



Is intuitive eating the same as flexible dietary control? Their links to each other and well-being could provide an answer

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ABSTRACT

Researchers have found that rigid dietary control is connected to higher psychological distress, including disordered and disinhibited eating. Two approaches have been touted by certain scholars and/or health organizations as healthier alternatives: intuitive eating and flexible control—yet these approaches have not been compared in terms of their shared variance with one another and psychological well-being (adjustment and distress). The present study explored these connections among 382 community women and men. Findings revealed that intuitive eating and flexible control are inversely related constructs. Intuitive eating was related to lower rigid control, lower psychological distress, higher psychological adjustment, and lower BMI. In contrast, flexible control was strongly related in a positive direction to rigid control, and was unrelated to distress, adjustment, and BMI. Further, intuitive eating incrementally contributed unique variance to the well-being measures after controlling for both flexible and rigid control. Flexible control was positively associated with psychological adjustment and inversely associated with distress and BMI only when its shared variance with rigid control was extracted. Collectively, these results suggest that intuitive eating is not the same phenomenon as flexible control, and that flexible control demonstrated substantial overlap and entanglement with rigid control, precluding the clarity, validity, and utility of flexible control as a construct. Discussion addresses the implications of this distinction between intuitive eating and flexible control for the promotion of healthy eating attitudes and behaviors.

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1. Introduction

Eating restraint, defined as a continued attempt to cognitively control eating behavior in order to lose weight or prevent weight gain (Stunkard & Messick, 1985), has been widely studied in its connections to disordered eating and body mass. In general, eating restraint does not lead to long-term weight reduction, a trend that is especially noticeable within methodologically sound studies (Mann et al., 2007). Some inconsistent findings have emerged, however. Longitudinal designs have shown that eating restraint increases weight gain and disordered eating among children (Birch & Fisher, 2005; Birch, Fisher, & Davison, 2003), adolescents (Neumark-Sztainer et al., 2006; Neumark-Sztainer, Wall, Haines, Story, & Eisenberg, 2007), and adults (Chaput et al., 2009; van

Strien, Herman, & Verheijden, 2014), leading the researchers of these studies to warn against prescribing eating restraint to control food intake and weight. Yet, select interventions promoting caloric restriction have recently been found to decrease binge eating, thin-ideal internalization, negative affect, weight gain, and other bulimic symptoms among female participants (Stice, Marti, Spoor, Presnell, & Shaw, 2008; Stice, Shaw, Burton, & Wade, 2006), prompting the researchers of these studies to advocate for prescribing eating restraint.

What could account for these discrepant findings? Perhaps the answer lies in how eating restraint is conceptualized and measured. Eating restraint is most often considered as a unitary construct, with little regard for differences in levels or forms of restraint. Yet, in as early as 1991, Westenhofer (1991) argued that eating restraint is not a homogenous construct, and instead divided it into two forms: rigid control and flexible control. *Rigid control* is an all-or-nothing approach to eating—operationalized by behaviors such as actively avoiding and refusing desired calorie-dense foods (and if

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such foods are consumed, overeating and guilt may follow), regimented calorie counting and dieting to control weight, eating diet foods to avoid weight gain, and skipping meals (Westenhofer, Stunkard, & Pudel, 1999). In contrast, *flexible control* is generally considered a balanced approach to eating—operationalized by behaviors such as taking smaller than desired servings of food to control weight, being conscious of foods eaten, taking weight into account when making food choices, and engaging in compensation (i.e., intentionally eating less and/or healthier alternatives at the next meal) if too much is eaten or less healthy options are chosen at the previous meal (Westenhofer et al., 1999).

Dividing eating restraint into rigid and flexible control holds promise for understanding some of the conflicting data in the restraint field. Research has shown that rigid control and flexible control are related in opposite directions to some health-related and well-being indices in various populations. Specifically, rigid control was positively related to disinhibited eating and body mass index (BMI), whereas flexible control was inversely related to disinhibited eating and BMI, among U.S. and German adult women and men in weight reduction programs (Smith, Williamson, Bray, & Ryan, 1999; Westenhofer, 1991; Westenhofer et al., 2013; Westenhofer, von Falck, Stellfeldt, & Fintelmann, 2004), U.S. and German community women and men (Shearin, Russ, Hull, Clarkin, & Smith, 1994; Smith et al., 1999; Westenhofer et al., 1999), and U.S., U.K., and German college women and men (Timko & Perone, 2005; Westenhofer, Broeckmann, Münch, & Pudel, 1994; Westenhofer et al., 2013). Rigid and flexible control were also differentially linked to binge eating and overeating among U.S. and German community adults (Smith et al., 1999; Westenhofer et al., 1999), with rigid control positively linked and flexible control inversely linked to these behaviors.

As a result of their findings, Westenhofer et al. (1999) have recommended that flexible control strategies be applied in lieu of rigid control strategies to promote health. This recommendation is also consistent with prominent health organizations advocating for the universal adoption of flexible control strategies (e.g., monitoring portion sizes, eating smaller amounts and lower calorie versions of comfort foods, staying within a predetermined daily calorie range, and self-monitoring weight; CDC, 2013).

