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Editorial

Role of Public Health Education in Addressing Intimate Partner Violence Against Women: A Global Crisis

Deborah A. Fortune, *North Carolina Central University*

Intimate partner violence (IPV) against women is a serious public health problem that is pervasive worldwide (World Health Organization [WHO], 2013). It is a global public health problem that affects about one third of women across the globe (WHO, 2013). Intimate partner violence includes both physical and sexual violence. The Centers for Disease Control and Prevention (CDC, 2012) defines intimate partner violence as physical, sexual, or psychological harm by a current or former spouse or partner. The WHO (2013) defines IPV as physical and/or sexual violence by an intimate partner. The intimate partner may be a formal partnership (e.g., marriage) or informal partnership (e.g., dating relationship or unmarried sexual relationship (WHO, 2013). For a working definition, WHO (2013) refers to physical violence to include any of the following: slapping, throwing objects to hurt a person, pushing/shoving, hitting a person with a fist or object, kicking, dragging, beating, choking, or purposively burning a person. Sexual violence is defined as physically forcing sexual intercourse, having sexual intercourse due to fear of partner, forcing partner to have sexual intercourse without use of condoms or other contraceptives, and forcing a person to perform a sexual act that is degrading or humiliating (WHO, 2013).

The WHO (2013) conducted the first global systematic review and synthesis of scientific literature on the prevalence of two forms of violence against women, which were intimate partner violence and non-partner sexual violence. The key findings from the study that are pertinent for this article include the following:

- 35% of women globally have experienced either physical and/or sexual IPV or nonpartner sexual violence.

Deborah A. Fortune is an associate professor, Department of Public Health Education, North Carolina Central University. Please send correspondences to dfortune@nccu.edu.

- 30% of all women have experienced physical violence and/or sexual violence by their husband or intimate partner. The rates were higher for some WHO regions, particularly low and middle income regions. The prevalence for South-East Asia was approximately 38%, Eastern Mediterranean was 37%, and Africa was 37%
- 38% of all murders of women are committed by their intimate partners.

The health effects that women suffer as a result of IPV include physical trauma; psychological/mental health trauma; and sexual health, such as unwanted pregnancy and HIV/other sexually transmitted infections. These health problems may lead to disability and/or death (WHO, 2013). A myriad of factors may put women at risk for IPV, including

- lack of or low employment of women, which makes women depend on men for subsistence, thus placing them at risk for IPV;
- social norms regarding male masculinity;
- male dominance over their wife or intimate partner;
- cultural acceptance of male dominance and control over women;
- lack of criminalization of domestic violence in some countries;
- lack of enforcement of laws against domestic violence in some countries; and
- lack of respect of women's right as a wife or intimate partner.

Translation to Health Education Practice

The CDC (2012) indicates that IPV can be prevented. Thus, a public health approach should be used to understand and prevent IPV among women around the world. A primary prevention public health approach should be emphasized. The following public health education strategies are recommended to prevent IPV against women globally.

Suggested Public Health Education Strategies

1. Increase awareness and knowledge about risk factors and ways to prevent IPV among youth. Emphasis should be placed on strategies for developing healthy relationships. Schools should include lessons on IPV in the health education curriculum as a component of violence prevention.
2. Empower women through education about IPV, helping them to develop self-efficacy and skills to protect themselves against IPV. Provide employment assistance to women. In addition, provide support for women who are victims of IPV.

3. Develop and provide treatment programs for male perpetrators of IPV. One component of treatment programs should emphasize changing concepts of masculinity as it pertains to dominance and control of women (e.g., men's wives or intimate partners).
4. Advocate for policies that support women's human rights and that discourage victimization of women by their husband or intimate partner. Also, advocacy efforts should include legal reform, particularly criminalizing domestic violence and enforcing laws against IPV.

Responsibilities II, IV, VI, and VII of the National Commission for Health Education Credentialing and Society for Public Health Education (NCHEC & SOPHE, 2015) are highlighted in the articles in this issue, but all seven roles and responsibilities for health educators are applicable for addressing IPV. Responsibility II states that health educators "plan health education/promotion" (NCHEC & SOPHE, 2015, p. 34). Subcompetency 2.4.1 for this responsibility recommends that those programs be based on proven health education theories and models. The WHO and London School of Hygiene and Tropical Medicine (2010) recommend the use of an ecological model to address IPV against women because of the complex nature and many factors associated with IPV. An ecological model would address influences for individual, relationship, community, and societal factors.

