

Predicting the 'Freshman 15':  
Environmental and Psychological Predictors of Weight Gain in First Year  
University Students

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the Faculty of Graduate Studies and Research  
in partial fulfillment of the requirements for the degree  
Master of Arts

by

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## Abstract

This study had two main objectives: (1) To investigate weight gain in first year university students and (2) to examine whether environmental and psychological factors, specifically accommodation, stress, and self-regulation, predict weight gain. In total, 84 participants (77% female) were weighed and completed stress, self-regulation, and health habits questionnaires at the beginning and end of their first semester of university. Weight gain was small, but significant ( $M=0.89$  kg,  $SD=3.30$ ). Students living on-campus gained more weight than their off-campus peers,  $M=1.65$  kg and  $0.13$  kg respectively,  $t(82)=-2.32, p < .05$ . No significant relationship was found between stress, self-regulation, and weight change. These results suggest that the first year of university is a critical period for weight gain, especially for students living in residence. Greater understanding of risk factors associated with weight gain in first year university students, particularly students living in residence, may aid in the development of prevention programs.

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Predicting the 'Freshman 15': Environmental and Psychological Predictors of Weight Gain in First Year University Students

The prevalence of overweight and obesity is increasing and in the past two decades has more than doubled (Tremblay, Katzmarzyk, & Willms, 2002; Tjepkema, 2005). In Canada in 1978/1979, 14% of adults were considered obese (Tjepkema, 2006). By 2004, 23% of Canadian adults were obese and an additional 36% were overweight (Tjepkema, 2006). These statistics are alarming as overweight and obesity are risk factors for numerous diseases including Type 2 diabetes, hypertension, cardiovascular disease, osteoarthritis, gallbladder disease, and some cancers (Birmingham, Muller, Palepu, Spinelli, & Anis, 1999; Peeters et al., 2003; Visscher et al., 2004). As such, intervention and prevention of obesity is of the utmost importance.

One way to prevent overweight and obesity is to better understand high-risk periods for weight gain and devise intervention strategies that are aimed specifically at these periods. The transition from late adolescence to early adulthood may be one such period. In the United States, between 1991 and 1997, the greatest increase in obesity was found among 18 to 29 year olds, from 7.1% to 12.1% (Mokdad et al., 1999). By 2001, the prevalence of obesity among this group had increased to 14% (Mokdad et al., 2003). People aged 18 to 29 with some college education appear to be at an even greater risk for weight gain as obesity rates among this group are higher. Obesity rates in this population rose from 10.6% to 17.8% between 1991 and 1997 (Mokdad et al., 1999). By 2001 the prevalence of obesity among this group had increased to 21% (Mokdad et al., 2003).

*The 'Freshman 15'*

Associated with weight gain among people with some college education is the phenomenon known as the 'Freshman 15'. The 'Freshman 15' is the belief that students will gain 6.8 kg (15 lbs) of weight in their first year of university. This belief is widespread in the popular media and on college campuses, but only recently has attracted the attention of the scientific community.

The data from studies on the 'Freshman 15' have varied widely. While magazine articles and Internet websites would have the public believing that a gain of 15 lbs is ubiquitous among freshman students, most scientific studies have found a gain of 15 lbs to be an overestimation. Among studies that found a significant increase in weight, mean gain ranged from 0.73 kg (1.6 lbs) (Butler, Black, Blue & Greteback, 2004) to 3.99 kg (8.8 lbs) (Hovell, Mewborn, Randle, & Fowler-Johnson, 1985) with the average weight gain found to be approximately 2 kg (4 lbs).

As weight problems in late adolescence are highly predicative of overweight and obesity in adulthood (Guo, Wu, Chumlea, & Roche, 2002), it is important to better understand this critical period of weight gain. As such, researchers have examined weight gain in different populations of first year students and some researchers have examined potential contributors to gain. For a summary of research investigating weight gain in freshman year see Table 1.

Table 1

*Summary of the 'Freshman 15' Research*

Year	Authors	Mean gain (kg)	Participants	Study duration	Possible predictors of weight gain examined	Predictors of weight gain found
1985	Hovell, Mewborn, Randle, & Fowler-Johnson	3.99	N=158; F in res. only	12 mos.	Behavioral factors (not specified)	None
1993	Hodge, Jackson, & Sullivan	No sig. gain	N=61; F only;	6 mos.	Body image, self-esteem, locus of control, self-monitoring	None
1996	Cooley & Toray <sup>a</sup>	2.0	N=104; F in res. only	7 mos.	None	None
1999	Vohs, Heatherton, & Herrin <sup>a</sup>	1.7	N=342; F only	6, 9, or 12 mos.	Eating behaviors, health habits, general well-being	None
2002	Graham & Jones <sup>b</sup>	No sig. gain	N=49	8 mos.	Eating attitudes and behaviors, body image, exercise habits, awareness and concern about the 'Freshman 15'	None
2003	Anderson, Shapiro & Lundgren	1.3	N=145	8 mos.	None	None

Year	Authors	Mean gain (kg)	Participants	Study duration	Possible predictors of weight gain examined	Predictors of weight gain found
2004	Levitsky, Halbmaier, & Mrdjernovic	1.9	N=60	12 wks.	Eating habits, sleep, alcohol consumption, physical activity	High junk food consumption, recent dieting, evening snacking
2005	Racette, S.S. Deusinger, Strube, Highstein, & R.H. Deusinger <sup>c</sup>	2.5	N=118	8 mos.	Diet and exercise habits	None
2006	Morrow et al.	1.0	N=137; F only	8 mos.	Diet and exercise habits	High baseline weight, greater fat mass at baseline, low physical activity
2006	Lowe et al.	2.1	N=69; F only	8 mos.	Dietary restraint, dietary disinhibition, emotional eating, and dieting status	Current or past dieting
2006	Levitsky, Garay, Nausabaum, Neighbours, & DellaValle <sup>d</sup>	3.1	n=23; F only	12 wks.	None	None

Year	Authors	Mean gain (kg)	Participants	Study duration	Possible predictors of weight gain examined	Predictors of weight gain found
2006	Hoffman, Policastro, Quick, & Lee	1.3	N=67; res.	7 mos.	None	None
2006	Hajhosseini et al.	1.4	N=27	16 wks.	Diet	None
2007	Serlachius, Hamer & Wardle <sup>a</sup>	1.5	N=268	6 mos.	Perceived stress, diet and exercise habits	High levels of perceived stress (esp. for women)
2007	Hull et al.	1.3 (+ 0.1 over summer)	N=69	8 mos. (+ 4 mos. of summer)	None	None
2008	Holm-Denoma, Joiner, Vohs, & Heatherton <sup>a</sup>	M: 1.6 F: 1.8	N=608	3, 6, or 9 mos.	Self-esteem, relationships, eating habits, exercise, disordered eating	M: Intense and frequent exercise, troublesome relationship with parents F: Positive relationship with parents
2008	Economos, Hildebrandt, & Hyatt <sup>a</sup>	M: 2.3 F: 2.5	N=396	8 mos.	Stress, alcohol and cigarette use, eating habits, feelings of control, life satisfaction	M: Alcohol consumption F: Increased workload
2008	Delinsky & Wilson <sup>a</sup>	1.5	N=149; F only	8 mos.	Disordered eating, dieting, knowledge of 'Freshman 15'	None

