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Weight gain in freshman college students and perceived health

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ABSTRACT

Background. We determined body weight increase in first year Dutch college students. We had the objective to determine whether the awareness of the unhealthy lifestyle raised concerns and willingness to change habits.

Methods. Body weight, heartbeat, BMI, body fat percentages, and blood pressure values were collected from 1095 students. Comprehensive statistical analysis was performed on the data.

Results. The students had a mean weight gain of 1.1 kg and an average BMI gain of 0.35. Members of a student corps gained significantly more weight (1.6 ± 3.1 kg) than non-members (1.0 ± 2.5 kg), while students who are living independently gained an average of 0.5 kg more than students living with their parents ($p < 0.05$). Approximately 40% of the students changed their eating patterns and 30.7% of the students consumed more alcohol.

Conclusions. Students experienced hindrance in physical exercise and mental well-being. Students with a high BMI without irregular eating habits were willing to change their lifestyle. However, students who had irregular lifestyles exhibited the lowest willingness to change their eating behaviors and to lose weight. Our study provides insight into means by which adolescents at high risk for weight gain can be approached to improve experienced quality of life.

Introduction

According to the World Health Organization, weight gain is one of the leading global health problems (Doak et al., 2012; Rolland-Cachera, 2011). One strategy to fight this epidemic health issue is to promote weight loss, however most people who successfully lose weight through lifestyle modifications regain the weight within several years (Lowe et al., 2006; Stice et al., 2012). Therefore, current research efforts are more focused on the prevention of weight gain rather than on the promotion of weight loss. Any prevention program is most successful when the program targets those at known risk, so it is important to identify predictors and susceptible periods of weight gain (Lowe et al., 2006).

The freshman period at university or college has been identified as a period of high risk for weight gain (Boujut and Bruchon-Schweitzer, 2009; Crombie et al., 2009; Crombie et al., 2012; Economos et al., 2008; Freedman, 2010; Gropper et al., 2012a, 2012b; Gropper et al., 2009; Gunes et al., 2012; Holm-Denoma et al., 2008; Jung et al., 2008; Lloyd-Richardson et al., 2009; Mihalopoulos et al., 2008; Nies et al., 2012; Pliner and Saunders, 2008; Smith-Jackson and Reel, 2012; Thomas, 2006; Vella-Zarb and Elgar, 2009; Wansink et al., 2012; Yakusheva et al., 2011). Several studies performed in the United States have shown that students attending their first year of university or college gain significantly more weight than age-matched individuals who do not attend university or college (Anderson et al., 2003b; Butler et al., 2004). Two papers confirm that weight gain also occurs in students in Europe (Deliens et al., 2013; Finlayson et al., 2012) but the causes for this seem to be different from that in the United States. This period has been called the “freshman 15” because of the myth that the typical weight gain in the first year of university or college is fifteen pounds. This 15 lbs is a real myth as in most cases it is less but still consistently present (Boujut and Bruchon-Schweitzer, 2009; Crombie et al., 2009; Crombie et al., 2012; Economos et al., 2008; Freedman, 2010; Gropper et al., 2012a, 2012b; Gropper et al., 2009; Gunes et al., 2012; Holm-Denoma et al., 2008; Jung et al., 2008; Lloyd-Richardson et al., 2009; Mihalopoulos et al., 2008; Nies et al., 2012; Pliner and Saunders, 2008; Smith-Jackson and Reel, 2012; Thomas, 2006; Vella-Zarb and Elgar, 2009; Wansink et al., 2012; Yakusheva et al., 2011). During the freshman time period, many social forces act on students to change their feeding, drinking, and sporting behavior (Graham and Jones, 2002; Lowry et al., 2000; Rozin et al., 2003), which can have

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long-lasting effects on weight and health (Hoffman et al., 2006). Weight gain is most pronounced in the first semester of the first year at university. The published studies are consistent in that they all indicate that there is a period of weight gain during the freshman year, although the reported weight gain varies considerably from 1.9 kg (Levitsky et al., 2004) to 0.9 kg (Hovell et al., 1985). Another recent report demonstrated that this weight gain is substantial and permanent, and thus can present serious life-long issues (Gropper et al., 2012a, 2012b).

The majority of studies on freshman weight gain have been carried out in the United States (USA). There are, however, substantial lifestyle differences between college students in most European countries (Deliens et al., 2013; Finlayson et al., 2012). In the USA most students move to the campus of the university, where they typically have "all-you-can-eat" meal plans (Levitsky et al., 2006; Levitsky et al., 2004) and lack parental supervision. In Europe there are rarely campuses connected to universities. College students have a choice to stay with their parents or to live in student houses. This allowed us to study weight gain in freshmen who live in different environments, e.g., in their parents' home, with minor lifestyle changes, or in a student home, with substantial lifestyle changes. Moreover, in the Netherlands college students can become a member of a student corps, for which they make a commitment to be present at many social events. In this study we determined body weight increases in first year Dutch college students as the consequence of a changed lifestyle. We determined which life style changes contribute to the weight gain. We also studied whether the awareness of the unhealthy lifestyle raised concerns and willingness to change habits.