Yet, these recommendations may be ill-advised, as data do not uniformly uphold a positive link between flexible control and health. Some studies have found no association between flexible control and well-being; more specifically, flexible control was unrelated to emotional distress (i.e., anxiety, depression, impulsiveness, and body image disturbance) in U.S. college women and men (Timko & Perone, 2005), eating pathology in U.S. college women (Timko & Perone, 2005), and disinhibited eating and body measurements (i.e., BMI, body fat, waist circumference) in Canadian adult men (Provencher, Drapeau, Tremblay, Després, & Lemieux, 2003). Yet other studies have found positive associations between flexible control and psychological distress; for instance, flexible control has been positively linked to eating disorder symptomatology in U.S. adult women with personality disorders (Shearin et al., 1994), impaired working memory in U.K. women enrolled in a weight loss program (Westenhofer et al., 2013), and eating pathology in U.S. college men (Timko & Perone, 2005). Among a large sample of Australian women participating in a 2-year longitudinal study on women's health, flexible control strategies promoted, instead of prevented, weight gain (Williams, Germov, & Young, 2007). For instance, after adjusting for baseline BMI and other confounds, reducing portion sizes was associated with an average weight gain of 1.25 kg, and reducing fats and sugars was linked to an average weight gain of 1.21 kg over the 2-year period. Williams et al. concluded that "doing nothing" (i.e., not using any weight control strategy) yielded more effective weight maintenance

than following flexible control strategies. Collectively, these findings challenge scholars' and public health organizations' universal recommendations to engage in dietary strategies characteristic of flexible control, as these strategies do not consistently promote healthier eating behavior, well-being, or weight maintenance.

Furthermore, flexible control has been found to be strongly related to rigid control in a positive direction among U.S. and German college samples ($r = .77$, Timko & Perone, 2005; $r = .63$, Westenhofer et al., 1994), German and U.K. men and women enrolled in weight loss programs ($r = .54$, Westenhofer, 1991; $r = .47$, Westenhofer et al., 2013), and U.S. women with personality disorders ($r = .87$, Shearin et al., 1994).¹ These correlations call into question Westenhofer et al.'s (1999) proposition that flexible control is distinct from rigid control, as their shared variance appears to be substantial. Increasing flexible control strategies in the absence of increasing rigid control strategies may not be feasible. Therefore, recommendations to employ flexible control strategies may need to be re-evaluated, and other alternatives considered.

Intuitive eating may be a viable alternative to dietary restriction strategies such as flexible control. *Intuitive eating* entails eating mainly in response to physiological hunger and satiety cues—those who eat intuitively are attuned to and trust their hunger and satiety signals to guide their eating (Tylka, 2006). If such individuals eat more at one meal, they may naturally eat less at the next meal because they are less hungry; therefore, intuitive eating has been described as a flexible and adaptive eating behavior (Tribole & Resch, 2012). Tribole and Resch assert that individuals who eat intuitively are less likely to be preoccupied with food or dichotomize food as good or bad—instead, they often choose foods for the purposes of satisfaction (i.e., taste), health, energy, stamina, and performance.

Evidence upholds intuitive eating's positive links to health and well-being (Van Dyke & Drinkwater, 2013). Among adult women and men from the U.S., France, Germany, and New Zealand, intuitive eating has been found to be (a) inversely related to eating disorder symptomatology, disinhibited eating, BMI, body fat, cardiovascular risk, triglyceride levels, food-related anxiety, thin-ideal internalization, body dissatisfaction, body preoccupation, body shame, self-silencing, and negative affect; and (b) positively related to high-density lipoprotein cholesterol, interoceptive sensitivity, enjoyment of food, body appreciation, self-compassion, life satisfaction, positive affect, proactive coping, and self-esteem (Augustus-Horvath & Tylka, 2011; Camilleri et al., 2015; Denny, Loth, Eisenberg, & Neumark-Sztainer, 2013; Hawks, Madanat, Hawks, & Harris, 2005; Herbert, Blechert, Hautzinger, Matthias, & Herbert, 2013; Madden, Leong, Gray, & Horwath, 2012; Schoenfeld & Webb, 2013; Shouse & Nilsson, 2011; Smith & Hawks, 2006; Tylka, 2006; Tylka & Wilcox, 2006).

Moreover, several studies have examined the impact of intuitive eating interventions on health, BMI, and well-being, with positive results (Schaefer & Magnuson, 2014). An intervention group grounded in intuitive eating and size acceptance was compared against a dieting-based weight loss intervention group which emphasized flexible dietary control strategies; both groups of U.S. adult female chronic dieters received six months of the respective intervention and two follow-up assessments at one year (Bacon et al., 2002) and two years (Bacon, Stern, Van Loan, & Keim, 2005) post-intervention. The group receiving the intuitive eating-based intervention decreased total cholesterol, low-density

¹ Westenhofer et al. (1999) and Smith et al. (1999) did not report a correlation coefficient between rigid and flexible control for their samples of German community women and men and U.S. college students, respectively, but indicated that flexible and rigid control were correlated at $p < .001$.

lipoprotein cholesterol, triglycerides, and systolic blood pressure at the 1- and 2-year follow ups as well as decreased physical hunger, disinhibited eating, bulimic symptomatology, drive for thinness, body dissatisfaction, poor interoceptive awareness, and depression at the 2-year follow-up. Whereas the dieting-based intervention group lost weight and showed initial improvements at the 1-year follow up, only one improvement (i.e., lower disinhibited eating) was sustained at the 2-year follow up. Furthermore, attrition was higher in the dieting group compared to the intuitive eating-based intervention (Bacon et al., 2005). U.S. female adult employees (or partners of employees) at a university who received a 10-week intuitive eating intervention reported lower disordered eating and body dissatisfaction and higher body appreciation and mindfulness compared to a wait-list control group at 10-weeks post intervention; in fact, the intuitive eating group was 3.5 times more likely to be asymptomatic for disordered eating than the control group at post-intervention (Bush, Rossy, Mintz, & Schopp, 2014).

