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Future Chefs' Beliefs on the Role of Nutrition, Diet, and Healthy Cooking Techniques in Culinary Arts Training for Foodservice: A Cross-Cultural and Gender Perspective

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ABSTRACT

This study examined the degree to which culinary students ($n = 342$) felt nutrition would be an important part of their professional lives using a pragmatic-contextualist approach. We examined differences in beliefs related to gender and diasporic perspectives. The majority felt that chefs should know more healthy cooking techniques and would consider a nutrition-focused job. Two-thirds felt nutrition would play a “very important” role in their future professions, particularly among females and international respondents. Only one-third felt that the restaurant industry viewed nutrition as important. Rethinking how foodservice training is delivered is essential given the renewed interest in international and culinary nutrition.

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Nutrition; culinary education; culinary science; food and culture

Introduction

Currently, Canadian families spend 35% to 50% of annual food budgets in restaurants and retail outlets (Charlebois et al., 2018). Unfortunately, this habit can increase the risk of health issues (such as obesity, diabetes, and hypertension) due to the higher fat, sugar, salt, and calorie consumption associated with frequent dining out (Goffe, Rushton, White, Adamson, & Adams, 2017). In Canada, four of the top 10 causes of death – heart disease, stroke, colorectal cancer, and diabetes – are related to poor dietary and lifestyle habits (Statistics Canada, 2017). Although literature often focuses on the role of health-care providers in mitigating these risks, foodservice workers and trainers – culinary educators, chefs, cooks, and culinary students – are an often-overlooked group when it comes to assessing willingness to assist in promoting healthier meal options. As frontline food providers, although cooks and chefs play a direct role in impacting the consumer experience in foodservice environments, their willingness to engage in meaningful promotion of healthy alternatives is typically characterized as lukewarm (Hamm, Schnaak, & Janas, 1995).

Despite the accepted knowledge that excessive caloric intake from nutritionally poor foods, such as French fries and baked goods, is a health concern, over 90% of restaurant meals, whether from small- or large-chain establishments, provide more than the recommended calorie intake per meal (Urban et al., 2016). Unfortunately, many chefs misunderstand what constitutes a proper portion size and believe a larger than necessary portion represents nutrition recommendations (Condrasky, Ledikwe, Flood, & Rolls, 2007). In a study that solicited chef opinions on portion sizes, customer expectations were a more important factor when determining serving sizes compared to nutrition recommendations based on health (Condrasky et al., 2007). In popular media, there are regular reports that customers want healthier options available when eating out at restaurants (Jones-Mueller & Lucero, 2018), but, unfortunately, these trends have not caused a real or substantive improvement in nutritional restaurant offerings for adults (Goffe et al., 2017; Powell & Nguyen, 2013). In contrast to the continued poor nutrition of adult meals, restaurant offerings targeted at youth are being nutritionally enhanced with meal options that include fewer solid fats and decreased sugars, and with increased advertising of alternative sweetened beverages and items with decreased sodium (Rehm & Drewnoski, 2016). Yet institutional pediatric foodservice operations are offering students large portions that are elevated in fat content compared to recommendations (Feldman et al., 2009). In terms of preference, in a survey of over 700 children aged 8 to 12 years, 68% indicated that they would choose a fruit or vegetable over french fries, and 81% would have a healthier beverage like milk or water instead of soda pop (Shonkoff et al., 2017). Given these data, it seems that current generational views of the importance of nutrition are evolving toward the healthier side compared to their previous cohorts.

In addition, research regarding the relationship between acquisition of cooking skills and healthier eating is also growing (Bernardo et al., 2017; Payne, 2002), although chefs' and cooks' ideas on the topic remain largely unstudied (and the majority of existing work focuses primarily on male chefs) (Reichler & Dalton, 1998). Policies for nutrient content of meals can be regulated by nutrition experts and agencies but kitchen workers can also play a role in population health (Tsui, Patinella, & Freudenberg, 2013). Chefs have a unique opportunity to shape the culinary landscape and provide healthier options that appeal to clientele whose main priority when eating out is taste (Obbagy, Condrasky, Roe, Sharp, & Rolls, 2012). Despite this opportunity, there is concern among chefs that healthier, lower-calorie items are under-ordered by patrons; that staff lack skills and knowledge necessary for preparing healthier items; and that high ingredient costs will make healthier items less profitable (Obbagy et al., 2012). Interestingly, despite close access to food, interviews with restaurant chefs conducted by Mahadevan and Feldmen (2011) found that many chefs attributed their

