intervention styles to increase IE overall. Clinicians and counselors would do well to assess subscales on an individual level when determining the best strategies to applied IE work.

These profiles further exemplify the need for more person-centered approaches in research seeking to develop or improve IE behaviors in the adult population. As researchers

generate different techniques for improving adaptive eating behaviors, they would do well to pair person-centered approaches with variable-centered approaches to obtain a more holistic view of the needs of a given population. These findings provide a glimpse of potential model structures, but it is important to acknowledge that they are likely culturally- and context-dependent and thus require many comparative samples to further explore profile structures.

Lastly, the current findings lend additional support to the growing body of literature highlighting the relationship between IE and positive mental health and body image. Given that the vast majority of IE studies employ cross-sectional methods, the burgeoning field of IE is still underequipped to make claims on the effectiveness of prescribing IE in applied public health settings. However, results such as these support the recommendation of further prospective studies and randomized control trials that utilize IE as a positive eating behavior model.

CONCLUSION

This study found that unique profiles of IE exist in combined and individual subsamples of undergraduates and community members. This suggests that there is meaningful variability in the patterns of responses for IE subscales in different adult subsamples. Further, this study showed that the undergraduate and community subsamples varied in model and profile structures indicating limited generalizability between groups.

Across both the undergraduate and community subsamples, findings suggest that the highest global levels of IE were associated with fewer weight loss attempts, more stability in the amount of food eaten during the pandemic and concerns about weight, and lower levels of depression and anxiety. This suggests that those with higher IE possibly fared better with the adjustments of the pandemic in terms of eating behaviors, body image, and mental health. There were no associations with profiles and physical activity in either subsample, providing useful evidence regarding the still inconclusive relationship between exercise and IE.

Meaningful deviations between subsamples can be seen in associations with gender. Findings from the undergraduate subsample align with the extant literature showing that women have higher odds of being in a profile associated with low levels of IE compared to men. There were no significant differences in gender by profile in the community subsample. Given that the community subsample derived more nuanced profiles than simply low and moderate to high levels of IE, it is possible that gender differences seen at the more global level are diluted when assessed in such specific profiles.

Both the combined sample and community subsample resulted in four-profile models with similar structures described as follows 1) a profile higher on Body-Food Choice

Congruence relative to the other subscales, 2) a profile higher in Unconditional Permission to Eat relative to the remaining subscales, 3) a profile that was around moderate or moderately high levels of IE subscales, and 4) a profile with high to very high levels of all IE subscales. In the community subsample, the first and/or second profiles showed distinct differences between the moderate to high and/or high profiles: the latter profiles had lower incidences of weight loss attempts, greater stability in food consumption and weight concern during the early COVID-19 pandemic, and less depression and anxiety. Further, the profile associated with higher levels of Unconditional Permission to Eat was related to greater increases in food consumption compared to the profile associated with higher levels of Body-Food Choice Congruence. These results support the possibility that IE levels both globally and in specific, naturally-occurring combinations of subscales are differentially related to eating and dieting behaviors, body image, and mental health.

Given that the results of the current study are likely context- and culturally-dependent, future research is needed to explore potential variations in IE indicators among a wider array of populations, particularly those that are traditionally under-studied. Finally, the current study assesses IE in the context of a historical pandemic, providing a useful comparison to other future research timepoints.

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APPENDIX A: THE TEN PRINCIPLES OF INTUITIVE EATING

1. **Reject the Diet Mentality**
   - Realizing the damage of dieting behaviors and the ways we have been socialized to pursue weight loss.

2. **Honor Your Hunger**
   - Consume food when you feel signs of biological hunger. Understand that ignoring biological signs of hunger may trigger primal drives to overconsume foods.

3. **Make Peace with Food (**Unconditional Permission to Eat**)**
   - Abandon rules around what to eat, granting yourself unconditional permission to eat. Do not have "forbidden food" and end the restrict/binge cycle.

4. **Challenge the Food Police**
   - Challenge negative think around food surrounding the morality of eating in a certain way. Get rid of guilt-provoking inner voices.

5. **Discover the Satisfaction Factor**
   - Discover satisfaction and pleasure in your eating experiences. Learn to eat mindfully.

6. **Feel your Fullness**
   - Determine the amount of food needed to reach satiety (when you are no longer hungry). Pause periodically to determine how the experience of eating changes with hunger levels.

7. **Cope with Your Emotions with Kindness**
   - Find ways to comfort yourself without food. Deal with emotions at the souce.

8. **Respect Your Body**
   - Honor your body's unique structure. Override thin ideals and appreciate your body's functionality.