Year	Authors	Mean gain (kg)	Participants	Study duration	Possible predictors of weight gain examined	Predictors of weight gain found
2008	Pliner & Saunders	1.5	N=38	5 mos.	Dietary restraint, eating habits, accommodation	High dietary restraint x living in residence
2008	Kasparek, Corwin, Valois, Sargent & Morris <sup>a</sup>	1.1	N=193; 94.3% in res.	6 mos.	Physical activity, alcohol consumption, fruit and vegetable intake	BMI>25 at baseline
2008	Mihalopoulos, Auinger, & Klein <sup>a</sup>	1.2	N=125	7 mos.	None	None
2008	Jung, Bray, & Ginis	1.4	N=101; F in res. only	12 mos.	Diet and physical activity	Decreased physical activity

*Note.* Studies that examined weight change over periods of time other than or beyond the first year of university, with no subset tested at the end of first year, are excluded. In addition, studies that examined BMI change only and not weight change are also excluded.

mos.= months, wks. =weeks, M=Males, F=Females, res.=residence, dietary restraint=the intentional control of food intake in order to maintain body weight and prevent weight gain.

<sup>a</sup> Weight change is self-reported

<sup>b</sup> Participants were highly concerned about their diet and weight, therefore results of this study can only be generalized to populations concerned about weight gain.

<sup>c</sup> This group is a subset of the total group (N=290) who was tested at the end of first year while the rest of the participants were tested at the end of second year

<sup>d</sup> Intervention study; only control group is reported in table

Results from the current literature suggest that the amount of weight gained is not as dramatic as the 'Freshman 15' myth implies. However, a significant amount of weight is gained in the first year of university. Although this weight gain has been examined in some detail, the current literature has its limitations.

### *Limitations of the 'Freshman 15' Literature*

There are two major limitations to the current literature on freshman weight gain. First, many researchers are relying on self-reported weight and height data instead of measured weight and height. Second, few researchers are examining predictors of weight gain. Studies that have examined predictors of weight gain have focused mainly on dietary and physical activity habits of first year students and have failed to investigate the environmental and psychological factors underlying these health behaviors.

#### *Self-Report vs. Measured Weight*

While using self-reported weight and height data saves time and money, self-reports of weight tend to underestimate weight whereas self-reports of height tend to overestimate height (Shields, Gerber, & Tremblay, 2008). This means that studies using self-report data may find a lower prevalence of overweight and obesity among college freshman than what exists. In addition, participants may not realize that they gained weight and report that their weight stayed the same or they may be embarrassed about weight gain and not report it. Alternatively, participants may feel they gained more weight than they actually did and report greater weight gain. This was found in one study that compared measured to reported freshman weight gain (Graham & Jones, 2002) and was noted as a concern in a meta-analysis of the 'Freshman 15' literature (Vella-Zarb & Elgar, in press).

#### *Predictors of Weight Gain*

Studies that have examined predictors of weight gain have largely focused on diet and exercise. It is widely known that a high-calorie, high-fat diet combined with a

sedentary lifestyle leads to weight gain, but what other factors play a role in weight gain in university students?

*Environmental predictors: Lifestyle and accommodation.* Incoming students may be particularly susceptible to weight gain because of changes in their lifestyle. The majority of students' diets do not meet nutritional guidelines, particularly in terms of recommended fruit and vegetable intake (Huang et al., 2003), and most students' diets far exceed sugar, fat, and sodium recommendations (Anding, Suminski, & Boss, 2001). Furthermore, physical activity rates of university students are exceptionally low, with some studies finding that almost 70% of university students do not meet recommended physical activity guidelines (Anding, Suminski, & Boss, 2001).

Environment may contribute to this lifestyle. Students living in on-campus residences or dormitories may be at greater risk for engaging in unhealthy behaviors as the transition from their parents' house to residence means new habits have to be formed. Arguably this period is when people first learn to take care of themselves; students will have to cook or at least plan their meals themselves and they may not know how to prepare healthy meals or which foods are healthy. They will also have to decide when and how much physical activity to undertake without their parents' influence. Lau, Quadrel, and Hartman (1999) suggest that this transition period of moving away from home is a vulnerable time for health behaviors as healthy habits that adolescents were taught by their parents, such as exercising regularly and eating adequate amounts of fruits and vegetables, may give way to unhealthy habits if adolescents are exposed to them during this vulnerable period.

The transition from home to residence also means a change in food environment. A wider variety of foods are available in the residence cafeteria than at home, which may produce a change in the amount of food eaten. In a classic study by Rolls (1981), participants ate more when they had a greater variety in food choice than when they only had one choice. In addition, students living in residence eat with peers as opposed to family members and likely in bigger groups of people than they are used to. As Clendenen, Herman, and Polivy (1994) reported, eating with others facilitates eating, particularly when the other diners are friends. Taking these factors into consideration, it follows that students living in residence will gain more weight in their first year of university than their peers who live off-campus.

*Psychological Predictors: Stress and Self-regulation.* Stress may also contribute to students' unhealthy lifestyle. The transition from high school to university can be a stressful time for young adults as individuals are particularly susceptible to stress during life transitions (Compas, Wagner, Slavin, and Vannatta, 1986).

According to Self-Regulation Theory, stress (or other forms of mental or physical exertion) can reduce self-regulation, the process by which people exercise restraint over their emotions, thoughts, and behaviors (Baumeister, Muraven, and Tice, 2000; Muraven, Tice, and Baumeister, 1998). When self-regulation or self-control is reduced people may fall back on behaviors that require the least amount of effort, such as remaining sedentary or consuming convenient junk food to satisfy hunger (Baumeister et al. 2000). Incoming university students' self-regulation may be reduced because beginning university can be a stressful time and this reduction in self-regulation could partly explain students' unhealthy habits.

Oaten and Cheng's (2005) study investigating examination stress supports this idea. In their study, first and second year university students who were studying for exams reported higher levels of stress, lower levels of self-control, and demonstrated poorer performance on tasks requiring self-regulation than students who were not studying for exams. In addition, these highly stressed exam-writing students reported a reduction in healthy eating and physical activity during this stressful period. While examination time is arguably a universally stressful period for students, during the rest of the year some students may experience more stress than others and these students may demonstrate poorer self-control over health behaviors, such as eating and physical activity.

A study conducted by Oliver and Wardle (1998) on the perceived effects of stress on eating behavior in university students supports this idea. In their study, the majority of participants reported that stress influences the overall amount of food they consume, with 42% of participants reporting that stress increases their food intake and 38% of participants reporting that stress decreases their food intake. Dieters were more likely to report an increase in eating during stressful times. However, regardless of dieting status, most students (73%) reported that they snack more often during stressful periods, eating mainly sweets and chocolates. Similar results were found in O'Connor, Jones, Conner, McMillan, and Ferguson's (2008) study examining daily hassles and eating habits in university students. In their study, results showed a positive relationship between daily hassles and high-fat and high-sugar food consumption and a positive relationship between number of hassles and snack consumption.