Conceptually, intuitive eating and flexible control should be distinct constructs. Intuitive eating relies on internal hunger and satiety cues, and compensation occurs naturally (e.g., not being hungry after a large meal; Tribole & Resch, 1995, 2012), whereas flexible control relies on external cues for eating (e.g., portion control, weight, and nutritional information), and compensation is conscious and effortful (Westenhofer, 1991). Yet, as reviewed above, they are both connected positively to health and well-being for select samples. Moreover, it is plausible that intuitive eating could reflect some form of dietary restraint, as intuitive eaters theoretically refrain from eating when physiological hunger cues are not present. It may not matter empirically, therefore, if an individual uses internal or external cues to “restrain” eating.

To date, intuitive eating and flexible dietary control strategies have not been compared to determine if they are qualitatively distinct (i.e., represent different constructs), quantitatively distinct (i.e., represent different levels of the same “restraint” construct), or neither qualitatively nor quantitatively distinct (i.e., represent similar levels of the same construct) within the same sample. These comparisons are necessary to determine whether eating based on internal or external cues is differentially linked to well-being (conceptualized broadly as adjustment and distress), and hence whether we should emphasize intuitive eating, flexible control, both, or neither within public health and clinical interventions.

Therefore, in the present study, we investigated the relationships of flexible control and intuitive eating to each other, rigid control, BMI, and several indices of well-being including psychological adjustment and psychological distress to discern their independence as constructs. Life satisfaction, positive affect, and body appreciation were chosen to represent indicators of psychological adjustment due to their consistent links to the affective and cognitive appraisals of general and body-related positive psychological health (Avalos, Tylka, & Wood-Barcalow, 2005; Pavot & Diener, 1993). Negative affect, poor interoceptive awareness, binge eating, and food preoccupation were chosen as indicators of psychological distress due to their consistent links with eating disorder pathology and negative emotional states (Dakanalis et al., 2014; Tapper & Pothos, 2010; Tylka & Kroon Van Diest, 2013). We sampled community adult women and men to improve generalizability of findings across age.

1.1. Hypotheses

H1. Intuitive eating would be inversely related to flexible control given their conceptual differences, namely in their approach to self-

regulation: intuitive eating relies on internal hunger and satiety cues to self-regulate, whereas flexible control relies on external (e.g., portion size, current weight, calorie consumption) cues to self-regulate.² This finding would yield preliminary evidence that high levels of intuitive eating are not equivalent to high levels of flexible control. Because of the strong positive relationships between flexible and rigid control documented in previous research, we predicted that flexible control's correlation with rigid control would be stronger than its correlation with intuitive eating, which would suggest that flexible control is more conceptually similar to rigid control than it is to intuitive eating.

H2a. Intuitive eating would be positively associated with adjustment and inversely associated with distress. Given the mixed findings regarding flexible control's associations with well-being reviewed above, we do not offer a hypothesis for its connection to adjustment and distress. **H2b.** Correlations between intuitive eating and each well-being index would be significantly different from the correlations between flexible control and each well-being index (e.g., the correlation between intuitive eating and life satisfaction would be significantly different from the correlation between flexible control and life satisfaction). If upheld, these findings would highlight that intuitive eating and flexible control have a different pattern in their connection to well-being, providing further evidence that they are not similar constructs.

H3. Intuitive eating would be inversely associated with BMI. Given the mixed findings for flexible control, we do not offer a hypothesis for its connection to BMI in the present study. We predicted that the correlation between intuitive eating and BMI would be significantly different from the correlation between flexible control and BMI, further upholding the construct differentiation between intuitive eating and flexible control.

H4. Intuitive eating would account for unique variance in each index of psychological well-being and BMI, above and beyond the variance contributed by flexible control, providing evidence that (a) intuitive eating and flexible control are *qualitatively* distinct, and (b) intuitive eating is an important and unique eating-related characteristic of well-being. We further considered the variance in well-being and BMI contributed by rigid control, which helped us also determine flexible control's unique links to well-being and BMI after rigid control's variance is removed.

2. Method

2.1. Participants

Data from 382 online community participants (192 women and 190 men) from 45 U.S. states were analyzed. Participants' average age was 33.80 ($SD = 11.08$). They identified as White (71.9%), African American (8.4%), Asian American (9.2%), Latin American (6.3%), Native American (.5%) or multiracial (3.6%). Their highest degree was a doctorate (1.0%), masters' (7.6%), bachelor's (31.4%), associate (13.6%), or high school (16.8%) degree; the remaining participants reported some graduate (4.1%) or undergraduate (28.3%) education or did not complete high school (.3%). Median household income fell in the \$45,000–\$60,000 category. Average body mass, calculated from self-reported height and weight via the formula offered by the CDC (2010), was 26.82 ($SD = 7.30$) for women and 26.54 ($SD = 5.96$) for men.

² This hypothesis was exploratory given that no extant research has compared the two approaches.

2.2. Measures

2.2.1. Intuitive eating

The 23-item Intuitive Eating Scale-2 (IES-2; [Tylka & Kroon Van Diest, 2013](#)) assessed participants' tendency to trust in and eat in response to their internal hunger and satiety cues, while choosing foods they enjoy and work well with their body (e.g., "I rely on my hunger signals to tell me when to eat," "I allow myself to eat what food I desire at the moment," "I mostly eat foods that give my body energy and stamina"). The items are rated along a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) and averaged, with higher scores indicating greater intuitive eating. Its second-order factor structure, as well as the internal consistency reliability, 3-week test-retest reliability, construct validity, incremental validity, and discriminant validity of its scores, have been upheld in samples of college women and men ([Tylka & Kroon Van Diest, 2013](#)). Cronbach's alpha was .90 in the present study.