Responsibility IV states that health educators "conduct evaluation and research related to health education/promotion" (NCHEC & SOPHE, 2015, p. 43). There is a need for the development of evidence-based intervention for the prevention of IPV among adults (CDC, 2014). Results from those studies will serve as the foundation for addressing IPV across the globe.

Responsibility VI states that health educators "serve as health education/promotion resource person" (NCHEC & SOPHE, 2015, p. 55). Health educators need to disseminate information that is culturally relevant for countries across the globe with suggested strategies to prevent the occurrence of IPV against women.

Responsibility VII indicates that health educators should "communicate, promote, and advocate for health, health education/promotion, and the profession" (NCHEC & SOPHE, 2015, p. 59). Thus, health educators should create and tailor messages that are culturally relevant for countries on warning signs and symptoms of IPV, risks factors for perpetrator and victims of IPV, ways to promote women's rights, and strategies to prevent or reduce behaviors associated with IPV. Also, health educators should advocate that schools (K–12), health care settings (hospitals and physicians' offices), community settings (e.g., community-based organizations and local health departments), businesses, and colleges and universities intervene to prevent or reduce the burden of IPV against women across the globe.

In conclusion, IPV is a global public health problem that affects women across the globe. As a public health problem, public health educators have a role to play in addressing IPV against women. At the present, public health educators need to develop and conduct media campaigns to increase the awareness about IPV against women in an effort to generate resources and interventions for preventing IPV.

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Physical Activity Among Chinese School Youth 1997–2011: A Longitudinal Study

Ying Li, *Western Washington University*
Hui Bian, *East Carolina University*
Bingqing Wang, *Plastic Surgery Hospital, Beijing, China*

Abstract

Purpose: The prevalence of overweight and obesity among Chinese youth has increased alarmingly along with rapid economic development in the last decade. Inactivity is often listed as a major contributor. However, few researchers have examined longitudinal physical activity change among Chinese youth. The purpose of this study was to examine the trend of physical activity engagement among Chinese youth by analyzing secondary data collected from the China Health and Nutrition Survey (CHNS). **Method:** Chinese youth aged 6 to 18 were extracted from the CHNS longitudinal data from 1997 to 2011. Linear mixed models were applied to explore the trend and examine the factors related to physical activity level among Chinese youth. **Results:** A significant but weak increase was found in the frequency and time spent in Extracurricular Gymnastics, Dancing, and Acrobatics from 1997 to 2011. In addition, a significant but weak decrease was found for the time spent in Extracurricular Sedentary Activity and In-School Physical Activity. **Conclusion:** The overall physical activity pattern among Chinese school youth from 1997 to 2011 is not clear.

Keywords

physical activity; Chinese school youth; longitudinal study

Ying Li, PhD, CHES, is an associate professor of community health for the Department of Health and Human Development at Western Washington University. **Hui Bian, PhD, CHES,** is a statistics and research consultant for the Office for Faculty Excellence at East Carolina University. **Bingqing Wang, MD,** is at the Plastic Surgery Hospital, Beijing, China. Please send author correspondence to ying.li@wwu.edu.

China as the most populous country in the world has undergone many social and economic changes that have led to a high prevalence of behavior-related noncommunicable diseases such as obesity and diabetes. For example, Wildman et al. (2008) reported that the prevalence of overweight and obesity among males increased from 9.6% and 0.6%, respectively, in 1991 to 20.0% and 3.0%, respectively, in 1999–2000. For females, the prevalence of overweight and obesity increased from 14.5% and 1.8%, respectively, in 1991 to 26.5% and 5.2%, respectively, in 1999–2000. Not surprisingly, the overall diabetes prevalence increased as well. Yang et al. (2010) reported an overall diabetes prevalence of 9.7% among a nationally representative sample of 47,325 adults in 2008, which is a steady increase compared to the rates of 2.5% in 1994 and 5.5% in 2000–2001 (Gu et al., 2003; Pan, Yang, Li, & Liu, 1997).

