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Young Adult Smokers' Perceptions of the Influence of Physical Activity on their Smoking Patterns

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Abstract

Background: Physical activity has the potential to be an efficient and effective strategy for harm reduction and cessation among smokers. However, much remains to be known in this area of inquiry. The purpose of this study was to address the following question: "How do smokers perceive that physical activity affects their smoking behaviour?" **Methods:** Individual semi-structured interviews and one focus group were conducted with 12 physically active smokers aged 20 to 35. An iterative data collection–data analysis cycle was employed, and data were analysed using a detailed thematic approach. The approach included transcriptions being segmented into meaning units, and meaning units were then sorted and presented as relative themes. **Results:** Physical activity does appear to influence tobacco consumption and nicotine dependence; however, the positive or negative influence depends on a) the type, and b) the context of the physical activity. Within "type of activity," two specific themes were identified: 1) intensity of activity, and 2) perceived activity competiveness. Within the "context of activity," two specific themes were identified: 1) level of activity socialization, and 2) activity location. **Conclusions:** All health care professionals should consider integrating tailored physical activity promotion programs into their tobacco cessation initiatives.

Keywords

adults; cessation; harm reduction; physical activity; tobacco; smoking

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Background

Commercial tobacco is the only legal substance that kills many of its users when used exactly as intended by manufacturers (World Health Organization [WHO], 2012). Smoking is the leading cause of preventable deaths worldwide (WHO, 2009). It is estimated that tobacco use kills more than 5 million people annually, and it is well documented that tobacco is the main cause of premature death in developed countries (WHO, 2012). Recent statistics indicate that one Canadian dies every 11 minutes from tobacco use (Health Canada, 2010). In 2012, there were 2.46 million tobacco users in Ontario representing 22% (18% were current smokers) of the province's total population (Ontario Tobacco Research Unit [OTRU], 2014). Tobacco consumption has also been linked to many health issues. Various types of cancers, heart disease, stroke, emphysema, chronic obstructive pulmonary disease, osteoporosis, and diabetes are among the causes of premature death related to tobacco use (Mackay & Eriksen, 2002).

Along with tobacco use, physical inactivity is also among the five leading global causes of mortality among all income groups (WHO, 2009). According to Health Canada, physical activity improves overall health; it reduces stress, strengthens the heart and lungs, and increases energy levels (Health Canada, 2011). Recent studies have suggested that being physically active may (a) increase attempts at smoking cessation (deRuiter & Faulkner, 2006), and (b) reduce mortality and morbidity among current smokers (Ferrucci et al., 1999; Garcia-Amyerich, Lang, Benet, Schnohr & Anto, 2007; Mahibir et al., 2004; Manson et al., 2002).

The main objective of tobacco control is to increase cessation among smokers (Smoke-Free Ontario [SFO] Scientific Advisory Committee [SAC], 2010). In the past year, 43% all current smokers in Ontario made a quit attempt (OTRU, 2014). Although typical smokers are open to the idea of cessation, many smokers are unable to overcome the physiological and behavioural addictions linked with tobacco consumption (Bolliger, 2000). Researchers have confirmed that approximately 23% of Canadian smokers participate in recommended amounts of leisure time physical activity (deRuiter, Faulkner, Cairney, & Veldhuizen, 2008) and that physical activity interventions can increase rates of successful cessation (Prapavessis et al., 2007). For instance, Prapavessis and colleagues (2007) found that exercise combined with nicotine replacement therapy facilitates smoking cessation, improves functional exercise capacity, and delays weight gain. There is also strong evidence to suggest exercise as an effective aid for reducing tobacco withdrawal and cravings (Ussher, Taylor, & Faulkner, 2012). Thus, in the context of providing smokers with programs to help them quit, there is evidence that physical activity interventions merit consideration.

Furthermore, ongoing consideration has been given to developing harm reduction-strategies for smokers who are unable to quit (deRuiter & Faulkner, 2006). A product is harm reducing "if it lowers total tobacco-related mortality and morbidity even though use of that product may involve continued exposure to tobacco-related toxicants" (Stratton, Shetty, Wallace, & Bondurant, 2001, p. 198). To date, tobacco harm-reduction strategies have focused on reducing tobacco-related harm through innovative tobacco products, medications, and reduced consumption (Hatsukami, Henningfield, & Kotlyer, 2004; Shiffman et al., 2002).

More recently, several studies have found that being physically active mitigates the long-term negative effects of smoking (Ferrucci et al., 1999; Garcia-Amyerich et al., 2007; Mahibir et al., 2004; Manson et al., 2002). Moderate to high levels of regular physical activity (e.g., light physical activity 2–4 hours per week to vigorous activity of any frequency) are associated with reduced lung function decline and reduced risk of chronic obstructive pulmonary disease among smokers (Garcia-Amyerich et al., 2007). Pulmonary disease is a leading cause of morbidity, mortality, and health care expenditures worldwide (Chapman et al., 2006). Physical activity may help to increase lung function for former smokers by reducing the health burden of smoking (Westmaas & Brandon, 2004). In addition, epidemiological evidence has suggested that physically active smokers live longer than inactive smokers (Blair et al., 1989; Myers et al., 2002; Paffenbarger, Hyde, Wing, & Hsieh, 1986). The principles of harm reduction and the exposure reduction approach are used as a guideline for harm-reduction programs. According to Hatsukami and colleagues (2004), the primary objective of harm reduction is to reduce the occurrence of tobacco-related morbidity and mortality related to the use of tobacco products in smokers who are unwilling or unable to quit. Relevant to the current paper, Hatsukami et al. (2004) affirms that a harm-reduction strategy, among other elements, should not contribute to nicotine dependence, should not reduce the chances of eventually quitting, and should not lead to increased tobacco dependence. Previously, nicotine replacement therapy was the only strategy considered to fill these obligations (Hatsukami et al., 2004). deRuiter and Faulkner (2006) recently provided an extensive review of the literature to argue that physical activity should receive consideration as a harm-reduction strategy for smokers. The authors argue that physical activity at least partially meets the requirements to be considered an effective harm-reduction strategy. Specifically, they provided empirical evidence to support that being physically active can delay the occurrence of disease in smokers, being physically active does not appear to further contribute to nicotine dependence or reduce the likelihood of eventual cessation, and it has the potential to bring about lifestyle changes that allow smokers to be tobacco and nicotine free (deRuiter & Faulkner, 2006).

The purpose of this study was to understand the viability of physical activity as a cessation tool and as a potentially effective harm-reduction strategy. We were specifically interested in exploring the question, "How do smokers perceive that physical activity affects their smoking behaviour?" While there is an abundance of research that has explored the association between physical activity and smoking behaviour (Kaczynski, Manske, Mannell, & Grewal, 2008; Kaczynski, Mannell, & Manske, 2008), much remains to be known in this area of research. To date, most studies that have explored the co-occurrence of physical activity and smoking have done so predominantly using quantitative methodologies. This paper expands our understanding in this area of inquiry by applying a qualitative methodological approach.

Methods

Participants

Physically active smokers aged 20 to 35 residing in a northern Ontario city were recruited for this study through word of mouth and snowball sampling. The range-of-age inclusion was narrowed to enhance the homogeneity of the respondent group. This specific age group was selected because it a) is the second largest age group of smokers in Canada (Statistics Canada, 2009a), b) has the lowest rate of quitting, and c) participates the most in regular physical activity (Statistics Canada, 2009b). "Physically active" respondents were classified according to their degree of activity using Godin's Leisure-Time Exercise Questionnaire (Godin & Shephard, 1985). Self-reported typical weekly frequencies of *strenuous, moderate,* and *light* activities were multiplied by their estimated value in Metabolic Equivalent [METs]. Physically active respondents were included in the study if they expended more than 38 METs per week for men, and more than 35 METs per week for women (Jacobs, Ainsworth, Hartman & Leon, 1993). These values are approximately 2,000 kilocalories of energy expenditure per week (Bengoechea, Spence, & McGannon, 2005). Such values have been associated with reduced risks of heart disease (Paffenbarger et al., 1986). Furthermore, these cut-points have been used in several other studies (Paffenbarger et al., 1986; Jacobs et al., 1993; Bengoechea et al., 2005). "Daily smokers" were defined as those who currently smoke cigarettes every day based on a Canadian Community Health Survey (CCHS) (Statistics Canada, 2009c). All respondents smoked a minimum of one cigarette per day. Each participant was briefed on the study and signed an informed consent.

Data Collection

Individual semi-structured interviews were conducted in private with each of the 12 participants, using a semi-structured interview guide (See Appendix A). The interviews were audio recorded and transcribed verbatim following the

interview. A confirmatory focus group was held with six of the same 12 participants for follow-up discussion on the categories that were identified from the individual interviews. All respondents were invited to participate in the focus group.

Data Analysis

The steps recommended by Berg (2009) were followed for the analyses. This included a) segmenting the text into meaning units (MUs); b) sorting the MUs by category, identifying patterns and commonalities; c) examining the sorted data to isolate meaningful patterns; and d) identifying patterns and generalizing overall themes that relate specifically to the research question. This analysis procedure was supported by qualitative data analysis software, QSR NVivo version 8 © (NVivo qualitative data analysis software, 2008). All respondents were given the opportunity to review their transcripts prior to analysis as well as participate in a follow-up focus group in order to confirm the results. The study was approved by the authors' institutional Research Ethics Board.

Results

The respondent group included 12 participants from the northern part of the province of Ontario in Canada. Six of the 12 interviewees participated in the confirmatory focus group to verify and discuss the themes that were identified from the individual interviews. The respondents included six men and six women with a mean age of 28. The average years smoking was 11, with respondents reporting smoking 5 to 25 cigarettes per day. Their self-reported physical activity levels ranged from 40 to 100 METs per week based on Godin's Leisure-Time Exercise questionnaire. The types of physical activity the respondents participated in included a variety of group sports such as hockey, slow-pitch baseball, golf, volleyball, and individual types of activities such as jogging, weight training, walking, or biking.

A total of 562 Meaning Units (MUs) were identified from the interview and focus group transcriptions. Upon further analysis, 340 MUs were retained as being directly related to the purpose of this study. Physical activity does appear to influence smoking behaviour; however, the positive or negative influence depends on (a) the type (162 MUs) and (b) context (178 MUs) of the physical activity. Two aspects of the "type of activity" were identified as important: (1) the intensity of the activity (129 MUs), and (2) the perceived activity competiveness (33 MUs). Two aspects of the "context of activity" were identified as important: (1) the level of activity socialization (103 MUs), and (2) the location of the activity (75 MUs).

Type of Physical Activity

Intensity of activity. Several participants suggested that the way their body physiologically responded to physical activity had a positive influence on their smoking patterns. For instance, one respondent shared her experience on how physical activity helped to prevent cigarette use:

> When I hit the ball into the outfield for an in-the-park home run and I get back to the bench, it takes me forever to catch my breath. It's an eye opener. It definitely works in a positive way for me (Respondent 3, Female, 24, Semi-Structured Interviews [SSI]).

Specifically, physical activities of a vigorous nature provided some respondents with a much-needed reminder of the negative physiological consequences of smoking.

Another example of how the physiological response of physical activity could decrease nicotine dependence and tobacco consumption was provided by a male respondent who spoke of the feeling of discomfort during high intensity physical activity, alluding to the fact that his body may have responded better to the activity if he were not a smoker:

> Some days you are doing everything you can just to catch your breath, your heart is racing, you can feel your blood pressure rising, you know there's some definitely not so nice effects to it. I get headaches sometimes… (Respondent 4, Male, 24, Semi-Structured Interview [SSI]).

These findings support the notion that being physically active reveals the negative physiological consequences of smoking. However, respondents expressed this primarily when speaking of high intensity activities, for example:

> …during intense sports, you really feel it. When you are playing slow-pitch or just pick-up basketball, you are not running full out, so it doesn't affect you, but you do notice that you are sweating a lot more than somebody that doesn't smoke cause your body is working twice as hard now (Respondent 1, Male, 32, SSI).

In addition to the physical reminder of the negative effects of smoking, being physically active appeared to create awareness and perhaps provide motivation to quit. Some respondents spoke of reduced patterns of tobacco consumption as a result of being physically active in high-intensity situations:

> I think by changing up your routine with adding physical activity to your day, I think would help with reducing smoking. I do smoke a lot at baseball, but I wouldn't really consider it a strenuous activity. So, by adding running to your day, and you know, more exercise, I think it would slow down the smoking (Respondent 4, Male, 24, SSI).

The findings described above provide some indication that physical activity can support smoking cessation; however, clearly individual differences are present. Furthermore, certain factors such as the intensity of the activity need to be considered in order to make such assumptions. During the focus group discussion, the respondents reiterated what were found during the interviews. The respondents confirmed that when they participated in high-intensity physical activity, it decreased their desire to smoke.

However, the physiological response to physical activity could also increase nicotine dependence and therefore tobacco consumption. For example, if a non-physically active smoker begins an exercise program, the participant might be less likely to succeed if the exercise is too vigorous because the participant might feel winded or out of breath. This respondent shared an example of how the smokers' perception of the physiological response to physical activity could also increase nicotine dependence among physically active smokers:

> After physical activity, for example going for a run, you are huffing and puffing and breathing deep because you're running, and sometimes, you think, I want to have a smoke right now, to calm myself down (Respondent 6, Male, 29, SSI).

As such, what is clear is that physically active smokers spoke of an increased physiological awareness as a result of being active. However, how this translates into a positive or negative outcome depends on individual perception.

Perceived activity competitiveness. A by-product from being active that seemed to clearly manifest itself differently depending on the individual and the type of activity was the role of competitive sport. In certain physical activities, namely organized sport, the competitiveness of the situation seemed to influence tobacco consumption patterns. Throughout the semi-structured interviews, as well as the confirmatory focus group, participants spoke of these types of competitive circumstances; however, there was a contradiction as to whether it was beneficial or harmful.

For instance, this 32-year-old male respondent provided an example of competitive stress from physical activity that actually increased the likelihood of tobacco consumption:

> As the game goes on and you're really into it, that's when I find myself craving one. Ever since I can remember, like you get into tense moments, and it just seems like the first thing you reach for is a cigarette (Respondent 1, Male, 32, SSI).

The stress seems to be a driver for some athletes in highly competitive situations. For this participant, smoking may act as a coping mechanism under competitive circumstances.

In contrast, other respondents expressed that the "competitiveness" or "stress" experienced during sport provided an interruption from cigarettes. For instance, this 26-year-old female speaks to the importance of being "in the game," saying, "You're there to play ball, you're focused, and you're into the game. You don't even think about smoking" (Respondent 10, Female, 26, SSI). For many of the respondents, participating in competitive sport and participating in high-intensity physical activity acted as a distraction from smoking. Again, however, individual variability was clearly present.

Context of the Activity

Level of activity socialization. Socialization and the recreational aspects of being active outdoors seemed to increase cigarette consumption. There were several meaning units that were identified during many of the discussions with the participants regarding the influence of socialization. Respondent 1, a 32-year-old male, possibly best exemplified this association:

> It's almost like when you yawn, you make the other person yawn, and you see someone lighting a cigarette, all of a sudden you are reaching in your pocket and you are like, I better have one, too. Don't want to let them smoke alone (Respondent 1, Male, 32, SSI).

Most participants described the feeling of being socially influenced to have a cigarette while being physically active, particularly in situations where smoking was permitted during the activity. Another example of this is expressed by a respondent stating;

> If I stayed home every day and did nothing and never left my house, I wouldn't smoke, because I don't smoke in the house. I don't like smoking by myself because that's boring. You have no one to talk to; you are just sitting there smoking. I'm pretty sure if I did not play sports, I wouldn't smoke (Respondent 8, Female, 28, SSI).

In general, most respondents described how activities of a 'recreational' nature increased their likelihood to smoke. Furthermore, this tendency was generally expressed when they were participating in activities where other teammates or partners were also smokers. For example:

> It all depends, if I play baseball on a team where nobody on the team smokes, I probably won't smoke. I am not going to leave the bench to go have a smoke, because no one else is smoking (Respondent 7, Female, 29, Focus Group [FG]).

This reaffirms the influence of socialization on cigarette consumption for certain participants.

Activity location. The focus group participants indicated that smoking policies could have a positive impact on smoking patterns and behaviours

during physical activities. One respondent described how she would react to smoke-free baseball fields, saying, "If you can't smoke, I'm not going to step away from the game to go for a smoke, if I am at the game, then I'm on the bench. If I can have one there I will, but if there is a ban in place and I can't, I won't" (Respondent 7, Female, 29, [FG]).

Regarding the issue of policy and smoke-free outdoor spaces, the group discussed that enforcement would be needed to affect change.

All respondents described the negative influence of certain aspects of being physically active throughout the semi-structured interviews and focus group. Participants felt that they had a greater desire to smoke, and in some cases increased their consumption of cigarettes, when participating in recreational, social-type physical activities. For example, this respondent clearly expressed how sport is detrimental to the likelihood of her negating her smoking behaviour: "If I'm sitting an inning (on the bench at baseball), I'm probably going to have a smoke… and if I don't finish it, and I'm going up to bat, I'll just pass it to someone on my team or if they are going up to bat, they will give me the smoke" (Respondent 7, Female, 29, [FG]).

Conversely, when they were put in a situation that prevented them from smoking, such as being indoors, being in a smoke-free outdoor environment or participating in a sport where social smoking did not appear to be prevalent, it acted as a distraction for the participants.

