Nutrition information and its influence on menu choice within higher education establishments

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Abstract

The aim of this research was to evaluate the influence of nutritional information on menu choices in a higher educational setting using a menu designed by the students themselves. Based on USDA healthy eating standards, a menu comprising 7 healthy and 7 unhealthy meal options were presented, once unlabeled as control (n=214) and once labeled with healthy and non-healthy nutrient icons as an intervention test menu (n=212). Findings demonstrate that despite a positive observed trend, there were no significant differences between healthy selection of labeled and unlabeled dishes (p=0.16). Providing nutritional information in student cafeterias may be challenging but helpful. However, more strategies need to be developed to provide nutrition data on menus in an informative, comprehensive, yet friendly way that encourages healthy eating in campus foodservices. Nevertheless, no labeling system or legislation can control choices made by individuals, so the responsibility for a healthy selection must always remain personal.

Background

Compared to meals prepared at home, outsourced meals tend to contain more calories, total fat and saturated fat, and it is here where the consumer has very little control over nutrient profile (Bohm & Quartuccio, 2008). Consequently, as the frequency of eating out of home has increased, so has the potential of this phenomenon to contribute to the current status of obesity (Bezerra, Curioni, & Sichieri, 2012). According to the National Health and Nutrition Examination Survey (2012), more than one-third of adults and almost seventeen percent of youth in the United States were obese in 2009-2010 (Ogden, Carroll, Kit, & Flegal, 2012). Though, it is somewhat encouraging that there was no change in the prevalence of obesity among adults or children from 2007–2010 (Ogden et al., 2012). Indicating perhaps, that menu labeling may have been minimally effective in contributing to the levelling. Clearly though, this is a major public health challenge; where the foodservice industry has been seen as a collaborator, influencing and encouraging an obesogenic environment. Unlike retail food products, many restaurant menus lack the type of nutritional information that can guide diners to make appropriate healthy choices. This problem has potentially carried over the college and universities where students often rely on campus foodservices for dietary needs.

College and university students have been found to be overweight, attributed in part to a substantial weight gain during their freshman year (Jung, Bray, & Ginis, 2008; Racette, Deusinger, Strube, Highstein, & Deusinger, 2008). The problem also encompasses students

who do not consume the recommended intake amounts for fruits, vegetables, fibre, whole grains, calories, saturated fats and sugars (A.C.H. Association, 2011; Byrd-Williams, Strother, Kelly, & Huang, 2009; Greaney et al., 2009). Stress, weight concerns, body dissatisfaction, skipping meals, extreme dieting and exercise and overeating contribute to a disconcerting picture of overall college student health. In particular, students reportedly have and difficulty in finding or understanding which healthful meals are available at university cafeterias (Delinsky & Wilson, 2008; Driskell, Schake, & Detter, 2008;Greaney et al., 2009). It is important to improve the dietary intake of students at this age, as these patterns may carry over into later life, accruing contingent health consequences (Hoefkens, Lachat, Kolsteren, Van Camp, & Verbeke, 2011).

Labeling menus with nutrition data has been proposed as tool for healthy-eating guidance, though this method has been sometimes found to be confusing or ineffective, particularly for college students (Chu, Frongillo, Jones, & Kaye, 2009; Driskell et al., 2008; Graham & Laska, 2012; Hoefkens et al., 2011) and in other foodservice settings (Alexander, O'Gorman, & Wood, 2010; Hwang & Lorenzen, 2008). Many consumers find existing nutrition information to be unbeneficial, difficult to use, or overwhelming (Hoefkens et al., 2011; Kozup, Creyer, & Burton, 2003; Krukowski, Harvey-Berino, Kolodinsky, Narsana, & DeSisto, 2006; Levin, 1996). The Food Standards Agency in the UK, for example, has acknowledged that the primary problem affecting healthier menu selections is that an appropriate nutrition-labeling system for foodservice does not yet exist (Paton, 2008). Even so, the menu is a potentially very powerful tool for healthy eating; students who read nutrition labels are more likely to have healthier dietary intakes (Graham & Laska, 2012). Clearly, there is a need for more research in this area to determine the most effective labeling design particularly within the environment of a student cafeteria and hence forms the aim of this study.