own unhealthy eating habits to the quality and lack of foods such as vegetables and fruit available at the workplace. Nearly all chefs in a recent survey, however, felt that calories could be reduced by 10–25% in a dish without impacting the flavor (Obbagy et al., 2012). Alongside these emerging views exist older perceptions regarding the degree to which it is possible to decrease calories while maintaining or enhancing flavor: as a culinary student study from the early 1990s stated, nutrition was “somewhat important” but a tasty dish could not be obtained without addition of butter, cream, oils, and salt (Hamm et al., 1995).

We are now at a moment when culinary educators can assume an important role in the educational future of chefs and cooks by providing them with nutrition knowledge. Currently, the Province of Ontario, Canada, maintains provincial curricula for one- and two-year culinary programs offered at public community colleges. Although the provincial curricula are not planned down to a course level, they always include program learning outcomes around which local community colleges must structure their curricula. A typical course, the two-year Ontario Culinary Management Diploma Program, for example, embeds the study of nutrition into the fifth program outcome, noting that students must “create menus that reflect knowledge of nutrition and food ingredients, promote general health and well-being, respond to a range of nutritional needs and preferences and address modifications for special diets, food allergies and intolerances, as required” (Ministry of Training, Colleges, and Universities of Ontario [Ministry TCUO], 2016). The curriculum also includes further clarification of nutritional education outcomes, mostly focusing on using Canada’s *Food Guide*, portion sizes, nutritional life-stage needs, allergy and cross-contamination risk-reduction strategies, and menu adaptation (Ministry TCUO, 2016). One- and two-year culinary programs at Ontario community colleges are free to decide on the exact manner of fulfilling this nutritional education requirement. They can offer a course cluster in nutrition or embed nutrition course outcomes across a range of practical and theoretical courses.

As the culinary industry recognizes the need for highly focused and knowledgeable culinary staff to meet the demands of restaurant clientele, and as executive chef positions are competitive, having an expertise in nutrition may make a chef candidate more marketable (Condrasky, Sharp, Carter, & Komar, 2015). The education of culinary students should, in this paper’s authors’ opinion, include more explicit healthy cooking techniques and menu modification education but it is not known if the current generation of students feels this is important. Given the more recent healthy eating trends seen in popular literature and the change in the food choices made by youth, this study was undertaken to determine how students prioritize nutrition among knowledge domains needed among chefs. We hypothesized that culinary students would see the value of nutrition for their future careers.

Methods

Given the pedagogical framework of culinary education within the province, the authors decided to obtain a representative sample of Ontario's culinary students by accessing and surveying the student population at George Brown College Chef School, Toronto, as it draws students from a range of urban, rural, local, national, and international settings. As the oldest culinary school in the province (established in 1951), George Brown offers numerous one-, two-, three-, and four-year culinary credentials that include apprenticeship, certificate, diploma, and undergraduate streams. The authors decided to survey a cross-section of industry-stream students at the school as a representative sample in order to assess aspiring chefs' interest in nutrition. Additionally, in order to ensure that there was no notable bias from subsequent education, the students surveyed had not completed any significant amount of culinary study. All respondents were attending their first semester of study and were questioned within the first 2 weeks of first-semester classes. Therefore, this sample represents not only those who attend culinary school, but also those who, nominally at least, want to be a chef or professional culinarian of some description.

