

Differences in eating and body-related attitudes, beliefs and behaviors among female graduate students in nutrition and dietetics and naturopathic medicine: a pilot study

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Received: 5 November 2016 / Accepted: 4 January 2017 / Published online: 7 March 2017
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Introduction

Registered dietitian nutritionists are food and nutrition experts who promote positive lifestyle choices by translating the science of nutrition into practical solutions for healthy living.

The pursuit of nutrition and dietetics as a career may be influenced by personal experiences with weight concerns or eating disorders. Some students may begin their training in nutrition because they are motivated to deal with their own dietary issues. Others, having recovered from disordered eating behaviors, may be inspired to help others overcome similar issues.

Previous cross-sectional studies have investigated differences between first-year and higher level nutrition/dietetics students on dietary restraint, disinhibition, orthorexia, and the prevalence of eating disorders. These studies indicate that nutrition education may promote healthier food choices and positive eating patterns [1–3]. However, the opposite may also be true. In some students, increased nutrition knowledge may lead to an obsession with eating only healthy food and avoiding unhealthy food (i.e., orthorexia), which has been observed among female dietetics students [4] and practicing dietitians [5]. Therefore, nutrition education may have a positive impact on the eating behaviors of some women, and a negative impact on others.

The university environment itself may have a harmful impact on students' eating and body-related behaviors, and this may be amplified at the graduate school

level. Orthorexia traits have been observed among medical students [6], and body weight dissatisfaction has been observed among pharmacy students [7]. Although prior investigations in this area have included undergraduate nutrition/dietetic students [1–4] and traditional medical students [6], a paucity of literature exists for graduate level nutrition/dietetics students and naturopathic medical students. Therefore, the aim of this pilot study was to examine differences in levels of eating and body-related attitudes and practices among female graduate students according to academic program, nutrition/dietetics (ND) vs. naturopathic medicine (NM), and time of data collection, pre- vs. post-year-one of graduate school.

Curricular similarities exist between these two graduate programs of study. The ND program includes basic science pre-requisites, advanced nutrient biochemistry and metabolism, clinical nutrition, dietary supplements, community/public health, food service management, psychology, counseling, statistics, and research methods. The NM program also includes basic science pre-requisites and a standard medical school curriculum, in addition to clinical nutrition, homeopathic medicine, botanical medicine, psychology and counseling. Thus, NM students were considered to comprise a suitable comparison group to ND students.

Methods

This observational pilot study was conducted using a convenience sample of graduate students attending a private university. The inclusion criteria included: being female; age 18 or older; enrolled in either the ND program or the NM program; an incoming graduate student or an existing graduate student completing their first year of study; not pregnant or lactating; and not currently receiving treatment

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for an eating disorder or other psychiatric condition. Males were excluded from this study since they made up less than 1/5 of the entire university student population and were under-represented in the ND program.

To retain the anonymity of each respondent, recruitment requests that included a direct link to the online questionnaire were e-mailed to all graduate students in the respective programs, which took place during four enrollment periods: October 2011 and 2012 (pre-year-one) and June 2012 and 2013 (post-year-one). Students who agreed to participate were prompted to create a unique 5-digit, alphanumeric, confidential code so it could be determined if any students repeated the study for longitudinal analyses. There were no repeat respondents, so the data reflect a cross section of students. The first page of the questionnaire included the informed consent.

The 185-item online questionnaire, estimated to take 90 min to complete, was accessible to participants via REDCap™ software, version 6.17.2 (Vanderbilt University; 2016). The questionnaire consisted of several validated and/or previously published instruments used to collect information on the following variables: demographics (age, height, weight, living location), dietary lifestyle (omnivore to vegan), current dieting status, body image perceptions, eating disorder history, weight concerns, weight control methods, orthorexia traits, intuitive eating, dietary restraint (including flexible and rigid control), disinhibition, susceptibility to hunger, physical activity, dietary intake, depression, and perceived stress.