Discussion

The overarching finding in this study is that physical activity has an influence on smoking behaviour and is mediated by a) the type of activity, and b) the context of the activity. However, the findings within this study suggest that the way physical activity influences smoking patterns is highly individualized. In general, if we are to use physical activity to promote harm reduction and eventual cessation, it appears that we need to focus on promoting physical activity of higher intensity nature. Higher intensity activities were mostly associated with a reduction of cigarette consumption, and more frequently, high-intensity activities also made participants aware of the negative physiological effects of smoking. For the most part, low-intensity recreational type activities led to an increased consumption of cigarettes and therefore were not helpful. Specifically, socially oriented outdoor activities appeared to increase cigarette consumption. As such, the influence of being physically active on smoking patterns appears to be mediated by additional elements—mainly the type of activity and the circumstance under which the activity is occurring.

Two main points merit further discussion. First, most respondents felt that being physically active provided a distraction that led to reduced cigarette consumption, and second, respondents felt that in more social physical activities where others were smoking, it would actually increase their likelihood of smoking. These two findings will be discussed in further detail.

First, to highlight that physical activity may be considered a distraction, a study of health care professionals suggested that physical activity helped clients to self-regulate cravings and withdrawal symptoms, which helped clients to feel in better control of their smoking patterns (Taylor, Everson-Hock, & Ussher, 2010). Similar findings were discussed during this study's confirmatory focus group. Respondents felt that the vigor of being physically active increased their awareness of their body and how it was reacting to the exercise. It is important for respondents to acknowledge these physiological responses. In many cases, being active reminded them how much their aerobic capacity had been affected by their daily tobacco consumption. Supporting smokers to participate in individual physical activities seems to have a positive effect on their smoking behaviour. Respondents found that when they were engaged in high-intensity individual activities, thoughts of smoking were suppressed. Physical activity in contrast to stress has been found to draw out feelings of health and energy (Moraska & Fleshner, 2001). Studies have also shown that moderate physical activity levels can alleviate emotional stress (Eliot, Forker, & Robertson, 1976). Furthermore, Norris, Carroll, and Cochrane (1992) looked at the effects of physical activity and exercise training on personal stress and well-being in adolescents, and found that when participants are undergoing higher levels of physical activity interventions, they reported significantly less stress levels than those using lower levels of physical activity. However, there were exceptions. Some respondents alluded to certain competitive stress situations and how when they felt tense or anxious during sport they would reach for a cigarette to "calm their nerves." This information is useful for persons who are using physical activity as a way to cope with non-exercise-related stress throughout the cessation process. If the competitiveness of sport is increasing their likelihood of reaching for a cigarette to cope with such stressors, it is important for the smoker to acknowledge this trigger, and the smoker want to consider either engaging in non-competitive sport or using alternative methods of stress management.

Second, smoking in social situations increases in adolescence and then declines during adulthood (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997). Further, a recent study also noted that adolescence smoking behaviour can be linked to social anxiety and gaining social confidence during adolescents (Watson, VanderVeen, Cohen, DeMarree, & Morrell, 2012). Researchers have also found that smoking behaviour and physical activity are negatively associated when smokers participated in a sport that usually has a strong social component (Kaczynski, Manske, Mannell, et al., 2008). However, in this study, when smokers participated in a recreational group sport, they were more likely to smoke because of the social influence of teammates. This social context was discussed at length during the individual interviews, as well as during the confirmatory focus group. All participants agreed that socializing

with a cigarette was a key similarity in their respective physical activities. There would appear to be the presence of "a smoking culture" associated with certain sports (e.g., baseball, golf). Gauthier, Snelling, and King (2012) recommended that smokers participate in recreational activities based on a higher likelihood of engaging in physical activity; however, according to the participants within this study, participating in recreational situations where smoking is permitted, they were actually more likely to smoke.

As a result the findings within this study, we offer two specific recommendations. First, we recommend that municipal policies or bylaws enforce smoke-free outdoor spaces. It would be encouraging for physically active smokers to refrain from smoking while at recreational outdoor facilities if smoking were prohibited. According to Hammond, McDonald, Fong, Brown, and Cameron, (2004), 38% of former smokers expressed that smoke-free policies helped them to abstain.

Second, we also recommend promoting outdoor activities where smoking is not part of the "culture" of the activity. These types of activity would ensure that smoking during physical activity is more difficult and less accepted. It would also be beneficial to recognize activity-related triggers and contexts in which athletes who smoke are most likely to smoke. Once triggers are identified, individuals and health care providers can be mindful of their behaviours and use strategies to overcome these situations.

Limitations

Despite the important contribution this study makes to this body of literature, the study has some limitations that prevent its generalizability. First, the sample is relatively narrow in scope, therefore results can only be transferred to physically active athletes between the ages of 20 and 35. Second, the respondents had established physical activity routines, so the study does not speak to the promotion of physical activity to non-active smokers. Third, all of the respondents were from the same geographic area, where smoking is quite prevalent. The participants expressed an apparent belief that smoking is the social norm among northern Ontarians. According to North East Local Health Integration Network data (2008), smoking in northern Ontario is more prevalent (25.6% smokers) than the provincial average (20.7% smokers), and northern Ontario residents are less likely (67.7%) to ask others to refrain from smoking than their counterparts in other areas of the province (72.5%). Furthermore, when the current study was conducted, municipal by-laws in the city did not prevent outdoor smoking (*Note:* Since the study, the city implemented a smoke-free by law on recreational facilities, playgrounds, and beaches). Thus, future studies should consider speaking with non-active smokers, considering a wider range of age within their sample, and explore if any geographical variations are present.

Conclusion

Physical activity should be used as a health-promotion strategy for smokers, but only under specific circumstances. High-intensity physical activity seems to provide a distraction from smoking and is also a reminder of the negative physiological effects of cigarette consumption. However, caution is warranted as in certain contexts (i.e., low-intensity sport) the physical activity might actually serve as a vehicle to increase cigarette consumption by way of socialization. Therefore, it is recommended that physically active smokers engage in high-intensity outdoor and any types of indoor activities (i.e., yoga, volleyball) that do not facilitate smoking. Consideration for the most appropriate intensity depending on the individual's level of fitness and the context of the suggested activity need to be considered. It is also important for smokers themselves to be aware of their personal triggers that incite smoking in order to facilitate the cessation process. As such, we encourage all health professionals to carefully consider integrating tailored physical activity programs into their tobacco cessation initiatives.

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Appendix A

Semi-structured Interview Guide

1. When did you first start smoking? Can you tell me about that experience?
2. Can you recall what or who influenced you to start smoking?
3. Have you always been physically active?
4. Were you more or less active prior to when you started smoking?
5. Do you think if you quit smoking that you would be more or less active?
6. Do you smoke while you are physically active? For instance, do you smoke while you golf or play baseball?
7. What types of physical activities do you participate in?
8. Do you think smoking socially isolates you from others you are active with or are you active with others who smoke?
9. When and where do you smoke the most?
10. Do you think being physically activite affects your smoking behaviour in any way?
11. Do you want to quit smoking?
12. Have you ever tried to quit smoking?
13. What is preventing you from quitting?

14. Do you think being physically active supports or hinders your desire or attempts to quit?
15. What challenges have you faced when trying to quit?
16. What challenges do you face in being physically active; how have you overcome these challenges?

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Factors Affecting Receipt of Nutrition Information Among a Select Group of University Students in the United States

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Abstract

Poor nutrition affects academic performance. Students receiving nutrition information interventions often have better dietary behaviors than peers not receiving such information. The link between educational institutions successfully providing nutrition information and student demographics has not been fully explored. Improved understanding of these student characteristics is needed to aid institutions in effectively meeting information needs. This study provides an analysis of U.S. data from a nationally representative group of university students to examine relationships between receiving nutrition information and variables of age, residence, academic year, gender, and dietary behaviors. Associations were found between failure to receive nutrition information and age and residence status. High percentages of students expressed interest in nutrition information but reported they have not received it. Information outreach efforts at one institution with comparatively positive scores are highlighted. Study findings and a review of relevant research from multiple countries indicate institutions worldwide must pay greater attention to needs of diverse student groups.

Keywords

health promotion; nutrition; information literacy; colleges and universities

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Poor nutrition, overweight, and obesity are critical global problems (World Health Organization, 2014). Individuals who seek postsecondary education are set to become the leaders, informed citizens, care providers, and drivers of the world's economy. Despite pursuance of education, these individuals are far from immune to dietary pitfalls that threaten academic success, later productivity, and overall well-being (Centers for Disease Control and Prevention, 2014; Florence, Asbridge, & Veugelers, 2008). Improved nutrition knowledge has been shown to lead to better eating decisions (Kolodinsky, Jean, Berlin, Johnson, & Travis, 2007; Ulla-Díez, Fortis, & Franco, 2012) and decreases in disordered eating (Rich & Thomas, 2008).

Due to the availability of online resources, advertising, and self-help materials, university students may supersaturate themselves with nutrition information if they choose. Having access to information does not mean one will seek it out or that the information is credible and useful. Even if quality information is found, individuals do not necessarily understand it or change their behaviors. As Pronk (2012) maintained, "At a time when access to scientific information is unprecedented, both the need for synthesis of such information and the need for reflection on its meaning are paramount" (p. 104). Due to the "bully pulpit" educational organizations hold, their contact with students, and their institutional missions, these schools are uniquely able to supply the credible nutrition information students need to make healthful decisions.

Research conducted in the United States has indicated key demographics such as students' residence (Freedman, 2010; Small, Bailey-Davis, Morgan, & Maggs, 2012) and year in school (Pliner & Saunders, 2008) have marked effects on dietary behaviors and weight. These findings do not appear limited to one country, though. Belgian students found making healthy eating decisions while at school challenging due to issues of food access, cost, and peer influence to consume unhealthy foods (Deliens, Clarys, De Bourdeaudhuij, & Deforche, 2014). Half of Maltese undergraduates interviewed by Cefai and Camilleri (2011) stated they consumed between one and two servings of fruits and vegetables per day and cited quality of school cafeteria food as a major factor contributing to such low consumption. Surveyed Canadian students were more likely to gain weight during the first year of university if they lived away from home (Vella-Zarb & Elgar, 2010), and students living away from home at universities in Bulgaria, Denmark, Germany, and Poland reported poorer dietary practices than similar students who lived at home and commuted to school (El Ansari, Stock, & Mikolajczyk, 2012).

Though much of the research indicates students who live away from campuses have better dietary behaviors than on-campus peers, nutritional practices for both groups are far from perfect (Quintilani, Bishop, Greaney, & Whitely, 2012). Strong evidence has not been found promoting one type of dietary intervention (in-person, online, or environmental) for university students in

general (Kelly, Mazzeo, & Bean, 2013), and the literature provides even fewer examples of such interventions focused on off-campus students. One U.S. example, a televised cooking show, met with mixed results (Clifford, Anderson, Auld, & Champ, 2009). Regardless of students' residence, research has indicated that those health information communications that are more specific to individuals' needs have greater positive impact than nontailored messages or those intended to scare recipients into healthy action (Kessels, Ruiter, Brug, & Jansma, 2011; Normand & Osborne, 2010).

Purpose

The purpose of this study was to explore the link between an academic institution's provision of nutrition information (including courses, school-wide communications, outreach at the individual level) and student demographics (e.g., residence, year in school).

Methods

Sample

The responses of more than 30,000 undergraduate and graduate students residing in the United States provided information for the American College Health Association's National College Health Assessment II (ACHA-NCHA II) Fall 2010 National Reference Group (NRG) data set, a representative sampling of 2- and 4-year institutions participating in the NCHA II. This data set was obtained from the ACHA, a process requiring submission of a formal data request and research plan. In the case of the NRG, 30,093 individual responses from 39 institutions were measured. ACHA reported the overall response proportion was 30.9%.

The local institution sample came from a U.S. coeducational, comprehensive university located in a rural, mountainous region of North Carolina. The school serves more than 9,000 undergraduate and graduate students. During the fall 2010 survey period, approximately 7,700 students, about 85% of the full student body, met criteria for participation in the ACHA-NCHA II. The local survey yielded responses from 923 undergraduate and graduate non-distance students, affording a representative sampling of the local institution's non-distance student population (confidence level of 95% and a confidence interval of ± 3). The overall local response proportion was 12.4%.

Nutrition Information Measures in Place

The local institution's current 42–credit hour general or liberal studies program for undergraduates includes a 3–credit hour wellness requirement. Freshmen may also take a personal nutrition course to complete a separate seminar

requirement. Students may receive credit for coursework deemed comparable taken at other institutions.

In addition to formal courses, the institution offers other nutrition information opportunities. Those interventions and resources include peer counseling within nutrition classes and nontherapeutic nutrition guidance offered by graduate students in the institution's Dietetic Internship Program. In addition, students have access to academic and consumer health resources on healthier eating through the institution's library and to a medical librarian who provides group and individual instruction on health information evaluation. For all university dining establishments, nutrient information is available online and onsite.

Instrument

The ACHA-NCHA II was used in this investigation. This widely used assessment collects data on physical, emotional, and academic factors of wellness affecting students in higher education. Since 2000, ACHA has used the assessment to collect information on student demographics and health behaviors in the United States. Since 2013, Canadian institutions have also begun to participate in the ACHA-NCHA II. Data from the ACHA-NCHA are rigorously analyzed for validity and reliability (ACHA, 2013).

The Institutional Review Board (IRB) granted approval to conduct the survey at the local institution. Non-distance students over age 18 received e-mail invitations to participate in the online survey, and flyers, posters, articles in campus publications, and notes in wellness and nutrition course syllabi provided further publicity.

Data Analysis

The authors analyzed data using SPSS statistical software. Groups were compared using a merged data set comprising the local group and a comparably sized random sampling of the national group. Missing values (i.e., responses left blank or illegible) were excluded. No more than 4% of cases were missing in local institution tabulations, and no more than 5% were missing in NRG tabulations. Where proportional depictions best represented results, simple percentages were rounded from .5 and higher to the next whole number where percentages were greater than 1. Dependent variables consisted of two dichotomous questions (with a yes/no response option for each): "Have you received information on the following topics from your college or university?" and "Are you interested in receiving information on the following topics from your college or university?" Independent variables were residence, age, year in school, gender, desire for information, body mass index (BMI), and daily fruit and vegetable intake.

Through matching institutional code numbers within the NRG data, the authors determined that all 923 participants at the local university remained in the NRG and comprised 3% of the full NRG. Comparisons between the local institution and the NRG were first run with local data preserved in the NRG and then with local data removed. Although only small statistical differences between tabulations were noted, results from secondary analyses are reported (where appropriate) in an effort to present more accurate comparisons.

Pearson's chi-square testing was performed to determine relationships between information reception and the independent variables. Relationships were defined as statistically significant when present at the $p < .05$ level. Where appropriate, variables having comparatively few responses were grouped into closely matching categories.

The authors conducted additional analyses using a random sampling of 863 participants (roughly 3% of national participants) in comparisons with the 923 respondents in the local group. Use of this sampling method decreased skewing of results caused by overrepresentation of the national group.

Results

Table 1 shows participant characteristics from the full NRG and the local sample. Small differences in sample sizes exist per characteristic as some respondents did not provide answers for all relevant questions and some answers were illegible.

Analysis of Residence, Age, and Year in School

Most local and NRG students were aged 18–23, defined as the "traditional" age for undergraduates (Justice & Dornan, 2001). Likelihood of students living away from campus increased with age. Nearly 90% (n = 150) of local, nontraditional-aged participants lived off campus, and just over 20% (n = 159) of traditional-aged students resided away from campus. For the NRG, approximately 95% (n = 4,406) of nontraditional-aged participants lived off campus compared to approximately 40% (n = 9,282) of 18- to 23-year-olds.

Incidence of residing on campus decreased as participants' year in school (first-year undergraduate through graduate student) increased in the local and national groups. Greater than 95% (n = 298) of local and approximately 80% (n = 7,737) of NRG first-year undergraduates resided on campus. In comparison, more than 40% (n = 44) of local group and nearly 30% (n = 997) of NRG fourth-year undergraduates lived on campus.

Differences between similarly aged participants living on campus in local and national groupings may owe to the rural location of the local institution and to the NRG's inclusion of 2-year institutions (3 out of 39 institutions, or 8%). Two-year colleges often do not offer campus housing.

Table 1
Characteristics of Local and National Groups

Participant Characteristic	Local	Percentage	NRG	Percentage
Gender				
Male	282	31%	9,997	35%
Female	616	65%	18,417	65%
Transgender	5	.6%	52	.2%
Age				
18-23 (Traditional)	741	80%	23,664	81%
24+ (Non-Traditional)	168	18%	4,667	16%
Residence				
On-Campus	572	64%	14,366	50%
Off-Campus	278	31%	12,519	44%
Other	49	5%	1,631	6%
Year In School				
1st Year	311	35%	9,670	34%
2nd Year	177	20%	5,598	20%
3rd Year	160	18%	5,488	19%
4th Year	102	11%	3,508	12%
5th Year	52	6%	1,247	4%
Graduate/Professional	88	10%	2,635	9%
Non-degree/Other	6	.6%	243	.9%
BMI				
Underweight	48	5%	1,562	6%
Desired Weight	484	54%	1,7411	62%
Overweight	201	23%	5,868	21%
Obese	161	18%	3,154	11%
Fruit/Vegetable Intake				
0 servings per day	76	8%	2,015	7%
1-2 servings per day	553	61%	17,677	61%
3-4 servings per day	248	27%	7,802	27%
5 or more servings per day	37	4%	1,381	5%
Trying to Change Weight				
Not trying to change	141	15%	4,176	15%
Stay the same	226	25%	7,631	26%
Lose weight	472	52%	14,312	50%
Gain weight	77	8%	2,752	10%
Received Information				
No	270	30%	12,574	44%
Yes	651	71%	16,275	56%
Interested in Information				
No	380	42%	11,982	42%
Yes	532	58%	16,429	58%

Receipt of Nutrition Information

The authors used chi-square tests with the merged data set to measure relationships between receiving nutrition information and variables of group (NRG vs. local), gender, age, residence, year in school, BMI, fruit and vegetable intake, whether students were trying to change their weight, and interest in nutrition information. A statistically significant difference existed between receipt of nutrition information and group, with a larger proportion of the local group (approximately 70% vs. 55% of the NRG) reporting reception of nutrition information ($p < .001$). Strong associations existed between receiving nutrition information and variables of residence and age in both the local ($p < .001$) and national groups ($p < .001$). Residence and age are highly connected due to the greater likelihood of older students living off campus.