2.2.2. Flexible control

We used the 12-item Flexible Control subscale of the Cognitive Restraint Scale ([Westenhoefer et al., 1999](#)) to measure flexible control. Each item (e.g., "If I eat a little bit more during one meal, I make up for it at the next meal" for more items see [Table 3](#)) receives one point if the participant provides a response indicative of flexible control.³ Points are summed, and thus total scores range from 0 to 12. Upholding the validity of its scores, the Flexible Control subscale was related to lower self-reported energy intake and greater weight loss among members engaged in a 1-year weight reduction program ([Westenhoefer et al., 1999](#)) and higher self-regulated eating (i.e., defined by eating "in moderation"; [Stotland, 2012](#)). Items on this measure do not assess disinhibited eating, weight history, or weight fluctuations ([Westenhoefer et al., 1999](#)). Cronbach's alpha was .87 in the present study.

2.2.3. Rigid control

The 16-item Rigid Control subscale of the Cognitive Restraint Scale ([Westenhoefer et al., 1999](#)) was used to estimate rigid control. Each item (e.g., "Sometimes I skip meals to avoid gaining weight," "Without a diet plan I wouldn't know how to control my weight") receives one point if a participant provides a response indicative of rigid control, and points are summed to arrive at a total score ranging from 0 to 16. The Rigid Control subscale was positively correlated with disinhibited eating, BMI, and more frequent and severe binge eating among members engaged in a 1-year weight reduction program, upholding the validity of its scores ([Westenhoefer et al., 1999](#)). Cronbach's alpha was .85 in the present study.

2.2.4. Life satisfaction

The 5-item Satisfaction with Life Scale ([Diener, Emmons, Larsen, & Griffin, 1985](#)) assessed participants' life satisfaction. The items (e.g., "In most ways my life is close to ideal") are rated on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) and averaged; higher scores reflect greater life satisfaction. Scores on this scale have demonstrated evidence of internal consistency reliability, 2-month test-retest reliability, and construct validity (e.g., via strong relationships to positive affect and self-esteem) among samples of college students ([Diener et al., 1985](#)). Cronbach's alpha was .94 in the present study.

³ We modified the item, "I pay attention to my figure, but I still enjoy a variety of foods" to "I pay attention to my figure (or body build), but I still enjoy a variety of foods" to make it applicable for both women and men.

2.2.5. Affect

The Positive and Negative Affect Schedule-Expanded ([Watson, Clark, & Tellegen, 1988](#)) measured participants' levels of positive affect (10-item subscale; e.g., "inspired," "proud") and negative affect (10-item subscale, e.g., "nervous," "distressed"). Participants were asked to rate the degree they experienced each emotion "in general, that is, on the average" along a 5-point scale ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). Subscale items are averaged. Higher subscale scores indicate higher levels of positive and negative affect, respectively. Scores on both subscales have garnered evidence of internal consistency reliability, 2-month test-retest reliability, and construct validity (e.g., via correlations with symptoms of depression and anxiety) among college students ([Watson et al., 1988](#)). Cronbach's alphas were .91 for the Positive Affect subscale and .92 for the Negative Affect subscale in the present study.

2.2.6. Body appreciation

The 10-item Body Appreciation Scale-2 (BAS-2; [Tylka & Wood-Barcalow, 2015](#)) assessed individuals' acceptance of, favorable opinions toward, and respect for their bodies. The items (e.g., "I respect my body") are rated along a 5-point scale that ranges from 1 (*never*) to 5 (*always*) and averaged; higher scores reflect greater body appreciation. Scores on the BAS-2 have evidenced internal consistency reliability, 3-week test-retest reliability, and construct validity (via inverse relationships with body shame and body dissatisfaction) among college samples ([Tylka & Wood-Barcalow, 2015](#)). Cronbach's alpha was .97 in the present study.

2.2.7. Poor interoceptive awareness

The 10-item Interoceptive Awareness subscale of the Eating Disorder Inventory-2 ([Garner, 1991](#)) assessed participants' disconnection to their internal body states, such as emotions, hunger, and satiety. These items are rated along a 6-point scale that ranges from 1 (*never true of me*) to 6 (*always true of me*). Rather than using Garner's original method of truncated scoring in clinical samples, we retained the continuous scoring and averaged these responses. Higher scores reflect poorer interoceptive awareness. Scores on this subscale have demonstrated evidence of internal consistency reliability, 3-week test-retest reliability, and construct validity (e.g., via its link to alexithymia) in college student samples ([Tylka & Subich, 2004; Wear & Pratz, 1987](#)). Cronbach's alpha was .89 in the present study.

2.2.8. Binge eating

We used the 16-item Binge Eating Scale ([Gormally, Black, Daston, & Rardin, 1982](#)) to assess participants' behaviors (e.g., eating large amounts of food), emotions (e.g., guilt after overeating), and cognitions (e.g., perceived lack of control when eating) associated with binge eating. Each item ranges in severity from 0 to 3, with higher levels indicating more severe binge eating symptoms. Item scores are summed. The internal consistency reliability and construct validity (e.g., via correlations with other measures of binge eating) of its scores have been upheld in adult samples ([Gormally et al., 1982; Marcus, Wing, & Hopkins, 1988; Telch & Agras, 1994](#)). Cronbach's alpha was .93 in the present study.

2.2.9. Food preoccupation

The 3-item Frequency subscale of the Food Preoccupation Questionnaire ([Tapper & Pothos, 2010](#)) was used to assess the extent participants thought about food. These items (e.g., "I often find myself thinking about food") are rated along a 5-point scale ranging from 1 (*completely disagree*) to 5 (*completely agree*) and averaged. Higher scores reflect greater food preoccupation. The internal consistency reliability, 1-week test-retest reliability, and

construct validity (via links to food cravings and binge eating) for this subscale's scores were supported among college students (Tapper & Pothos, 2010). Cronbach's alpha was .93 in the present study.