Methods

The method for development of the menu instrument has been previously published [redacted] and is summarized as follows: A prototype university foodservice menu was developed with student input, based around a rigorous grounded theory approach (Charmaz, 2006). Focus groups were conducted to inform a user centric design of a prototype university foodservice menu. [redacted] from November 2011 to January 2012. A total of 40 students (17 male, 23 female) participated in seven focus groups where sampling was

convenient with consent. Students were recruited in the student cafeteria while they were partaking of lunch. They were sitting at tables in groups of twos, threes, fours or fives, which represented a true-life environment of meal experience. Respondents were asked to select and write down their first 3 choices of meals with demographic data also collected at this point. It was emphasised by the faciltator that this should be an individual choice and thereafter there was no communication with other members of the group. Forms were collected and the students were thanked for their support. The students ranged from a required minimum of 18 to 24 years of age. Other than age, the only exclusion criteria were that students could not be enrolled in a food or nutrition program. The researchers vigilantly offered protections by encouraging participants to give freestanding opinions not influenced by coercion, conflict avoidance, acquiescence or fickleness (Kidd & Parshall, 2000). A final "insurance question" was asked at the end of each session, to insure that the critical information was clear and understood by the researchers and participants (Ruff, Alexander, & McKie, 2005). The researchers employed a process of iteration to carry forward data from first focus group, through the theoretical saturation of ideas during the final sessions.

All the sessions were audiotaped and transcribed verbatim. The transcripts were analyzed using deductive content analysis, which involved assigning codes to text passages (Charmaz, 2006). Three researchers analyzed the data separately to provide a multi-rater perspective (Jones, 2010; Webb & Kevern, 2001). The focus group data was discursively refined to acquire a confirmatory model of ideal menu labeling. No attempt was made by the researchers to artistically embellish the evolving menu instrument, which was designed to articulate, as closely as possible, how students want the food selections presented and described. The menu was built in components subject to student approval for each step towards completion. Continually evolving visual menu displays were presented to each group to elicit comments, comparisons and suggestions. Then the layout was continually refined, evolving into a cumulative menu-design. The consensus from the students was that the menu should contain colored symbols (green, for the healthiest choices, yellow for an okay choice and red for a not so healthy choice), with nutrition data in a configuration similar to the UK Traffic Light system (Balcombe, Fraser & Di Falco 2010), as presented at Figure 1.

Figure 1: Student design for a university foodservice menu.