Not only has stress been found to increase unhealthy food consumption, but it has

also been found to decrease physical activity. In Steptoe, Wardle, Pollard, Canaan, and Davies (1996) study on the effects of exam stress, the researchers found that stress during exams predicted a reduction in physical activity levels among university students. Similar results were found in Nguyen-Michel, Unger, Hamilton, and Spruijt-Metz's (2006) study on daily hassles and physical activity. Results of this study showed a significant negative relationship between physical activity and hassles. This suggests not only that high levels of physical activity are predicative of low levels of stress, but also that high levels of stress are predicative of low levels of physical activity.

In sum, stress can have a negative impact on health behaviors. Specifically, research suggests that higher levels of stress are associated with greater junk food consumption and less physical activity. Self-Regulation Theory posits that this link between stress and poor health behavior is due to the exhausting effect that stress has on self-regulation. Beginning university can be a stressful time so incoming university students' self-regulation may be particularly low and this may explain in part students' poor health habits and subsequent weight gain. Following this logic, it would be expected that students with higher levels of stress and lower levels of self-control would gain more weight.

### *The Present Study*

The purpose of this study was to fill the identified gaps in the literature by meeting two main objectives: (1) To investigate the amount of weight gain that occurs in first year university students using measured weight and (2) to examine how environmental and psychological factors, specifically accommodation, stress, and self-regulation, affect weight gain.

In order to meet these objectives, four hypotheses were tested:

Hypothesis 1: There is a significant increase in mean body weight in first year university students. It was necessary to test this hypothesis because there has been some controversy over whether or not weight gain occurs during the first year of university. In addition, participants' weight and height were measured using a physician's scale, unlike in some studies where weight and height were self-reported and thus subject to self-report bias (e.g. Serlachius et al., 2007; Delinsky & Wilson, 2008). Measuring weight and height avoids self-report bias and thus provides a more accurate depiction of whether or not weight change occurs.

Hypothesis 2: Students living in residence will show a greater increase in weight than their off-campus peers. Few studies on freshman weight gain have examined students in different types of accommodations and even fewer still have compared weight gain by accommodation. This study advances knowledge in this area by testing this hypothesis.

Hypothesis 3a: Higher levels of stress predict greater weight gain. While Serlachius et al. (2007) found a positive correlation between stress and weight gain in freshman year, weight and height were self-reported in their study. Weight and height were measured in the present study, thus reducing self-report bias and providing a more accurate depiction of the link between stress and weight gain.

Hypothesis 3b: Variation in self-regulation accounts for (or mediates) the effects of stress on weight gain. To date, the link between stress, self-regulation and weight gain in university students has not been tested.

Hypothesis 4: A combination of environmental and psychological factors, namely accommodation, stress, and self-regulation, account for a significant proportion of the variation in weight gain among first year university students.

## Method

### *Participants*

First year students at Carleton University were recruited for participation at beginning of the 2008 academic year. Participants were recruited through Carleton's online participant pool (SONA) and through announcements in first year English and Economics classes (see Appendix A for participant pool notice and classroom script). Potential participants were informed that the study would look at demographic characteristics and lifestyle habits of students and would involve being weighed, but they were not told that the study would examine weight gain in order to avoid self-selection bias (i.e., to avoid attracting only students who are concerned about their weight). Introductory psychology students were informed they would earn 1.5 course credits for their participation (0.75 credits for each visit) and other students were informed they would earn \$15 for their participation (\$7.50 for each visit).

Students who were not in their first year of university and first year students who were older than 20 years of age at baseline testing were excluded from this study in order to assess only those students making the transition from high school to university. In addition, participants who were pregnant or planning on becoming pregnant over the course of the study, participants diagnosed with metabolic disorders, and participants on medication that may affect their weight (not including birth control) were excluded from this study.

In total, 112 participants signed up for the study and were weighed, measured, and completed questionnaires assessing their health habits, stress levels, and self-regulation in September of their first year of university. Ninety-one participants (81.25% of the original sample) returned for follow up testing approximately 11 weeks later ( $M = 76.67$  days,  $SD = 1.76$ ). Non-returnees were not significantly different from returnees on any of the measured baseline characteristics. Of the 91 returnees, data from six students were removed due to their failure to meet the inclusion criteria and one student was removed as an outlier (see section on data screening). After these seven cases were removed, complete data were available on 84 participants.

The majority of the remaining 84 participants were female (77%). The ethnic distribution of the sample was 58% Caucasian, 24% Asian, 8% African-Canadian/African-American, and 10% other ethnic group. At Time 1 testing, 17% of participants were 17 years old, 60% were 18 years old, 17% were 19 years old, and 7% were 20 years old. Approximately half of the participants lived on-campus (54%) and half lived off-campus (46%).

### *Ethical Considerations*

The Psychology Department Research Ethics Board at Carleton University approved this study. Prior to participation, each participant completed a consent form (see Appendix B) and was assigned a participant number. A master list matching names and participant numbers was kept in a location separate from the completed questionnaires.

### *Measures and Apparatus*

*Demographic and background information.* All demographic and background information was self-reported and included age (in years), ethnicity (Caucasian, African Canadian/ African American, Asian, Aboriginal, Hispanic, or other ethnic identification), gender, and accommodation (on or off campus). For exclusion purposes, participants were asked, “Are you pregnant or planning on becoming pregnant in the next 6 months?” “Have you been diagnosed with a disorder that affects your metabolism (e.g. diabetes)?” and “Are you on any medication that may affect your weight (not including birth control)?”

*Health Habits Questionnaire.* This questionnaire was developed for the present study and designed after the lifestyle questionnaire used by Levitsky et al. (2004). The 18-item self-report questionnaire asks participants about their meal habits, snack habits, dieting history, alcohol use, smoking behavior, exercise habits, sleep habits, and television viewing habits (as a measure of sedentary behavior). Respondents are asked to check the box that best describes their behavior or write their answer next to the question when a box is not provided. Examples of questions asked include “How many meals do you typically consume in a day?” and “How many minutes per week do you spend engaged in physical activity that makes you sweat or breathe heavily (e.g. running, biking, etc.)?” See Appendix C for the complete questionnaire.

*Perceived Stress Scale.* The Perceived Stress Scale (Cohen et al., 1983) is a 14-item self-report measure in which respondents rate how unpredictable, unmanageable, and generally stressful they believe their lives to be. Each item is a statement which participants respond to by indicating how often during the last month they experienced

the feeling described in the statement (e.g., "In the last month, how often have you found that you could not cope with all the things that you had to do?"), on a scale where 0=almost never and 4=very often. Total possible scores range from 0 to 56. The Perceived Stress Scale was originally tested on two college samples and a sample of adults enrolled in a smoking cessation program. The measure was found to have good internal consistency ( $\alpha = .84, .85, \text{ and } .86$  for the three samples respectively). Test-retest correlations for the samples assessed by Cohen et al. were .85 (2 days) for the college sample and .55 (6 weeks) for the smoking sample. Total scores of participants in this study ranged from 4 to 47. Mean score was 26.80 ( $SD = 8.83$ ). Internal reliability among items was high,  $\alpha = .85$ . See Appendix C for the complete measure.