Similarly, Chinese youth have also become heavier and bigger. Many researchers have reported the increased overweight and obesity prevalence among Chinese youth (Gordon-Larsen, Wang, & Popkin, 2014; Ji, 2008; Lau, 2004). Because of the differences in sample size, study quality, overweight and obesity criteria, and geographical distribution, the numerical reports varied across studies. To address those issues, Yu et al. (2012) conducted a meta-analysis after screening 1,326 papers and included 35 papers (41 studies), with the majority of medium quality. They reported that the prevalence of overweight and obesity increased from 1.8% and 0.4%, respectively, in 1981–1985 to 13.1% and 7.5%, respectively, in 2006–2010. The average annual increase was 8.3% and 12.4%, respectively. They also reported gender and location effects; specifically, boys or children from urban areas were more likely to be overweight or obese than girls or children from rural areas.

Childhood overweight and obesity are associated with many immediate and long-term health effects (Centers for Disease Control and Prevention, 2014). Specifically, children with overweight and obesity have a higher risk of experiencing social and psychological problems, heart disease, diabetes, joint problems, breathing problems, and adult obesity, which directly affect those children's mobility and mortality in the future. Therefore, it is important to examine childhood overweight and obesity contributor factors for prevention purposes.

Though many factors contribute to the rapid increase of the obesity and overweight issue among Chinese youth, inactivity is often listed as a major contributor (Gordon-Larsen et al., 2014; Wang & Zhai, 2013). However, there is a lack of research in which researchers have examined the longitudinal physical activity changes among Chinese youth over the years, which may prevent an accurate understanding of the reality and make goal setting more challenging. The purpose of this study was to understand the longitudinal trend of physical activity among Chinese school youth by analyzing China Health and Nutrition Survey (CHNS) data.

Method

CHNS data provided by the Carolina Population Center at the University of North Carolina were used in this study. CHNS is an ongoing study with a face-to-face interview approach to collect individual-level information on income, diet, health, and demography for all participants and community-level data on services and infrastructures in nine diverse provinces (Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Liaoning, and Shandong) of China. A multistage random cluster process was used to draw the sample surveyed in each of the provinces (Zhang, Zhai, Du, & Popkin, 2014).

The data set used in this study included six time points of unbalanced data (1997, 2000, 2004, 2006, 2009, and 2011), which means not all participants were interviewed in every study year. The participants for this study included children who were in school at the point of the data collection and aged 6 to 18 years old. The physical activities measures in this study were measured each study year.

Measures

EPA: Extracurricular physical activities (do not include weekend activities). The extracurricular physical activities per week (do not include weekend activities) included four measures: frequency of physical exercise engagement (frequency); minutes of gymnastics, dancing, and acrobatics; minutes of track and field and swimming; and minutes of other physical activities, including martial arts, soccer, basketball, volleyball, badminton, tennis, ping-pong, and Tai Chi.

ESA: Extracurricular sedentary activities. Sedentary activities per week (do not include weekends) measures included minutes of watching TV and videotapes, VCDs, and DVDs; minutes of extracurricular reading, writing, and drawing; and minutes of other sedentary activities, including video games, toy cars, puppets, and board games.

IPA: In-school physical activities. There were three measures for in-school physical activities per week. They were minutes of gymnastics, dancing, and acrobatics; minutes of track and field and swimming; and minutes of other physical activities, including martial arts, soccer, basketball, volleyball, badminton, tennis, ping-pong, and board games.

Data Analysis

Data analyses were performed using SPSS 22.0. Descriptive statistics were conducted to inspect the data for distribution. Median was used to describe the average physical activities per week. Because of the design of the survey, no information regarding physical or sedentary activities over the weekends was collected. For the rest of this paper, the terms *per week* or *a week* only refer to 5

weekdays, not the regular week of 7 days. Modified Box-Cox transformations were conducted to improve the normality of the measures. Linear mixed models were applied to the studied variables. Two-level random coefficient models include a time variable at Level 1 (Year) and a subjects variable (Individuals) at Level 2. Year serves as a repeated variable as well as a random effect. In other words, time is nested within subjects. Level 1 intercept (e.g., mean score of physical activity) and Level 1 slope (e.g., average growth rate in physical activities) were predicted as random effect. Individual-level predictors including gender and age were examined for their effects on change over time in physical activities. They were fixed effect predictors.