Associations between gender and having received nutrition information did not appear statistically significant within or between the local and national groups ($p < .001$). A relationship between year in school and having received nutrition information showed statistical significance in the local group ($p < .001$), but not in the NRG ($p = .17$). This difference may owe to the local group's larger concentration of on-campus residents. BMI differences were significant with regard to receipt of nutrition information in the NRG ($p < .001$), but when compared to the local group, no significant differences existed. A significant difference was found between the number of servings of fruits and vegetables consumed per day and reception of nutrition information in both the local and national groups ($p < .001$). However, when groups were compared, no significance was shown.

Desire for information appeared related to whether individuals reported successfully receiving information. More than 60% ($n = 9,916$) of NRG and nearly three quarters ($n = 388$) of local participants with a stated interest in nutrition information received the information compared with one half ($n = 5,934$) of national and one third ($n = 127$) of local participants who stated they were uninterested in receiving such information.

Approximately 60% of both national ($n = 17,064$) and local ($n = 549$) participants stated they were trying to change their weight at the time of the survey. Greater than 55% ($n = 9,527$) of national and 70% ($n = 392$) of local participants who reported trying to change their weight also reported having received nutrition information.

Strong statistical significance existed in the relationship between receiving nutrition information and fruit and vegetable intake in the national group ($p = .001$), but not in the local group ($p = .76$). National participants who reported having received nutrition information from their institutions were more likely to consume three or more servings of fruits and vegetables per day. Analysis showed no difference in the local group. As this difference was marked between

the groups, analysis of the full national data set (minus local group data) was re-run, confirming statistical significance for receiving nutrition information and higher intake of fruits and vegetables in the national group. As reasons behind this difference are not immediately apparent, institutions wishing to draw conclusions from this particular finding may wish to use national group data as this larger group should provide greater opportunity for generalization.

Discussion

Key Demographics and Benchmarking

Correlations have long been held between residence and academic success, with retention and other measures positively associated with on-campus living (Schudde, 2011; Tinto, 1993; Turley & Wodtke, 2010). Findings from this study highlight additional challenges in communicating nutrition messages to off-campus and nontraditional students. In the national and local groups, students were more likely to report receiving nutrition information if they resided on campus, were younger, and desired (and may have sought out or were more likely to remember having received) this information.

A greater proportion of the local institution's students reported receiving nutrition information compared to the national sample. This finding bolsters the institution's current activities. However, decreased information receipt in off-campus and older student populations and deficits between desire for information and actual receipt indicate a need for greater local action.

Broad Applicability

Though this study drew from U.S.-based data, implications of providing reliable nutrition information to students are internationally applicable. As with local and national groups analyzed in this study, college and university students across the globe engage in poor nutritional practices and struggle with related health effects (El Ansari et al., 2011; El Ansari, Labeeb, Moseley, Kotb, & Houfy, 2013).

Effectiveness of practices already in place at the local institution, such as required wellness courses, is correlated with this investigation's findings and research from across the globe. Researchers in Australia (Pearce & Cross, 2013), Canada (Emrich & Mazier, 2009; Higgins, Lauzon, Yew, Bratseth, & McLeod, 2010), China (Huang, Liu, & Tsou, 2013), India (Rani et al., 2013), Malaysia (Wan Putri Elena, Mohd Razif, & Pei Lin, 2014), and the United States (Everhart & Dimon, 2013; Hager, George, LeCheminant, Bailey, & Vincent, 2012) found wellness and nutrition courses improved students' health knowledge and positively impacted their dietary behaviors.

Positive effects of peer-to-peer nutrition education models also appear wide reaching. Evidence from Australia (Roberts et al., 2009), Canada (Lo et

al., 2008), China (Li et al., 2009), and the United States (Kicklighter, Koonce, Rosenbloom, & Commander, 2010) supports the efficacy of such interventions in improving students' nutrition knowledge and dietary practices.

Limitations

This inquiry focused on data pertaining to nutrition information. However, the ACHA-NCHA II tool did not place the term *information* in context. Information may be taken to mean knowledge gleaned from classroom instruction, websites, counseling, books, or a host of resources. Participants may have attributed one or none of these meanings. The connotation of the term *institution* used in the assessment may be broadly interpreted as well. Participants may not have considered entities internal to the institution (dining hall, library, etc.) as part of the institution. Fallibility of human memory presents another limitation as students may have received information from institutions but too quickly recycled pamphlets or forgotten about information sessions.

The eternal quandary of causation versus correlation (Clapham & Nicholson, 2009) also limits findings of this study. Though correlations existed in several relationships dealing with receipt of nutrition information and issues of residence, desire to change weight, fruit and vegetable intake, and desire for nutrition information, causative effects of these variables cannot be measured with current data.

Recommendations and Conclusion

Recommendations for Future Research

Among the recommendations listed in their systematic review of dietary interventions for university students, Kelly et al. (2013) called for "more rigorous methodologies, including RCTs [randomized controlled trials], long-term follow-up analyses, attention to potential mediators, and standardized dietary assessment methods" (p. 312). Echoing this call, future researchers should incorporate stronger methodologies such as pretests and posttests and randomization of intervention recipients to enable better interpretation of the relationships between information interventions and changes in knowledge and behavior.

Of note to future researchers, implementing more rigorous methodology may be complicated in groups of comparative size or larger than the several thousand participants studied in the current research. Multiple universities would need to agree upon, and then successfully complete, the offering of similar interventions and administration of similar surveys prior to and following interventions. Involvement of large accrediting bodies, governmental entities, and/or the World Health Organization may be needed to coordinate efforts.

Institutions with staff desiring to replicate the current study have several

options. For institutions participating in the ACHA-NCHA II in the United States and Canada, staff may request data specific to their institutions from the ACHA as well as limited national reference group data and run the same or similar analyses. Reports for both U.S. and Canadian (spring 2013 forward) NRGs are freely available through the ACHA-NCHA II reports website (http://www.acha-ncha.org/reports_ACHA-NCHAII.html).

For non-U.S. and Canadian institutions and other institutions that do not participate in the ACHA-NCHA II, staff may create their own surveys. Samples of ACHA-NCHA II Web and paper surveys are available via the ACHA-NCHA survey website (http://www.acha-ncha.org/sample_survey.html). Although ACHA does not permit reproduction, question text may provide limited guidance for new survey crafting.

However, the authors recommend that new surveys, regardless of location, incorporate more queries dealing with information reception and dietary behaviors. The ACHA-NCHA II used in the current research is limited in terms of garnering information about nutrition behaviors and information environment. Only one question dealing with food intake exists in the current survey. Methods by which students receive nutrition information are not delineated in the survey.

Although the ACHA-NCHA II has limits in these areas, the authors did not identify other assessments for this population covering these issues during the review of the literature and in broad searches of English language resources online. Development and validation of a nutrition-related survey that identifies how students receive nutrition information and whether they desire this information, as well as specific questions about nutrition-related behaviors, is recommended. If such an assessment is found to be already available, that tool should be adapted, translated, and, if needed, revalidated for use in institutions across the globe.

Recommendations for Changes in Practice

The following practice recommendations are based on findings from the current study. First, given the global public health burden of overweight and obesity, the issue of students not receiving nutrition information in institutions of higher education needs immediate further exploration. Colleges and universities should assess their current nutrition information environment, including students' living arrangements and desire for and receipt of nutrition information. Nutrition and health education interventions should focus on methods of information provision that do not rely on physical presence on a campus or even desire for such information as students may not fully realize the importance of proper nutrition to academic success and well-being.

Second, findings of this study offer an opportunity for institutions of higher education to conduct nutrition education programming with select groups,

including nontraditional-aged students and students who live away from campus. Despite information outreach practices at the local institution, students interested in nutrition information, particularly those not at their desired weight, sometimes did not receive it. Information receipt was lower for students at the national level. Since nutrition behaviors correlate with weight status, providing nutrition information and education to students in greatest need is paramount. The authors recommend that researchers use findings from the current study to pilot nutrition information and educational programs and share results with the international community for program replication and improvement.

Finally, information provided within interventions should be of high quality, but not so academically focused that it is difficult to understand for individuals not specializing in nutrition. Information professionals such as librarians may assist in finding good resources, and many governments and nutrition organizations may provide credible dietary guidance. Information resources should be available at points of need (in restaurants, through mobile applications, etc.) and, whenever possible, be spread by students themselves.

Conclusion

Nutrition information bombarding students from popular culture and well meaning "experts" in many cases may be deemed questionable at best. Success in meeting the health information needs of all students—not only individuals fitting within "traditional" student demographics—calls for a unified approach from individuals invested in students' health: health educators and other instructors, nutrition and wellness professionals, administrators, food services staff, librarians and other information professionals, residential living professionals, parents, spouses, and students themselves.

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Beliefs About eHealth Communication and Preferred eHealth Strategies Among Middle- and Older-Aged Adults in Taiwan

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Abstract

Purpose: This study examined how beliefs about eHealth communication predict preferred eHealth communication strategies among middle- and older-aged adults in Taiwan and how age, gender, and education moderate these relationships. **Methods:** A validated eHealth communication belief inventory (eHealth-BI) was used among employees aged 40 to 64 in Taiwan. **Results:** A total of 533 employees participated. Data showed that participants who perceived higher eHealth benefits were more likely to endorse eHealth communication strategies, and those who perceived lower eHealth barriers were more likely to endorse webinar, downloadable information, and related Web links strategies. After adjusting for demographics, participants who perceived higher eHealth benefits were still more likely to endorse e-mail ($OR = 3.65$, $p < .001$), webinar ($OR = 2.21$, $p < .001$), video ($OR = 2.05$, $p < .001$), health assessment ($OR = 2.49$), downloadable materials ($OR = 3.74$, $p < .001$), and related links ($OR = 3.09$, $p < .001$). **Conclusion:** The study identified strategies that were perceived as most useful and has implications on using the eHealth-BI tool for targeted interventions.

Keywords

beliefs; Chinese; eHealth communication; middle- and older-aged adults; strategies

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The "Graying" of the Internet and Social Media

A recent Pew Internet study examining U.S. older adults found that 90% of the participants aged 50 and older send or read e-mails and the majority of them exchange e-mail messages on a typical day (Madden, 2010). Although Internet searches and e-mail still top the list of most popular online activities for older adults, social networking site usage has been on the rise (Madden & Zickuhr, 2011). Social networking sites provide new opportunities to reconnect people and provide online support, as well as information and experience sharing. These network support systems could continuously play an important role of connecting people, especially individuals approaching the retirement stage. According to a phone interview study conducted by Princeton Survey Research Associates International among a representative sample of U.S. adults, over half of Internet users aged 50–64 use social networking sites (Madden & Zickuhr, 2011). Although the frequency of social networking site usage among the younger population is stable, the usage among older adults has rapidly increased.

The phenomena of the growing and graying Internet is not limited to the United States. In a large study conducted by the Taiwan Network Information Center (2005) among 3,000 residents in Taiwan, the random sample phone survey report showed that over 35% of middle-aged adults in their 40s and nearly 15% of those in their 50s use broadband Internet. A more recent consumer report in Taiwan further showed a rapid increase of Internet usage among older adults, with about 40% of those aged 50–64 using the Internet (Yang & Kao, 2013).

Effectiveness and Potential of Online Health Programs

Eight in 10 U.S. adult Internet users have looked online for health information (Fox, 2006). An increasing research effort has been devoted to examining strategies to facilitate exposure or effectiveness of Internet-delivered health interventions among targeted groups (Brouwer et al., 2011; Neuhauser & Kreps, 2010). Existing studies have shown the rapid acceptance and effectiveness of eHealth intervention strategies (Neuhauser & Kreps, 2010). Researchers reviewed the first 15 years of eHealth studies and concluded that eHealth intervention strategies not only have gained rapid acceptance worldwide but also have shown significant positive changes on health behaviors across health conditions and in diverse populations (Neuhauser & Kreps, 2010). As we enter the rapidly changing eHealth era, we need to rethink how to leverage the power of the Internet and technology and continue to improve access and acceptability to bridge the digital divide for older adults.

Beliefs About eHealth Communication and Preferred Strategies

As the world population is rapidly aging at an unprecedented rate (United Nations, 2013), opportunities of eHealth communication and interventions among middle- and older-aged adults warrant increased attention. The challenges of rapid population aging in Asia are particularly acute (Chinese Academy of Social Sciences, Indian National Science Academy, Indonesian Academy of Sciences, National Research Council of the U.S. National Academies, & Science Council of Japan, 2011). China has the largest population in the world (Population Reference Bureau, 2012). However, few studies have examined beliefs about Internet health communication among Chinese adults. Previous studies identified that learners' fear of technology and insufficient computer skills influence their views toward online learning (Davis, 1993). The technology acceptance model hypothesizes that the overall affective attitude toward using a new system is a function of two cognitive beliefs: perceived usefulness and perceived ease of use (Davis, 1993). Yu and Yang (2006) are among the first to examine attitudes and intentions toward Web-based learning among public health nurses in Taiwan (Chen, Yang, Tang, Huang, & Yu, 2008; Yu & Yang, 2006). Pan and Jordan-Marsh (2010) found that perceived usefulness, ease of use, and subjective norm are key factors of Internet adoption among Chinese older adults. Despite increased Internet use among middle- and older-aged adults, little is known about beliefs of communicating health information delivered via the Internet or preferred eHealth communication strategies among Chinese adults (Hou, Hsiao, & Hou, 2012). With the rapidly aging population worldwide, researchers must fill the knowledge gap on eHealth communication beyond the U.S. population.

The current study examined beliefs about and preferred strategies of communications to assess the potential of eHealth communication programs among middle- and older-aged working adults before they reach and/or transit into senior or retirement age. Although most studies analyze the older population by age groups of 50–64 and 65+, early signs and symptoms of many chronic diseases may begin in the 40s (American Academy of Ophthalmology, n.d.; Mayo Foundation, n.d.). The younger middle-aged group warrants more attention. Thus, our current study aimed to include the younger middle-aged adults (aged 40–49), in addition to the older-aged group (aged 50–64). Specifically, this study examined (a) the preferred eHealth communication strategies by the two age groups, (b) how beliefs about eHealth communication (i.e., perceived usefulness [pros] and ease of use [cons]) predict preferred eHealth communication strategies, and (c) how age, gender, and education moderate these relationships among adults aged 40–64 in Taiwan. We hypothesized that the younger middle-aged and older-aged adults would have somewhat differ-

ent preferred communication strategies and that those who had more favorable beliefs about eHealth communication would have stronger preference about the eHealth communication strategies (see measurement description below). Results of the study have implications on identifying preferred eHealth communication strategies among younger middle-aged and older-aged adults, as well as how beliefs about eHealth communication and demographics influence the eHealth communication strategies that are perceived as most useful.

Methods

Participants

Convenience samples of adult aged 40–64 were recruited from two companies in Taiwan: a traditional industrial car company and a high-tech manufacturing company, both of which had ongoing employee health programs. A total of 533 middle-age adults participated, with half from each worksite company. These two sites were selected due to their active employee health and wellness programs and the history of collaboration with the researchers.

Data Collection

The eHealth communication survey was administered at the study sites. A previously validated eHealth communication belief inventory (eHealth-BI) with eHealth-BI pros (four items) and eHealth-BI cons (three items) subscales was used to assess participants' perceived usefulness (pros) and ease of use (cons) about eHealth communication (Hou & Hou, 2013). In addition, a list of preferred eHealth communication strategies and demographic variables were included in the survey. The survey took about 15 minutes to complete. The research team communicated with study site managers and nurses about the study purpose and consent procedures and collaboratively discussed ways to identify participants who meet the age eligibility criteria for the study. Site unit leaders and nurses assisted in recruitment, with study purpose and procedures explained during unit meetings. Employees aged 40–64 were given the self-administered paper–pencil questionnaire, with assistance being provided to those who had difficulty in reading the survey questions. The Institutional Review Board (IRB) at the University of Georgia, Athens, GA, approved this study.

Measurement (eHealth-BI)

This study used a theory-based eHealth Belief Inventory (eHealth-BI) to assess participants' beliefs about eHealth communication. The technology acceptance model (David, 1993) and related measurements from previous studies conducted in Taiwan (Chen et al., 2008; Yu & Yang, 2006) were used in developing this assessment tool. This seven-item eHealth-BI had been piloted

and validated in two samples of middle- and older-aged adults in Taiwan (Hou & Hou, 2013; Hou, Lui, & Wen, 2010). A list of preferred eHealth communication strategies was developed through reviewing existing studies (Baker, Wagner, Singer, & Bundorf, 2003; Brouwer et al., 2011; Fox, 2006; Yu & Yang, 2006), as well as identified via stakeholder interviews with the study site managers and coordinators and input from a small sample of middle- and older-aged adults. Short descriptions of key variables used in the current study are provided below.

Perceived eHealth pros. Four items were used to measure perceived usefulness of Web-based learning: Web-based health information enables one to learn more than would otherwise be possible, enables one to learn more quickly, enhances the effectiveness of communication, and enhances the quality of communication. Items were measured using a 5-point Likert scale from *strongly disagree* to *strongly agree*.

Perceived eHealth cons. Three items were used to measure perceived ease of use toward Web-based information delivery: health information communicated via Web-based channel is cumbersome to use, takes a lot of effort to become skillful to use, and lowers learning effect. Items were measured using a 5-point Likert scale from *strongly disagree* to *strongly agree*.