*Additional Measures of Stress.* In addition to the Perceived Stress Scale, stress frequency and stress intensity were assessed by the following two questions: 1) In the past semester, how often have you felt stressed (1=never 2=sometimes 3=often)? 2) During the times you felt stressed, how stressed did you feel (1=very low stress 2=moderate stress 3=very high stress)? Mean stress frequency was 2.38 ( $SD = 0.60$ ) and mean stress intensity was 2.05 ( $SD=0.58$ ). See Appendix C for the questions.

*Self-Control Scale (Brief Version).* The Self-Control Scale (SCS) was developed by Tagney, Baumeister, and Boone (2004) in order to fill the need for a modern measure of self-regulation. Both the full and brief versions consist of self-report items that ask how much each statement reflects the respondent's typical behavior (e.g. "I am good at resisting temptation") on a scale where 0=not at all and 5=very much. The full scale has 36 items, whereas the brief version contains 13 items. The SCS and its brief version were originally tested on two college samples and were both found to have high internal

consistency estimates of reliability. Alpha levels for the Full SCS were .89 in both studies and alpha levels for the Brief SCS were .83 and .85 for the two studies respectively. In addition, test-retest reliability was .89 (3 weeks) for the Full SCS and .87 (3 weeks) for the Brief SCS. The brief version was used in this study because its alpha levels are comparable to the alpha levels of the full version and use of the shorter version should reduce participant fatigue. Possible total score on the brief scale ranges from 0 to 65. Participants in this study scored from 26 to 62 with a mean score of 42.05 ( $SD=8.02$ ). Internal consistency in this sample was high,  $\alpha = .84$ . See Appendix C for the brief scale.

*Weight, height, and BMI.* The researcher measured weight and height using a Detecto balance beam scale (Webb City, MO, USA). Participants were weighed in their regular indoor clothing after removing their shoes, jackets, and heavy items from their pocket (e.g. wallets). Weight was measured to the nearest 0.25 kg and height to the nearest 0.25 cm. BMI was calculated from the weight and height measurements by dividing the participants' body weight in kilograms by their height in meters squared ( $BMI=kg/m^2$ ).

#### *Procedure*

The initial testing period occurred within the first three weeks of the start of the fall academic semester. After giving their informed consent (see Appendix B for the consent form), participants completed the questionnaires and were weighed and measured by the researcher. Approximately 11 weeks later, at the end of the fall academic semester, participants completed the same questionnaires and were again weighed and measured. After completion of the study, the participants were fully debriefed (see

Appendix B for the debriefing form). Each visit took approximately 30 minutes to complete.

### *Statistical Analyses*

Analyses were conducted using SPSS Version 17 for Macintosh. Descriptive statistics, including demographic information, were calculated.

Hypothesis 1 (a significant increase in weight occurs during freshman year) was tested using a paired groups t-test with weight at Time 1 and weight at Time 2 as the variables.

Hypothesis 2 (students living in residence will show a greater increase in weight than their off-campus peers) was tested using an independent groups t-test with accommodation (on or off campus) as the independent variable and weight change as the dependent variable.

Hypothesis 3a (higher levels of stress are predictive of greater increases in weight) was tested in three ways: (1) Using a simple linear regression model with Perceived Stress Scale scores as the predictor variable and weight change as the criterion variable, (2) using a simple linear regression model with stress frequency as the predictor and weight change as the criterion, and (3) using a simple linear regression model with stress intensity as the predictor and weight change as the criterion.

Hypothesis 3b (self-regulation mediates the relationship between stress and weight gain) should have been tested following Kenny and Baron's (1986) steps for establishing mediation. According to Baron and Kenny, mediation is said to exist if the following four conditions are met: (1) the independent variable (stress) is significantly related to the dependent variable (weight gain); (2) the independent variable is

significantly related to the mediator (self-regulation); (3) the mediator is significantly related to the dependent variable while controlling for the independent variable; (4) the strength of the relation between the independent variable and dependent variable is reduced once the mediator is entered. As the first condition was not met (i.e. stress was not significantly related to weight gain), no further steps were tested.

Hypothesis Five (stress, accommodation, and self-regulation explain a significant amount of the variation in weight gain in first year university students) was tested using standard multiple linear regression with stress, self-regulation, and accommodation as the predictor variables and weight change as the criterion variable.

## Results

### *Data Screening*

Prior to testing each of the study hypotheses, all relevant statistical assumptions were tested. All assumptions were met except for normality for the dependent variable, weight change. Transformation of scores was undesirable, as it would threaten the interpretation of changes in weight, so outliers were examined and dealt with first.

From an examination of box-plots and Z-scores, one potential outlier was identified (Case 78: weight change=12.50 kg, Z-score= 3.29). Upon further investigation, it was noted that this participant not only gained more weight than any of the other participants, but also had a BMI in the normal range in September and ended with a BMI in the obese category at the end of the 11-week test period (BMI change= 16.10). This extreme BMI change was abnormal and did not seem to be representative of the average first year university student's experience. Subsequently, the decision was

made to remove Case 78 as an outlier. Once Case 78 was removed from the data, the assumption of normality was met for weight change scores.

### *Potential Covariates*

Before testing any of the hypotheses, an attempt was made to identify factors that could be related to weight change and thus influence findings. If such factors could be identified, they could be used as covariates to neutralize their influence on the results. Potential covariates were identified as follows: (1) Weight at Time 1, as previous studies noted that participants with higher baseline weight tended to gain more weight than other participants; (2) study duration, as Vella-Zarb & Elgar (in press) noted that weight gain increases with study duration; (3) for female participants only, the number of days between the day of the participant's last menstrual period and test date, as body weight can fluctuate during different points in the menstrual cycle. None of the variables identified correlated with body weight or weight change. Therefore, no covariates were used in the analyses.

### *Weight Change*

To examine weight change, a paired groups t-test was performed comparing body weight at Time 1 to body weight at Time 2. A statistically significant difference was found,  $t(83) = -2.47, p < .05$ . Mean weight change was 0.89 kg ( $SD = 3.30$  kg). Median weight change was 0.88 kg. There was no significant difference between weight change for females ( $M=0.87, SD=3.59$ ) and males ( $M=0.97, SD=2.11$ ),  $t(82) = -0.13, p > .05$ . See Table 2 for descriptive statistics of body weight at Time 1 and Time 2 and weight change.

Table 2

*Descriptive Statistics for Body Weight (kg) and Weight Change (kg)*

	<i>M</i>	<i>SD</i>	Range
Time 1	63.94	13.37	35.75 to 112.50
Time 2	64.83	13.48	35.50 to 116.00
Weight Change	0.89	3.30	-5.50 to 11.75

*Weight Change by Accommodation*

To examine weight change by accommodation, an independent groups t-test was performed using weight change as the dependent variable and accommodation (off-campus or on-campus) as the independent variable. A significant difference in weight change was found between students living off-campus and students living on-campus,  $t(82) = -2.32, p < .05$ , with students living on-campus gaining significantly more weight than their off-campus peers. See Table 3 for weight change by accommodation.