2.3. Procedure

After IRB approval was granted from a large university in the Midwestern United States, data were collected from adult community members on Amazon Mechanical Turk (MTurk). Increasingly used in psychological research, MTurk is an online website whereby participants receive monetary compensation for completing work-related tasks, referred to as "hits," which can include completing surveys. Data gathered from MTurk are more diverse and nationally representative, but just as psychometrically sound, when compared to data gathered from college student samples (Buhrmester, Kwang, & Gosling, 2011).

This study was described to potential participants on the MTurk worker website as "an investigation of eating behaviors and personality." Access was restricted to U.S. citizens who completed ≥ 100 hits and had an average $\geq 98\%$ acceptance rating, which is based on other experimenters' approval of their prior work. The latter two restrictions ensured that participants were experienced users of MTurk and increased the likelihood that they would be conscientious when completing the measures. Restricting the survey to U.S. citizens ensured that geographical variations in culture and knowledge of the English language would not influence the results.

The Flexible Control subscale was administered separately from the Rigid Control subscale to prevent potentially elevated correlations between these subscales due to their proximity. More specifically, rigid control items were entered on one survey page and flexible control items were entered on another survey page. All measures were then randomized via SurveyMonkey, so that each participant received a unique ordering of the surveys to control for order and proximity effects. Participants each received \$1.50 as remuneration.

Participants were excluded from the analyses if they failed at least one of five embedded validity questions gauging attentiveness (e.g., "Please do not provide an answer for this item," $n = 27$), terminated early ($n = 11$), or had significant missing data ($n = 8$). Data from 382 participants remained and were analyzed.

3. Results

3.1. Preliminary analyses

Across all measures, the count for individual missing items was low, ranging from 0 to 1.3% ($M = .33\%$). Thus, we used available item analysis to handle missing data, the recommended method when the percentage of unanswered items is low and scales are internally consistent (Parent, 2013). All measures were normally distributed, and skewness and kurtosis values did not violate the assumptions of our analyses (Kline, 2005). No outliers were detected. Variable means, standard deviations, and correlations are presented in Table 1.

3.2. Tests of hypotheses

As hypothesized (H1), intuitive eating was inversely related to flexible control (see Table 1), and their conceptual overlap (i.e., r^2) was 7.0% for women and 11.7% for men. These findings provide preliminary evidence that intuitive eating and flexible control are not similar constructs because (a) high levels of intuitive eating do not correspond with high levels of flexible control and (b) their

degree of conceptual overlap was not large. Conversely, there was a great deal of conceptual overlap between flexible and rigid control, which were positively correlated (i.e., $r^2 = 50.4\%$ for women and 51.8% for men). A Fisher's r to z correlational comparison, which examines the significance of the difference between two correlation coefficients, revealed that flexible control was more closely related (i.e., conceptually similar) to rigid control than intuitive eating, $z = 18.28$, $p < .001$.

Furthermore, intuitive eating and flexible control were differentially related to the indices of well-being (see Table 1). Intuitive eating was positively related to psychological adjustment (life satisfaction, positive affect, and body appreciation) and inversely related to psychological distress (negative affect, poor interoceptive awareness, binge eating, and food preoccupation) for both women and men, thus upholding H2a. In contrast, flexible control was unrelated to psychological adjustment and distress, except for its rather small positive correlations with poor interoceptive awareness and binge eating for men, and food preoccupation for women and men.

Fisher's r to z correlational comparisons determined whether the correlations between intuitive eating and each well-being index were significantly different from the correlations between flexible control and each well-being index—for example, the intuitive eating and life satisfaction correlation was compared to the flexible control and life satisfaction correlation. Because the pattern of correlations was generally similar between women and men (Table 1), we combined women and men and set the p -value at .007 (.05/7) to control for the seven comparisons. These correlational comparisons were significantly different for life satisfaction ($z = 4.78$), negative affect ($z = -4.98$), body appreciation ($z = 9.86$), poor interoceptive awareness ($z = -10.67$), binge eating ($z = -12.79$), and food preoccupation ($z = -11.88$; all $p < .001$), but similar for positive affect ($z = 2.07$, $p = .019$). Thus, these findings largely support H2b and, collectively, provide evidence that intuitive eating and flexible control have a different pattern in their connection to well-being, providing further evidence that they are quantitatively dissimilar.

Intuitive eating was inversely associated with BMI to a moderate degree for women and men. Flexible control, however, was not related to BMI for women or men. Indeed, Fisher's r to z correlational comparisons revealed that intuitive eating and flexible control were differentially associated with BMI for women ($z = -4.45$, $p < .001$) and men ($z = -4.37$, $p < .001$). These findings uphold H3, in that intuitive eating's connection to BMI is different than flexible control's connection to BMI.

Next, we conducted a set of hierarchical regressions to determine whether intuitive eating accounted for unique variance in each well-being index and BMI above and beyond the variance contributed by flexible control (see Table 2). Also, given the large positive correlation found between flexible and rigid control, we examined whether flexible control was associated with these criteria once its shared overlap with rigid control was excluded. Therefore, for each regression, rigid control was entered at Step 1, flexible control at Step 2, and intuitive eating at Step 3, in the prediction of each well-being index and BMI. Because of the similar correlational values between women and men (Table 1), we combined their data in the analyses and adjusted the p -level to .006 (.05/8) to control for Type I error. At each step, tolerance and variance inflation factor (VIF) values were acceptable (i.e., tolerance = .486, .640, and .610; VIF = 2.06, 1.56, and 1.63, for each step, respectively), indicating that multicollinearity was not an issue, and the individual predictors could be interpreted with confidence (Allison, 1998).