9. **Movement: Feel the Difference**
   - Exercise for intrinsic reasons rather than for body change. Find movement that is right for you.

10. **Honor Your Health: Gentle Nutrition**
    - What you eat still matters. Make choices that are both healthy and pleasurable. Keep in mind that no foods are off limits and one "unhealthy" day won't hurt you in the long run. It is the choices we make consistently overtime that matter.

APPENDIX B: REDUCED SURVEY OF RELEVANT ITEMS

Demographics

1. What country do you currently live in? (text option)

2. What state or territory do you currently live in? (text option)

3. What is your age in years? (text option)

4. The term, gender, refers to "the socially constructed characteristics of women and men--such as norms, roles, and relationships of and between groups of women and men." Cisgender means that your gender corresponds to your sex assigned at birth, while transgender means that your gender does not correspond to your assigned sex. What do you consider your gender to be?
    1. Cisgender Woman
    2. Transgender Woman
    3. Gender Queer
    4. Transgender Man
    5. Cisgender Man
    6. Prefer not to answer

5. What is your race? (check all that apply)
    a. Indigenous
    b. Black or African American
    c. Asian American
    d. White
    e. Prefer not to answer

6. What is your ethnicity? (check all that apply)
    1. Hispanic
    2. Latinx
    3. Chicanx
    4. Non-Hispanic/Latinx/Chicanx
    5. Prefer not to answer

Weight Loss Attempts

7. During the past 12 months, have you tried to lose weight?
    1. Yes
    2. No

8. Are you currently trying to lose weight?
    1. Yes
    2. No

Weight Concern Related to COVID-19

9. Has your level of concern about your weight changed due to changes related to the COVID-19 outbreak?
    1. No, I am not concerned about my weight
    2. No, my concern about my weight has not increased or decreased
    3. Yes, my concern about my weight has INCREASED
    4. Yes, my concern about my weight has DECREASED

Changes in Food Consumption During COVID-19

10. Select how the following food-related behaviors have changed since the onset of the COVID-19 outbreak: Amount of food consumed.
    1. Decreased a lot
    2. Decreased a little
    3. No change
    4. Increased a little
    5. Increased a lot

Intuitive Eating During COVID-19

Subscales are noted in () and reverse coded items are noted with an *.

UPE= Unconditional Permission to Eat

EPR= Eating for Physical Rather than Emotional Reasons

RHSC= Reliance on Internal Cues of Hunger and Satiety

B-FCC= Body-Food Choice Congruence

Please select the responses which best characterize your attitudes or behaviors during the COVID-19 outbreak.

Response options for the following 23 questions are

1. strongly disagree
2. disagree
3. neutral
4. agree
5. strongly agree

1. (UPE)* I try to avoid certain foods high in fat, carbohydrates, or calories.
2. (EPR)* I find myself eating when I'm feeling emotional (e.g., anxious, depressed, sad), even when I'm not physically hungry.
3. (UPE) If I am craving a certain food, I allow myself to have it.
4. (UPE)* I get mad at myself for eating something unhealthy.
5. (EPR)* I find myself eating when I am lonely, even when I'm not physically hungry.
6. (RHSC) I trust my body to tell me when to eat.
7. (RHSC) I trust my body to tell me what to eat.
8. (RHSC) I trust my body to tell me how much to eat.
9. (UPE)* I have forbidden foods that I don't allow myself to eat.
10. (EPR)* I use food to help me soothe my negative emotions.
11. (EPR)* I find myself eating when I am stressed out, even when I'm not physically hungry.
12. (EPR) I am able to cope with my negative emotions (e.g., anxiety, sadness) without turning to food for comfort.
13. (EPR) When I am bored, I do NOT eat just for something to do.
14. (EPR) When I am lonely, I do NOT turn to food for comfort.
15. (EPR) I find other ways to cope with stress and anxiety than by eating.
16. (UPE) I allow myself to eat what food I desire at the moment.
17. (UPE) I do NOT follow eating rules or dieting plans that dictate what, when, and/or how much to eat. (1)
18. (B-FCC) Most of the time, I desire to eat nutritious foods.
19. (B-FCC) I mostly eat foods that make my body perform efficiently (well).
20. (B-FCC) I mostly eat foods that give my body energy and stamina.
21. (RHSC) I rely on my hunger signals to tell me when to eat.
22. (RHSC) I rely on my fullness (satiety) signals to tell me when to stop eating.
23. (RHSC) I trust my body to tell me when to stop eating.