Table 3

*Weight Change (kg) by Accommodation*

Accommodation	<i>N</i>	<i>M</i>	<i>SD</i>	Range
Off-Campus	39	0.13	2.83	-5.50 to 7.50
On-Campus	45	1.65	3.52	-4.00 to 11.75

*Stress and Weight Change*

The relationship between stress and weight change was first tested using a simple linear regression model with Perceived Stress Scale scores ( $M=26.80$ ,  $SD = 8.83$ , Range = 4 to 47) as the predictor variable and weight change as the criterion variable. No significant relationship was found between perceived stress and weight change,  $R^2 = 0.02$ ,  $F(1,82)= 1.52$ ,  $p > .05$ ,  $\beta = -.14$ .

The relationship between stress frequency and weight change was then tested using simple linear regression with stress frequency ( $M=2.38$ ,  $SD = 0.60$ ) as the predictor and weight change as the criterion. No significant relationship was found between stress frequency and weight change,  $R^2 = 0.001$ ,  $F(1,82)= 0.09$ ,  $p > .05$ ,  $\beta = .19$ .

The relationship between stress intensity and weight change was then tested using simple linear regression with stress intensity ( $M=2.05$ ,  $SD = 0.58$ ) as the predictor and weight change as the criterion. No significant relationship was found between stress intensity and weight change,  $R^2 = 0.02$ ,  $F(1,82)= 1.58$ ,  $p > .05$ ,  $\beta = -.79$ .

*Stress, Self-regulation, and Weight Change*

An attempt was made to test Hypothesis 3b (self-regulation mediates the relationship between stress and weight change) using Kenny and Baron's (1986) steps for establishing mediation. The Perceived Stress Scale scores were used as the measure of stress because of the scale's high reliability. First, weight change was regressed on the stress scale scores in order to examine the relation between stress and weight change. The unstandardized regression coefficient ( $B = -0.05$ ) associated with the effect of stress on weight gain was not significant ( $p > .05$ ) and thus the requirement for Condition 1 was not met. As such, no further mediation steps were conducted.

*Accommodation, Stress, Self-Regulation, and Weight Change*

Hypothesis 4 (stress, self-regulation, and accommodation together explain a significant amount of variance in weight change) was tested using standard multiple regression, with accommodation, perceived stress, and self-regulation as the predictor variables and weight change as the criterion variable. The Perceived Stress Scale scores were used as the measure of stress because of the scale’s high reliability.

Altogether, the three variables failed to explain a significant amount of the variability in weight change,  $F(3, 83) = 2.36, p > .05$ . Only 8% (5% adjusted) of the variability in weight change was predicted by knowing scores on these three variables. See Table 4 for a summary of the regression analysis.

Table 4  
*Summary of Regression Analysis for Accommodation, Perceived Stress, and Self-Regulation as Predictors of Weight Change (kg)*

Predictor	<i>B</i>	<i>SE B</i>	$\beta$
Accommodation	1.49	.72	.23*
Perceived Stress	-.05	.04	-.12
Self-Regulation	-.05	.05	-.12

Note: Accommodation was dummy coded (0 = off campus and 1 = on campus)  
 \*  $p < 0.05$

## Discussion

This study examined measured weight change in first year university students in the first semester of university. Accommodation, stress, and self-regulation were examined as potential environmental and psychological predictors of weight gain.

### *Overall Weight Gain*

The overall mean weight gain for students was small, but significant. Mean gain was consistent with previous research by Butler, et al. (2004), Morrow et al. (2006), and Kasparek, et al. (2008), but smaller than that reported in other studies (e.g. Hovell, et al., 1985, Levitsky et al., 2004, Holm-Denoma, et al., 2008). No significant differences were found in weight gain between genders, as was noted in previous studies (Economos, et al., 2008, Holm-Denoma, et al., 2008). However, sample sizes for gender were unequal and thus the statistical power for detecting an effect was low. Future researchers could examine gender differences in weight gain by oversampling males and obtaining an equal sample size for each gender.

One explanation for the smaller gain found in this study compared to other studies (e.g. Hovell, et al., 1985, Levitsky et al., 2004, Holm-Denoma, et al., 2008) is that weight was measured instead of self-reported. A recent meta-analysis of the 'Freshman 15' literature by Vella-Zarb and Elgar (in press) showed that studies relying on self-reported weight data found greater gain than studies that used measured weight data. Thus it is possible that the greater weight gain found in other studies was not due to actual weight gain, but instead due to self-reporting error.

Another possible explanation for the smaller gain found in this study is that the duration of this study was relatively short. There is mixed evidence about whether

weight gain increases over the course of freshman year. Several authors, including Anderson, et al. (2003) and Holm-Denoma, et al. (2008), have found that weight gain remains steady after November. However, in the meta-analysis performed by Vella-Zarb and Elgar (in press), it was found that study duration predicted weight gain; the longer the time period between baseline and follow up testing, the greater the mean weight gain.

Although the increase in weight found in this study was statistically significant, it may seem questionable whether a gain of less than 1 kg in 11 weeks is enough to warrant clinical attention. While this is a legitimate concern, research suggests that Canadian adults gain approximately 0.5 to 1 kg every two years (Orpana, Tremblay, & Finès, 2008). Thus, in 11 weeks, students in this study gained an amount of weight equivalent to that which the average adult gains in two years. This is particularly disconcerting if weight gained in the first year of university is maintained throughout university. However, regardless of whether or not weight gain is permanent, the first year of university is still a critical period for weight gain as weight gain during this period is greater than typically found in early adulthood.

#### *Weight Gain in Residence*

Most interestingly, the results indicated that not all first-year university students are equally vulnerable to weight gain. While overall mean gain was 0.89 kg, weight gain among students living on campus was 1.65 kg. In addition, weight gain for students living off campus was practically nonexistent ( $M = 0.13$  kg). These results suggest that it is not transitioning from high school to university that puts one at risk for weight gain, but transitioning from home to residence that increases vulnerability. This is particularly noteworthy, as the majority of research on the 'Freshman 15' has not made a distinction

between students living in residence or off campus. Students living in residence could be gaining more weight than students who live off campus because of changes in lifestyle or changes in their dietary habits. Students living in residence likely have greater food choice than students living off campus and this may lead to greater food consumption (Rolls, 1981). In addition, students living in residence often eat their meals with large groups of friends, which may facilitate overeating (Clendenen, et al., 1994). Not only may students in residence be consuming more food than students living off campus, but they may also be making more unhealthy food choices. School cafeterias are often stocked with fried foods and desserts, while offering a much more limited selection of healthy alternatives (Huang et al., 2003). As this trend changes and schools begin to offer more healthy options, future research should examine whether the association between accommodation and weight gain changes along with this.

#### *Stress Does Not Predict Weight Gain*

Perceived stress was examined as a psychological predictor of weight gain. Contrary to findings by Serlachius, et al. (2007), no link was found between stress and weight gain. The main difference between this study and Serlachius and his colleagues' study was that weight was self-reported in Serlachius' study. Recent research has shown that stronger associations are found between health factors and body weight when self-reported rather than measured weights are used in research (Shields, et al., 2008). It is possible that the correlation between stress and weight gain found in Serlachius' study was a result of shared method variance.