These regressions revealed that intuitive eating predicted unique variance (i.e., range 5.5%–17.7%) in each psychological well-

Table 1

Variable means, standard deviations, and correlations.

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Intuitive eating		-.34***	-.49***	.24***	.24***	-.37***	.46***	-.50***	-.59***	-.49***	-.28***	.08
2. Flexible control	-.27***		.72***	-.06	.13	.06	-.07	.19**	.22***	.20***	.03	.02
3. Rigid control	-.51***	.71***		-.13	.11	.24***	-.23***	.49***	.49***	.36***	.20***	-.06
4. Life satisfaction	.35***	-.03	-.21*		.45***	-.39***	.54***	-.29***	-.23***	-.14*	-.15*	-.12
5. Positive affect	.29***	.07	-.12	.48***		-.26***	.54***	-.15*	-.08	-.04	-.08	-.01
6. Negative affect	-.30***	-.04	.15*	-.53***	-.31***		-.41***	.54***	.34***	.30***	.12	-.08
7. Body appreciation	.64***	-.04	-.38***	.55***	.51***	-.40***		-.31***	-.43***	-.30***	-.38***	.01
8. Poor interoceptive awareness	-.60***	.08	.39***	-.40***	-.34***	.53***	-.56***		.53***	.38***	.09	-.13
9. Binge eating	-.68***	.09	.50***	-.31***	-.20***	.36***	-.57***	.59***		.59***	.22***	-.12
10. Food preoccupation	-.65***	.14*	.46***	-.20***	-.22***	.30***	-.52***	.52***	.66***		.15*	-.06
11. Body mass index	-.40***	-.10	.22***	-.17**	-.09	.19**	-.38***	.33***	.56***	.37***		.08
12. Age	.00	-.13	-.07	-.13	.05	-.03	-.13	-.03	-.12	-.06	.02	
<i>M</i> _{women}	3.34	6.10	7.33	4.27	3.08	1.73	3.22	2.22	25.60	2.94	26.82	35.01
<i>SD</i> _{women}	.70	3.65	2.64	1.76	.81	.71	.96	.90	9.44	1.20	7.30	12.45
<i>M</i> _{men}	3.51	5.32	6.46	4.16	3.15	1.64	3.46	2.06	23.84	2.60	26.54	32.57
<i>SD</i> _{men}	.59	3.65	2.56	1.75	.77	.64	.86	.74	8.64	1.09	5.96	9.35
Range	1–5	0–12	0–16	1–7	1–5	1–5	1–5	1–6	16–62	1–5	18–51	18–63

Note. Women $n = 192$; men $n = 190$. Values for women are presented below the diagonal; values for men are presented above the diagonal. * $p < .05$. ** $p < .01$. *** $p < .001$.**Table 2**

Intuitive Eating's incremental variance in psychological well-being and BMI.

Criterion	Step	Predictor	β	t	R^2	ΔR^2	ΔF
Life satisfaction	1	Rigid control	-.16	-3.10	.026	.026	9.61*
	2	Flexible control	.17	2.24	.039	.013	5.01
	3	Intuitive eating	.30	4.71*	.087	.055	22.17*
Positive affect	1	Rigid control	-.01	-.25	.000	.000	.06
	2	Flexible control	.22	2.97*	.024	.024	8.80*
	3	Intuitive eating	.34	5.27*	.093	.069	27.72*
Negative affect	1	Rigid control	.20	3.79*	.038	.038	14.33*
	2	Flexible control	-.27	-3.79*	.074	.037	14.35*
	3	Intuitive eating	-.31	-4.96*	.133	.059	24.62*
Body appreciation	1	Rigid control	-.32	-6.54*	.105	.105	42.71*
	2	Flexible control	.37	5.35*	.170	.065	28.61*
	3	Intuitive eating	.54	9.92*	.348	.177	98.30*
Poor interoceptive awareness	1	Rigid control	.44	9.27*	.191	.191	85.99*
	2	Flexible control	-.39	6.04*	.261	.074	36.49*
	3	Intuitive eating	-.43	-8.06*	.372	.112	65.03*
Binge eating	1	Rigid control	.50	9.51*	.248	.248	90.34*
	2	Flexible control	-.31	-4.46*	.299	.051	19.93*
	3	Intuitive eating	-.52	-8.87*	.456	.157	78.69*
Food preoccupation	1	Rigid control	.43	8.98*	.181	.181	80.56*
	2	Flexible control	-.24	-3.65*	.210	.029	13.30*
	3	Intuitive eating	-.49	-9.18*	.359	.149	84.34*
BMI	1	Rigid control	.21	3.99*	.042	.042	15.91*
	2	Flexible control	-.36	-5.05*	.105	.063	25.52*
	3	Intuitive eating	-.30	-4.88*	.161	.056	23.86*

Note. Women $n = 192$; men $n = 190$. BMI = body mass index. * $p < .006$ (.05/8).

being index and BMI above and beyond flexible and rigid control (see Table 2). Therefore, in support of H4, intuitive eating is qualitatively different from flexible control (i.e., they are not simply different levels of the same restraint construct), demonstrating that intuitive eating is both an important and unique eating-related characteristic of well-being and is uniquely associated with lower BMI.

Furthermore, in these regressions, we noted that flexible control was positively associated with the indices of adjustment, with the exception of life satisfaction, and inversely associated with the indices of psychological distress and BMI (see Table 2). These findings stand in contrast to the bivariate correlations which demonstrated that flexible control was unrelated to psychological well-being and BMI (see Table 1). The difference between these

analyses was that, in the regressions, the variance flexible control shared with rigid control was excluded from consideration. Therefore, flexible control was positively related to most indices of adjustment and negatively related to psychological distress and BMI only when flexible control's sizeable conceptual overlap ($r^2 > 50\%$) with rigid control was removed.