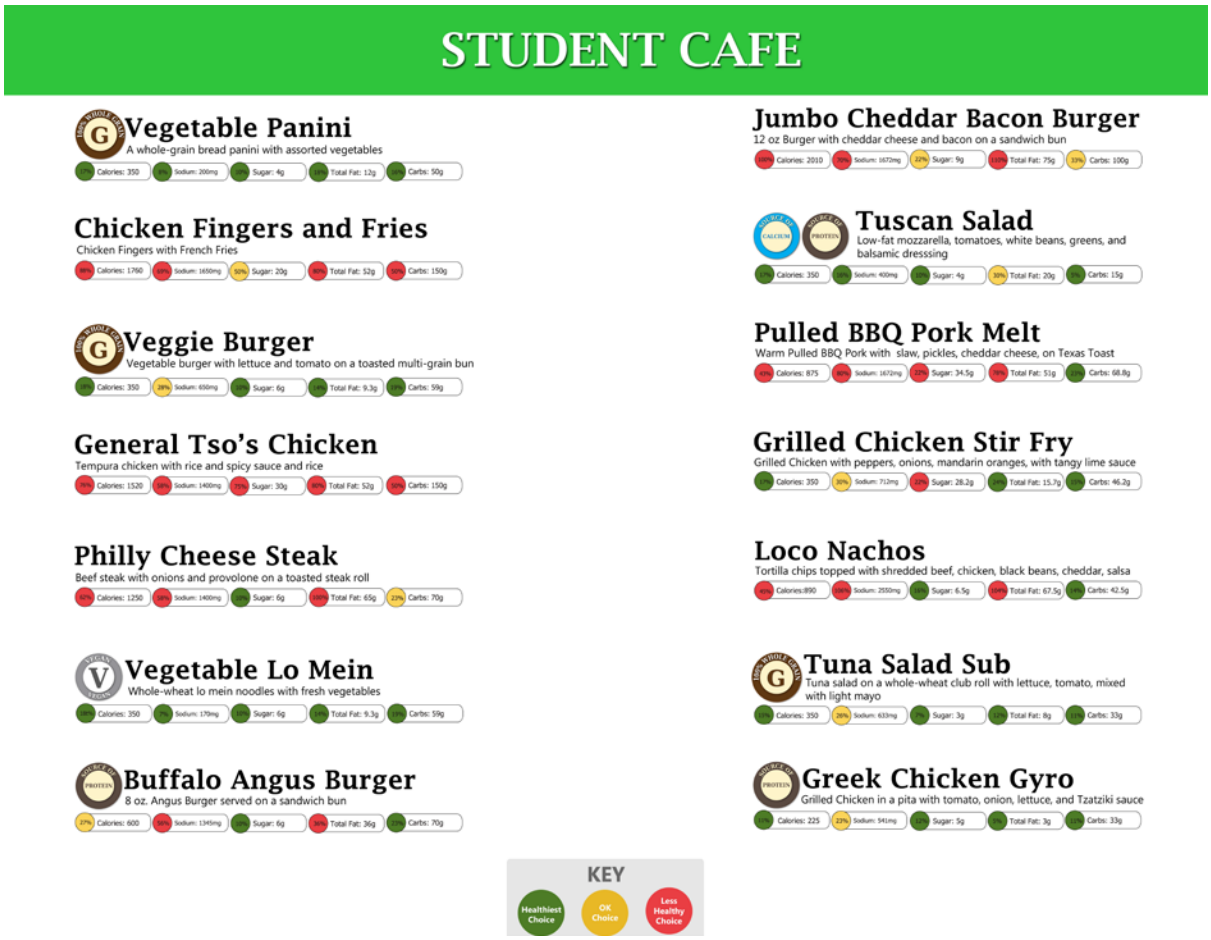

Figure taken from [redacted]

Based on USDA healthy eating standards, a finalized menu comprising 7 healthy and 7 unhealthy meal options was presented unlabled on a board to students in the student cafeteria, as a control (n=214) and another was labeled with nutrient icons (Figure 1 - n=212) and presented as an intervention test menu.

Statistical Data Analysis

Data were analysed using SAS (version 9.2). The baseline was characterized by intervention and control status and the statistical comparisons of means and proportions. T-tests were used to analyse the difference between the intervention and control group for age and BMI. Chi-square statistics (χ^2) were used to determine whether the proportion of categorical variables such as gender, ethnicity, athletic status and top choice are statistically independent or associated with intervention or control groups. Significance determined at $p \leq 0.05$ was used for all tests. To study the effect of menu design, the data was analyzed using two logistic regression models with responses from top choice and top 3 choices respectively.

For the top choice model, the response was the healthy food selection indicator. For the top 3 choices, the response was the grouped data in the form of 'r/n', where r is the number of healthy food selected, and n is the number of selections a student made.