The survey instrument was developed based on the one used by Whibbs and Holmes (2019) to test culinary students' motivations for attending culinary school. The instrument included some demographic survey questions supplied by the college, including program lists, age ranges, gender identity, and nationality. A core group of Whibbs and Holmes (2019) questions regarding rationale for attending culinary school were identified and integrated into the present interment in order to allow for cross-tabulation between beliefs about nutrition study and career aspirations. In particular, original questions focused on testing the relationship between beliefs about the importance of nutrition and future career aspirations and queried the relationship between beliefs about the importance of nutrition in culinary education and nationality. Three questions not directly related to nutrition—allergies, religion, and preferences were included to assess differences between non-nutrition specific questions and nutrition-specific questions to ensure students were not biasing results toward nutrition only. See Appendix A for the survey. All questions were tested for reliability as well as content and face validity, first via administration to five culinary or nutrition education experts, and later through a pilot study group of 40 culinary students prior to the start of the main study. Questions were modified based on feedback to produce the 29 final questions administered to study subjects.

Demographic and program information was gathered via drop-down list, while opinions regarding nutrition were solicited using Likert-type scales in order to assess degree to which respondents identified with the prompt. Upon obtaining research ethics approval from the college in the spring of 2017, five

existing faculty members agreed to administer the survey, all of whom are Canadian Registered Dietitians. In order to ensure consistent sampling conditions, all Research Assistants attended a short three-hour training course developed by the Primary Investigator. Survey respondents reviewed the research ethics Information Letter and consent clause before deciding whether to take part in the study. Sample size calculations were based on a confidence interval of 5%, with a population of 1000 from which to draw participants. Upon cleaning, data indicated that approximately 40 respondents declined to participate or otherwise invalidated their survey. All remaining respondents completed more than 95% of survey questions and were thus included in the cleaned data.

The particular classes selected for participation represent a convenience sample drawn from among existing classes being offered at the Chef School. Although students were attending different curriculum streams, all sections surveyed were attending a provincially mandated culinary or baking program. Given that each of these programs requires some knowledge of nutrition to be embedded in the learning outcomes, all respondents in the sample were deemed to be representative of the desired population for the purposes of this study. The sample is readily generalizable since similar student demographics can be seen at other institutions, including more rural institutions who, according to Colleges Ontario (2017), currently attract similar combinations of domestic and international students.

The cleaned sample included ($n = 342$) subjects. Subjects who didn't identify as male or female ($n = 5$) or left the question blank ($n = 5$) were not included in the gender analysis, as numbers were too small to determine statistical significance. The responses from bakery students and culinary nutrition students were not statistically different than culinary students, and thus the data was collapsed into one group for all variables. When asked about future career aspirations, 100% of the sample indicated desire for a culinary-industry position of some sort, although there was diversity in the exact sectors of the industry to which students are drawn. Similarly, to Whibbs and Holmes (2019), participants were asked to rank nutrition and subcategories of nutrition from 1 "not important" to 5 "very important." Much of the data fell in the 4 to 5 range, and thus data were analyzed for those who felt a category was "very important" (ranked 5) to their future careers.

Data were entered into Microsoft Excel, with variables coded in order to allow for frequency analysis. Interval data provided a basis from which to establish mean and standard deviation, with percentages determined for nominal data. Frequency was determined using ranked Likert-scale responses. Inferential statistic and Chi-Square were used to determine proportional gender differences in data between males and females; regional variation for those born in or outside of Canada; and to determine which program

participants were attending (culinary, bakery, or culinary nutrition). A difference was statistically significant at $p < .05\%$.

Results

Subject characteristics

There were 342 students who completed the electronic survey. Male and female genders were equally matched (only 10 had no gender specified), and a wide range of ages represented. The majority of the students were enrolled in culinary programs (89%). International students were well represented at 56%. Refer to [Table 1](#) for specific subject characteristics. Students were asked where they would like to work after graduation and could choose all areas that applied to them. Only half of them wanted to work in a restaurant, yet 73% wanted to get their Red Seal Journeyman Designation. Forty-one percent wanted to be personal chefs and 25% wanted to be celebrity chefs. See [Figure 1](#) for other employment inclinations.

Nutrition knowledge

Only 6% of students felt they had excellent nutrition knowledge, yet the majority (81%) were able to identify the definition of healthy eating as specified (“A diet that includes a variety of foods needed for good health”) (Government of Canada, 2019). Only half of the participants felt chefs were

Table 1. Demographics of culinary students involved in a nutrition survey ($N = 342$).