These latter findings prompted us to question whether certain flexible control items are related in an adaptive direction to well-being or negatively linked to BMI without being linked to rigid control—if so, these items may reveal positive aspects of flexible control that are uncontaminated by rigid control. Thus, we performed a post-hoc canonical correlation analysis to explore the multivariate shared variance between the 12 flexible control items (the first variable set) and the seven well-being indices, BMI, and

Table 3

Canonical correlation analysis relating flexible control items to well-being indices, BMI, and rigid control.

Variable	First canonical variate		Second canonical variate	
Set 1: Flexible control items				
1. "When I have eaten my quota of calories, I'm usually good about not eating any more"	Corr. .47	Coeff. .08	Corr. .60	Coeff. .64
2. "I deliberately take small helpings as means of weight control."	.74	.12	.07	-.09
3. "While on a diet, if I eat food that is not allowed, I consciously eat less for a period of time to make up for it."	.77	.30	-.28	-.46
4. "I consciously hold back at meals in order not to gain weight."	.77	.14	-.09	-.05
5. "I pay a great deal of attention to changes in my figure or body build."	.55	.11	.12	-.20
6. "How conscious are you of what you are eating?"	.46	.14	.20	.03
7. "How likely are you to consciously eat less than you want"	.76	.11	.00	.16
8. "If I eat a little bit more on one day, I make up for it the next day."	.64	-.02	.00	.14
9. "I pay attention to my figure (or body build), but I still enjoy a variety of foods."	.27	-.03	.45	.45
10. "I prefer light foods that are not fattening."	.49	.15	.48	.39
11. "If I eat a little bit more during one meal, I make up for it at the next meal."	.71	.10	.04	.12
12. "Do you deliberately restrict your intake during meals even though you'd like to eat more?"	.78	.25	-.26	-.45
% of variance	40.60%		8.36%	
Redundancy	25.17		1.50	
Set 2: Well-being, BMI, rigid control				
Life satisfaction	-.09	-.08	.31	-.17
Positive affect	.09	.02	.44	.12
Negative affect	.03	-.05	-.36	-.03
Body appreciation	-.14	.07	.84	.66
Poor interoceptive awareness	.19	-.23	-.38	.11
Binge eating	.32	.10	-.76	-.52
Food preoccupation	.32	.02	-.66	-.43
BMI	.04	-.11	-.64	-.36
Rigid Control	.96	1.09	-.19	.21
% of variance	13.67%		27.03%	
Redundancy	8.48		4.87	
Canonical correlation		.78***		.42***

Note. Corr. = correlation with canonical variate ($rs \geq .45$, *** $p < .001$ are boldfaced). Coeff. = standardized canonical coefficient.

rigid control (the second variable set). The overall model was significant, Wilks' $\lambda = .249$. As illustrated in Table 3, two pairs of canonical variates accounted for the significant relationships between the two variable sets, and together accounted for 88.33% of the total variance. With an interpretive cutoff correlation of .45 (Sherry & Henson, 2005), correlations with the first canonical variate indicated that participants reporting higher rigid control also reported higher flexible control on all items except Item 9 ("I pay attention to my figure [or body build], but I still enjoy a variety of foods"). After removing the shared variance from the first canonical variate, the second canonical variate revealed that higher positive affect and body appreciation, as well as lower food preoccupation, binge eating, and BMI, were related to higher levels of flexible control. Items 1 ("When I have eaten my quota of calories, I am usually good about not eating any more"), 9 ("I pay attention to my figure [or body build], but I still enjoy a variety of foods"), and 10 ("I prefer light foods that are not fattening"). Therefore, Item 9 was the only flexible control item that did not share substantial variance with rigid control and was associated positively with body appreciation and inversely with binge eating, food preoccupation, and BMI.

4. Discussion

Intuitive eating and flexible control have been touted by certain scholars as adaptive approaches to eating that stand in contrast to rigid restriction of food intake (Tribole & Resch, 2012; Tylka & Kroon Van Diest, 2013; Westenhofer et al., 1999). Seemingly similar in some behaviors (e.g., eating less to compensate for a large meal), yet theoretically different (e.g., following internal versus external cues to eating), intuitive eating and flexible control have never been positioned together in the same study to determine their unique contributions to well-being. In this study, we compared intuitive eating with flexible control to determine

whether they are qualitatively distinct (i.e., represent different constructs), quantitatively distinct but qualitatively similar (i.e., represent different levels along a restraint continuum), or neither qualitatively nor quantitatively distinct (i.e., represent similar levels of the same construct). Two main conclusions emerged.

First, intuitive eating is not the same as flexible control. These constructs are qualitatively distinct and independent. Largely, this conclusion was derived from our finding that intuitive eating contributed unique variance to eight indices of well-being (psychological distress and adjustment) and BMI, above and beyond the variance contributed by flexible control. Additional analyses excluded other possibilities, such as that intuitive eating and flexible control are mirror constructs or that they represent different levels of the same underlying construct. Because they are inversely related, and the degree of conceptual overlap between intuitive eating and flexible control (via their correlations with one another) was quite low for both women (7%) and men (11.7%), we conclude that intuitive eating and flexible control are not conceptually the same construct. Also, because intuitive eating and flexible control were significantly different from one another in their bivariate associations with six of the seven well-being indices and BMI, we are confident that intuitive eating and flexible control do not simply represent different levels of the same construct.