Chi-square test for independence or Fisher's exact test was used to evaluate differences in categorical variables between ND and NM students. Two-way, univariate ANOVA was used to examine the main effects and interaction between academic program and time of questionnaire completion for continuous variables. The Bonferroni test adjusted for multiple comparisons, and Levene's test for homogeneity of variance. The significance level was set at $p < 0.05$. IBM® SPSS®, version 23.0 (Armonk, NY: IBM Corp; 2015) was used for all statistical analyses.

Results

The total number of students who responded to the questionnaire was 100. Of these, 27 completed less than 25% of the questionnaire, and were excluded from the analyses. The remaining 73 participants were unique respondents (30 ND students and 43 NM students), so the data represented a cross section of these two groups. There were no significant differences between the groups in living location (on- vs. off- campus), weight worry/concerns, BMI category, dieting status, self-perception of current weight, or dietary lifestyle (not shown).

Table 1 displays outcomes based on academic program and time of questionnaire completion. Academic program had a significant main effect on physical activity. ND students exercised an average of 2596 MET-minutes/week (SD 1995) compared to NM students who exercised 1737 MET-minutes/week (SD 1217), $F(1, 69) = 4.49$, $p = 0.038$, $\eta_p^2 = 0.061$.

Academic program also had a significant main effect on dietary intake of added sugars. ND students reported lower intake of added sugars overall ($M_{\text{tsp./day}} = 1.2$, $SD = 0.8$) than NM students ($M_{\text{tsp./day}} = 1.7$, $SD = 0.9$), $F(1, 69) = 5.80$, $p = 0.019$, $\eta_p^2 = 0.078$. ND students also consumed less sugar from sugar-sweetened beverages ($M_{\text{tsp./day}} = 0.14$, $SD = 0.28$), than NM students ($M_{\text{tsp./day}} = 0.42$, $SD = 0.54$), $F(1, 69) = 7.35$, $p = 0.008$, $\eta_p^2 = 0.096$. The main effect of time of questionnaire completion was not significant for any of the variables studied.

The interaction between academic program and time of questionnaire completion was significant for several variables including dietary restraint [$F(1, 69) = 6.54$, $p = 0.013$, $\eta_p^2 = 0.087$], rigid control [$F(1, 69) = 4.40$, $p = 0.038$, $\eta_p^2 = 0.060$], disinhibition [$F(1, 69) = 4.04$, $p = 0.048$, $\eta_p^2 = 0.055$], orthorexia scores [$F(1, 69) = 4.50$, $p = 0.038$, $\eta_p^2 = 0.061$], intuitive eating total scores [$F(1, 69) = 5.47$, $p = 0.022$, $\eta_p^2 = 0.073$], and the 'unconditional permission to eat' subscale of the intuitive eating scale [$F(1, 69) = 12.13$, $p = 0.001$, $\eta_p^2 = 0.150$].

Simple effect procedures for significant interactions yielded the following results. For ND students, dietary restraint ($F(1, 69) = 5.62$, $p = 0.021$) and orthorexia scores ($F(1, 69) = 6.97$, $p = 0.010$) were lower for post-year-one students than for incoming (pre-year-one) students; while intuitive eating ($F(1, 69) = 5.27$, $p = 0.024$) and 'unconditional permission to eat' scores ($F(1, 69) = 11.77$, $p = 0.001$) were higher for post-year-one students than for incoming students. Among incoming students, 'unconditional permission to eat' scores were lower for ND students than NM students ($F(1, 69) = 4.46$, $p = 0.038$). For students who had completed 1 year of grad school, dietary restraint ($F(1, 69) = 4.35$, $p = 0.041$) and rigid control scores were higher for NM students than ND students ($F(1, 69) = 5.85$, $p = 0.018$); while 'unconditional permission to eat' scores were lower for NM students than ND students ($F(1, 69) = 7.69$, $p = 0.007$).