Characteristic	Divisions	Number	Percentage
Gender	Male	173	51
	Female	159	47
	Doesn't identify as male or female	5	2
	No Answer	5	2
Age (years)	16–18	79	23
	19–21	113	33
	22–25	75	22
	26–35	55	16
	36–65	17	5
Country of Birth	No answer	3	1
	Canada	152	44
	Other	39	11
	South Korea	38	11
	China	37	11
	Philippines	24	7
	India	18	5
	Vietnam	10	3
	Brazil	8	2
	Mexico	7	2
	Japan	3	1
	Ukraine	2	1
	Russia	2	1
	United States	2	1
Venezuela	0	0	

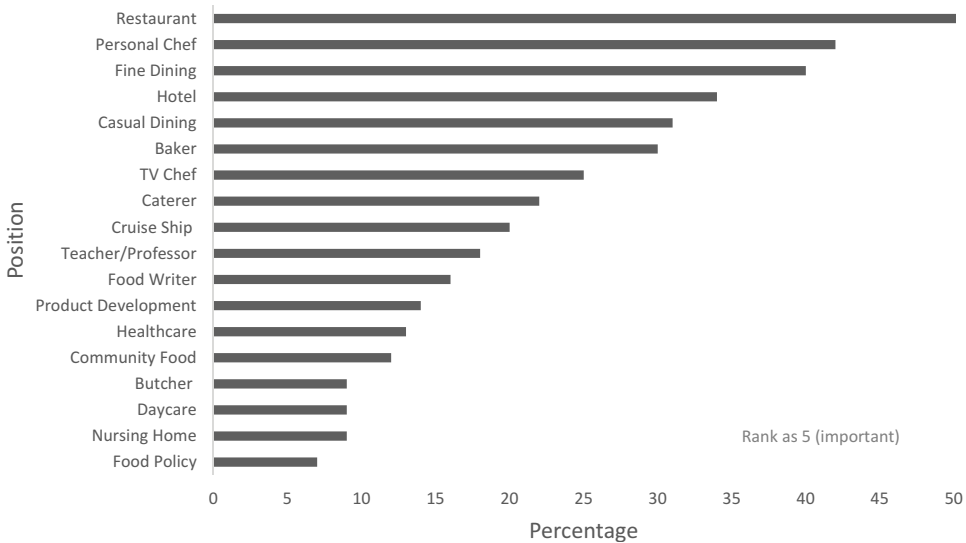


Figure 1. Potential position of employment Post Graduation from culinary school ($N = 342$).

a good source for nutrition information and reported dietitians and professors were more adequately able to provide sound nutrition knowledge. Most students (99%) felt that chefs needed to know more beyond only making tasty food and needed to know how to make nutrient-dense food. Fifty-two percent of students reported that chefs played a very important role in the health of customers, with a lesser role to play in disease prevention (31%) and obesity (24%). Despite this recognition of the requirement of the ability to make healthy foods, only 13% wanted to work in healthcare and 9% in senior homes. Students were able to recognize that allergenic food identification was critical to the skills of a chef and ranked it above all other nutrition categories. The other two non-nutrition-related areas, religion, and food preferences, were at the bottom of the scale rankings (Figure 1).

Nutrition and future jobs

Many subjects would consider a nutrition-focused career (40%), with another 46% considering it if the pay was good (total 86%). When ranking on a scale of “being bored” to “being energized” about cooking healthy, 36% felt energized and only 8% reported being bored when thinking about healthy cooking. Of these energized students, 48% were male, 64% were between the ages of 16 to 21 years, and 53% were born outside Canada. Further analysis was run with those who had previously worked in the food industry, revealing that this factor did not have an impact on the results.

Gender differences

Overall, 60% of participants felt that nutrition would play a very important role in their future professions, with females ranking it higher compared to males, as a whole, and for every sub-classification of nutrition asked in the questionnaire. When comparing females to males, women had statistically higher responses in prioritizing these areas: calories on menus, infant nutrition, customer requests, nutrition trends, nutrition fads, fad diets, diet modifications for disease, personal preferences, and religion (Table 2).