Materials and methods

Ethics statement

This study was the result of an annual practical training for life sciences students. Students were taught how to measure parameters such as measuring weight, heartbeat, BMI, body fat percentages, and blood pressure. After the practical assignment, they received a series of lectures explaining the phenomenon of freshmen weight gain and the physiology of obesity. We discussed our approach with the Institutional Ethical Commission. According to the Medical Ethical Committee of the University Medical Center Groningen (UMCG), we did not need medical ethical approval for the study, as the procedures did not use human samples and the study was the direct result of an educational training program in the life sciences. Students were guaranteed that the results would be processed anonymously. The procedure was approved by the Medical Ethical Committee of the UMCG, and conducted according to the principles expressed in the Declaration of Helsinki.

Population

The study was based on data collected from 2006 until 2009 by the University Hospital and the University of Groningen. The students who participated in this study were all freshmen (18–20 years old) studying life sciences at the University of Groningen.

Data was collected at two time-points: (1) At the beginning of September, during the first week of arrival at the university (T = 1), and at the end of December, when the first semester finished (T = 2). At both occasions bodyweight (in underwear) and height were measured and BMI (weight/height^2) was calculated. At each time-point, the students also completed a questionnaire regarding their health status and perception thereof. The questionnaire included 134 questions on gender, age, living arrangements (with parents or in a student house), membership of student corps, eating habits, health perception. The questionnaires are available upon request (versions available from 2006 and 2007–2009). Responses to the questionnaire were analyzed using advanced statistical techniques. In total 1238 students were originally enrolled in the study, however some were excluded due to issues such as illness or not failure to answer essential questions on the questionnaire. The final analysis included data from 1095 students at both time-points.

Data analysis

Analysis of weight gain. We analyzed the data longitudinally, as students provided data at two time-points. In order to explain the change in body weight, we use the fixed effects model. The individual characteristics analyzed were: gender, housing situation, and student corps membership. The lifestyle items analyzed were: being a vegetarian, number of meals per day, skipping breakfast or lunch, number of snacks per day, and number of glasses of alcohol per week. The model was corrected for being on a specific diet (for medical and/or ethnical reasons), frequency of eating at certain places or situations (e.g. in restaurants or in groups) or certain foods (e.g. take-out food), none of which had a significant effect on body weight changes.

As the Netherlands experiences strong seasonal fluctuations in weather, we also evaluated whether any observed weight changes could be explained by seasonal weight fluctuations. A study by Visscher and Seidell (2004) showed that body weight for both men and women was on average 0.2 kg lower at the beginning of autumn (September) than during winter (end of December), and the weight difference between summer and winter was even higher (0.7 kg). We used the most extreme seasonal difference (0.7 kg) as the criterion for actual weight gain and calculated the proportion of students meeting this criterion. In order to be able to compare our findings with the study by Anderson et al. (2003a), we also used a broader definition for weight gain of 2.3 kg (5 lbs).

Analysis of students' self-perception of health. This analysis consisted of an exploratory component and an explanatory component (Hausman, 1978; Hausman and Taylor, 1981). In the exploratory stage, all questionnaire responses (Table 1) were used to extract useful measures (factors) of the perception of health. The questionnaire contained many rating scale responses about the perception of health, habits, eating patterns, physical condition, and the willingness to change these factors. We performed a latent factor analysis on rescaled values of the responses. For rescaling, we used the principal factor method because of the non-normality of the variables. Factors were extracted based on Kaiser's criterion (the scree plot), and a preliminary correlation analysis and with rotation of the factor loadings by the Oblimin algorithm to facilitate interpretation.

In the explanatory stage we used the extracted factors as outcomes in effects regression models with the predictors' year, gender, blood pressure, BMI, eating habits, exercise patterns, smoking, and drinking habits. We made a uniform selection of predictors based on their relevance, parsimony of the model and completeness of data.

The variables describing health perception and willingness to change are presented in Table 1. The factor analysis of the questionnaire responses led to the identification of four factors of health perception by the students:

1. The extent to which the health status hindered the student in normal everyday life (variables included: Feellessdaily, Feellessachiev, Feelrestridaily, Feelrstrsstudy, see Table 1 for full definitions).
2. Worry about current health and resistance and the expectation of their developments (variables included: Feelgener, Feelyrago, Feelrestrheavy, Felloftenill, Feelhealthy, Feelexpworse, Feelexcellent, see Table 1 for full definitions).
3. The extent to which physical condition hindered the student in physical endurance (variables included: Feelrstrheavy, Feelrstrmod, Feelrestr 1 km, Feelrestr 500 m and Feelrestr100 m, see Table 1 for full definitions).