Results

The demographic distribution of respondents is summarised in Table 1. There was no significant difference in age between the intervention and control group, but BMI is significantly different between these groups (p=0.0007). Similarly, there was no significant difference between intervention and control group on gender, ethnicity, and diet status. Table 1 also shows that the top choice selection does not depend on the group status. As there are significant differences in BMI and athletic status in the two groups, these variables were controlled when the effect of the menu design on food selection was analyzed in logistic regression. Gender and diet status were also controlled to remove confounding effects. Two logistic models with healthy food selection results were built from the top choice and top 3 choices respectively. Table 2 shows the result from the logistic regression models.

Table 1: Demographics

Variable	**Intervention**	**Control**	**Significance**
	Mean(SE)	**Mean(SE)**	***p*-value***
Age	20.03 (0.13)	19.90 (0.11)	0.43
BMI	25.32 (0.32)	23.84 (0.28)	0.0007
	Number(%)	**Number(%)**	***p*-value****
Gender			0.15
Male	109(51.9)	96(44.9)	
Female	101(48.1)	118(55.1)	
Ethnicity			0.99
White	140 (66)	141 (65.9)	
Black	18 (8.5)	17 (7.9)	
Hispanic	30(14.2)	30(14.0)	
Other	24 (11.3)	26 (12.2)	
Diet Status			0.19
Yes	52(24.6)	41(19.3)	
No	159(75.4)	171(80.7)	
Athletic Status			0.038
Yes	62(29.4)	44 (20.7)	
No	149 (70.6)	169 (79.3)	

Top 1 choice			0.14
Healthy choice	84(39.6)	70(32.7)	
Non-healthy choice	128(60.4)	144(67.3)	

*t-test of difference between means

**Chi-square test of independence

For the top choice, when the healthy food selection status is fitted with covariates for menu, gender, diet status, athletic status and BMI, gender and diet status significantly affected the food selection from the menu, with p-values <0.0001 and 0013 respectively. The odds ratio of selecting healthy foods from the menu between male and female is 0.36 with 95% confidence interval (0.23, 0.57). This indicates the odds of selecting healthy food from a menu for male students is about 0.36 times the odds of selecting healthy foods for female students. Similarly the odds ratio of selecting healthy foods from the menu between students on diet and not on diet is 2.28 with 95% confidence interval (1.38, 3.78). This shows that the odds of selecting healthy foods for students on diet is more than twice as likely than that for students not on diet. In addition, athletic status and BMI did not affect the food selection significantly; the p-values were 0.10 and 0.47 respectively. Students in the intervention group had higher odds to select healthy food than students in the control group with the odds ratio 1.42, however the intervention effect was not significant (p=0.16).

For the overall top 3 choices, the confounding effect of gender, diet status, athletic status and BMI was also considered in the logistic model. Similar results were observed as for the top choice. Gender, diet status, athletic status all significantly affected the selection of healthy food from the menu with p-values <0.0001, <0.0001 and 0.0018 respectively. Specifically the odds ratio of selecting healthy food from the menu between male and female students was 0.42 with a 95% confidence interval (0.32, 0.54). The odds ratio between students on a diet and students not on diet was 2.35 with a 95% confidence interval (1.76, 3.13). The odds ratio between athletic students and nonathletic students was 0.69 with a 95% confidence interval (0.51, 0.94). This shows that athletic students were significantly less likely to select healthy foods than nonathletic students.

Table 2: Logistic regression result with odds ratio of selecting healthy food.

Variable	**Model 1** **OR(95% CI)**	**Model 2** **OR(95% CI)**
Menu(Ref: Control)		
Intervention	1.42(0.92,2.21)	1.23(0.96,1.57)

Gender(Ref:Female)		
Male	0.36(0.23,0.57)*	0.42(0.32,0.54)*
Diet Status(Ref:No)		
Yes	2.28(1.38,3.78)*	2.35(1.76,3.13)*
Athletic Status(Ref:No)		
Yes	0.63(0.36, 1.09)	0.69(0.51, 0.94)*
BMI	1.02(0.97, 1.07)	1.02(0.98, 1.05)

*: p-value <0.05

Discussion

Though gender, diet and athletic status significantly affected the food selection from the intervention menu (p-values <0.0001 and 0013 respectively), the effect was mostly independent of the menu design influence, despite a positive observed trend for healthy choices. While nutrition information increased the odds of selecting healthy food (OR=1.23), the overall effect was not statistically significant (p-value=0.11). Additionally, BMI did not significantly affect the healthy food selection (p-value=0.25).