Results

A total of 18,399 children aged 6 to 18 years old were in the data set. Between 1997 and 2011, a typical Chinese youth engaged in EPA two to three times per week. When the EPA is broken down by type, the engagement duration for Gymnastics, Track, and Other Activities ranged from 14–27.5, 20–30, and 30–40 min/week, respectively. For ESA, a typical Chinese youth spent 60–84, 30–84, and 24–30 min/week in Watching TV, Reading, and Others between 1997 and 2011. Compared to EPA, IPA had fewer variations over the years in terms of engagement duration. Specifically, the duration for In-School Gymnastics was 60 min/week for most years, except 70 min/week for 2000. The engagement duration for In-School Track was 40 min/week for 2004, 2009, and 2011, with the exception of 45 min/week for 1997 and 2006 and 60 min/week for 2000. The engagement duration for In-School Other Activity was 60 min/week for 1997, 2004, 2009, and 2011, with the exception of 90 min/week for 2000 and 70 min/week for 2006. When the time for EPA and IPA are added together, a typical Chinese youth spend 90 min/week in physical activities.

Fixed Effects

The average growth rates per year for extracurricular physical activities were .02 points (p = .00) for frequency of physical exercise; .05 points (p = .04) for gymnastics, dancing, and acrobatics; .01 points (p = .15) for track and field and swimming; and .01 points (p = .68) for other extracurricular physical activities while controlling for gender, age, random effects, and repeated measure. The average growth rates per year for sedentary activities were −.03 points (p = .00) for watching TV and videotapes, VCDs, and DVDs; −.10 points (p = .00) for extracurricular reading, writing, and drawing; and −.03 points (p = .00) for other sedentary activities. The average growth rates per year for in-school activities were −.02 points (p = .00) for gymnastics, dancing, and acrobatics; −.01 points (p = .00) for track and field and swimming; and −.01 points (p = .01) for other in-school physical activities (see Table 1).

Table 1
Fixed Effects in Linear Mixed Models

Fixed effects	Estimate	*SE*	*p*	95% CI
Extracurricular physical activities				
1. Frequency (*n* = 2,157)				
Intercept	1.46	.05	.00	1.36, 1.56
Male vs. Female	.14	.03	.00	.08, .20
6–12 vs. 16–18 years	.03	.04	.45	−.05, .11
13–15 vs. 16–18 years	.03	.05	.45	−.06, .12
Year	.02	.003	.00	.01, .02
2. Gymnastics (*n* = 550)				
Intercept	5.08	.36	.00	4.37, 5.79
Male vs. Female	.17	.23	.46	−.28, .62
6–12 vs. 16–18 years	−.43	.32	.18	−1.05, .19
13–15 vs. 16–18 years	−.23	.36	.53	−.93, .47
Year	.05	.02	.04	.002, .09
3. Track (*n* = 1,217)				
Intercept	3.59	.12	.00	3.37, 3.82
Male vs. Female	.17	.08	.03	.02, .32
6–12 vs. 16–18 years	−.04	.10	.70	−.23, .15
13–15 vs. 16–18 years	−.10	.11	.34	−.31, .11
Year	.01	.01	.16	−.005, .03
4. Other activities (*n* = 1,999)				
Intercept	6.44	.19	.00	6.05, 6.82
Male vs. Female	.78	.13	.00	.52, 1.04
6–12 vs. 16–18 years	−.70	.16	.00	−1.01, −.39
13–15 vs. 16–18 years	−.40	.17	.02	−.72, −.07
Year	.01	.01	.65	−.02, .03
Sedentary activities				
1. Watching TV (*n* = 5,442)				
Intercept	8.35	.11	.00	8.13-8.57
Male vs. Female	.13	.07	.07	−.01, .27
6–12 vs. 16–18 years	.34	.10	.00	.14, .53
13–15 vs. 16–18 years	−.60	.11	.00	−.82, −.39
Year	−.03	.01	.00	−.05, −.02

Table 1 (cont.)