Another possible reason why no link was found between stress and weight gain is that there may not have been enough time for weight gain to occur. Stressed students

could be exercising less, consuming more food, and eating more unhealthy foods, but the effect of those changes may not have directly resulted in weight gain at the time of measurement. Future research should re-examine the relation between stress and weight gain later in the year to see if this is the case.

Lastly, the link between stress and weight gain is often not direct; some people are more likely to gain weight when stressed than others. In particular, obese people, women, and people high in dietary restraint (i.e. people who carefully monitor what they eat in order to maintain or lose weight) are more likely to overeat when stressed than others (Greeno & Wing, 2000). Of these groups, the highest connection between stress and overeating is found in highly restrained eaters (Greeno & Wing, 2000). Dietary restraint was not measured in this study, but it would be interesting to see if the dietary restraint and stress interaction that is suggested in the literature exists in the first year of university. It is possible that no link was found between stress and weight gain because this link does not exist for everyone, only for restrained eaters.

As no link was found between stress and weight gain, it was not possible to test whether self-regulation mediates this link. Based on Self-Regulation Theory, it was assumed that higher levels of stress would predict lower self-restraint and subsequently greater weight gain. However, this could not be tested without the initial connection between stress and weight gain. Many factors in addition to stress (e.g. general fatigue, constant use of self-restraint, social support) can decrease or increase self-regulation (Baumeister, Muraven, and Tice, 2000). It is possible that Self-Regulation Theory did not explain weight gain because other factors were increasing self-regulation and thus reducing the impact of stress on weight gain. Taking this into consideration along with

research that suggests that individual factors such as dietary restraint may affect the relationship between stress and weight gain, it is possible that Self-Regulation Theory is not the best way to examine the link between stress and weight gain. Instead, the interaction between stress and individual factors, particularly between stress and dietary restraint, may be a better way of examining this link.

#### *Environmental vs. Psychological Predictors of Weight Gain*

As a link was found between environment (accommodation) and weight gain, but not stress and weight gain, it is possible that weight gain in the first year of university is best explained through environmental rather than psychological factors. In fact, recent research suggests that environmental factors both directly and indirectly impact upon weight gain, after adjustment for individual factors (Santana, Santos, & Nogueira, 2009). In other words, it seems that characteristics of one's environment play a role in weight gain above and beyond individual characteristics. While it is indeed possible that environment plays a stronger role than psychological or individual factors in weight gain in first year university students, stress was the only psychological predictor examined in this study. More research examining other psychological and individual factors should be conducted before making this assumption.

#### *Strengths of the Study*

There are numerous strengths to this study. First, this study used measured weight data as recommended by Vella-Zarb and Elgar (in press). In their meta-analysis, they found that studies using self-reported weight found significantly greater weight gain than studies that used measured weight. By using measured weight, this study eliminated

biases that may have occurred and provided the most accurate depiction of weight change.

Second, this study examined environmental and psychological predictors of weight gain. This adds to the understanding of weight gain in the first year of university as, until recently, researchers mainly focused on dietary and exercise behaviours and thus missed out the complexity of weight gain.

Third, this study examined weight gain in Canadian students. The majority of the research on the 'Freshman 15' has been conducted at American colleges and universities and a Canadian perspective has been missing in the literature. This perspective is needed in order to examine whether weight gain among Canadian students is comparable to gain among American students and thus warrants health care attention in Canada.

#### *Limitations of the Study*

There are several limitations to this study. First, the number of participants in this study was relatively small and thus power for detecting an effect was lower than desirable. However, it should be noted that almost all of the studies that examined weight gain in first year students used similar sample sizes, with the exception of a few that used self-report weight data. Second, only 81.25% of participants returned for testing at the end of the semester, although it should be noted that the non-returnees did not differ from the returnees on any measured baseline characteristics, including weight and BMI and many of the non-returnees contacted the researcher with various reasons for not returning that were unrelated to the study (e.g. leaving the university). In addition, the return rate of this study was comparable or higher than that found in all other studies investigating weight gain in first year university students. Lastly, this study did not span

the course of the freshman academic year; study duration was just 11 weeks. While following students over the full year (or beyond) would have provided more information about the stability of weight gained in first year, the test period of this study is consistent with numerous other studies investigating the 'Freshman 15' (Black, et al., 2004, Levitsky, et al., 2004, & Levitsky, et al., 2006) and several researchers (Holm-Denoma, et al., 2008, Anderson, et al., 2003) have noted that weight gain stabilizes between November and May.

#### *Future Research*

Participants in this study completed questions assessing their health habits however this data was not examined, as it was not needed to test the hypotheses. This available data may provide opportunities for future research, such as the examination of the effects of alcohol consumption, sleep patterns, sedentary behaviour, and eating breakfast on weight gain. In addition to the effects of these health behaviours on weight gain, future researchers could also examine the effect of age on weight gain.

Given the findings of this study future researchers should further investigate the link between accommodation and weight gain in order to better understand why students living in residence are more vulnerable to weight gain than students living off campus. Possible mediators of the link between accommodation and weight gain include diet, exercise, sleep, and alcohol consumption. Possible moderators include dietary restraint, as noted by Delinsky & Wilson, 2008. Better understanding of the link between accommodation and weight gain could lead to more appropriate intervention programs.

Lastly, future researchers examining freshman weight gain could examine the long-term effects of weight gain in the first year of university by tracking participants

throughout all their years at university and possibly even beyond. While this would be a lengthy and costly endeavor, it is important to know whether weight gained in the first year of university is permanent and increases long-term risk of weight gain. If this is the case, then intervention programs aimed at first year university students are necessary for preventing overweight and obesity and thus their associated health risks. If weight gain is transient, then gain is much less of a concern.

### *Implications for Health Services*

Health professionals working on university campuses should examine and address the myth of the 'Freshman 15'. University health providers should address the 'Freshman 15' not only to prevent excessive weight gain from occurring, but also to promote healthy lifestyles and ease students' concerns about gaining weight. In Delinsky and Wilson's study on freshman weight gain, they found that 96% of first-year university students had heard of the 'Freshman 15' and could accurately define it and 29% were extremely worried about gaining 15 lbs (Delinsky & Wilson, 2002). If health care providers do not address and dispel the myth of the 'Freshman 15', students could rely on unhealthy compensatory behaviours to avoid gaining weight, such as extreme dieting and exercising. University health professionals should use the current research on freshman weight gain to inform students that weight gain in the first year of university is neither inevitable nor is it typically as large as 15 lbs. This information could be combined with tips for students on maintaining a healthy lifestyle at university.

Additionally, health professionals should design weight gain prevention programs targeting first year students living in residence as results from this study suggest that this group is the most vulnerable to weight gain. Prevention programs could consist of

providing healthier food in residence cafeterias, residence based exercise programs, and nutrition workshops. Placing programs in the residence buildings themselves would enable health professionals to best target those who are most at risk for weight gain.