There is an increasing focus for local and national governments to require foodservices to provide nutrient labeling on menus (Driskell et al., 2008) and while some university foodservices do this (Freedman & Connors, 2011), research has shown that nutrient labels could be confusing or ineffective, particularly for college students (Hoefkens et al., 2011). Student cafeterias are increasingly being identified as environments where better lifestyle habits can be promoted, although, it is also accepted that not all consumers will wish to engage in this positive change; it depends on health-related attitude and behaviour (Stuber, 2008).

While it is evident that public concern over health related issues such as the amount of fat and sugar in foods has risen considerably, the rising levels of obesity indicate that average energy intakes are currently exceeding consumer requirements both in the US and UK (FSA, 2010; Human & Services, 2010)[32, 33].Therefore, any initiative provided by foodservice operators that informs and encourages better decision making among motivated consumers could play a large role in a healthier population. The feasibility and acceptability of embracing this strategy has not been evaluated across all catering sectors and certainly within this research it would appear that menu design had little significant effect on changing food choice behaviour among a student body, although a positive trend was observed.

It is difficult to establish the link between cause and effect and to assume that the potential changes in behaviour are the result of certain interventions; capturing learning or

useful data which contributes to evidence based public health policy is challenging. In the context of nutrient labeling, while there have been calls for an integrated view of promoting healthy sustainable eating habits, there has been little or no research into best practice involving partnerships of consumers, educators (and their institutions) and the foodservice industry. Before the implementation of any public health nutrition policy, it is important to take into account ongoing initiatives and programmes, existing structures as well as existing barriers, which to some extent include the attitude of consumers themselves.

Implicit to existing labeling research is the notion that food-related ideas, perceptions and intentions often do not completely transact into behaviors. There are many reasons why menu labels may not deliver the expected changes in consumption behaviors. One issue is the overall acceptance of trust value from a label when the consumer is typically bombarded with similarly advertised claims from various commercial media. Research has also demonstrated that food labels are confusing to some consumers and they may not be able to process nutritional data labels (such as grams per serving size) in short periods of time.

While it has been argued that a nutrition-labeling menu system could have an impact on people's selection of healthier foods, the impact may be contingent on their motivation to make a change (Feunekes, Gortemaker, Willems, Lion, & Van Den Kommer, 2008; Yoon & George, 2012). Individual behaviour is highly complex with many external and internal influences on perception, attitude and action. A possible lack of menu labeling affect could be attributed to many contingent factors that are potentially more significant for meal choice than nutrition information. For example, it has been suggested that multiple criterion need to be in place for a person to transition from an intention or plan into an actual new behaviour. The social and physical environment and available time must be favourable. The intended change must also be a high-priority for this person and likely fit into a peer-group norm (Atkins & Michie, 2013). Then again, potential healthy menu intention may be mitigated by intervening factors much before the actual point of purchase, that includes taste preferences or aversions, which reach back to early years of childhood (Bordi, Cranage, Borja, & Cole, 2003; D. Cranage & Lee, 2007). Other mediators include price, especially in the case of lower-income consumers; the foodservice setting, that encompasses smells, the dining atmosphere and product appearance; convenience; anticipation, including a pre-conceived desire or perceptions about a particular food; the consumer's age and gender; and attitudes and predispositions to dietary change (Block, Gillman, Linakis, & Goldman, 2013; Chaufan, Fox, & Hong, 2011; Elbel, 2011; Gordon & Hayes, 2012; Gosliner, Madsen, Woodward-Lopez, & Crawford, 2011; Hoefkens et al., 2011; Vadiveloo, Dixon, & Elbel, 2011; Wisdom,