Preferred eHealth communication strategies. Eight preferred eHealth communication strategies were identified and measured: e-mail, webinar, experience sharing, online video, online health assessment survey, online support group, downloadable materials, and related resource Web links. Items were also measured using a 5-point Likert scale.

Data Analysis

Descriptive analyses were used to analyze demographic variables. The reliabilities of the eHealth pros (four items) and the eHealth cons (three items) measured by Cronbach's alphas were satisfactory in both age groups (40–49 and 50–64), demonstrating sufficient internal consistencies among items. The Cronbach's alpha of the eHealth pros (four items) was .89 in the 40–49 age group and .94 in the 50–64 age group, and Cronbach's alphas were .84 in both age groups for the eHealth cons (three items). Confirmatory factor analysis showed that all items were loaded significantly on these eHealth-BI subscales with good model fits, RMSEA = .072, 95% CI [.020, .095], NFI = .98, TLI = .97, CFI = .98, IFI = .98, GFI = .98.

Participants ranked the preferred eHealth communication strategies by beneficial level using a 5-point Likert scale, from *most beneficial* to *least beneficial*. However, due to a small number of participants choosing any of the preferred strategies as not beneficial, the fourth and fifth beneficial categories were merged together in the analysis. Chi-square tests were also used to compare each preferred strategy by the age groups (40–49 vs. 50–64) to examine

whether the younger middle- and older-aged adults had different preferences on eHealth communication strategies (see Table 1).

Table 1

Preferred eHealth Communication Strategy by Age Group

Participant Characteristic	Local	Percentage	NRG	Percentage
Gender				
Male	282	31%	9,997	35%
Female	616	65%	18,417	65%
Transgender	5	.6%	52	.2%
Age				
18-23 (Traditional)	741	80%	23,664	81%
24+ (Non-Traditional)	168	18%	4,667	16%
Residence				
On-Campus	572	64%	14,366	50%
Off-Campus	278	31%	12,519	44%
Other	49	5%	1,631	6%
Year In School				
1st Year	311	35%	9,670	34%
2nd Year	177	20%	5,598	20%
3rd Year	160	18%	5,488	19%
4th Year	102	11%	3,508	12%
5th Year	52	6%	1,247	4%
Graduate/Professional	88	10%	2,635	9%
Non-degree/Other	6	.6%	243	.9%
BMI				
Underweight	48	5%	1,562	6%
Desired Weight	484	54%	1,7411	62%
Overweight	201	23%	5,868	21%
Obese	161	18%	3,154	11%
Fruit/Vegetable Intake				
0 servings per day	76	8%	2,015	7%
1-2 servings per day	553	61%	17,677	61%
3-4 servings per day	248	27%	7,802	27%
5 or more servings per day	37	4%	1,381	5%
Trying to Change Weight				
Not trying to change	141	15%	4,176	15%
Stay the same	226	25%	7,631	26%
Lose weight	472	52%	14,312	50%
Gain weight	77	8%	2,752	10%
Received Information				
No	270	30%	12,574	44%
Yes	651	71%	16,275	56%
Interested in Information				
No	380	42%	11,982	42%
Yes	532	58%	16,429	58%

Bivariate analyses were conducted to assess whether participants with favorable eHealth-BI scores were more likely to prefer the eHealth communication strategies described above. To determine meaningful item (or scale) discrimination or differences, the cutoff points for higher versus lower eHealth pros and eHealth cons beliefs were determined by the scores of each scale: scores in the top one third versus the bottom one third of each scale (Hou, 2009; Hou & Luh, 2005, 2007). In the current study, the high versus low cutoff points for the eHealth-BI pros scale were those who scored 16 or higher versus those who scored 15 or lower. The high versus low cutoff points for the eHealth-BI cons scale were those who scored 9 or higher versus those who scored 7 or lower. Multiple logistic regressions were used to examine the associations between perceived eHealth-BIs and preferred strategy after adjusting for key demographic variables including age, gender, and education (see Table 2).

Results

Participants

A total of 533 adults participated (age: $M = 46.21$, $SD = 5.01$), and 87.3% were married. Nearly three fourths of the participants were aged 40–49. The age distributions were proportionate to that of the respective participating companies. No significant difference was found on gender between the two age groups. However, participants aged 50–64 were less likely to have college education (25.0% vs. 50.9%, $p < .001$). The majority of the participants reported Internet or e-mail usage; the prevalence was higher among those in the 40–49 (more than 80%) age group than those in the 50–64 (more than 60%) age group.

Preferred eHealth Communication Strategies by Age

Regarding the preferred eHealth communication, 32.9% rated regular e-mails on health information as the most beneficial, followed by providing links to health websites (22.7%), downloadable information (21.7%), personal testimonies or experience sharing (20.3%), or health-related videos (20.0%). The distributions of the most preferred eHealth communication were similar between the age groups. However, those aged 50–64 were more likely to rate health-related videos or health assessment as more beneficial.

eHealth-BI and Preferred eHealth Communication Strategies

The bivariate analyses showed that participants with higher eHealth pros scores were more likely to prefer the eHealth communication strategies than those with lower eHealth pros scores, and those with lower eHealth cons were

Table 2

Multiple Logistic Regression Analyses of Preferred eHealth Communication Strategies by Age, Gender, Education, and eHealth-BI

		Independent variable					
		Age[a]	**Gender[b]**	**Education[c]**	**eHealth pros 95% CI**	**eHealth cons 95% CI**	**Model statistics**
Dependent variable	**E-mail**	ns	ns	ns	*OR* = 3.65** [2.43, 5.48]	ns	$X^2_{(5)}$ = 49.89** 68.2% correct
	Webinar	ns	ns	ns	*OR* = 2.21** [1.45, 3.38]e	*OR* = .54* [.46, .82]	$X^2_{(5)}$ = 26.55** 64.1% correct
	Experience sharing	ns	ns	ns	ns	ns	$X^2_{(5)}$ = 18.02* 57.7% correct
	Video	ns	ns	ns	*OR* = 2.05** [1.38, 3.05]	ns	$X^2_{(5)}$ = 21.81** 59.0% correct
	Health assessment	ns	ns	ns	*OR* = 2.49** [1.64, 3.79]	ns	$X^2_{(5)}$ = 28.99** 63.6% correct
	Online support	ns	ns	ns	ns	ns	ns
	Downloadable materials	ns	ns	ns	*OR* = 3.74** [2.25, 5.05]	ns	$X^2_{(5)}$ = 44.63** 64.6% correct
	Web links	ns	ns	ns	*OR* = 3.09** [2.07, 4.63]	ns	$X^2_{(5)}$ = 38.96** 63.8% correct

Note. CI = confidence interval. NS = not significant. *OR* = odds ratio.

[a]Age 50–64. [b]Female. [c]No college education.

*$p < .05$. **$p < .001$.

more likely to prefer webinar, downloadable information, and related Web links strategies than those with higher eHealth cons scores. After adjusting for age, gender, and education, participants with higher eHealth pros (scored 16 or higher) were still more likely to endorse the strategies: e-mail, *OR* = 3.65, 95% CI [2.43, 5.48], $p < .001$; webinar, *OR* = 2.21, 95% CI [1.45, 3.38], $p < .001$; video, *OR* = 2.05, 95% CI [1.38, 3.05], $p < .001$; health assessment, *OR* = 2.49, 95% CI [1.64, 3.79], $p < .001$; downloadable materials, *OR* = 3.74, 95% CI [2.25, 5.05], $p < .001$; and related links, *OR* = 3.09, 95% CI [2.07, 4.63], $p < .001$. The significances of eHealth cons, however, disappeared. Preferred strategies were not influenced by age, gender, or education.

Discussion

Our study showed that e-mails, Web links, downloadable information, experience sharing, and videos were the top five preferred eHealth communication strategies endorsed by the middle- and older-aged adults in the study, with a much higher percentage of participants indicating e-mails as the most beneficial strategy of communication. This result is consistent with findings from the recent Pew Internet study in the United States (Madden & Zickuhr, 2011) indicating that Internet search and e-mail still top the list of the most popular online activities. The distributions of these top five preferred strategies were, however, similar between those in the younger middle-aged (40–49 years) and older-aged (50–64 years) groups, except that those in the older-aged group significantly preferred video strategy. Although we had hypothesized somewhat different patterns on the preferred strategies by age group, our data showed more similarity than differences. As trend of "graying" of the Internet and social media continues, age may become less of a factor on preferred eHealth communication strategies (Madden, 2010; Madden & Zickuhr, 2011). Our data also showed that those aged 50–64 were more likely to endorse health assessment than those aged 40–49. Additional research may be needed to further explore possible reasons.

Online support group, on the other hand, was not a popularly endorsed strategy for eHealth communication. One reason may be that online support groups are still evolving. Kim and Kwon (2010) examined cancer "e-patients" who participated in the National Cancer Institute's Health Information National Trends Survey and found that only 5% of these online health consumers had participated in an online equivalent support group. Social networking sites or online groups offer the opportunity of participation irrespective of geographical location or time constraints; at the same time, concerns of confidentiality (Farmer, Bruckner, Cook, & Hearing, 2009) and a false sense of intimacy may need attention (Boyd, 2008). Social networking sites or online support groups are worth continued research as they may provide new opportunities of social support. A recent study showed that middle- and older-aged adults, who are more likely to live with chronic diseases, are more likely to reach out for

support online (Fox & Purcell, 2010). In addition, health interventions may potentially incorporate educational content into online social support groups (Perkins & LaMartin, 2012).

Regarding beliefs about eHealth communication, our data were consistent with our hypothesis that those who had more favorable beliefs about the usefulness of eHealth communication (eHealth-BI pros) would have higher endorsement on the eHealth communication strategies. The relationships observed were strong and consistent across eHealth communication strategies. However, we found it somewhat surprising that the significance of perceived barriers about eHealth communication (eHealth-BI cons) on preferred strategies disappeared after considering key demographic variables and perceived benefits. In addition, preferred strategies had no significant relationships with key demographic variables (age, gender, or education) when beliefs about eHealth communication were factored in the multiple regression models.

The current study identified strategies that were perceived as most useful among middle- and older-aged adults. Our data showed that perceived usefulness about eHealth communication (eHealth-BI pros) was a strong and consistent predictor for the preferred eHealth communication strategies. Results may help health researchers and practitioners better understand key factors related to ways of delivering eHealth communication interventions. Future studies are needed to identify and describe system design features that may influence participants' perceived usefulness and ease of use about eHealth communication interventions for promoting health behavior change. The study identified strategies that middle- and older-aged adults perceived as most useful for tailored eHealth promotion program planning. It also used the eHealth-BI tool to identify audiences who may be more likely to respond to the eHealth communication strategies for targeted interventions.

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Assessing the Influence of Season and Time of Day on Physical Activity Levels During Recess

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Abstract

Background: Recess time may significantly contribute to a child's daily opportunity to attain the recommended 60 minutes of physical activity per day. This study assesses the impact of block scheduling and season on physical activity levels during recess for children in Grades 3 and 6.
Methods: Data were collected over 5 consecutive days during fall and winter in a school from a northern Ontario community. Children wore the Yamax SW-200 pedometer, and data were collected using a segmented data approach to assess class time and recess time step counts.
Results: Seventy-eight students participated in this study. Average daily steps were higher in the fall compared to the winter. No meaningful differences were found in the number of steps taken considering time of day. Steps accumulated during fall recess were significantly higher than during winter recess. Boys accumulated significantly more steps than girls for total recess steps regardless of season. Grade 3 students experienced the greatest decrease in steps seasonally.
Conclusions: These results suggest that differences in recess step counts are impacted by season; this may be particularly true for younger children. Strategies to mitigate these declines should be implemented.

Keywords

physical activity; children; time of day; season; recess; balanced school day

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Human Subjects Approval Statement. The study protocol was approved by the Laurentian University Research Ethics Board and the school board of the participating school.

Review of Literature

The Canadian Physical Activity Guidelines recommend a minimum of 60 minutes of moderate to vigorous physical activity each day for children aged 5 to 11 (Canadian Society for Exercise Physiology, 2011). Canadian researchers have also estimated that 12,000 steps per day is roughly equal to 60 minutes of moderate to vigorous daily physical activity (Colley, Janssen, & Tremblay, 2012). Given that children spend roughly one third of their waking hours in school, this setting offers important opportunities for children to achieve recommended levels of physical activity. During the school day, students divide their time between classroom and recess time. Each time provides the children opportunities to accumulate the recommended daily physical activity. However, the levels and patterns of physical activity achieved during school hours are rarely explored in isolation from activity levels achieved outside the school setting. Given the current emphasis placed on schools to increase children's daily physical activity levels, further research is needed to fill this knowledge gap.

Students who experience inadequate amounts of physical activity face serious health risks (Boreham & Riddoch, 2001; Boyle, Jones, & Walters, 2010; Janssen & LeBlanc, 2010), and children who do not participate in physical activity throughout the day exhibit higher excess energy levels and poorer concentration in the classroom (Taras, 2005). In this context, scheduled recess is important for health and academic success. In Ontario, almost all school boards have adopted the balanced school day (BSD) schedule. The BSD is block scheduling wherein the school day is divided into three 100-minute teaching blocks separated by two 40-minute nutrition/activity breaks. A consequence of block scheduling, such as the BSD schedule, is the fundamental alterations in the number, length, and time of day that recesses are scheduled; specifically, schools now plan for two recesses, each 20 minutes in length, with the first being offered midmorning and the second midafternoon. The cumulative 40 minutes of outdoor playtime are believed to be fundamental for students to attain a significant portion of the recommended 60 or more minutes of daily exercise.

To maximize the amount of physical activity children achieve during school hours, close consideration of recess scheduling is warranted. For example, McWilliams et al. (2009) reported that children are more active when provided with shorter but more frequent bouts of physical activity compared to longer and less frequent opportunities to be active. More specifically, McKenzie et al. (1997) observed that children are most active for the first ten minutes of active play regardless of the length of playtime. This finding suggests that more frequent, shorter recesses would be more beneficial to maximize levels of physical activity at school. Also, according to Garriguet and Colley (2012), children aged 6 to 10 are most active from 11:00 a.m. to 1:00 p.m. In the context

of the BSD, children are in class during this time frame. This suggests that time of day during which recess time is scheduled may impact the amount of physical activity in which children engage.

The impact of inclement weather is a co-consideration when examining time-of-day effects and number of recesses to offer during school hours. According to Chan, Ryan, and Tudor-Locke (2006), inclement weather may have a negative impact on physical activity, yet this factor is commonly overlooked in research (Duncan, Hopkins, Schofield, & Duncan, 2008). A study by Duncan et al. (2008) has shown that low temperatures, strong winds, and heavy rainfall have a negative effect on outdoor physical activity and therefore may result in lower overall energy expenditure levels. Given that different geographical locations experience different climates, it is reasonable that school location will also impact children's physical activity (Duncan et al., 2008). More specifically, children attending schools located in climates that experience more dramatic seasonal variations in temperature are likely to experience greater fluctuations in physical activity levels, potentially impacting their health. It is also reasonable to envisage that physical activity levels may differ between morning and afternoon play periods, particularly during the winter season when cold temperatures may prohibit outdoor play in the morning. Given that the BSD schedule provides opportunities for recess in the morning and the afternoon, daily inclement weather could result in the cancellation of one or both of these recesses. Additionally, repeated extreme cold temperatures, particularly during the winter, would hypothetically impact total physical activity more dramatically in winter compared to summer, spring, or fall. This concept has not received considerable attention and merits further investigation.

Given the broad spectrum of physical capabilities and activity levels among elementary school–aged children from kindergarten to Grade 8, age-related differences in physical activity levels during recess should also be considered when examining school recess schedules. Although the physical activity levels of children of all ages are reportedly impacted by inclement weather (Chan et al., 2006; Tucker & Gilliland, 2007), more detailed studies comparing recess physical activity levels of children from different age groups are lacking and therefore merit consideration.

The purpose of this study was therefore to compare (a) total daily step counts accumulated during class time and recess time, (b) block scheduling effects on variations in step counts accumulated during morning and afternoon recess, and (c) seasonal variations in step counts accumulated during recess for children in Grades 3 and 6.

Methods

Study Design

Data were collected for 5 consecutive days during the fall (October) and winter (February) from an elementary school in northern Ontario. Students in Grades 3 and 6 at this school were asked to participate in the study. Parental/guardian information and consent forms were provided to each child's family prior to data collection. Student assent was obtained only from students who had received parental/guardian consent. This study was approved by the research ethics boards from the authors' academic institution and the school board of the participating school.

Participants

Seventy-eight children (49 boys, 29 girls) from Grades 3 ($n = 37$) and 6 ($n = 41$) from the identified school agreed to participate. The response rate was 63%.

Instruments

The Yamax SW-200 pedometer was used in this study as it has been shown to be the most consistent and accurate pedometer (Tudor-Locke, Ainsworth, Thompson, & Matthews, 2002). Multiple tests have demonstrated the lowest absolute value of percent error under free-living conditions (Le Masurier, Lee, & Tudor-Locke, 2004). Yamax guidelines were followed when using the devices.

Procedure

Students were assigned a labeled pedometer prior to data collection and wore it throughout both data collection periods. During these data collection periods, students were exposed to their regular BSD schedule, which included a 100-minute classroom block, 40-minute nutrition and recess break (20 minutes each), another 100-minutes classroom block, a second 40-minute nutrition and recess break (20 minutes each), and a final 100-minute classroom block. Researchers attached pedometers to participants' waistbands each morning and removed them at the end of the school day. Each device was reset to 0 upon attachment in the morning, and researchers collected step counts from the devices before and after the morning and afternoon recesses and at the end of each day, allowing for total daily step counts to be segmented into class time and recess time. Students were instructed not to touch their pedometers and were monitored throughout the day.