Physical Activity

The following questions will ask you about the time you spent being physically active in the last 7 days.

Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think only about those physical activities that you did for at least 10 minutes at a time.

Think about all the vigorous activities that you did in the last 7 days.

Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal.

24. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?
    1. Zero days in the past week
    2. One day in the past week
    3. Two days in the past week
    4. Three days in the past week
    5. Four days in the past week
    6. Five days in the past week
    7. Six days in the past week
    8. Seven days in the past week

25. How much time did you usually spend doing vigorous physical activities on one of those days?
    1. 0 minutes
    2. 1-15 minutes
    3. 16-30 minutes
    4. 31-45 minutes
    5. 46-60 minutes
    6. 61-75 minutes
    7. 76-90 minutes
    8. 91-105 minutes
    9. 106-120 minutes
    10. More than 120 minutes

Think about all the moderate activities that you did in the last 7 days.

Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

26. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

1. Zero days in the past week
2. One day in the past week
3. Two days in the past week
4. Three days in the past week
5. Four days in the past week
6. Five days in the past week
7. Six days in the past week
8. Seven days in the past week

27. How much time did you usually spend doing moderate physical activities on one of those days?
    1. 0 minutes
    2. 1-15 minutes
    3. 16-30 minutes
    4. 31-45 minutes
    5. 46-60 minutes
    6. 61-75 minutes
    7. 76-90 minutes
    8. 91-105 minutes
    9. 106-120 minutes
    10. More than 120 minutes

Think about the time you spent walking in the last 7 days.

This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

28. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

1. Zero days in the past week
2. One day in the past week
3. Two days in the past week
4. Three days in the past week
5. Four days in the past week
6. Five days in the past week
7. Six days in the past week
8. Seven days in the past week

29. How much time did you usually spend walking on one of those days?
    1. 0 minutes
    2. 1-15 minutes
    3. 16-30 minutes
    4. 31-45 minutes
    5. 46-60 minutes
    6. 61-75 minutes
    7. 76-90 minutes
    8. 91-105 minutes
    9. 106-120 minutes
    10. More than 120 minutes

Anxiety

Over the last 2 weeks, how often have you been bothered by the following problems?

Response options for the following 7 questions are
1. strongly disagree
2. disagree
3. neutral
4. agree
5. strongly agree

1. Feeling nervous, anxious, or on edge
2. Not being able to stop or control worrying
3. Worrying too much about different things
4. Trouble relaxing
5. Being so restless it's hard to sit still
6. Becoming easily annoyed or irritable
7. Feeling afraid as if something awful might happen

Depression

Below is a list of the ways you might have felt or behaved. Please indicate how often you have felt this way **during the past week**.

Response options for the following 7 questions are

1. Rarely or none of the time (Less than one day)
2. Some or a little of the time (1-2 days)
3. Occasionally or a moderate amount of time (3-4 days)
4 Most or all of the time (5-7 days)

1. I was bothered by things that usually don't bother me
2. I did not feel like eating; my appetite was poor
3. I felt that I could not shake off the blues even with help from my family or friends
4. I felt that I was just as good as other people
5. I had trouble keeping my mind on what I was doing
6. I felt depressed
7. I felt that everything I did was an effort
8. I felt hopeful about the future
9. I felt fearful
10. My sleep was restless
11. I was happy
12. I talked less than usual
13. I felt lonely
14. People were unfriendly
15. I enjoyed life
16. I had crying spells
17. I felt sad
18. I felt that people dislike me
19. I could not "get going"

APPENDIX C: IRB APPROVAL

Colorado State University

Knowledge to Go Places

eProtocol
Office of the Vice President for Research
321 General Services Building - Campus Delivery 2011 eprotocol
TEL: (970) 491-1553

DATE:	June 05, 2020
TO:	Graham, Dan, Psychology Johnson, Ashlie, Psychology, Rojas, Don, Psychology
FROM:	Felton-Noyle, Tammy, Senior IRB Coordinator, BMR, CSU IRB Exempt
PROTOCOL TITLE:	Health Behaviors and Well-being During the COVID-19 Pandemic
FUNDING SOURCE	None
PROTOCOL NUMBER:	20-10025H
APPROVAL or DETERMINATION PERIOD:	June 05, 2020

NOTICE OF IRB REVIEW FOR HUMAN RESEARCH

Thank you for submitting your application for exempt review to Colorado State University IRB (CSU) (FWA0000647). We appreciate the work you have done on your proposal. The IRB has reviewed your submitted IRB application and all ancillary materials. Upon review, the IRB has determined that the above-entitled project meets the requirements for exemption under the federal regulations 45 CFR 46.101 that govern the protections of human subjects, specifically .