Country of origin differences

International students ranked nutrition as “very important” to their future professions more frequently than Canadian students (68% compared to 50%, $p < .0005$). Those born outside Canada felt nutrition was more important in most sub-categories, although Canadians felt that customer food intolerances would have a stronger influence on their careers than did international participants (Table 3).

Views on food industry

Students were asked how they felt the food industry viewed nutrition. When considering different sectors of the foodservice industry, responses varied.

Table 2. Gender differences in ranking nutrition as very important for future job (N = 332).

Category*	All (%)	Male (%)	Female (%)	<i>p</i> value (males v females)
Nutrition (as a whole)	60	56	63	.1
Allergies	80	79	81	.7
Intolerances	70	67	73	.2
Label reading	70	67	72	.3
Calories on menus	53	45	60	.001**
Ingredients	72	69	77	.08
Balanced meals	60	55	65	.51
Nutrition requirements of infants	56	51	63	.05**
Nutrition requirements of children	59	54	64	.7
Nutrition requirements of adults	59	55	64	.1
Nutrition requirements of elderly	60	57	64	.2
Nutrition basics	67	65	70	.3
Guidelines	57	53	61	.1
Portions	60	53	67	.01**
Customer requests	68	62	76	.001**
Nutrition trends	51	45	59	.001**
Nutrition fads	50	42	60	.02**
Fad Diets	35	30	42	.02**
Modifications	52	43	63	.001**
Modifications for disease	55	43	63	.02**
Modification for preferences	55	46	67	.001**
Modifications for religion	58	52	65	.01**
Nutrient preservation	62	58	65	.16
Nutrition (as a whole after answering categories above)	67	62	73	.03**

*Percentage related to students rating nutrition category as Rank 5 (very important)

**Significantly different at $p < .05$. Statistical test used was chi-square.

Table 3. Place of birth and ranking nutrition as very important for future job (*N* = 342).

Category*	Canadian (%)	International (%)	p value
Nutrition (as a whole)	50	68	.001**
Allergies	82	79	.7
Intolerances	79	63	.001**
Label reading	69	70	.7
Calories on menus	47	57	.05**
Ingredients	72	73	.6
Balanced meals	50	67	.001**
Nutrition requirements of infants	51	61	0.07
Nutrition requirements of children	52	65	.01**
Nutrition requirements of adults	51	67	.001**
Nutrition requirements of elderly	51	67	.001**
Nutrition basics	63	71	.1
Guidelines	49	64	.04**
Portions	57	62	.2
Customer requests	72	65	.2
Nutrition trends	47	54	.2
Nutrition fads	41	57	.001**
Fad Diets	23	46	.001**
Modifications	45	58	.09**
Modifications for disease	47	61	.09**
Modification for preferences	52	57	.3
Modifications for religion	57	58	.6
Nutrient preservation	55	67	.02**
Nutrition (as a whole after answering categories above)	64	70	.2

*Percentage related to students rating nutrition category as Rank 5 (very important)

**Significantly different at $p < .05$. Statistical test used was chi-square.

When it comes to fast food restaurants, for example, 17% of respondents thought that nutrition would be important in this sector. When it came to more sensitive settings, such as hospitals and daycares, 64% of respondents saw nutrition as being important within the sector (Figure 2).

Discussion

This culinary student survey is an extension of the work of Condrasky et al. (2015), which found that professional chefs believed nutrition could play a larger role in the culinary industry. The majority of first-year college culinary students feel that chefs need to know more about making healthier foods. Additionally, the majority would consider a nutrition-focused culinary job if the pay was suitable. Almost two-thirds felt nutrition would play a very important role in their future professions, particularly among females and students born outside of Canada. Only one-third of respondents feel that the foodservice industry, and chefs in general, view nutrition as “important.”