Data Analyses

Data were expressed as mean values and standard deviation. Mean scores were computed for continuous variables and compared using independent sample *t* tests and paired sample *t* tests. Independent sample *t* tests were computed when step counts for two groups were being compared (e.g., Grade 3 and Grade 6 total recess steps for the fall). Paired sample *t* tests were used when comparing the same group of participants over two periods (e.g., Grade 3 total recess steps for the fall compared to Grade 3 total recess steps for the winter). For all analyses, statistical significance is reported at the < 0.05, < 0.01, and < 0.001 levels.

Results

Average Daily Step Counts Accumulated During Class and Recess Time

Total daily steps. Students accumulated an average of 5,899 (SD = 1,444.0) steps.

Recess. Students accumulated an average of 2,767 steps (SD = 804.5) during recess, representing 47% of the average daily steps being accumulated during school hours.

Class. Students accumulated an average of 3,132 steps (SD = 762.9) during class, representing 53% of the average daily steps being accumulated during school hours.

Block Scheduling Effects (Morning vs. Afternoon Recess)

A comparison of step counts achieved during the morning (AM) and afternoon (PM) recesses are displayed in Table 1. For the average 10-day AM and PM recess step counts for all students, boys, girls, Grade 3, and Grade 6, no difference was found in the number of steps taken, as assessed with the paired *t* test. Similarly, no differences were observed in the number of steps students took during the AM and PM recesses for the fall or winter seasons for all groups, with the exception of Grade 6 students in the winter (see Table 1).

Group Comparisons

Combined seasonal averages.

Gender. Compared to girls, boys accumulated significantly more steps in AM recess (boys: M = 1,547, SD = 342.4; girls: M = 1,121, SD = 378.0; $p < 0.001$) and PM recess (boys: M = 1,549, SD = 361.1; girls: M = 1091, SD = 341.5; $p < 0.001$). See Table 1.

Grade. No difference was found in the number of steps accumulated for the AM or PM recesses for Grades 3 and 6 (see Table 1).

Table 1
Time of Day Comparison for Step Counts During Recess: Mean (Standard Deviation)

	10-day mean step count			5-day fall mean step count			5-day winter mean step count		
	AM	PM	*p*	AM	PM	*p*	AM	PM	*p*
All (N = 78)	1,388 (409.8)	1,379 (416.2)	0.65	1,527 (473.9)	1,476 (496.3)	0.12	1,230 (472.8)	1,258 (449.7)	0.31
Boys (N = 49)	1,547 (342.4)	1,549 (361.1)	0.93	1,684 (392.8)	1,656 (439.4)	0.39	1,383 (469.1)	1,411 (447.5)	0.46
Girls (N = 29)	1,121 (378.0)	1,091 (341.5)	0.46	1,262 (486.7)	1,172 (440.8)	0.19	971 (356.7)	999 (319.5)	0.46
Grade 3 (N = 37)	1,468 (396.4)	1,423 (396.1)	0.08	1,686 (465.3)	1,624 (509.5)	0.11	1,226 (451.9)	1,185 (338.2)	0.35
Grade 6 (N = 41)	1,316 (413.1)	1,339 (434.5)	0.50	1,384 (439.6)	1,342 (449.0)	0.42	1,234 (496.6)	1,323 (526.4)	**0.01**

Note. AM = morning recess; PM = afternoon recess.

Fall step counts.

Gender. Boys accumulated significantly more steps than girls in AM (boys: $M = 1{,}684$, $SD = 392.8$; girls: $M = 1{,}262$, $SD = 486.7$; $p < 0.001$) and PM (boys: $M = 1656$, $SD = 439.4$; girls: $M = 1172$, $SD = 440.8$; $p < 0.001$) recesses.

Grade. Grade 3 students accumulated significantly more steps than Grade 6 students in the AM (Grade 3: $M = 1{,}686$, $SD = 465.3$; Grade 6: $M = 1{,}384$, $SD = 439.6$; $p < 0.01$) and PM (Grade 3: $M = 1{,}624$, $SD = 509.5$; Grade 6: $M = 1{,}342$, $SD = 499.0$; $p < 0.01$) recesses.

Winter step counts.

Gender. Boys accumulated significantly more steps compared to girls in the AM (boys: $M = 1{,}383$, $SD = 469.1$; girls: $M = 971$, $SD = 356.7$; $p < 0.001$) and PM (boys: $M = 1{,}411$, $SD = 447.5$; girls: $M = 999$, $SD = 319.5$; $p < 0.001$) recesses.

Grade. No differences were found in the AM or PM recesses for Grades 3 and 6.

Seasonal effects (fall vs. winter).

Total daily steps. Overall, students accumulated significantly more steps in the fall ($M = 6{,}267$, $SD = 1{,}652.7$) than in the winter ($M = 5{,}487$, $SD = 1{,}575.9$, $p < 0.001$). See Table 2.

Recess. Students accumulated significantly more steps during recess in the fall ($M = 3{,}003$, $SD = 927.1$) compared to the winter ($M = 2{,}488$, $SD = 890.4$, $p < 0.001$). See Table 2.

Class time. Students accumulated significantly more steps during in-class time in the fall ($M = 3{,}264$, $SD = 891.2$) compared to the winter ($M = 2{,}999$, $SD = 853.5$, $p < 0.01$). See Table 2.

Boys. Boys accumulated significantly more steps in the fall compared to the winter for total daily steps (fall: $M = 6{,}754$, $SD = 1{,}450.2$; winter: $M = 5{,}914$, $SD = 1{,}581.9$; $p < 0.001$), total recess steps (fall: $M = 3{,}340$, $SD = 799.9$; winter: $M = 2{,}794$, $SD = 877.1$; $p < 0.001$), and total in-class steps (fall: $M = 3{,}414$, $SD = 820.8$; winter: $M = 3{,}120$, $SD = 847.7$; $p < 0.01$). See Table 2.

Girls. Girls accumulated significantly more steps in the fall compared to the winter for total daily steps (fall: $M = 5{,}445$, $SD = 1{,}670.6$; winter: $M = 4{,}764$, $SD = 1{,}295.8$; $p < 0.01$) and total recess steps (fall: $M = 2{,}434$, $SD = 855.8$; winter: $M = 1{,}970$, $SD = 647.7$; $p < 0.01$). No significant difference was found between seasons for total in-class steps. See Table 2.

Grade 3. Children in Grade 3 accumulated significantly more steps in the fall compared to the winter for total daily steps (fall: M = 6755, SD = 1794.3; winter: M = 5664, SD = 1402.8; p < 0.001), total recess steps (fall: M = 3310, SD = 949.0; winter: M = 2411, SD = 755.2; p < 0.001). No significant difference was found between seasons for total in-class steps. See Table 2.

Grade 6. Children in Grade 3 accumulated significantly more steps in the fall compared to the winter for total daily steps (fall: $M = 5{,}827$, $SD = 1{,}393.3$; winter: $M = 5{,}327$, $SD = 1{,}718.8$; $p < 0.05$) and total in-class steps (fall: $M =$

3,101, *SD* = 770.8; winter: *M* = 2,770, *SD* = 865.9; $p < 0.01$). No significant difference was found between seasons for total recess steps. See Table 2.

Table 2
Daily Step Counts by Season: Mean (Standard Deviation)

		Season		*p*
Sample		Fall	Winter	
All				
(100%, *N* = 78)	Total	6,267 (1652.7)	5,487 (1575.9)	**0.001**
	Recess	3,003 (927.1)	2,488 (890.4)	**0.001**
	Class Time	3,264 (891.2)	2,999 (853.5)	**0.01**
Boys				
(62.8%, *N* = 49)	Total	6,754 (1450.2)	5,914 (1581.9)	**0.001**
	Recess	3,340 (799.9)	2,794 (877.1)	**0.001**
	Class Time	3,414 (820.8)	3,120 (847.7)	**0.01**
Girls				
(37.2%, *N* = 29)	Total	5,445 (1670.6)	4,764 (1295.8)	**0.01**
	Recess	2,434 (855.8)	1,970 (647.7)	**0.01**
	Class Time	3,011 (960.9)	2,794 (838.0)	0.22
Grade 3				
(47.4%, *N* = 37)	Total	6,755 (1794.3)	5,664 (1402.8)	**0.001**
	Recess	3,310 (949.0)	2,411 (755.2)	**0.001**
	Class Time	3,445 (987.2)	3,253 (773.9)	0.19
Grade 6				
(52.6%, *N* = 41)	Total	5,827 (1393.3)	5,327 (1718.8)	**0.05**
	Recess	2,726 (823.4)	2,557 (1001.3)	0.14
	Class Time	3,101 (770.8)	2,770 (865.9)	**0.01**

Group Comparisons: Fall Step Counts

Gender. Boys accumulated significantly more steps than girls for total daily steps (boys: *M* = 6,754, *SD* = 1,450.2; girls: *M* = 5,445, *SD* = 1,670.6; $p < 0.001$), total recess steps (boys: *M* = 3,340, *SD* = 799.9; girls: *M* = 2,434, *SD* = 855.8; $p < 0.001$) and total in-class steps (boys: *M* = 3,414, *SD* = 820.8; girls: *M* = 3011, *SD* = 960.9; $p < 0.05$).

Grade. Grade 3 students accumulated significantly more steps than Grade 6 students for total daily steps (Grade 3: *M* = 6,755, *SD* = 1794.3; Grade 6: *M* = 5,827, *SD* = 1,393.3; $p < 0.01$) and total recess steps (Grade 3: *M* = 3,310, *SD* =

949.0; Grade 6: $M = 2{,}726$, $SD = 823.4$; $p < 0.01$). No significant differences were found between Grades 3 and 6 for total in-class steps.

Group Comparisons: Winter Step Counts

Gender. Boys accumulated significantly more steps than girls for total daily steps (boys: $M = 5{,}914$, $SD = 1{,}581.9$; girls: $M = 4764$, $SD = 1{,}295.8$; $p < 0.01$) and total recess steps (boys: $M = 2{,}794$, $SD = 877.1$; girls: $M = 1{,}970$, $SD = 647.7$; $p < 0.001$). No significant differences were found in the winter between boys and girls for total in-class steps.

Grade. Grade 3 students accumulated significantly more steps than Grade 6 students for total in-class steps (Grade 3: $M = 3{,}253$, $SD = 773.9$; Grade 6: $M = 2{,}770$, $SD = 865.9$; $p < 0.05$). No significant differences were found between Grades 3 and 6 for total daily steps or total recess steps.

Discussion

The aim of this study was to assess how physical activity levels in children from Grades 3 and 6 from a northern Ontario elementary school are impacted by the recess schedule of the BSD and by season. Our findings show that the levels of physical activity during recesses are significantly reduced during the winter months, particularly for younger students, whereas recess scheduling has no impact. Daily total step counts in the present study are similar to those reported by Gauthier, Laurence, Thirkill, and Dorman (2012), further indicating that the school setting is not likely being fully exploited to help children achieve the recommended daily physical activity levels. Results from our study indicate that throughout the day participants accumulated only 52% (6,267 steps) of the recommended 12,000 steps in the fall and 46% (5,487 steps) in the winter. As data were collected via a segmented approach, we can report that during recess time participants attain only 25% (3,003 steps) of the recommended daily physical activity in the fall and 21% (2,488 steps) in the winter. Therefore, unless children engage in physical activities outside school hours, the 40 minutes of unstructured play provided by recess periods of the BSD appear to not engage students sufficiently in physical activity levels that are conducive to health and wellness.

Our findings also suggest that boys accumulate more recess-based physical activity than girls, which has also been reported in other studies (Beighle, Morgan, Le Masurier, & Pangrazi, 2006; Huberty et al., 2011; Nettlefold et al., 2011; Ridgers, Stratton, & Fairclough, 2005; Ridgers, Tóth, & Uvacsek, 2009; Verstraete, Cardon, Clercq, & De Bourdeaudhuij, 2006). Some researchers have postulated that these gender differences arise due to the behaviors in which each gender engages at recess time. In particular, some researchers have suggested that boys tend to engage in more competitive and sporting behaviors (Blatchford, Baines, & Pellegrini, 2003) and girls participate more in seden-

tary play (Blatchford, Baines, & Pellegrini, 2003; Ridgers, Stratton, & McKenzie 2010). Accordingly, these results suggest that physical activity interventions targeting the interests of girls to increase their participation in recess-based physical activity are warranted; however, boys should also be encouraged to increase their physical activity levels during recess. Furthermore, Grade 3 students accumulated more physical activity than Grade 6 students. These findings are consistent with similar studies that have focused on recess-based physical activity (Gauthier et al., 2012; Ridgers, Saint-Maurice, Welk, Siahpush, & Huberty, 2011). Therefore, strategies to enhance physical activity participation in older students during recess time are also needed.

Although participants did not appear to maximize opportunities for physical activity throughout the day, a fairly balanced amount of steps were accumulated during the AM and PM recess time during fall and winter. In other words, children using the BSD are engaging in equal amounts of physical activity in the AM and PM recesses, but this amount likely remains insufficient to attain healthful levels of physical activity, particularly if children are not engaged in activities outside of school.

The present study is the first to report the impact of season on recess-based physical activity for students using the BSD. Our results clearly demonstrate that season has a strong influence on physical activity levels attained during recess time by children using the BSD schedule. Specifically, step counts are significantly reduced in the winter season. This is particularly worrisome given that previous studies have shown that declines in activity in the winter months persist into overall declines in subsequent seasons as well (Chan & Ryan, 2009).

The area in which this study was conducted faces varying weather conditions during the elementary school year. For instance, in October, average temperatures are 5.8°C, whereas in February average temperatures are -11.4°C with extreme temperatures as low as −50 °C with the wind chill (Environment Canada, 2013). According to Chan et al. (2006), weather conditions may have a great influence on outdoor activities, impacting daily steps counts and overall energy expenditure. They postulated that an increase in temperature by 10°C may result in a 2.9% increase in steps per day. In the present study, students accumulated 515 steps fewer during recess in the winter, and Grade 3 students experienced the greatest decrease in steps seasonally, dropping by 899 steps from fall to winter. This suggests that to increase recess-based physical activity levels in colder weather, interventions targeting children, particularly younger students, are warranted. For instance, some winter physical education classes could be held outside, focusing on educating children on how to engage in snow-related activities. This would allow the younger students to become more comfortable and engaged during inclement weather, in turn accumulating more physical activity during recess time. Indoor play could also be implemented. The option of playing in the gymnasium during cold weather spells

may be more conducive to active play; however, this option may be feasible only in schools with a small student population.

Limitations

Pedometers were used in this study because they are commonly used for assessing physical activity levels (Bassett & John, 2010). The frequency of pedometer use has increased for measuring levels of physical activity in children as these devices yield more objective data than traditional self-report instruments such as physical activity logs, diaries, and questionnaires (Bassett & John, 2010). These latter subjective measures are less suitable as they require memory recall, which when used to record physical activity levels are highly prone to self-reported bias specifically in children (Bassett & John, 2010; Welk, Corbin, & Dale, 2000; Sallis & Saelens, 2000) as a child's cognitive development may impair the ability to provide accurate recall (Baranowski, 1988). Although more reliable than certain survey data, pedometers are limited as they do not assess all aspects of physical activity, specifically duration and intensity of movement. Using a more comprehensive tool (e.g., accelerometers) would have allowed for a more detailed understanding of the children's activity patterns (i.e., intensity). Furthermore, despite the strong response rate and sample size, the simultaneous assessment of recess-based physical activity at multiple schools using scheduling variations would have been beneficial. The addition of multiple schools, with various school schedules, would have allowed for a more comprehensive analysis of the impact of season on recess-based physical activity. Additionally, assessing multiple schools at more frequent intervals (not just fall and winter) would have provided a more in-depth analysis of the influence that weather may have on recess-based physical activity. Overall, the inclusion of multiple schools, with varying schedules, over a broader range of weather would allow for a study like this to provide more generalizable results.

Furthermore, the study would have benefited from the collection of additional covariates. For example, the study was focused only on the impact of the general concept of season, yet the addition of daily temperature values may have allowed researchers to control for weather conditions. Additionally, controlling for individual predictors of physical activity, such as body mass index, would also have been beneficial. As such, future studies should consider controlling for additional confounding elements.

Conclusions

As a result of this study, we have reaffirmed that children are not maximizing opportunities for physical activity during the school day. In general, girls have a lower step count than boys. We also conclude that the recess schedule (i.e., AM vs. PM) does not affect physical activity during recess in children using the BSD; however, a seasonal influence exists. All children were less active

in the winter recess compared to the fall, and this was particularly accentuated among the younger participants. Future studies in this area of research would benefit from including schools using the same organizational system for recess time, schools using different scheduling systems, and data collection periods throughout the school year, a strategy that would result in more generalizable results.

Implications for School Health

This study has four main applied findings. First, strategies to enhance active play during recess, irrespective of time of day or season, are warranted as recess time is severely underused. Second, this study reaffirms the need for targeted strategies to enhance active play for girls. Third, strategies to mitigate the declines in physical activity during the winter should be implemented. For example, situations where extreme weather conditions apply may warrant physical activity interventions including more organized, inclusive outdoor play or perhaps indoor gymnasium activities. Finally, despite this study finding no difference in recess step counts at different times of day, and thus confirming that the BSD is a balanced school scheduling system as it relates to comparative physical activity levels, administrators need to consider all aspects affected by modifications of school scheduling. We recommend that administrators work with the research community to properly evaluate the impact of administrative changes on physical activity levels and corresponding health and wellness effects prior to a complete implementation. The adoption of healthful behaviors during childhood that include exercise and physical activity has long-lasting impacts on physical activity behaviors in adulthood. Schools should recognize their important role and contributions in helping children achieve lifelong well-being.