Second, flexible control was intertwined with rigid control at both the scale and item levels. At the scale level, our analyses demonstrated that flexible and rigid control were positively related and shared a substantial percentage of variance (i.e., slightly over 50%), which was unsurprising due to the strong positive correlation between flexible and rigid control documented in some previous studies (Timko & Perone, 2005; Westenhofer, 1991; Westenhofer et al., 1994, 2013). Our findings further revealed that this strong positive relationship suppressed flexible control's associations with well-being. Flexible control was unrelated with psychological well-

being and BMI within bivariate correlations. When its shared variance with rigid control was removed in the multiple regression analyses, however, flexible control was positively related to most indices of adjustment and negatively related to psychological distress and BMI. Thus, researchers would need to remove flexible control's shared variance with rigid control in order to be able to assess an adaptive version of flexible control. At the item level, a canonical correlation analysis revealed that 11 of the 12 flexible control items were positively related to rigid control. After excluding the items' shared variance with rigid control, three flexible control items were associated positively with body appreciation and inversely with binge eating, food preoccupation, and BMI. Of these three, only "I pay attention to my figure [or body build], but I still enjoy a variety of foods" was not substantially linked to rigid control, suggesting that it may tap into an adaptive version of flexible control by itself.

Our findings therefore call into question the clarity and utility of flexible control. The adaptive properties of flexible control are not revealed unless researchers remove its shared variance with rigid control. It would be impractical for researchers to assess adaptive flexible control by measuring both flexible and rigid control and excluding the variance contributed by rigid control. Even if researchers proceeded to assess adaptive flexible control in this manner, it is not clear what adaptive flexible control is in the absence of rigid control, as both constructs are intertwined within 11 of the 12 flexible control items. We can look to the one item unrelated to rigid control for guidance on defining adaptive flexible control; however, this single item would likely not yield a comprehensive understanding of adaptive flexible control as a construct. For the study of adaptive flexible control to continue, researchers need to explore a different operationalization of this construct—one that emphasizes external self-regulation yet does not overlap conceptually or empirically (via shared variance) with rigid control and is linked to indices of well-being and health in a beneficial direction. We are uncertain if such an operationalization is feasible. Indeed, it seems to be the exertion of external control placed on eating that underlies rigid and flexible control patterns of eating, and distinguishes them from intuitive eating. Whether or not this "control" can ever be adaptive in the context of eating behavior remains an open question.

It is likely that the flexible control strategies advocated by some professionals and health organizations inadvertently emphasize rigid control, as these strategies are similar to the item content of Westenhoefer et al.'s (1999) Flexible Control subscale. As such, we discourage professionals and health organizations from advocating that community adults adopt flexible control strategies to promote health and well-being, as Westenhoefer et al. (1999) has recommended. Our data suggest that this recommendation may be impractical and potentially harmful: if professionals and health organizations follow this recommendation and utilize the operationalization of flexible control proposed by Westenhoefer et al. (1999), they may be inadvertently promoting rigid control as well.

In contrast to flexible control, intuitive eating appears to be an adaptive and stand-alone construct useful for researchers and clinicians. Researchers do not need to extract intuitive eating's shared variance with rigid and/or flexible control (or any other variable) for intuitive eating to be positively associated with psychological adjustment and inversely associated with psychological distress and BMI. The measures of intuitive eating available—the original IES and the newer IES-2—yield reliable and valid scores for women and men, and their items clearly and comprehensively represent the intuitive eating construct (Tylka, 2006; Tylka & Kroon Van Diest, 2013), which is a benefit to researchers. Instead of being strongly related to higher levels of rigid control (like flexible control), intuitive eating is more moderately related to lower levels of

rigid control. Thus, it is highly unlikely that promoting intuitive eating will promote rigid control. Indeed, Bacon et al. (2005) found that their Health at Every Size® intuitive eating intervention group significantly lowered participants' eating restraint from baseline to post-treatment, and sustained this change at a 2-year follow-up. Bush et al. (2014) found that their intuitive eating intervention group was 3.5 times more likely to be asymptomatic for disordered eating than a wait-list control group at 10-weeks post intervention. Hence, intuitive eating interventions are not likely to promote eating pathology and may even lessen it (Schaefer & Magnuson, 2014; Tylka et al., 2014).

It is important to acknowledge the present study's limitations, which reveal avenues for future research. We used a cross-sectional, correlational design which precludes conclusions regarding causal direction. From our data, we cannot argue that intuitive eating increases psychological adjustment or decreases psychological distress and BMI—we can only conclude that intuitive eating is related to well-being in an adaptive fashion as well as related to lower BMI. Perhaps psychological well-being promotes attention to and trust in internal bodily signals, which facilitates intuitive eating, rather than the opposite direction. Longitudinal studies are needed to examine intuitive eating and well-being patterns across time.

Participants self-selected to complete this study, which may have led to biases in the sample, such that only U.S. citizens with access to the Internet and both interested in and curious about eating habits provided their responses. Although our sample is more diverse than the typical U.S. college student female sample, there is still a need to examine whether our findings are generalizable across participants of various social and cultural identities, many of which may not have easy access to the Internet. Furthermore, we relied upon self-report data, and thus it is possible that participants did not accurately report their responses. The anonymous nature of the survey may have minimized overt misreporting.

5. Conclusions

The present study garnered considerable support for intuitive eating as an adaptive and distinct construct from flexible control among community women and men. Conversely, the present study did not support flexible control's conceptual independence from rigid control, and this overlap with rigid control clouded our understanding of flexible control as a construct and confounded its associations with well-being. Importantly, intuitive eating does not appear to be another variety or form of restraint. Collectively, our findings caution against promoting flexible control (as it is currently operationalized and assessed) within clinical and public health contexts while further substantiating efforts to promote intuitive eating among adults within these contexts.

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