Fixed effects	Estimate	*SE*	*p*	95% CI
2. Reading (*n* = 4,695)				
Intercept	6.63	.07	.00	6.49, 6.77
Male vs. Female	−.01	.05	.76	−.10, .08
6–12 vs. 16–18 years	−.37	.07	.00	−.50, −.24
13–15 vs. 16–18 years	−.37	.07	.00	−.52, −.22
Year	−.10	.004	.00	−.11, −.09
3. Other activities (*n* = 1,946)				
Intercept	5.26	.17	.00	4.94, 5.59
Male vs. Female	.06	.10	.53	−.13, .25
6–12 vs. 16–18 years	−.28	.15	.07	−.58, .02
13–15 vs. 16–18 years	−.81	.17	.00	−1.14, −.47
Year	−.03	.01	.00	−.05, −.01
In-school activities				
1. Gymnastics (*n* = 3,550)				
Intercept	4.24	.03	.00	4.17, 4.30
Male vs. Female	−.03	.02	.19	−.06, .01
6–12 vs. 16–18 years	.00	.03	1.00	−.07, .07
13–15 vs. 16–18 years	.04	.04	.31	−.03, .11
Year	−.02	.002	.00	−.019, −.01
2. Track (*n* = 3,658)				
Intercept	3.99	.04	.00	3.92, 4.07
Male vs. Female	.03	.02	.13	−.01, .08
6–12 vs. 16–18 years	−.09	.04	.02	−.16, −.01
13–15 vs. 16–18 years	−.06	.04	.14	−.13, .02
Year	−.01	.002	.00	−.02, −.007
3. Other activities (*n* = 3,518)				
Intercept	4.35	.04	.00	4.27, 4.43
Male vs. Female	.29	.02	.00	.24, .34
6–12 vs. 16–18 years	−.19	.04	.00	−.26, −.12
13–15 vs. 16–18 years	−.06	.04	.14	−.13, .02
Year	−.01	.002	.01	−.012, −.002

Note. First-order autoregressive structure with homogeneous variances (AR(1)) for repeated measures.

The average initial scores for extracurricular physical activities were 1.46 (= 2.60 times) for frequency of physical exercise; 5.08 (= 20.89 min) for gymnastics, dancing, and acrobatics; 3.59 (= 20.49 min) for track and field and swimming; and 6.44 (= 35.08 min) for other extracurricular physical activities while controlling for gender, age, and random effects. The average growth rates per year for sedentary activities were 8.35 (= 64.41 min) for watching TV and videotapes, VCDs, and DVDs; 6.63 (= 67.08 min) for extracurricular reading, writing, and drawing; and 5.26 (= 35.38 min) for other sedentary activities. The average growth rates per year for in-school activities were 4.24 (= 68.41 min) for gymnastics, dancing, and acrobatics; 3.99 (= 53.05 min) for track and field and swimming; and 4.35 (= 76.48 min) for other in-school physical activities (see Table 1).

Male youth participated in more EPA than did female youth in frequency (b = .14, p = .00), track and field and swimming (b = .17, p = .03), and other activities (b = .78, p = .00) when other variables held constant. They also had more Other IPA than did female counterparts (b = .29, p = .00). As for age, youth in the 16–18 years group likely exercised more than youth in other age groups in other extracurricular physical activities ($b_{6–12}$ = −.70, p = .00; $b_{13–15}$ = −.40, p = .02), in-school track and field and swimming ($b_{6–12}$ = −.09, p = .02), and other in-school activities ($b_{6–12}$ = −.19, p = .00). However, they also reported more ESA than did youth in other age groups in extracurricular reading, writing, and drawing ($b_{6–12}$ = −.37, p = .00; $b_{13–15}$ = −.37, p = .00); watching TV and videotapes, VCDs, and DVDs ($b_{13–15}$ = −.60, p = .00); and other sedentary activities ($b_{13–15}$ = −.81, p = .00). Children aged 6–12 years had watched more TV and videotapes, VCDs, and DVDs (b = .34, p = .00; see Table 1).

Random Effects

The random effects of subjects and year on the initial scores and growth rates of physical activities were examined (see Table 2). The random effects were not significant (p > .05) in extracurricular physical activities of gymnastics, dancing, and acrobatics; sedentary activities of extracurricular reading, writing, and drawing; and in-school activities of track and field and swimming as well as other in-school activities. The multilevel models may not be proper. Therefore, the linear mixed models analyses were conducted again for measures with only repeated measures effects and fixed effects modeled.