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Theater and Health: Results From *Dulce and the Good Life*

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Abstract

The purposes of this study were to provide a replicable model of community engagement involving local health issues and to examine the effectiveness of a community-based play for audience members' attitudes toward diabetes. The research question was, can a community-based, culturally responsive play positively influence participants' attitudes toward understanding diabetes? Diabetes knows no borders or boundaries. Latinos across the Americas are experiencing an increase in diabetes based on poor nutrition and a changing lifestyle in this new millennium. Communities on the United States–Mexico border are representative of this nutrition-related problem in both countries. The play *Dulce and the Good Life* was written with and for the border community. The protagonist, a Mexican American youth with type 2 diabetes, struggles with her diagnosis and food choices. Audience members of the two evening performances ($N = 70$) and one daytime performance ($N = 119$) completed a valid and reliable nutrition attitude survey; data analysis was performed using descriptive statistics and SPSS to determine significance levels. Participating audience members made statistically significant nutrition attitude changes. This study, based on community engagement and semiotic frameworks, adds to the literature concerning the importance of culturally relevant health interventions with maximum community involvement.

Keywords

diabetes; nutrition; health; Latinos; theater

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The objectives of this study, conducted in the lower Rio Grande Valley (LRGV) near the Gulf of Mexico, were to (a) involve the community in a culturally responsive theatrical play related to nutrition, diabetes, and obesity and (b) evaluate the efficacy of a play in changing participants' attitudes regarding nutrition. The research question related to the second objective was, can a community-based, culturally responsive play positively influence participants' attitudes regarding nutrition as it relates to diabetes? For both objectives, community engagement (Zhu, n.d.) and semiotics (Peirce, 1955) were the theoretical frameworks. Nutrition, diabetes, and obesity are important health issues in the United States and Mexico, and both countries lead the western hemisphere in obesity and type 2 diabetes (United Nations, 2013). In 1999, 13% of U.S. children aged 6 to 11 and 14% of U.S. adolescents aged 12 to 19 were overweight (Surgeon General, 2013). Based on 2009–2012 baseline data, the National Prevention Council (2014) reported that 16.9% of U.S. children aged 2 to 19 were obese. These figures demonstrate that obesity continues to increase in the United States. Childhood obesity is a leading health indicator in the 21st century (Healthy People, 2010).

More disturbing health-wise is the situation directly across the border in Mexico, which has surpassed the United States as the fattest country in North America (United Nations, 2013). The obesity rate in Mexico has tripled since 1980 (Barquera et al., 2009), and 33% of Mexicans were obese in 2008 (Food and Agricultural Organization of the United Nations, 2013). The percentage of school-aged Mexican children who were clinically obese increased 27% in just over a decade (United Nations, 2013). The side effects of obesity, such as diabetes and heart disease, are considered a public health emergency, and the Mexican government is the first in Latin America to launch a nutrition education effort (World Health Organization, 2011). According to the Central Intelligence Agency (2013), the primary resource for health-related data collection in most countries, of the more than 70,000 Mexicans who die from diabetes every year, the majority are food-based poor who also suffer from malnutrition. In other words, malnutrition and obesity can sit at the same table.

Children who grow up overweight are more likely to become obese adults in the United States and Mexico (Dietz, 1997). Therefore, it is logical to use a community engagement theoretical framework (Zhu, n.d.) to educate children at risk of becoming obese adults on proper eating habits. According to Zhu (n.d.), community engagement theory is tailored to the population, community-based organizations and diverse stakeholders should be involved, and the project should be evaluated. This study is focused on nutrition education through a community-based drama, *Dulce and the Good Life*, a play the first author cowrote with her former undergraduate students and coproduced with a high school drama teacher and his students. The play is focused on Dulce, a troublemaker teen who discovers she has type 2 diabetes. Dulce's grandmother,

whose foot is amputated due to diabetes-related problems, persuades Dulce to get tested for the disease. When Dulce discovers she, like her grandma, has type 2 diabetes, she is outraged because she has to alter her eating and exercise habits dramatically. Although Dulce's two friends are not supportive of Dulce's lifestyle changes, she has a friend, an Aztec goddess, school nurse, track coach, and family encouraging her to eat healthy and exercise.

The LRGV has the highest prevalence of obesity and diabetes in the United States (Texas Comptroller of Public Accounts, 2008) and is the unhealthiest geographic region in the United States (Associated Press, 2004). Hispanics represent 96% of the local population (U.S. Census Bureau, 2010). The U.S. Census Bureau (2010) uses the term *Hispanic* to represent people of Spanish origins, but for cultural specificity, we use the term *Mexican American* or *Latino* if a particular study highlighted this term (Nieto & Bode, 2012). Many years ago children and adolescents were rarely diagnosed with type 2 diabetes; however, much has changed in terms of children's diet and exercise, especially in developed countries. Nowadays, type 2 diabetes is 3 to 4 times higher in Hispanic children than in non-Hispanic Whites (Kaufman, 2008). Furthermore, many Latinos suffer from higher rates of type 2 diabetes, metabolic syndrome, obesity, and vascular-related complications (Caballero, 2005; Herscovici, Kovalskys, & De Gregorio, 2013). Mexican Americans in particular face higher risks for diabetes and obesity than the general U.S. population (Fisher-Hoch et al., 2010). These statistics are especially poignant because Hispanics are among the fastest growing and largest U.S. minority group and are expected to represent 23% of the U.S. population by 2050 (U.S. Census Bureau, 2010).

In the LRGV and Matamoros, Mexico, a few minutes away, Pérez, Reininger, Aguirre Flores, Sanderson, and Roberts (2009) found that about one third of 653 ninth grade students, aged 14 to 16, were at risk for being overweight or were already overweight. Only 7% of the Matamoros adolescents and 9% of the LRGV students in the Pérez et al. study engaged in varied, extensive physical activity; 57% of the Matamoros adolescents and 50% of the LRGV students watched 3 hours or more of television during an average week day. Rideout, Foehr, and Roberts (2010) corroborated these findings in their national poll; Hispanics spent 5 hours 21 minutes daily watching television.

Day (2004) reported that of the 1 million people living on the U.S. side of the Mexican border, many are Mexican immigrants living below the poverty line with a level of education lower than high school. According to Day, income and education are leading factors related to nutrition: "Poverty, number of adults without high school education, high unemployment, and the number of female-headed households in Cameron, Hidalgo, Starr, and Willacy counties suggest that food insecurity exceeds the national average" (p. x). Local families cross the border to visit relatives, often daily or weekly. Many families have school children living weekends with one parent or grandparent in Mexico and

attending school in South Texas while living with the other parent on school days. Many of these school-aged children on both sides of the border are suffering from poor nutrition, and obesity and type 2 diabetes are at near epidemic levels as a result.

Pérez et al. (2009) concluded that interventions on healthy eating, physical education classes, and team sports are important to reduce the high prevalence of obesity and Type 2 diabetes among students on both sides of the United States–Mexico border. The continued increase in obesity and diabetes in this border community is remarkable considering that medical professionals have been studying the problem for over 20 years (Green, 2012). Some strictly medical approaches have failed, and some educational approaches have had some success. Sharon Brown (as cited in Green, 2012) had some success by infiltrating the cultural aspects of life that may contribute to health problems. For example, instead of teaching people not to eat tortillas, she had some success with convincing people not to use lard when they made tortillas. Other cultural aspects were also helpful to Brown, Dougherty, Garcia, Kouzekanani, and Hanis (2002), who placed keen attention on respecting the local culture, families, and traditions. These dimensions of respect were achieved for the culture through Spanish usage, for the community through evening presentations, and for the families through patterns of support. These dimensions were considered part of the success in education as an intervention to diabetes. Brown et al. were able to reduce participants' diabetes indicators, as seen through bloodwork, by 25%.

Thus, Brown et al. (2002) hypothesized that culturally relevant interventions could impact community members' awareness of the medical complications associated with diabetes. Specifically, Jackson (2004) found that a culturally relevant play was an effective means to help African American school children understand nutrition. Thus, the first author cowrote a nutrition education play with her former students from an undergraduate content area literacy course. Participating students were preservice teachers. The goals of the *Dulce* play were to (a) produce a diabetes awareness play, which local health professionals checked and corrected for accuracy; (b) use education as a tool to combat local diabetes and obesity problems in local youth; and (c) involve the community in the artistic processes and products. Table 1 demonstrates how community members were involved in the play and research.

Content Validity

To ensure maximum community participation, this project spanned 2 years and involved area teens, parents, and health professionals. Content validity was the first focus of the research design. Thus, a local Mexican American high school student with diabetes, as well as his sister and mother, spoke to the writing group about how the student and his family reacted to and coped with

Table 1
Participants' Matrix

Participants' matrix		
Participants	**Role**	**Contribution**
Health care professionals	Feedback regarding accuracy of the medical and nutritional content in the play	Medical and nutrition content validity, community need
Teenager with diabetes, his mother and sister	Guest speakers at university writing group session	Medical and nutrition content validity, community need
Organizations and local media	Publicity	Advertised the play and invited public to participate as survey respondents
Local hospital and authors' university	Monetary assistance	Assisted in paying for additional props and costumes and the video-taping of the play
University faculty	Coauthor and coproducer the play and research	Planning, cowriting, implementation, and research
Preservice teachers	Observations of local teens in a mall; cowriters of first play version, music creators and performers, creators of food props, assistance with publicity, and photographers	Data collection in field, cowriting, and implementation
High school drama teacher	Coproducer and codirector	Implementation and feedback
High school students	Performers	Implementation and feedback
School district staff and teachers	Gatekeepers	Allowing the study to be conducted and assisting with data collection in classrooms
Evening performance audience-participants	Nonexperimental design	Survey and anecdotal data
Daytime high school audience-participants	Experimental design	Survey and anecdotal data

his recent diagnosis. Also, several local health professionals read and revised the script to ensure content validity of relevant medical and health information. For example, the first author changed a beginning scene from *Dulce* needing emergency care because of undiagnosed diabetes to Dulce's pediatrician

telling Dulce she had diabetes because health professionals stated that type 2 diabetes among obese adolescents is manifested gradually.

Community Participation

Besides content validity, cultural responsiveness and community engagement (Zhu, n.d.) were important in the research design and occurred throughout the process. According to Zhu (n.d.), main community engagements are: a) area-based, which focus on socioeconomic status disparities, b) person-based, which engage marginalized groups, and c) coalition-based, which involve special interest groups. The latter is focused on interest groups. Our project incorporated all three categories. Figure 1 demonstrates how the project began with a community need. For Step 1, local health issues, the first author participated in a LRGV literacy and wellness task force consisting of community members,

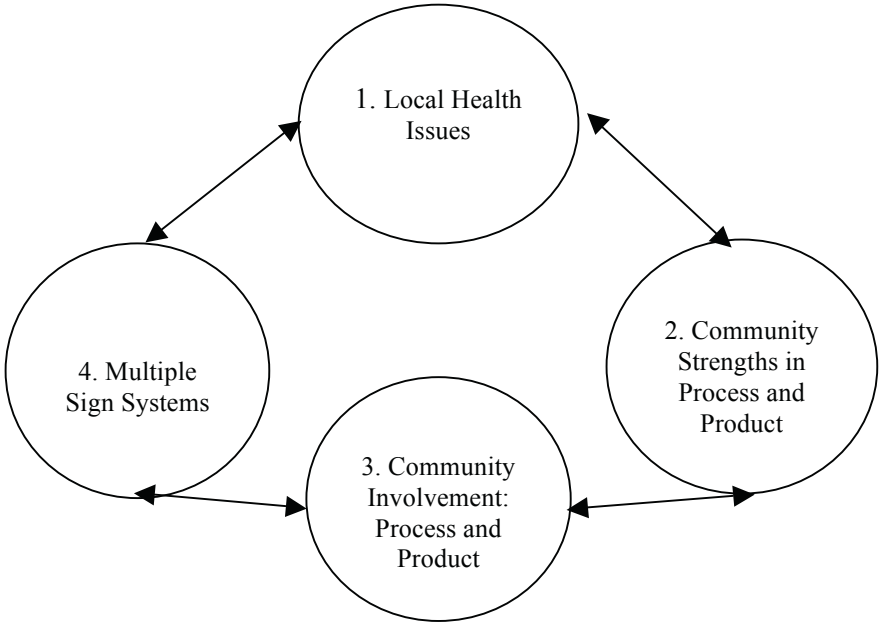

Figure 1. Culturally responsive community product model.

university students, and faculty. The task force sought ways to educate people about the high rate of diabetes and obesity in their South Texas border town. Thus, the first author attempted to solve this local health problem by cowriting a play with her students.

For Step 2 of Figure 1, community strengths, the playwrights attempted to affirm their community's border language and culture (Nieto & Bode, 2012)

by incorporating local code-switching (a common English-Spanish mixture) and by creating a 15-year-old Mexican American female protagonist, Dulce. The emotionally strong Latina protagonist was a counter-hegemonic move. In fact, most U.S. stories do not feature culturally diverse females as strong protagonists. Instead, most are about White male protagonists, and most literature for children and adolescents portrays females as weak (Garcia, 2013). Fictional characters and actors in the *Dulce* play were Mexican Americans, which is representative of the setting of the study. The script also mentioned the benefits of popular, nutritious Mexican foods, such as *nopales*, or cactus pads. The Mexican history and heritage were represented by an Aztec goddess who helped Dulce, the protagonist, eat in a healthy, Southern Mexican way rather than relying on eating habits influenced by mainstream Americans (e.g., corn tortillas versus flour tortillas or modern mainstream Texas Mexican fast foods and sodas loaded with corn syrup). Last, healthy Mexican recipes and eating and exercise tips were presented at the commencement of the play using PowerPoint slides.

To embrace community strengths and teen practices as part of Step 2, former Latino students observed teen speech and behaviors, as well as teen music and food choices, to incorporate components of the local youth culture into the

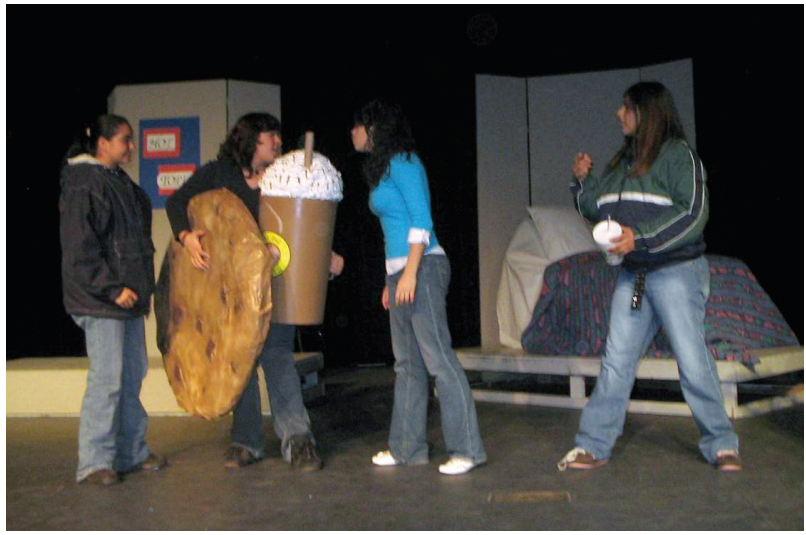

Figure 2. Actors and props in *Dulce and the Good Life*.

script. The richness of both border cultures is reflected in the play. In Figure 2, the main character, Dulce, chooses sweets over health and fights with her best friend, who is concerned about Dulce's diabetes. The scene refers to restaurants and music and clothing stores in the local mall, including a cookie stand. All business names were changed. See Figure 2.

For Step 3 of Figure 1, community involvement, the first author presented involved local children at a neighborhood soup kitchen in some of the skits related to a first draft of the play and sought feedback from the children. When the play was in its final version, advanced drama students and their public high school teacher produced the play, which was shown during the day and evening at the high school and in the evening at the university theater. Three performances were offered. For the daytime performance, high school research participants, teachers, and staff saw the play. For the evening performances, local media and health organizations announced the free play and invited the public to participate in the pre- and postsurveys. Also, a local hospital and the university provided approximately $600 to pay for props, costumes, and a video recording of the play. According to Zhu (n.d.), power-sharing is an essential aspect of a community engagement framework. We demonstrated this throughout every facet of the research, as we sought feedback, wrote the play with college students, and then coproduced the play with a local high school teacher.

Step 4 of Figure 1 relates to the second theoretical framework, semiotics, originating from Peirce's (1955) study of signs. Sign or communication systems are ways to gain deeper understanding of phenomena (Berghoff, Egawa, Harste, & Hoonan, 2000). We involved drama through acting; language through the script; art through the props, sets and lighting; dance through the Aztec goddess who visits Dulce; and music through the scene transitions and before and after the play. We also included a short, informational PowerPoint presentation after the play as audience participants completed the survey. Unlimited semiosis or interpretations may more readily occur with combined signs (Berghoff et al., 2000). Two art majors from the same undergraduate course created the props. They made the cookies from papier-mâché and the mocha latte from a trash can and spray-on foam. A music major enrolled in the same class composed and performed the theme song of the play along with his friends; the play also included popular songs local teens enjoyed. The use of theater as a culturally responsive intervention also relates to learning styles theory. Because each human processes and stores information differently (Dunn, 1993), some audience members may be affected or moved by the music in a play, whereas others may be affected or moved by the script. In other words, many learning styles are tapped into with a play. Also, within the Mexican culture of rich music, dance, and art, a theatrical performance may be as appropriate as other educational interventions.