Exempt studies are subject to the ethical principles articulated in The Belmont Report, found at the OHRP Website www.hhs.gov/ohrp/humansubjects/guidance/belmont.html.

Your research must be conducted according to the proposal that was submitted to the IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For any proposed changes in your research protocol, please submit an amendment to the IRB. Exempt determinations are active for five (5) years. Please be aware that changes to your protocol may change this determination for exemption from 45 CFR 46.101 and may require submission of a new IRB application or other materials to the IRB.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite the best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the IRB as soon as possible. We will ask for a complete written explanation of the event and your written response. Other actions also may be required depending on the nature of the event.

Please refer to the protocol number denoted above in all communication or correspondence related to your application and this approval. Should you have additional questions or require clarification of the contents of this letter, please contact the IRB Office. On behalf of the IRB, we wish you success in this scholarly pursuit.

Please direct any questions about the IRB's actions on this project to:

IRB Office - (970) 491-1553; RICRO_IRB@mail.Colostate.edu
Claire Chance, Senior IRB Coordinator - (970) 491-1381; Claire.Chance@Colostate.edu
Tammy Felton-Noyle, Senior IRB Coordinator - (970) 491-1655; Tammy.Felton-Noyle@Colostate.edu

Colorado State University

Knowledge to Go Places

eProtocol
Office of the Vice President for Research
321 General Services Building - Campus Delivery 2011 eprotocol
TEL: (970) 491-1553

Chance, Claire

Exempt determination including Amendment 1 has been granted 6/5/20 to recruit with the approved recruitment and consent procedures. The above-referenced research activity has been reviewed and determined to meet exempt review by the Institutional Review Board under exempt category 2(i) of the 2018 Requirements. This study is not funded.
Newly reviewed documents include:
CONSENT- General document (version submitted 5/27/20)
SURVEY- Longitudinal release (version submitted 5/27/20)

None

APPENDIX D: CONSENT FORMS

CSU Psychology Research Pool Consent
Health Behaviors and Well-being During the COVID-19 Pandemic
Investigators: Dan Graham, PhD, Department of Psychology; Ashlie Johnson, MS, Department of Psychology

Dear Participant,

My name is Ashlie Johnson and I am a researcher from Colorado State University in the Psychology Department. We are conducting a research study to better understand the impact of the COVID-19 pandemic on psychological and physical health. The Principal Investigator is Dr. Dan Graham from the Psychology Department and I am the Co-Principal Investigator.

We would like you to take an anonymous online survey. Participation will take approximately 30 minutes. Your participation in this research is voluntary and you will be compensated with 0.5 hrs. of credit toward your CSU Psychology research requirement for completing the survey. If you decide to participate in the study, you may withdraw your consent and stop participation at any time without penalty.

We will not collect your name or personal identifiers. At the conclusion of the survey, you will be asked if you would like to submit your email address to be considered for additional follow-up surveys with the potential for compensation. The email address will be used strictly for recruitment purposes for future studies and will not be maintained in the data set used for analyses. When we report and share the data with others, we will combine the data from all participants. While there are no direct benefits to you, we hope to gain more knowledge on how the coronavirus pandemic is impacting individuals' health behaviors such as physical activity, nutrition, and sleep. We also hope to understand the impact of COVID-19 on psychological aspects such as stress, affect, and well-being.

There are no known risks to participants in this study beyond what one might experience in routine medical or psychological screening questionnaires. It is not possible to identify all potential risks in research procedures, but the researcher(s) have taken reasonable safeguards to minimize any known and potential (but unknown) risks.

To indicate your consent to participate in this research and to continue to the survey, please click "agree" below.

If you have any questions about the research or would like a digital copy of this consent agreement, please contact Ashlie Johnson at ashlie.johnson@colostate.edu or Dan Graham at dan.graham@colostate.edu. If you have any questions about your rights as a volunteer in this research, contact the CSU IRB at: RICRO_IRB@mail.colostate.edu; 970-491-1553.

Dan Graham	Ashlie Johnson
Associate Professor	Doctoral Candidate

Community Sample Survey Consent
Health Behaviors and Well-being During the COVID-19 Pandemic

Dear Participant,

My name is Ashlie Johnson and I am a researcher from Colorado State University in the psychology department. We are conducting a research study to better understand the impact of the COVID-19 pandemic on psychological and physiological health. The Principal Investigator is Dr. Dan Graham from the Psychology department and I am the Co-Principal Investigator.