### *Conclusions*

In conclusion, students gained a small, but significant amount of weight in the first year of university. Gain was greater than what occurs in the general population, but whether this gain has significant long-term implications remains to be seen. While overall gain was small, students living in residence were particularly vulnerable to weight gain. University health care providers should address the myth of the 'Freshman 15' and provide students with accurate information about freshman weight gain while offering healthy lifestyle tips aimed at factors associated with weight gain. In addition, interventions should be aimed at students living in residence as they are at the greatest risk for freshman weight gain. A greater understanding of freshman weight gain could lead to prevention of this weight gain and potential subsequent overweight and obesity.

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Appendix A

Participant Pool (SONA) Recruitment

The study is called- FIRST YEAR STUDENTS' HEALTH HABITS AND LIFESTYLE

Description: This study will explore the demographic characteristics and lifestyle habits of first year university students at Carleton University. If you are a first year student at Carleton, are under 20 years of age, are not pregnant or planning on becoming pregnant in the next 6 months, have not been diagnosed with a metabolic disorder, and are not on any medication that may affect your weight (not including birth control), we would like to invite you to participate in this study.

As part of the study you will be asked to fill out questionnaires about your lifestyle habits on two separate occasions- one in September and one in December. You will also be weighed and measured privately and confidentially by the researcher. Each visit will take approximately 30 minutes to complete.

If you are a student enrolled in Introductory Psychology and are eligible to receive credit for research participation, you will earn two credits for participating in this study (one for each visit). If you are not eligible to receive credit for participation, you will receive a \$20 honourarium (\$10 for each visit).

Please feel free to contact Rachel Vella-Zarb (principal investigator) or Dr. Frank Elgar (faculty supervisor) if you have any further questions about this study.

Thank you.

Rachel Vella-Zarb  
Principle Investigator  
[rvzarb@connect.carleton.ca](mailto:rvzarb@connect.carleton.ca)

Frank Elgar  
Faculty Supervisor  
613-520-2600 ext. 1542 or [frank\\_elgar@carleton.ca](mailto:frank_elgar@carleton.ca)

Classroom Script

“Good morning (afternoon, evening). My name is Rachel Vella-Zarb and I am a Master’s student in Psychology here at Carleton University. I am here today to ask for your help with a study I am conducting for my Master’s thesis. The purpose of the study is to examine the demographic characteristics and lifestyle habits of first year students at Carleton. Participation in the study will involve coming into the lab on two separate occasions, once in September and then again in December. At each visit, you will fill out some quick questionnaires and have your height and weight measured. Each visit will take approximately 30 minutes to complete. After completion of both parts of the study you will receive either two credits if you are in Introductory Psychology and are eligible to receive credits for participation or \$20 if you are not able to receive credit for participation. Your participation in the study is completely voluntary, but would be greatly appreciated. I will now pass around a clipboard, which you can write your name and email address on if you are interested in participating. I will then contact you to set up a date and time. I will also write my email address on the blackboard in case anyone would prefer to contact me. Thank you very much.”

Appendix B  
Consent Form

*Title of the study:* First year students' health habits and lifestyle

*The purpose of an informed consent form is to ensure that you understand the purpose of the study and the nature of your involvement. It must provide adequate information for you to decide whether or not you wish to participate.*

*Research personnel:* The study is being conducted by Rachel Vella-Zarb, a Carleton University Masters Student in Psychology, and is being supervised by Dr. Frank Elgar, Carleton University.

*Purpose of the study:* The study examines the demographic characteristics, lifestyle habits, and personality traits of first-year university students at Carleton University.

*Nature of your involvement:* Once you have agreed to participate in the study you will be asked to complete several questionnaires examining your lifestyle habits, stress levels and self-regulation. You will also be weighed and measured on a physician's scale by the researcher. You will then return to the lab 12 weeks later to complete the same questionnaires and again be weighed and measured.

*Location and time involved:* The study will take place in a private room that will be announced upon further notice. The study involves TWO visits, one in September and one in December. Each visit will take approximately 30 minutes to complete.

*Potential risks and discomfort:* This study does not have any risks associated with it but if you experience any emotional discomfort the debriefing document contains contact information for university services available to handle those concerns.

*Confidentiality:* All testing will be conducted in a private room with only you and the researcher. All your responses to the questionnaires and your weight and height will be kept confidential and your name will not be revealed. Your responses and measurements will be associated with a numeric code, not your name. The data collected will be used for research purposes only and will be viewed only by the research personnel involved in this study.

*Right to withdraw:* You have the right to withdraw at any time during the study without penalty.

I have read the above description of the study entitled, First Year students' Habits and Lifestyle and understand the conditions of my involvement and I agree to participate in the study.

Name (printed):

Signature:

Date:

Appendix C  
Demographic Questionnaire

1. How old are you?  
 Under 17  17  18  19  20  Over 20
  
2. Please check off your gender  
 Male  Female
  
3. Please check off the box that best describes your ethnicity  
 Caucasian  Asian  African Canadian/African American  Hispanic  
 Aboriginal  Other (*Please specify*)
  
4. Where do live?  
 Residence  Off-campus
  
5. Are you pregnant or planning on becoming pregnant in the next 6 months?  
 Yes  No
  
6. Have you been diagnosed with a disorder that affects your metabolism (e.g. diabetes)?  
 Yes  No
  
7. Are you on any medication that may affect your weight (not including birth control)?  
 Yes  No

Health Habits Questionnaire

Please answer the following questions based on your regular activities and lifestyle from your past semester at Carleton University. When boxes are provided, please check the ONE box that best fits your answer. When boxes are not provided, please write your answer on the line provided.

Meals

- 8. How many meals do you consume in a *day*?  
 0  1  2  3  4  5  Other (*please specify*) \_\_\_\_\_
- 9. Do you typically eat breakfast?  
 Yes  No
- 10. Who prepares the majority of your meals?  
 You  Parents  Cafeteria/Restaurants  Other (*please specify*) \_\_\_\_\_
- 11. How many meals per *week* do you eat from the cafeteria or from a restaurant?

Snacks

- 12. How many snacks do you typically consume in a *day*?  
 None  1  2  3  4  5  Other (*please specify*) \_\_\_\_\_
- 13. Who prepares the majority of your snacks?  
 You  Parents  Cafeteria/Restaurants  Other (*please specify*) \_\_\_\_\_
- 14. How many snacks per *day* do you eat from the cafeteria or vending machine? \_\_\_\_\_
- 15. Do you typically snack after dinner?  
 Yes  No
- 16. How many times per *week* do you consume the following:
  - a. Chips \_\_\_\_\_
  - b. Chocolate \_\_\_\_\_
  - c. Candy (e.g. gummy bears, jolly ranchers) \_\_\_\_\_
  - d. Baked goods (e.g. muffins, cookies, cake) \_\_\_\_\_
  - e. Non-diet soft drinks \_\_\_\_\_
  - f. Diet soft drinks \_\_\_\_\_
  - g. Fruit \_\_\_\_\_
  - h. Vegetables \_\_\_\_\_

Dieting

- 17. Have you ever been on a diet to lose weight?  
 Yes  No

18. Are you currently on a diet to lose weight?  
 Yes  No

Alcohol

19. How many alcoholic beverages do you consume in a typical *week* (one alcoholic beverage equals 1.5 ounces of hard liquor, 1 bottle of beer, or 1 five ounce glass of wine)? \_\_\_\_\_