Additionally in terms of Step 4 of Figure 1 and semiotics, several researchers have found that health-related plays positively influence participants' attitudes because multiple sign systems are involved. Perhaps this is because many people live vis-à-vis media images and popular culture (Rideout et al., 2010). Frank (1996) used this applied theater framework in Uganda to raise awareness

of health and environmental issues, although she does not explain how the two plays influenced audiences. Also, Perry, Zauner, Oakes, Taylor, and Bishop (2002) found significant differences in nutrition knowledge and food choices between the treatment and control groups (N = 4,093) after watching a nutrition education play and participating in follow-up activities; they found no differences between the groups at pretest. Participants, aged 5 to 12, represented a cross-section of public school children in Minneapolis. Similarly, Colby (2006) developed a Latino nutrition play with 19 Latino youth aged 8 to 12. Significant positive changes occurred in participants' nutrition attitudes, as well as a 26% increase in their knowledge, after the children cowrote and coproduced a bilingual nutrition play for the public.

Methods

This section is focused on the hypothesis, data source, sampling plan, nonexperimental study (evening performances with no random sampling), and the experimental study (daytime performance with random sampling). The hypothesis was that watching the play would positively influence most participants' nutrition attitudes regarding diabetes, measured by a pre- and postnutrition attitude survey.

Data Source and Analysis

A preexisting valid and reliable nutrition attitude survey was used with prior written permission from the survey authors (Devine, Olson, & Frongillo, 1993a, 1993b). Each pre- and postsurvey was on a bubble-in Scantron sheet, which the authors' university assisted in creating. The first author used all 14 questions from Devine et al. (1993a, 1993b) survey (on a 5-point Likert scale). Sample statements were "Learning about nutrition is interesting to me" and "I feel better when I eat right." At the time of the study, an appropriate standardized survey about nutrition knowledge was not available, yet the question of influencing attitude remained. Therefore, this study was focused on positively influencing attitude. Respondents were asked to bubble in one response that best described the way they felt about each statement. Demographic questions related to weight, height, sex, ethnicity, age, and educational level; blood relatives with diabetes; participant's diabetes; and weekly exercise information.

Next, data were analyzed using descriptive statistics (e.g., percentages and mean scores) and inferential statistics (e.g., significance and correlations). For the latter, SPSS software was used to determine the t test, mean differences, confidence intervals, degrees of freedom, and significance levels. Last, quotes (including negative ones) from audience participants were provided for qualitative data and for transparency of research.

Permissions

Since this research involved human subjects, the institution's internal review board for human subjects reviewed and approved this project. The facets of research were a nonexperimental study (conducted during two evening performances) and an experimental study (with random sampling for high school students for a daytime performance). For the evening performances, adult audience members and students in grades six and over who had guardians present were invited to participate in the study. For the daytime study, all children participants turned in completed parent consent forms and child assent forms.

Nonexperimental Design

The nonexperimental study occurred during two evening performances in a south Texas border city in November and December. There were 29 matching pre- and postsurveys for the November evening performance: 23 adults, four children, and two unmarked for age, with 17 Latinos, eight Caucasians, and four who answered Other for race. Nineteen of 29 (66%) participants with matching pre- and postsurveys reported having blood relatives with diabetes, and four of 29 (14%) wrote they have diabetes.

The December evening performance yielded 41 matching pre- and postsurveys, from 30 adults, 10 children, and one unmarked for age, self-reporting as 31 Latinos, eight Caucasians, one Asian, and one Other. Twenty-nine of 41 (71%) respondents stated in the survey that their blood relatives have diabetes, and three of 41 (7%) said they have diabetes. Data regarding participants who cross daily from Mexico to attend public school in this border city were not disaggregated from permanent residents at the same high school since they have the same border culture and are influenced by the same health issues. Thus, 70 surveys for the two evening performances.

Experimental Design

In the same Mexican American border city, the experimental study occurred during seventh period class in a public high school in December. All 10 teachers, randomly selected for the control and treatment groups, agreed to ask their students to participate (100%). All students except one agreed to participate in the treatment group; eight students in one class of the control group did not wish to participate. Thus, nine of 240 chose not to participate, which leaves a participation rate of 96.25%.

The number of potential participants in the experimental study was 230; however, due to attrition, the number of final participants was lower after the posttest. The final data included 69 matching pre- and postsurveys for the control group and 50 for the treatment group ($N = 119$). Latinos made up 98%, as self-reported by the participants. Approximately 62% reported blood relatives

with diabetes. Only one participant reported having diabetes.

The author gave each classroom identical surveys in English and Spanish for those needing translations. To prevent invalid results, teachers were instructed not to make comments to influence students or do anything outside of their regular curriculum. The teachers, all bilingual in Spanish and English and of Mexican American heritage, read each survey question aloud as the students completed the two-page presurvey in their language of preference. All participants completed the presurveys the day before the play. Although the treatment and control groups attended the 65-minute play toward the end of the school day, only the treatment group completed the postsurveys. All audience members sat with the teachers, and the treatment group returned the surveys before they returned to their classrooms with their teachers.

Results

This section is focused on statistics and then participants' quotes for the nonexperimental and experimental studies associated with the *Dulce* play. Survey data were normalized on a Likert scale from 1 to 5 (1 = *agree*, 5 = *disagree*), such that 5, which represented a positive nutrition attitude, was always the best answer. For example, if a participant answered a 1 (*disagree*) to the question "Good nutrition is too much bother," that score was automatically converted to a 5. Thus, normalization of responses helped to create a meaningful nutritional attitude mean for each participant and group.

Nonexperimental Study

The 29 matching pre- and postsurveys for the November evening performance of the nonexperimental study had mean scores on pre- and postsurvey of 4.18 and 4.38, respectively, on a 1 to 5 Likert scale (again, 5 represents the best nutrition attitude), $MD = .20$, 95% CI [−.35306, −.05732], $t(28) = -2.843$, $p \leq 0.008$. For the December evening performance (nonexperimental), 41 matching pre- and postsurveys existed, with mean scores of 4.11 and 4.2, respectively, $MD = .16$, 95% CI [−.29344, −.03542], $t(40) = -2.576$, $p \leq 0.014$. The November and December results indicate participants made statistically significant positive changes in their nutrition attitudes after viewing the play.

The evening survey requested self-identification of age group. For the purposes of reporting data, participants were grouped as pre-teens (11-13), young teenagers (14-15), older teenagers (16-18), young adults (19-24), adults (25-44), middle aged adults (45-64) and elderly (65 and up). Several participants wrote comments on the post-surveys for the evening performances. For the November evening performance, a male Latino between ages 11 and 13 with no blood relatives with diabetes commented, "The play was asome [sic]." Also, Latino participants between ages 25 and 44 whose blood relatives had diabetes wrote:

> "This play is too [*sic*] helpful that shult [*sic*] be take [*sic*] to other schools like elementaries and middle school."

> "Es muy interesante el tema porque nos ayuda aprender sobre la nutrición y sobre la salud y como llevar un control sobre la diabetes" [The subject is very interesting because it helps us to learn about nutrition and health and how to control diabetes].

> "Nos explica la forma de alimentarnos y que alimentos debemos eliminar para estar sanos y prevenir la diabetes" [It explains what to eat and what not to eat so we can be healthy and prevent diabetes].

A female Latino between ages 25 and 44 who was diagnosed with type 2 diabetes 3 years before she saw the play wrote in Spanish that the play was excellent and she would like to change her health habits after seeing the play because she did not have her diet balanced and she was not eating enough *nopales*, prickly pear cacti, known locally and scientifically as a natural way to decrease blood glucose levels (Hernandez-Galicia, Garcia-Vega, Flores-Saenz, & Alarcon-Aguilar, 2002; O'Connell, 2005).

For the December evening performance, a female Latino between ages 45 to 64 who was diagnosed with type 2 diabetes 10 years before seeing the play wrote that she thought the play would help Latino youth because they eat too much junk food, or as she put in Mexican Spanish, *chatarra*. A participant of Asian descent between ages 11 and 13 whose father and grandmother had diabetes commented on specific parts:

> I liked the part when Dulce first liked shot put. I thought the part with the nutritionist was very informative. The play was humorous so it made everything easier to understand and not boring. The part where Dulce had to talk with the school nurse was very exciting. I think it helped Dulce. The beginning was good because it shows how careless Dulce was and if you compare it to the end, it shows how much she has changed.

Another youth, a 14- to 15-year-old female Latino whose mom was diabetic, wrote, "The play was great. I learned new and awesome things about eating and being healthy." Additionally, a White male participant between ages 45 and 64 with no blood relatives with diabetes wrote,

> It seems to have a DVD of this, or something that could be circulated from school to school, would be very helpful. I could certainly use it with my students. An accompanying script would be helpful because inevitably questions will come up like, "What'd they say" and it would be a good opportunity to stop and talk about diets. I had one pre-AP [Advanced Placement] student tell me she didn't eat veggies because

they were fattening! Disinformation! Anyway this is a very useful tool kids will relate to.

A 25- to 44-year-old female Latino whose blood relatives had diabetes also said the play needed to be incorporated into local schools: "I would like elementary students to see a play like this. My son is a 4th grader at [school name] and it would be nice for 4-6 graders to be exposed to this info." Only one participant, a 14- to 15-year-old Latina who had blood relatives with diabetes wrote a negative comment on the survey. She said, "The play was too stereotypical."

Experimental Study

For the daytime experimental study, 119 pre- and postsurveys matched, 50 treatment and 69 control. The difference between the treatment and control groups mean before treatment was .12, which was not statistically significant according to the independent samples t test ($t = -1.407$, $df = 117$). The control group's presurvey score mean was 4.0. The treatment group's presurvey score mean was 3.88 and postsurvey score mean was 4.22, $MD = .33$, 95% CI [−.47804, −.19796], $t(49) = -4.850$, $p \leq 0.000$, which showed the treatment group moved closer to a 5 (positive nutrition attitudes).

Besides a statistically significant change from pre- to postsurvey for the treatment group, 85% of the high school students in the treatment group made positive changes in their nutrition attitudes. The following are the treatment group's mean positive increases for each of the 14 questions: Q1: 14%, Q2: 21%, Q3: 5%, Q4: 17%, Q5: 22%, Q6: 13%, Q7: 13%, Q8: 7%, Q9: 19%, Q10: 13%, Q11: −2%, Q12: 8%, Q13: 7%, and Q14: 11%. The treatment group participants' attitudes became more negative for Question 11: "If I am careful about the way I eat now, I will be healthier when I am older." Perhaps the teens' attitudes were more negative for this question because some did not understand the conditional statement, which requires more careful reading or because they, like many teens, did not think about the impact of their actions today on their adulthood. Cognitively, this may have to do with the development period in which adolescents feel they are invincible (Wickman, Anderson, & Greenberg, 2008). Wickman et al. (2008) conducted interviews with teens about their feelings of invincibility regarding health-related behaviors; they concluded that involving teens in planning and conducting health promotion interventions is important.

High school respondents in the daytime treatment group circled their exact ages on the survey in response to the demographic question about age. The teens wrote several comments on their postsurveys; they had no negative comments. All quotes were from Latinos, who represented 98% of the daytime participants. Comments from Classroom 1, representing freshmen, were "I think this play was good because it provides you with information but in a fun way. It influence [*sic*] you to be healthy" and "The play was excellent. You should do

more things like that." The former had a father and grandmother with diabetes. Also, a Latino female the same age who had a great grandmother with diabetes wrote, "The play rocked! Thanks!" Three Latino females the same age who had no blood relatives with diabetes wrote, "The play was good and also the message transmitted through it. Good idea to do this!" and "This was a very good play. I learned a lot from it! Thank you!" A 16-year-old Latino male whose grandmother had diabetes wrote, "It was a pretty good play for the students to learn about health problems." From Classroom 2, representing high school seniors, an 18-year-old Latino whose mother had diabetes wrote, "Don't just mention nopales [cactus]. Talk about more foods."

From Classroom 3, representing juniors, a 17-year-old Latino female whose grandmother had diabetes wrote on her presurvey,

> Wen [*sic*] talking about food makes me hungry. I will love to know how can I loss [*sic*] weight. I don't want to eat more junk food. I want to get in good shape. I will love to get in a diet but I can't because I always brake [*sic*] the diet.

On her postsurvey she wrote, "I think this play is going to help people who has [*sic*] that disease." Judging from her comments, it appeared she believed the play applied more to people diagnosed with diabetes, even though her grandmother had diabetes, which made her at risk for it. Also, she did not mention losing weight in the postsurvey, which appeared to be her goal in the presurvey.

There were only three participants from Classroom 4; from these three surveys, no one wrote comments. Classroom 5 contained freshmen, and it was the last in the treatment group; a Latino male with no blood relatives with diabetes wrote, "I really wanna know about the health and what I did." Based on these comments, the high school participants appeared to enjoy the play and learn from it for the most part.

Limitations

A limitation of this study was the use of an attitude survey, which is based on the opinions of participants. Although an attitude survey may not be as valid as a knowledge test or behavior scale, a goal of this study was to change the perceptions of the audience members. With 20 years of research using educational awareness and cultural relevance as foundations (Brown et al., 2002), a culturally responsive approach to attitudes is a legitimate undertaking. A separate study addressing knowledge gains should be conducted to address this limitation.

Next, perhaps participants answered the way they felt the author wanted because they were trying to be kind or because they believed seeing a free play obligated them to answer in complimentary ways. This quid pro quo perception is a possibility and thus may affect the validity of the results. In other words, did

the pre- and postsurveys measure participants' changes in nutrition attitudes, or did the participants respond in ways pleasing to the author?

Another limitation relates to the short-term nature of the study. It cannot be determined, for example, whether participants' positive changes in nutrition attitudes impacted them in the long run. In terms of lasting impact, a post-posttest could have been administered from 1 week to 1 month later. Thus, only a short-term effect may be claimed for the play's impact on participants' nutrition attitudes. Learning theory suggests most of what is learned is from personally engaging in an activity versus merely watching something being performed (National Research Council, 1999). Thus, another limitation is the lack of follow-up activities to engage the audience participants. Also, drama educators such as O'Connor (2000) and Cahill (2007a, 2007b) have demonstrated that changes in attitudes and behaviors come from students creating their own dramas about topics important to them; both focus on participant-focused drama, in which process is more important than performance.

Finally, although residents on both sides of the border cross frequently for family events or cultural events such as Charro Days or the Sombrero Festival, two local holidays encouraging participants from Mexico and the United States, this study did not distinguish participant residency. The political climate regarding people without legal U.S. documents inhibits asking residency questions. Unfortunately, we did not include a question concerning participants' exact heritage, but instead we followed the 2000 U.S. Census categories of Hispanic or Latino, African American, White, American Indian, Asian, Pacific Islander, and other race as response types; thus, we cannot be more specific about ethnicity.

Recommendations

To eliminate the political overtones of identifying residency, the play should be performed in a border town in Mexico for comparison. If positive results are seen in a purely Mexican study away from the border, the play could be the core focus of a study in many Latino communities. Taking the play across borders and using the same pre- and postsurvey by Devine et al. (1993a, 1993b), in addition to another scale on nutrition knowledge and practices, would be a fruitful replication study. Minor rewriting of the play to fit local cultures and languages would make this possible. Other artist educators may tailor the emphasis and language of an educational play to raise awareness of other local health issues, such as AIDS. Targeting specific communities and cultures (Jackson, 2004) is a viable means of educating today's children on nutrition.

Regarding the short-term nature of the survey administration, it may be helpful for future researchers who conduct pre- and postnutrition attitude surveys to call participants 1 week (or longer) after they complete the postsurvey to determine whether their nutrition attitudes stayed the same or changed or

whether they changed any nutritional practices. This would measure long-term effects. It would also allow for more triangulation and cross-referencing.

Next, having youth create plays and dramas related to health concerns may have more of a lasting impact because of the learning process involved in co-creating performances and negotiating meaning. O'Connor (2000) discussed his drama work with 18 students, aged 13 to 20, with intellectual disabilities. Drama became "an agent for social change" (p. 4) or a conduit between the mainstream and marginalized. His students, who created and performed a drama, received standing ovations from an international audience. Cahill (2007a, 2007b), like O'Connor, advocated for children to be coinvestigators and key respondents in health and education programs. Cahill (2007a) also argued effective youth drug education in particular should include longitudinal, real-life "interactive learning strategies" (p. 673). Practitioners, researchers, and youth may create plays, skits, and dramas in response to LRGV health concerns. This study focused on nutrition education and type 2 diabetes, but a host of health issues could be explored through drama.

Besides being involved in the writing of plays, youth could participate in school activities related to a theatrical play that help them to discuss nutrition with their peers, who are important in their development and identity formation. Also, involving families is essential because school environments alone do not indicate changes in nutritional habits of school-aged children (Healthy Study Group, 2012). A school–home partnership with activities across environments may produce longer term improvements in nutrition-related behaviors.

Last, more analysis, such as relationships between the demographic questions and the pre- and postsurvey variables, would be useful for future studies. For example, does a relationship exist between nutrition attitudes and gender, age, ethnicity, body mass index (determined by height and weight), educational level, experience with diabetes, and exercise habits?

Conclusions

The *Dulce and the Good Life* play and research study involved the community in every aspect and focused on diabetes awareness in response to a community need. The study and project were firmly grounded in semiotic and community engagement theoretical frameworks in every facet, and the findings demonstrate that a culturally appropriate educational play positively impacted audiences' attitudes about nutrition. The majority of participants in each group, one daytime performance and two evening performances, reported having blood relatives with diabetes. Such high percentages are cause for alarm because if someone has a blood relative with type 2 diabetes, a genetic predisposition exists (Hall, 2009). Also, judging from respondents' reports of relatives with diabetes, the play appeared to match the health needs of the community. Next, based on participating audience members' quotes and their responses to the Likert scale questions, they appeared to enjoy the play. Their

before and after responses on the survey further indicate they made at least short-term positive changes in their nutrition attitudes.