Downs, & Loewenstein, 2010). In sum, consumers have to negotiate the trade-offs between what appears healthy, what looks and tastes good, what is affordable (although these attributes need not be mutually exclusive) and a host of other menu selection influences. Nutrition only plays a part in an ingrained meal decision process (Bordi et al., 2003; D. Cranage & Lee, 2007). Therefore, labels may not be enough to entirely overcome these dynamics. Nutritional wellbeing is the consequence of a complex multi-causal series of linkages; this research has provided a hint at one element to achieve a desired healthy outcome by menu labeling but clearly more research is required.

Conclusion

While existing methods for improving consumers' present and future diets have yet to be proven successful, initiatives by foodservice operators that inform and encourage better menu decision-making could play a role in wellbeing. However, before the implementation of any health and nutrition policy, it is important to take into account the attitude of consumers themselves. Input from constituents through various survey methodologies could help nutrition specialists access the potential impact of labels on choice, before the menu is implemented. Adjustments then could be made to the label to make it more user-friendly, trustworthy and hence, more effective in the promotion of healthy-eating. Portions sizes could also be fine-tuned to meet planned consumer expectations. Health claims, should be accompanied by specific nutrient data and certainly the overall final product must provide the nutrition that is ascribed. By doing the aforementioned, foodservice management could foster the trust, openness and overall positive perceptions of food quality. These attributes are necessary to enable consumers to embrace and clearly understand the nutrient labels of the foods they are eating (D. A. Cranage, Conklin, & Lambert, 2004). Consumer trust cannot be gained through hollow claims, false merchandizing or inaccurate nutrient information.

Public health may be best served if foodservice outlets limit their offerings to healthy options, though this approach may intrude on personal rights to choose. Examples include recent efforts to limit certain food products in schools (Gosliner et al., 2011; Hoefkens et al., 2011), government efforts for overall reductions of sodium in foods (Wyness, Butriss, & Stanner, 2011), municipal attempts at regulating soft drink serving sizes (Grynbaum, 2012), and the recent US Food and Drug Administration efforts to ban trans-fats from restaurant foods (FDA, 2013). Subliminal menu merchandizing, treatments or "nudging" consumers to healthy choice through the use of symbols may also have a modest effect in promoting healthier meal selections ([redacted]. Modifying

the food environment by merchandizing healthy choices is another option. This could be accomplished by lighting or garnishing affects when the food is being displayed, or by language embellishments, when a particular healthy food is listed or described. In our opinion, the best opportunity for public nutritional health would be for the foodservice industry to improve the overall quality of the products it serves. Still, better strategies need to be developed to influence menu choice before the consumer enters the foodservice environs. Providing nutritional information in student cafeterias may be challenging but helpful. While independent operators may not have the resources to test, analyse and effectively market healthy eating strategies, large contracted foodservice providers may have the wherewithal to lead in this area. Nevertheless, no labeling system or legislation can control choice made by individuals, the responsibility for a healthy selection must always remain personal.

Competing interests

The author(s) declare that they have no competing interests.

Authors' contributions

Authorship is based on substantive contributions to each of the following: conception and design of the study; generation and collection of data, analysis and/or interpretation; and drafting or revision of the manuscript and approval of the final version.

Ethical Approval

The Independent Ethical Review Board of Montclair State University gave full approval for this study. An information sheet and consent form was distributed to all respondents and signed and where informed consent implied through participation and completion of the questionnaire. Respondents were informed of their right to withdraw from the survey and that their identity would be protected. Data was stored safely for the duration of the study, for administrative purposes, after which handling of data sets will adhere to guidelines of the Data Protection Act 1998.

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