Smoking

20. What is your smoking status? *Please check only one box.*
- Currently smoke cigarettes daily
  - Currently smoke cigarettes occasionally
  - Used to smoke cigarettes daily
  - Used to smoke cigarettes occasionally
  - Never smoked a cigarette

21. If you currently smoke, in a typical *day* how many cigarettes do you smoke? \_\_\_\_\_

Exercise

22. How many minutes per *week* do you spend engaged in physical activity that makes you sweat or breathe heavily (e.g. running, biking, etc.)? \_\_\_\_\_

Sleep

23. How many hours do you sleep on a typical *weeknight*? \_\_\_\_\_  
 24. How many hours do you sleep on a typical *weekend night*? \_\_\_\_\_

Television

25. How many hours per *day* do you spend watching television, not including time you spend watching television while exercising? \_\_\_\_\_

Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last *month*. In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer each question fairly quickly. That is, don't try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

For each question choose from the following alternatives:

- 0. never
- 1. almost never
- 2. sometimes
- 3. fairly often
- 4. very often

1. In the last month, how often have you been upset because of something that happened unexpectedly?

- 0    1    2    3    4

2. In the last month, how often have you felt that you were unable to control the important things in your life?

- 0    1    2    3    4

3. In the last month, how often have you felt nervous and "stressed"?

- 0    1    2    3    4

4. In the last month, how often have you dealt successfully with irritating life hassles?

- 0    1    2    3    4

5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?

- 0    1    2    3    4

6. In the last month, how often have you felt confident about your ability to handle your personal problems?

- 0    1    2    3    4

7. In the last month, how often have you felt that things were going your way?

- 0    1    2    3    4

8. In the last month, how often have you found that you could not cope with all the things that you had to do?

- 0    1    2    3    4

9. In the last month, how often have you been able to control irritations in your life

0  1  2  3  4

10. In the last month, how often have you felt that you were on top of things?

0  1  2  3  4

11. In the last month, how often have you been angered because of things that happened that were outside of your control?

0  1  2  3  4

12. In the last month, how often have you found yourself thinking about things that you have to accomplish?

0  1  2  3  4

13. In the last month, how often have you been able to control the way you spend your time?

0  1  2  3  4

14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

0  1  2  3  4

(Cohen, Kamarck, & Mermelstein, 1983)

*Scored in the reverse direction: 4, 5, 6, 7, 9, 10, 13*

**Additional Questions**

15. Over the past semester, how often have you felt stressed?

Never  Sometimes  Often

14. During the times you felt stressed, how stressed did you feel?

Very low stress  Moderate stress  Very high stress

Self-Control Scale

Using the scale provided, please indicate how much each of the following statements reflects how you typically are.

	Not at all	Very much
1. I am good at resisting temptation.	1—2—3—4—5	
2. I have a hard time breaking bad habits.	1—2—3—4—5	
3. I am lazy.	1—2—3—4—5	
4. I say inappropriate things.	1—2—3—4—5	
5. I do certain things that are bad for me, if they are fun.	1—2—3—4—5	
6. I refuse things that are bad for me.	1—2—3—4—5	
7. I wish I had more self-discipline.	1—2—3—4—5	
8. People would say that I have iron self-discipline.	1—2—3—4—5	
9. Pleasure and fun sometimes keep me from getting work done.	1—2—3—4—5	
10. I have trouble concentrating.	1—2—3—4—5	
11. I am able to work effectively toward long-term goals.	1—2—3—4—5	
12. Sometimes I can't stop myself from doing something, even if I know it is wrong.	1—2—3—4—5	
13. I often act without thinking through all the alternatives.	1—2—3—4—5	

(Tagney, Baumeister, & Boone, 2004)

*Scored in the reverse direction: 2, 3, 4, 5, 7, 9, 10, 12, 13*

## Appendix D Debriefing

I would like to take this opportunity to thank you for your participation in our study on demographic characteristics and lifestyle habits of first year university students. Before you leave, I would like to tell you more about our research and why we are interested in this topic.

### *What are we trying to learn in this research?*

This study is not only examining lifestyle habits and characteristics of first-year students, but it is also examining weight gain in the first year of university. Specifically, this study is examining how much truth there is to the 'Freshman 15', the widely held belief that students gain 15 lbs in their first year of university. We are looking at whether or not weight gain occurs in university and how lifestyle habits, stress, self-regulation, and accommodation are related to weight gain.

### *Why is this important to scientists or the general public?*

Previous research has shown that while weight gain does occur in the first year of university, a gain of 15 lbs is an exaggeration. Most studies find that students gain 2 or 3 kg (5-7 lbs) of weight in their first year of university. Weight gained can lead to overweight and obesity, which are associated with numerous diseases, such as diabetes and cardiovascular disease. Therefore, it is important to be able to understand why weight gain occurs and who is most likely to gain weight. This information will further our understanding of university weight gain and allow us to design intervention programs targeted at those who are most at risk.

### *What are our hypotheses and predictions?*

It is anticipated that higher levels of stress, lower levels of self-regulation, and living in residence will be predictive of greater weight gain.

### *Where can I learn more?*

If you would like to know more about this topic here are a few articles that may be of interest to you:

- Hovell, M. F., Mewborn, C. R., Randle, Y., & Fowler-Johnson, S. (1985). Risk of excess weight gain in university women: A three-year community controlled analysis. *Addictive Behaviors, 10*(1), 15-28.
- Holm-Denoma, J. M., Joiner, T. E., Jr., Vohs, K. D., & Heatherton, T. F. (2008). The "freshman fifteen" (the "freshman five" actually): Predictors and possible explanations. *Health Psychology, 27* (1, Suppl), S3-S9.
- Levitsky, D. A., Halbmaier, C. A., & Mrdjenovic, G. (2004). The freshman weight gain: A model for the study of the epidemic of obesity. *International Journal of Obesity, 28*(11), 1435-1442.

### *What if I have questions later?*

If you have any questions about this study you can contact:

Rachel Vella-Zarb, principle investigator, Carleton University,  
rvzarb@connect.carleton.ca or

Dr. Frank Elgar, research supervisor, 613-520-2600 ext 1542 or frank\_elgar@carleton.ca

Should you have any ethical concerns about this study, please contact Avi Parush (Chair for the Carleton University Ethics Committee for Psychological Research) at 613-520-2600 ext. 6026 or [avi\\_parush@carleton.ca](mailto:avi_parush@carleton.ca). If you have any other concerns about this project you can contact Anne Bowker (Psychology Department Chair) at 613-520-2600 ext. 2648 or [psychchair@carleton.ca](mailto:psychchair@carleton.ca).

*Is there anything that I can do if I found this experiment to be emotionally draining?*

If you feel concerned about your weight or any feelings that came up during your participation in the study please contact:

Carleton University Health and Counselling Services, 613-520-6674

<http://www.carleton.ca/health/>

The Carleton Health and Counselling Services website also provides a link to health assessments on eating, physical activity and stress at:

[http://www.carleton.ca/health/health\\_assessments/index.html](http://www.carleton.ca/health/health_assessments/index.html)

We would like to thank you for your participation in this study. Your time and effort are greatly appreciated.