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Global Health: Chartering a New Mission for Health Education Specialists

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Abstract

The interconnectivity linking human populations facilitates the exchange of not only ideas and technology, but also disease-causing organisms. The ease of travel and the possibility of global pandemics makes it imperative for health education and promotion specialists to learn and understand global health issues and to learn from health promotion programs implemented in other countries to reach the rapidly increasing U.S. population effectively.

Keywords

global health; health education; health promotion; cross culture

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One of the defining characteristics of the ever-increasing global population, some 7.1 billion in 2014 (U.S. Census Bureau, n.d.), is the interconnectedness that results from advances in technology, economic development, and the migration that takes place within and between countries.

Globalization allows individuals to travel across geographic areas carrying with them not only their currency, cultural backgrounds, but also infectious agents that may result in increased morbidity and mortality rates. Recent outbreaks of global infectious diseases such as Ebola (Centers for Disease Control and Prevention [CDC], 2014a), Middle East respiratory syndrome coronavirus (World Health Organization [WHO], 2014), avian influenza A (H7N9; WHO, 2013), measles (WHO, 2011), severe acute respiratory syndrome (WHO, 2010), along with local and regional outbreaks of bovine spongiform encephalopathy (BSE), *Salmonella enterica*, and West Nile encephalitis, among others, are a clear call to health promotion specialists and to health educators to better prepare to address the threat to human health resulting from emerging infectious diseases. Pérez (2004) suggested that the immediate danger of these infectious diseases and the resulting morbidity and mortality present an urgent call for health promotion specialists to develop primary prevention strategies to mitigate their negative outcomes. These efforts require many entities across international borders to not only coordinate responses to existing epidemics and pandemics, but also engage in prevention efforts to decrease their impact on human populations.

Defining Global Health

Currently, there is a lack of a common definition for the term *global health*, leading to confusion, misunderstanding, and lack of coordination for prevention strategies. The Institute of Medicine (1997) defined global health as the "health problems, issues and concerns that transcend national boundaries and may best be addressed by cooperative actions" (p. 1). Merson, Black, and Mills (2012) similarly stated that global health "places much greater emphasis on health issues that concern many countries or that are affected greatly by transnational determinants, such as climate change or urbanization" (p. xvii). Furthermore, they stated that greater emphasis on the health problems allows for the "opportunity to address cross-border issues as well as domestic health disparities in high-income countries" (Merson et al., 2012, p. xvii). According to Macfarlane, Jacobs, and Kaaya (2008), global health is the "worldwide improvement of health, reduction of disparities, and protection against global threats that disregard national borders" (p. 383). Simply stated by Beaglehole and Bonita (2010), global health is "collaborative trans-national research and action for promoting health for all" (p. 5142).

Koplan et al. (2009) called for a common definition of global health that can be widely accepted to advance global health. First, they distinguished glob-

al health from international health and public health. According to Koplan et al., *international health* has the following characteristics: the focus is on low- and middle-income countries, solutions to health problems tend to be binational rather than including global cooperation, the focus is on other nations, and it is multidisciplinary (but limited disciplines involved). *Public health* is characterized by its focus on a particular community or country; solutions to health problems usually do not include global cooperation; focus is within a nation; and it is multidisciplinary, particularly health sciences with social sciences. Although different, global health, international health, and public health have commonalities. All three areas are population based and preventive focused, have multidisciplinary and interdisciplinary approaches, and emphasize low-income and underserved populations (Koplan et al., 2009).

Koplan et al. (2009) defined global health as "an area of study, research, and practice that places a priority on improving health and achieving health equity for all people worldwide" (p. 1995). In addition, they stated that global health refers to "any health issue that concerns many countries or is affected by transnational determinants, such as climate change or urbanization, or solutions, such as polio eradication" (Koplan et al., 2009, p. 1994). They further stated that global health should include both communicable and health issues such as obesity, injury prevention, tobacco control, and nutritional deficiencies. The term *global* refers to the scope of the problem and not location; therefore, global health can address domestic as well as transnational health issues.

Although Koplan et al. (2009) called for and proposed a common definition of global health, several scholars challenged their definition (Bozorgmehr, 2010; Beaglehole & Bonita, 2010). Bozorgmehr (2010) argued that their definition of global health did not adequately address the term *global* and that it lacked specificity. Also, he argued that global should be viewed as supraterritorial and proposed that the concept of global should show the connection between the social determinants of health anywhere in the world. Beaglehole and Bonita (2010) stated that Koplan et al.'s definition was too long and did not capture all elements associated with the topic. All these definitions illustrate the lack of widely accepted and agreed upon definition of global health. The lack of a universal definition, however, should not be a deterrent for exploring global health. All definitions share common components including:

- Transcends national boundaries
- Focuses on worldwide improvement of health problems
- Addresses social determinants of health and inequities
- Includes a multidisciplinary focus
- Includes research and practice for improving health worldwide
- Calls for global cooperation

In the *Global Journal of Health Education and Promotion (**GJHEP**)*, the term *global health* will be viewed as addressing health issues/problems worldwide from a multidisciplinary perspective and disregarding national boundaries. Emphasis will be placed upon the role and implications for health education specialists in improving health and reducing disparities worldwide.

Global Health: A Current Imperative

The origin of the global health movement is unclear. According to some health scholars and historians, the shift toward global health occurred after the formation of the World Health Organization (WHO) in the late 1940s (Brown, Cueto, & Fee, 2006; Chen, 2014). Brown et al. (2006) asserted that the emergence of global health started when WHO moved away from its campaign to eliminate malaria and focused on worldwide elimination of smallpox, thus transitioning from the term *international* to the term *global*. Furthermore, they noted that the malaria elimination campaign suffered major setbacks, and it became apparent that smallpox elimination was possible due to factors such as the development of an effective vaccine. Thus, WHO shifted its focus to smallpox worldwide elimination, which was successful (Brown et al., 2006).

The shift to global health is evidenced in the growing number of journal publications with *global health* in the title. Chen (2014) conducted a search of articles listed in PubMed that contain global health in the title. From 1945 to 1995, only a few studies had global health in the title; however, from 1995 to 2014, there were over 500 articles listed in PubMed with global health in the title.

Furthermore, Banta (2001) strongly stated that *global health* is the term today and that *international health* is outdated. This concept is evident in the number of academic programs (degree and certificate) in global health and academic centers and institutes of global health. The following are a few programs: Columbia University Mailman School of Public Health and the University of Miami Miller School of Medicine Graduate Programs in Public Health both recently instituted a certificate program in global health. In addition, graduate programs in global health can be found at schools such as the University of California in San Francisco and the University of Florida. Furthermore, many academic institutions have centers on global health such as the University of Colorado at Denver and Johns Hopkins University. The missions of those centers are focused on addressing the health from a global or worldwide perspective.

What is the impetus for the global health movement? Chen (2014) asserted that there are four factors that may be driving this movement: (a) uneven development of health globally, (b) rapid development of information technology (e.g., Internet, wireless technologies, and social media), (c) economic globalization, and (d) influence of nongovernmental organizations (e.g., philanthropic

organizations that are encouraging the global health movement). For example, the Bill and Melinda Gates Foundation has a strong global focus and has pledged millions of dollars to address health issues around the globe. Of these four driving forces, Chen stated that the unevenly paced health development is the main impetus for the global health movement, particularly noting the patterns of life expectancy, mortality, and morbidity in developing countries compared with developing countries. He believes these inequities have urged philanthropists and segments of developed countries to invest in global health.

For example, the first case of Ebola diagnosed in the United States on September 30, 2014 (CDC, 2014b), and subsequent cases highlight the importance of addressing global health issues as part of health education and health promotion. As the global outbreak of Ebola has threatened the health of Americans, it is imperative that health education specialists understand and address the importance of protecting Americans from diseases and other health threats that start abroad and learn how to prevent the spread to the United States (CDC, 2013). Moreover, given the constant travels of individuals between countries and the interdependent economies across the globe (Bentley & Van Vliet, 2010), health education specialists are now more aware and exposed to health issues and illness affecting individuals globally. As such, "the Obama administration has embraced global health as a core feature of its national security, diplomacy, and development work around the world" (CDC, 2011, p. 3). Although the U.S. global public health initiatives have helped reduce infant deaths, eradicate smallpox, reduce polio and river blindness, and treat people with HIV/AIDS, malaria, and tuberculosis, there are still many challenges for the next decade and beyond. Consequently, the U.S. government through its global health initiatives has developed strategies and principles to improve health outcomes in HIV/AIDS, malaria, tuberculosis, maternal health, child health, nutrition, family planning, and reproductive health and has neglected tropical diseases across the globe (CDC, 2011).

Implications for Health Educators

Health promotion, including education, community development, policy, legislation, and regulation, is equally valid for preventing communicable diseases, injury, violence, and mental problems as it is for preventing noncommunicable diseases (WHO, n.d., para. 2). Thus, health promotion specialists and health educators need a venue to share recent and cutting-edge information related to their efforts to improve the health status of populations around the world.

Health education specialists can play a vital role in implementing global health initiatives, strategies, and principles internationally and in the United States. However, to be successful in this area, health education specialist must be educated in global health prevention and health promotion efforts. A few

years ago, top-tier schools of public health asserted their philosophy that public health and global health are interchangeable and that they were leading the efforts to educate global health professionals (Bentley & Van Vliet, 2010). Health education and promotion professionals must join their public health counterparts in these efforts. Although education and preparation to become a global health expert begin in a health education and promotion professional preparation program, health education specialists can continue to learn and explore topics in the global health arena by examining articles published in journals such as the *Global Journal of Health Education and Promotion* (***GJHEP***).

Realizing the need for professionals to communicate and share their knowledge and experience, the now defunct American Association of Health Education (AAHE) launched the *International Electronic Journal of Health Education* (*IEJHE*) in December 1997. The *IEJHE* was the first peer-reviewed health education journal available on the Internet and published relevant research conducted around the world. The *IEJHE* published uninterrupted since its introduction in 1997 until 2012.

In November 2013, the Foundation for the Advancement of Health Education (FAHE) launched the ***GJHEP*** as a successor publication of the former *IEJHE*. The purpose of the ***GJHEP*** is to publish manuscripts that are relevant to global audiences and that involve international programs, initiatives, and collaborative ventures in health education and promotion. The ***GJHEP*** also publishes book reviews relevant to its primary mission. Professionals, students, and academics are encouraged to present original research, practice perspectives, reviews, conceptual and theoretical papers, and brief reports for inclusion in this publication.

The expedient dissemination of quality scientific knowledge is important to the editorial board of ***GJHEP***. For that reason, this open volume periodical, which does not charge for publication, but adheres to the highest standards of scientific inquiry, is designed to accept manuscripts throughout the year and is committed to a review process lasting no more than 4 weeks. The quick turnaround time allows researchers to share the results of their scientific inquiry quickly with their peers. Accepted manuscripts are published online within 2 weeks of the completion of the review process. In addition to the quick posting of electronic articles, at the end of each quarter, the published articles are compiled into a single issue, which is available in print and electronic formats. This current issue seeks to provide an overview of global health issues and includes a variety of articles such as:

- Young adult smokers perceptions of the influence of physical activity on their smoking patterns with data from college students in Canada
- Factors affecting receipt of nutrition information among a select group of university students in the United States, which is focused on data from the United States, and implications for a global audience

- Beliefs about eHealth communication and preferred ehealth strategies among middle- and older-aged adults in Taiwan, as well as strategies for reaching the older population with electronic health messages
- Accessing the influence of season and time of day of physical activity levels during recess among students in Canada
- Theater and health: Results from *Dulce and the Good Life* program for communities on the Mexico–United States border

Learning and understanding about global health issues and health promotion programs implemented in other nations will allow health education and promotion specialist to gain knowledge about cross-cultural issues not encountered in the United States. In a cross-cultural global society, tackling a health issue and developing a health promotion program are different in context, and associated factors must be considered when addressing the needs of a specific target group. For example, although the cause of HIV/AIDS is recognized universally, beliefs systems, gender roles, and sexuality still impact the way some countries and cultures view HIV/AIDS prevention and how public health professionals are addressing it across the globe (Edberg, 2013). Similarly, cultural views about health, illness, disease, and healing practices are related to global health and people in low- and middle-income countries (Skolnik, 2012). Thus, health education and promotion specialists must understand these concepts to properly address global health issues.

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Global Journal of Health Education and Promotion

Editorial Guidelines for Authors

The ***Global Journal of Health Education and Promotion (GJHEP)*** is a quarterly publication devoted to publishing scholarly and substantive manuscripts in the field of health education and promotion. *GJHEP* includes manuscripts, practice perspectives, brief reports, and reviews.

The central criteria for publication are that the material is (a) germane to the topic of health education and promotion; (b) theoretically or empirically based with practical health education and promotion implications; and (c) substantive in the sense of proposing, discovering, or replicating knowledge in the field. All material should adhere to the manuscript preparation guidelines that are outlined in each issue of *GJHEP*. All manuscripts that meet the identified criteria will be reviewed by three reviewers as well as the editor. Based on the reviewer recommendations, the editor will decide on the disposition of manuscripts.

Every effort will be made to provide authors with a detailed, critical review. Each submission will be refereed with a summary of the reviewer comments forwarded to the author(s) whose manuscript requires specific revisions or whose manuscript will not receive further consideration for publication.

Manuscript Guidelines

GJHEP provides an international forum for research and discussion current and upcoming health education and promotion issues. When an article is accepted for publication, it is considered the property of *GJHEP*. If the article is not accepted for publication, it will be returned to the author. No payment is made for articles published in *GJHEP*.

*All submitted articles should follow *The Publication Manual of the American Psychological Association,* 6th edition, format.

Manuscript Preparation

- All materials must be double-spaced on 8 1⁄2 × 11-inch (or 22 × 28 cm) pages.
  - Margins should be a minimum of 1 inch on all four sides.
  - A manuscript should be under 20 pages, including references
  - Times or Times New Roman, pt. size 12.
  - Number all pages consecutively.
  - Only the title should appear on the manuscript itself. The title should appear at the top of the first page, followed by the abstract, and then the body of the manuscript.

- Each table, drawing, illustration, photo, or map must be prepared on a separate page and keyed to the text. These should be limited to a maximum of 2–4.
  - All images submitted must be 300 dpi.

- On a separate sheet sent with the manuscript, include the following:
  - An abstract of approximately 150 words.
  - Title, submission date, author(s).
  - Five to seven keywords.
  - Biographical sketch of the author(s) not to exceed four (4) lines.
  - Contact information for primary manuscript author.

- Research-oriented manuscripts should contain the need or purpose of the study, review of literature/related research that includes the conceptual foundation/theoretical basis for the study, procedures or methodology, findings and conclusions, and suggestions for applying research findings.

- Theoretical or conceptual manuscripts should contain the need or purpose of the paper with a strong rationale for its unique contribution to the literature, and related research, synthesis of the literature that results in a unique perspective or framework for the field of health education and promotion.
- Reference citations should be sufficient to cover background information and related literature. Reference citations should adhere to *APA,* 6th ed. format.
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  - All references to books, bulletins, and articles must be identified in the text by last name of author, year of publication, and where appropriate, pagination—all within parentheses.Depending on construction of the sentence, the citation will appear as Wise (2012) or (Wise, 2012). Specify subsequent citations of the same source in the same way as the first. However, within a paragraph, the year need not be included in subsequent references to the original work, as long as the study cannot be confused with other studies in the paragraph or manuscript.
  - For direct quotations only, pagination follows the year of publication, separated by a comma (Wise, 2012, p. 337).
  - If an author has more than one citation in the same year, distinguish the citations by use of letters (a, b, c, etc.) attached to the year in both text and reference appendix (Stumbo, 2012a; 2012b).
  - When a work has two authors, always cite both names every time the reference occurs in the text. When a work has more than two authors but less than six authors, cite all authors the first time the reference occurs; in subsequent citations include only the surname of the first author followed by "et al." and the year (Hutchinson et al., 2012).
  - For institutional authorship, give identification each time the citation appears: Centers for Disease Control and Prevention (CDC, 2010)
  - Enclose a series of references within parentheses, separated by semicolons in

alphabetic order (Baird, 2011; Cheing, Tsui, Lo, & Hui-Chan, 2013; Gordon, Merenstein, D'Amico, & Hudgens, 2012; Stumbo, 2006a; 2006b).

- A list of references used in the text must be appended alphabetically on a separate page at the end of the manuscript as follows:

Csikszentmihalyi, M. (20077). *Finding flow: The psychology of engagement with everyday life*. New York: BasicBooks.

Janssen, M. (2004). The effects of leisure education on quality of life in older adults. *Therapeutic Recreation Journal, 38*(3), 275–288.

Electronic sources must include the URL:

Centers for Disease Control and Prevention (CDC). (2010). *How much physical activity do older adults need?* Retrieved from http://www.cdc.gov/physicalactivity/everyone/guidelines/olderadults.html

- Authors are advised to use person-first terminology throughout their manuscripts. Specific suggestions for person-first terminology may be found in the *Publication Manual of the American Psychological Association* (6th ed., p. 76), and in the paper.

Practice Perspectives Guidelines

The focus of the Practice Perspectives is to embrace different ways of knowing about the field of health education and promotion experience and the facilitation of service delivery in both participant relationships and clinical, administrative, and interdisciplinary contexts. This section has been expanded to invite two distinct components:

- Case Reports that are about (a) an individual or group or (b) an intervention, protocol, or organizational aspect of practice.

Manuscript Preparation

The manuscript should describe any of the following:

- one or more unique practice applications of the health education and promotion intervention process with participants (assessment, planning, implementation, evaluation) or programs;
- the experience of participants, families, program design or innovation, ethical dilemmas, or management strategies.

Submissions

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