We would like you to take an anonymous online survey. Participation will take approximately 30 minutes or less to complete. Your participation in this research is voluntary. If you decide to participate in the study, you may withdraw your consent and stop participation at any time without penalty.

We will not collect your name or personal identifiers. At the conclusion of the survey, you will be asked if you would like to submit your email address to be considered for additional follow-up surveys with the potential for compensation. The email address will be used strictly for recruitment purposes for future studies and will not be maintained in the data set used for analyses. When we report and share the data to others, we will combine the data from all participants. While there are no direct benefits to you, we hope to gain more knowledge on how the coronavirus pandemic is impacting individual's health behaviors such as physical activity, nutrition, and sleep. We also hope to understand the impact of COVID-19 on psychological aspects such as stress, affect, and well-being.

While this study's risks do not exceed what one might experience in routine medical or psychological screenings, participants should note that questions regarding eating behaviors may cause distress for those who have experience with disordered eating. It is not possible to identify all potential risks in research procedures, but the researcher(s) have taken reasonable safeguards to minimize any known and potential (but unknown) risks.

To indicate your consent to participate in this research and to continue to the survey, please click "agree" below.

If you have any questions about the research or would like a digital copy of this consent agreement, please contact Ashlie Johnson at ashlie.johnson@colostate.edu or Dan Graham at dan.graham@colostate.edu. If you have any questions about your rights as a volunteer in this research, contact the CSU IRB at: RICRO_IRB@mail.colostate.edu; 970-491-1553.

Dan Graham	Ashlie Johnson
Associate Professor	Doctoral Candidate

APPENDIX E: DEBRIEFING FORMS

CSU Student Debriefing

Health Behaviors and Well-being During the COVID-19 Pandemic

Investigators: Dan Graham, PhD, Department of Psychology; Ashlie Johnson, MS, Department of Psychology

Thank you for participating in this study addressing the impact of the COVID-19 pandemic on psychological and physiological health. As we mentioned in the consent document, this study was designed to help us understand how people are responding to the coronavirus. We are interested in exploring how people's health behaviors such as diet, physical activity and sleep have been impacted. Additionally, we are interested in understanding how COVID-19 has affected psychological health factors such as stress, affect, and well-being.

We appreciate you taking the time to help us with this research! It is our hope that we can use this type of research to better understand the impact of prolonged periods of stress on psychological and physiological health. If you have questions or concerns or would like more information about the study, please contact Ashlie Johnson at ashlie.johnson@colostate.edu or Dr. Dan Graham at dan.graham@colostate.edu. If you have any questions about your rights as a volunteer in this research, please contact the Colorado State University Institutional Review Board (IRB) at: RICRO_IRB@mail.colostate.edu; 970-491-1553. Thank you again!

Resources:

Counseling services remain available at little to no cost for CSU students! Please visit https://health.colostate.edu/about-counseling-services/ for more information

National Institute of Mental Health: https://www.nimh.nih.gov/index.shtml

National Helpline for Substance Abuse and Mental Health: 1-800-662-HELP (4357) https://www.samhsa.gov/find-help/national-helpline

National Mental Health Resources: https://www.mentalhealth.gov/

Community Sampled Debriefing

Health Behaviors and Well-being During the COVID-19 Pandemic

Investigators: Dan Graham, PhD, Department of Psychology; Ashlie Johnson, MS, Department of Psychology

Thank you for participating in this study addressing the impact of the COVID-19 pandemic on psychological and physiological health. As we mentioned in the consent document, this study was designed to help us understand how people are responding to the coronavirus. We are interested in exploring how people's health behaviors such as diet, physical activity and sleep have been impacted. Additionally, we are interested in understanding how COVID-19 has affected psychological health factors such as stress, affect, and well-being.

We appreciate you taking the time to help us with this research! It is our hope that we can use this type of research to better understand the impact of prolonged periods of stress on psychological and physiological health. If you have questions or concerns or would like more information about the study, please contact Ashlie Johnson at ashlie.johnson@colostate.edu or Dr. Dan Graham at dan.graham@colostate.edu. If you have any questions about your rights as a volunteer in this research, please contact the Colorado State University Institutional Review Board (IRB) at: RICRO_IRB@mail.colostate.edu; 970-491-1553. Thank you again!

Resources:

National Institute of Mental Health: https://www.nimh.nih.gov/index.shtml

National Helpline for Substance Abuse and Mental Health: 1-800-662-HELP (4357)
https://www.samhsa.gov/find-help/national-helpline

National Mental Health Resources: https://www.mentalhealth.gov/