Discussion

This is the first study of its kind to evaluate graduate-level ND and NM students for eating and body-related attitudes, beliefs and behaviors; these outcomes have not previously been studied among NM students. ND students reported a higher level of weekly physical activity than NM students,

Table 1 Eating and body-related attitudes, beliefs and behaviors among female graduate students in nutrition and dietetics and naturopathic medicine at pre- and post-year-one, mean (SD)

Outcomes	Academic program			
	Nutrition and dietetics (ND) <i>n</i> = 30		Naturopathic medicine (NM) <i>n</i> = 43	
	Time of questionnaire completion			
	Pre-year-one (<i>n</i> = 18)	Post-year-one (<i>n</i> = 12)	Pre-year-one (<i>n</i> = 25)	Post-year-one (<i>n</i> = 18)
Age (years)	31.3 (8.4)	32.4 (8.1)	28.8 (7.5)	33.0 (9.2)
BMI (wt·kg/ht·m ²)	27.0 (8.2)	24.5 (5.1)	25.5 (6.3)	24.3 (2.8)
Body image				
Self-perception	59.8 (22.8)	70.3 (14.1)	67.5 (23.2)	67.1 (19.0)
Others' perception	64.3 (19.3)	73.2 (17.2)	66.3 (26.8)	69.2 (15.9)
Activity level				
Sitting (hours/day)	8.4 (3.9)	9.3 (3.4)	9.7 (2.5)	11.0 (4.1)
Physical activity (MET·min/week) ^a	2642 (2133)	2527 (1857)	1599 (1160)	1929 (1301)
Eating behaviors				
Dietary restraint ^b	9.7 (3.4) ^c	6.5 (3.4) ^{c,d}	8.0 (3.7)	9.3 (4.0) ^d
Flexible control	5.4 (1.8)	4.9 (2.2)	5.2 (1.7)	5.4 (2.0)
Rigid control ^b	5.5 (2.6)	3.8 (2.6) ^c	5.2 (3.0)	6.4 (3.6) ^c
Disinhibition ^b	8.3 (3.3)	6.3 (3.2)	6.6 (3.8)	7.9 (3.3)
Hunger	5.7 (1.6)	5.4 (2.0)	6.4 (3.1)	6.4 (2.8)
Orthorexia ^b	4.6 (2.0) ^c	2.4 (2.3) ^c	4.0 (2.2)	4.1 (2.4)
Depression	11.8 (7.3)	13.1 (9.0)	13.9 (11.2)	15.2 (8.2)
Stress	18.1 (2.7)	16.7 (2.8)	17.6 (3.2)	16.7 (2.5)
Intuitive eating				
Total ^b	3.1 (0.5) ^c	3.6 (0.5) ^c	3.4 (0.7)	3.2 (0.5)
Unconditional permission to eat ^b	2.9 (0.6) ^{c,d}	3.9 (0.4) ^{c,f}	3.3 (0.7) ^d	3.0 (0.6) ^f
Eating for physical reasons	2.7 (0.9)	3.1 (0.8)	3.2 (0.9)	3.1 (0.8)
Reliance on hunger/satiety cues	3.6 (0.6)	3.8 (0.4)	3.6 (0.8)	3.6 (0.6)
Dietary intake				
Whole grains (servings/day)	1.4 (0.8)	1.1 (0.7)	1.3 (0.7)	1.2 (0.8)
Dairy (servings per day)	1.8 (4.1)	0.8 (0.9)	1.0 (0.8)	0.8 (0.8)
Fruits/vegetables (cup equiv./day)	5.5 (2.5)	5.4 (2.4)	5.2 (2.9)	5.6 (2.1)
Added sugars (tsp./day) ^a	1.2 (0.7)	1.3 (0.9)	1.7 (1.0)	1.8 (0.9)
Added sugars beverages (tsp./day) ^a	0.1 (0.3)	0.1 (0.2)	0.4 (0.5)	0.5 (0.6)
Red or processed meat (times/day)	0.3 (0.5)	0.5 (0.7)	0.3 (0.3)	0.4 (0.5)

^aSignificant main effect of academic program (ND vs. NM), $p < 0.05$

^bSignificant interaction between academic program and time of questionnaire completion, $p < 0.05$

^{c,f}Significant difference between groups with the same subscript in the same row, $p < 0.025$

^{d,e}Significant difference between groups with the same subscript in the same row, $p < 0.05$

which may be related to the time commitment of the respective programs. At the university where this study took place, ND students had a typical workload of 14–17 credit hours per quarter, while the NM students' typical credit load was 20–24 per quarter. Thus, the difference in time constraints may have contributed to this difference.