Eating out in a restaurant and eating healthy are not usually synonymous concepts, given that restaurant food is typically higher in calories, salt, saturated and trans fats, and sugar (Goffe et al., 2017). The higher caloric intake of purchased meals were, in the past, linked with obesity in children and adults (Gillis & Bar-Or, 2003; Goffe et al., 2017). Taste of food was the main driver of chefs when providing food to patrons (Obbagy et al., 2012). However, students

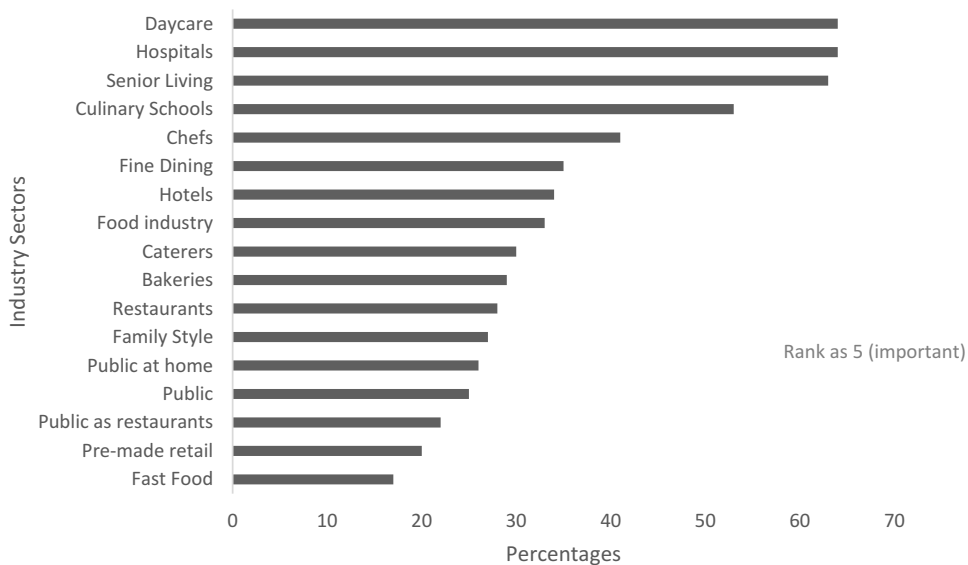


Figure 2. Culinary student views on how the food industry values nutrition ($N = 342$).

in the current study felt that taste should not be the only motivation when serving food, with only 1% reporting this former belief. The surveyed students responded that chefs should know how to make flavorful *and* healthy meals. It is noteworthy that one-quarter of the culinary students in this current study wanted to pursue a career as a celebrity media chef. Professional chefs are being revered as role models, similar to sports persona, thus making their opinions significant in social culture. If cooks and chefs are viewed as influencers of public opinion, this may additionally increase the demand for nutrition-based fare (Condrasky et al., 2015).

One must question the degree to which respondents understand what the term “healthy” means. There is no consensus on what is considered healthy in the literature (Tulloch, 2005), and healthy eating is a particularly fluid concept, as new research is continually being obtained and reported on foods and health. There is also concern that this generation is regularly obtaining incorrect nutrition information from the Internet that is not regulated by a government body (Wansink, 2006). Whether intentional or not, findings in nutritional research are often misrepresented or misunderstood in popular discourse. With nutrition increasingly becoming a tool through which to drive sales, there is a risk of overemphasis of certain supposed benefits of products, sometimes even by public figures who give credence to particular foods based on beliefs and not actual scientific rigor (Wansink, 2006). Therefore, prior to any unbiased, scientific nutrition education, it is unclear if the culinary students could use the nutrition knowledge they have to make proper meal decisions to meet the health needs of their customers, patients, or clients. Indeed, only 6% of our respondents felt they had excellent nutrition

comprehension. College students, in general, lack nutrition knowledge and the ability to read nutrition food labels which can translate into unhealthy food choices (Monteiro, Jeremic, & Budden, 2010). This may partly explain why only 9% wanted to work in settings like daycares and long-term care homes where nutrition is particularly crucial. Chefs need to be trained in the proper evaluation of nutrition data and know how to access nutrition experts, such as Registered Dietitians, when they have questions (Quagliani & Hermann, 2012).

