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Evaluating patterns of weight and body composition change among college women

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ABSTRACT

The prevalence of obesity increases as women move from adolescence to young adulthood, and college women have been identified as a population at risk for unhealthy weight gain. Studies of weight gain in college populations have revealed that significant, variable weight change occurs in as few as eight weeks, but few have included participants beyond their freshman year of college or assessed body composition. The aims of the study were to use a repeated measures design to identify patterns of weight change among college women at all grade levels and to evaluate factors that may predict weight change over a one-year period. Undergraduate college women ($N = 131$) completed measures of physical activity, dietary restraint, living conditions, and body dissatisfaction at baseline, 6-months, and 12-months. Height, weight, and body composition were collected at all assessment periods. Forty-four percent of participants gained at least 3 lb, 23% lost at least 3 lb, and 33% maintained weight over one year. Weight change was associated with changes in body fat and was not related to baseline BMI or age. There were no significant differences between grade levels, suggesting that future studies should include women at all grade levels. Baseline physical activity, dietary restraint, living conditions, and body dissatisfaction did not predict weight change at one year, nor did they differentiate between individuals in the three weight change categories. Further research is needed to identify the factors associated with weight gain in young adult women, and such studies should not be limited to college freshmen.

1. Introduction

Rates of overweight and obesity increase in young adulthood, with obesity prevalence among women nearly doubling from 17.1% to 31.9% between the age ranges of 12–19 and 20–39 years (Flegal, Carroll, Kit, & Ogden, 2012; Ogden, Carroll, Kit, & Flegal, 2012). College students appear to be particularly vulnerable, and numerous studies have sought to identify patterns of weight change in college populations (Anderson, Shapiro, & Lundgren, 2003; Cluskey & Grobem, 2009; Delinsky & Wilson, 2008; Jung, Bray, & Ginis, 2008; Levitsky, Halbmaier, & Mrdjenovic, 2004; Pliner & Saunders, 2008; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). Such studies have produced mixed results, but all found significant, variable weight change among college students. The percentage of participants who gained weight over various study periods have ranged from 25% gaining at least 5 lb over three months (Anderson et al., 2003) to 70% gaining weight over two years (Racette et al., 2005). However, the majority of these studies have focused solely on weight change among college freshmen, with the assumption that aspects of the freshman experience (e.g. change in environment, increased access to calorie dense foods) make this population especially vulnerable. However, given the identification of young adults as an at-risk population, studies of weight change within this population should include college students beyond their freshman year.

The health risks associated with weight gain are linked to increases in adipose tissue rather than increases in muscle mass (Kopelman, 2007). Therefore, it is important to distinguish increases in body fat from increases in muscle when evaluating weight change. To our knowledge, however, only one published study has reported body composition in relation to weight change in young adults and found that changes in weight were attributable to changes in body fat (Jung et al., 2008). Replication of this finding is needed.

Identifying the predictors of weight gain among young adults could help identify individuals who might benefit from weight gain prevention interventions, as well as inform the content of such interventions. Several of the aforementioned studies examined predictors of weight change in addition to patterns of weight change. Self-reported physical activity, dietary restraint, and living conditions have been examined, with inconsistent or non-significant results. Two studies of weight change in college freshmen found no significant relationship between weight change and an unvalidated measure of physical activity (Racette, Deusinger, Strube, Highstein, & Deusinger, 2008, Racette et al., 2005). Further examination with valid measures of physical activity is needed before it can be ruled out as a useful predictor of weight change.

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Studies of weight change have produced conflicting results regarding the role of dietary restraint as a predictor of weight change. Delinsky and Wilson (2008) found no relationship between overall weight change and restraint in college women over seven months. However, Pliner and Saunders (2008) found that restrained eaters gained more weight than unrestrained eaters at a 5-month follow-up. Notably, the researchers also found an interaction between restraint and living conditions, and further research is needed to understand the role of living environment and dietary restraint on weight change. Additionally, although body dissatisfaction has been linked to weight change (van den Berg & Neumark-Sztainer, 2007), unhealthy weight control behaviors, and decreased physical activity in adolescents (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006), it has yet to be examined as a potential predictor of weight change in young adult women.

The present study aimed to identify patterns of weight change and associated demographic and psychological features among college women at all levels of undergraduate study. This study was limited to female participants due to the elevated risk for obesity among women (Pan, Freedman, Gillespie, Park, & Sherry, 2011) and the relationship between body dissatisfaction and weight change in adolescent females (van den Berg & Neumark-Sztainer, 2007). At baseline, 6 months, and 12 months, body weight, physical activity, dietary restraint, living conditions, and body dissatisfaction were evaluated. The present study aimed to improve upon previous research in this domain by a) including women beyond their freshman year of college, b) collecting body composition data, c) utilizing a repeated-measures design and including a mid-point assessment, d) using validated measures of physical activity, e) including an expanded assessment of living conditions, and f) including assessment of body dissatisfaction.