Measures of dietary restraint and orthorexia were lower for ND students at the end of the first year of graduate school than for those at the start of the academic year; this pattern was not observed among NM students. Moreover,

by the end of the first year, NM students had significantly higher rigid control scores than ND students. Results of a previous study of undergraduates demonstrated a reduction in dietary restraint over time for nutrition students and students in other majors [2]. The NM students in the current study may represent a unique comparison group to ND students. For example, the NM curriculum includes instruction on prescribing low-calorie diets, elimination diets, anti-inflammatory diets, and hypoallergenic diets. Learning about such restrictive regimens may negatively impact (i.e.,

increase) students' personal levels of rigid control over food intake in their drive for "clean" eating.

ND students exhibited higher intuitive eating and 'unconditional permission to eat' scores at the end of their first year of graduate school, compared to those at the beginning of the year. In other words, by the end of the academic year, ND students reported lower obsession with eating exclusively healthy food and avoiding unhealthy food, and improved ability to trust and respond to physiological hunger/satiety cues, giving themselves permission to eat a wide variety of foods to satisfy their appetites, compared to ND students at the start of the year. While NM students exhibited no such difference between the two time points, their 'unconditional permission to eat' scores differed significantly from those of ND students at both time points. The differing pattern in these scores between the two academic groups may be related to the threaded nature of intuitive eating concepts throughout the ND program at this particular university, which was absent from the NM school curriculum. For example, the required lifecycle nutrition course taken by all ND students during the fall quarter of their first year incorporated intuitive eating, body acceptance, and weight-neutral theories and models. Training in intuitive eating has been shown to improve physical and psychological wellness, and reduce the risk of developing disordered eating [8]. ND students' exposure to these unique concepts during their first year of study may have contributed to the results observed. However, the differences in rigor and curriculum content of the two programs were not directly compared.

Added sugar intake was the only difference in dietary intake between the two groups. ND students consumed significantly less added sugar and sugar-sweetened beverages than NM students. However, neither group consumed the recommended daily amount of whole grains or dairy products. These results align with a previous study in which the dietary intake of ND students was better than that of the comparison group, yet recommended daily intake levels for some nutrients were not met [1].

Strengths of this study include: the use of previously validated and/or published measures; the thoroughness of the questionnaire to capture a wide variety of eating and body-related attitudes, beliefs and behaviors; the anonymity of the data to limit bias; and the fact that two time points during graduate school education were evaluated. The fact that a convenience sample was used is a limitation of this study. Another issue that limits generalizability of these findings is the relatively small, cross-sectional nature of the sample. Although a longitudinal sample of greater size was intended, there were no repeat respondents, which may be due to the lengthy nature of the study questionnaire. Future research in this area should focus on longitudinal design with a shorter, more focused questionnaire for repeated

measures and larger sample size. The medium to large effects [9] of academic program and its interaction with time spent in graduate school (pre- vs. post-year-one) suggest that further study is warranted.

In conclusion, this study provides evidence that among female graduate ND students, those at the end of their first year of graduate school exhibited lower dietary restraint, rigid control, and orthorexia scores; and higher intuitive eating and 'unconditional permission to eat' scores than incoming ND students. NM students exhibited no such difference between the two time points. However, among students finishing their first year of graduate school, NM students exhibited higher levels of dietary restraint and rigid control and lower 'unconditional permission to eat' scores than ND students. Overall, ND students also engaged in more weekly physical activity and consumed less added sugar than NM students. Thus, graduate school educators are in a unique position to consider the ways in which specific graduate school programs may impact the eating and body-related attitudes, beliefs and behaviors of their students.

Acknowledgements This research was supported by the Department of Nutrition and Exercise Science and the Bastyr Center for Research, Grant award number BUCSR-Y4-014. The author would like to thank Chair Debra Boutin for her support of this project, and Laura Moore for her assistance with a final literature search.

Compliance with ethical standards

Conflict of interest The author states that there is no conflict of interest.

Ethical approval All procedures performed in this study were in accordance with the ethical standards of the university's Institutional Review Board and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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