There has been concern that chefs lack proper nutrition knowledge and suggestions have been made that all food handlers should be accredited in nutrition (Hu, Leong, Wei, & Yeh, 2005). This certainly opens the conversation about how curriculum should be delivered in this province beyond *Canada's Food Guide*, particularly in respect to portion sizes, nutritional life-stage needs, allergy, and cross-contamination risk-reduction strategies, and menu adaptation, which were all areas prioritized by female respondents. Efficacy in healthy cooking techniques and recipe and menu modifications for special dietary needs, conditions, and diseases could possibly be included in the curriculum (Condrasky et al., 2015), especially given the emerging interest of the culinary students in the current study.

Males and females have different motivations for food choices which could be related to past hierarchical roles in food purchasing. For example, traditionally the female in the household had the role of purchasing food and thus is more likely to read food labels than males. The reasons for this difference might not be so simple. Males look at labels for unique medical needs and to complement exercise routines while females look to labels for body image issues and avoiding weight gain (Su et al., 2015). This is also reflected in the current findings, given the higher importance that the females place on nutrition in certain segments such as calories, fad diets, nutrition trends, and fads. The college curriculum focuses on multiple learners, all with their own interests, learning styles, and educational requirements. Individualization of pedagogy steps away from universality in teaching and allows learners to have free choice in education based on their own motivations (Francia, 2013). Meeting the requisites of all types of students is highlighted with the results of this study. In previous surveys of culinary educators and students, 68% to 84% of the respondents were male making the current study results more relevant in today's culinary arena (Condrasky et al., 2015; Reichler & Dalton, 1998) as more females are entering the culinary world (Moskin, 2014).

When developing health behaviors, youth are strongly influenced by what their parents eat and to the culture in which they were raised. Although the majority of college students see the significance in eating healthy, there are cultural disparities in their beliefs around certain nutrition factions (Lee, Jin, & Kim, 2013). Similar to our data in which students from various Asian locales felt nutrition would play a bigger role in their careers compared to Canadians,

Chinese students in another analysis were more concerned in the value of eating, particularly in relation to immune health over the interests of American students (Banna, Gilliland, Keefe, & Zheng, 2016). South East Asian consumers spend more time in the kitchen cooking and using natural ingredients and have extra respect for the health benefits of a nutritious diet compared to Westerners (Ma, 2015). There are also cultural differences based on health belief systems (Banna et al., 2016; Ma, 2015). This may be due to the value of specific foods having symbolic importance to life. For example, peanuts signify a long life or oranges bring good luck in the Chinese culture (Ma, 2015). Thus, when educating culinary students from different cultures about nutrition, it may be essential to consider traditional beliefs and customs to enhance the understanding of the material and applicability to international restaurateurs.

Conclusions and implications

One of the strengths of this study was its inclusion of a large number of participants with adequate representation of males and females and cultural backgrounds. As Toronto is Canada's most populous city with diversity in food service options, it would be interesting to test in other cities to provide comparative data. In regards to the survey validity, threats to internal validity such as instrumentation were not likely as all students were tested in the same manner and discussions were not permitted between participants. They were tested prior to receiving culinary nutrition information so not biased by education from a trained nutrition educator. A limitation of this study was the quantitative nature which did not measure respondents' understanding of individual questions. Although the sample size was large enough to determine significance, it is possible that students who were already motivated by nutrition filled out the survey (over their peers who were uninterested), which led to a biased interpretation. To rectify this problem, incentives could be added to the study budget to entice participation by more students. As the questionnaires were given during class time by their professors, students may have felt pressure to participate. However, the survey clearly indicated that students could skip to the last question and leave the survey without penalty, which did occur with some of the students. Finally, better industry-wide definitions of "healthy eating," are necessary.

We discovered that the next generation of culinary school graduates feel that healthy eating options will play a role in their future professions, particularly for women and international students from Asia. This may present a unique opportunity for culinary educators to integrate greater nutrition education within the current curriculum. It would be interesting to know if current restaurateurs also share this belief. Other potential projects could focus

on the industry factors that influence the provision of healthy food to customers which could further enhance curriculum content.

In conclusion, we demonstrated a change in focus for future chefs with an emphasis, not only on taste, but on the use of ingredients that are healthy when providing food for the public. This renewed interest is distinctive in certain populations, thus nutrient education should reflect this diversity.

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