2. Method

Participants were 131 female undergraduate students enrolled at the University of Hawai'i at Mānoa (mean baseline age = 20.30 years (SD = 2.86); mean BMI (kg/m^2) = 22.92 (SD = 4.02); 49% Asian, 33% Caucasian, 5% Hawaiian/Pacific Islander, 3% Hispanic/Latino, and 10% mixed race). Individuals were ineligible to participate if they a) would not be enrolled at the university for the duration of the study, b) currently had a probable eating disorder as identified by either self-report or the Eating Disorder Examination-Questionnaire (EDE-Q), or c) currently had a medical condition that impacted their weight (e.g., thyroid disease, pregnancy during the study period). Table 1 shows participants' self-reported ethnicity, grade level, and living conditions.

Table 1
Baseline ethnicity, grade level, living conditions and BMI.

	n (%)
Ethnicity	
Asian	64 (49%)
Caucasian	43 (33%)
Hawaiian/Pacific Islander	7 (5%)
Hispanic	4 (3%)
Mixed race	13 (10%)
Grade level	
Freshmen	39 (30%)
Sophomores	30 (23%)
Juniors	46 (35%)
Seniors	16 (12%)
Living conditions	
On campus	50 (38%)
Off campus with family	50 (38%)
Off campus with non-family	31 (24%)
BMI	
Underweight	5 (4%)
Normal weight	98 (75%)
Overweight	23 (18%)
Obese	5 (4%)

2.1. Measures

Each participant's height and weight were obtained at every assessment. Body composition was measured through bioimpedance using a Tanita BF-522W Body Fat/Body Water Analyzer. The scale accounts for the participant's height, weight and gender in calculating body fat percentage to the nearest 0.1%. This method of body composition measurement was selected due to the non-invasive nature and good reliability and validity of the Tanita BIA device (Ihmels, Welk, McClain, & Schaben, 2006).

2.1.1. Eating pathology

The EDE-Q (Fairburn & Beglin, 1994) is a 36-item self-report questionnaire derived from the Eating Disorder Examination interview (EDE; Fairburn & Cooper, 1993) and assesses disordered eating pathology over the past 28 days. The EDE-Q has been validated in both clinical and general populations of young adult women and has demonstrated internal consistency ranging from .78 to .93 and test–retest reliability ranging from .57 to .70 for the distinctive behaviors associated with eating disorders (Fairburn & Beglin, 1994; Luce & Crowther, 1999; Mond, Hay, Rodgers, Owen, & Beumont, 2004). The EDE-Q, along with a single-item self-report question (i.e. "Do you currently have an eating disorder"), was administered at baseline assessment to identify and screen out individuals with probable eating disorders.

The 10-item Restrained Eating Subscale from the *Dutch Eating Behaviour Questionnaire* (DEBQ-R; van Strien, Frijters, Bergers, & Defares, 1986) was used to assess dietary restraint. It has demonstrated excellent internal consistency (α = .95; α = .93 in the present sample) in normal-weight and obese populations and excellent test–retest reliability over a two-week period (r = .92; Allison, Kalinsky, & Gorman, 1992).

To assess whether weight change was related to expressed intention to lose weight, participants were asked to report if they were currently trying to lose weight with a dichotomous response option of No or Yes. Similar single-item measures of current dieting status have been used in previous research and have demonstrated temporal reliability as well as convergent and divergent validity (Lowe et al., 1996; Stice, 1998).

2.1.2. Physical activity

The *Godin Leisure Time Activity Questionnaire* (GLTEQ; Godin & Shephard, 1985) assesses the amount of mild, moderate, and strenuous exercise participants engage in during their free time per week. It has demonstrated acceptable test–retest reliability (r = .74 for two weeks; r = .62 for one month) and validity in healthy populations (Godin & Shephard, 1985; Jacobs, Ainsworth, & Hartman, 1993).

2.1.3. Body image

Three measures of body dissatisfaction were utilized in the present study. The Body Areas Satisfaction Subscale of the Multidimensional Body Self-Relations Questionnaire (MBSRQ-BAS; Brown, Cash, & Mikulka, 1990) assesses how satisfied an individual is with various regions of the body and has demonstrated good internal consistency among women (α = .82; Cash, Fleming, Alindogan, Steadman, & Whitehead, 2002). The internal consistency in the present sample was α = .79. The 8-item version of the *Body Shape Questionnaire* is an alternative form of the original 34-item measure (BSQ-8; Evans & Dolan, 1993; BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987) and assesses feelings about an individual's appearance over the past four weeks. The scale has demonstrated excellent internal consistency among women in the general population (α = .96, α = .90 in the present sample). Participants were also asked to report their current body weight and ideal body weight in order to determine the discrepancy between them.