Table 2

Covariance Structures in Linear Mixed Models

Random effects	Estimate	*SE*	*p*
Extracurricular activities			
1. Frequency (*n* = 2,157)[a]			
Variance of intercept	.498	.07	.00
Variance of year	.004	.001	.00
2. Gymnastics (*n* = 550)			
Variance of intercept	.00		
Variance of year	.0002	.01	.98
3. Track (*n* = 1,217)			
Variance of intercept	.49	.15	.00
Variance of year	.003	.001	.00
4. Other activities (*n* = 1,999)			
Variance of intercept	1.03	.52	.048
Variance of year	.01	.004	.00
Sedentary activities			
1. Watching TV (*n* = 5,442)[b]			
Variance of intercept	.010	.21	.96
Variance of year	.025	.002	.00
2. Reading (*n* = 4,695)[c]			
Variance of intercept	.28	.20	.15
Variance of year	.004	.02	.08
3. Other activities (*n* = 1,946)[b]			
Variance of intercept	.00		
Variance of year	.01	.002	.00
In-school activities			
1. Gymnastics (*n* = 3,550)[b]			
Variance of intercept	.00		
Variance of year	.001	.0002	.00
2. Track (*n* = 3,658)			
Variance of intercept	.00		
Variance of year	.0001	.0001	.33
3. Other activities (*n* = 3,518)[c]			
Variance of intercept	.02	.04	.51
Variance of year	−.001	.001	.31

Note. Variance components structure for random effects.
[a]Compound symmetry-heterogeneous covariance structure. [b]No intercept model. [c]Unstructured covariance structure.

The intercept effect is the effect of subjects on initial physical activities scores. This effect was not significant ($p > .05$) in sedentary activities of watching TV and videotapes, VCDs, and DVDs; other sedentary activities; and in-school activities of gymnastics, dancing, and acrobatics. However, the year effects were significant in those measures ($p < .05$). Linear mixed models with no random intercept effect were specified. The significant intercept effects ($p < .05$) were present in extracurricular physical activities of frequency of physical exercise, track and field and swimming, and other extracurricular physical activities. This significant effect means the initial scores of those physical activities vary among school children (see Table 2).

The year effect on the growth rates was also significant ($p < .05$) in the above mentioned measures including all extracurricular physical activities, all sedentary activities except reading, and in-school activities of gymnastics, dancing, and acrobatics, which implies that there is a tendency that school children experience different growth rates of those physical activities across years (see Table 2).

Discussion

To combat noncommunicable diseases (NCD), the Chinese government has been actively promoting healthy lifestyles by setting national goals and initiating campaigns such as the China National Plan of NCD Prevention and Treatment 2012–2015 (Chinese Center for Disease Control and Prevention, 2012). The efforts that specifically apply to Chinese youth include the passage of the governmental policy titled Central Opinions on Strengthening Youth Sports to Enhance Youth Physical Fitness (Xinhua News Agency, 2007). In this document, Chinese youth are recommended to have 60 min or more of physical activity each day, which is the same as the recommendation made by the U.S. Department of Health and Human Services (2008). Unfortunately, a typical Chinese youth from 1997 to 2011 who had an average of 90 min of physical activity per week failed to meet this recommendation, which was echoed in other studies. For example, Zhang et al. (2012) conducted a nationwide survey among 166,812 Han ethnicity students aged 9 to 18 years and reported that only 22.7% of the participants met the recommendation of having physical activity for 60 or more minutes each day. Zhang et al. (2012) further reported that students with higher physical activity desire, physically active parents, and better school sports atmospheres were more likely to meet the recommendation. In addition, students with heavy homework loads and long homework time were less likely to take part in physical activity.

A significant but weak increase was found in the frequency and time spent in Gymnastics, Dancing, and Acrobatics from 1997 to 2011. In addition, a significant but weak decrease was found for the time spent in ESA and IPA. Therefore, it is difficult to draw a conclusion regarding the overall physical ac-

tivity pattern from 1997 to 2011. At the same time, the decrease in time spent in ESA was interesting and surprising as many other researchers in China and the United States reported contradictory results (Zong & Li, 2014). Based on secondary data analysis, Zong and Li (2014) reported that time spent in front of a television, video, or computer increased, as did the proportion of children and adolescents who commuted to school in a motorized vehicle between 1991 and 2009. However, in all the studies mentioned above, the researchers adopted a subjective approach to quantify the time spent for sedentary activities, that is, self- or proxy-report. This left room for bias/errors, especially when these studies were conducted among youth.

Although there was a small decrease in IPA compared to EPA across years, the results reveal that Chinese school youth spend more time in in-school activities than in extracurricular activities. In China, academic success is emphasized. Chinese youth typically have a heavy load of homework and are free of home chores (Tudor-Locke, Ainsworth, Adair, Du, & Popkin, 2003), which may lead to a low amount of extracurricular physical activities. Fortunately, Chinese school children receive additional physical activities through mandatory physical education in schools. The schools provide an environment for different activities, and school staff can supervise and assure the quality of and the time spent in those activities. Given that Chinese school youth receive more physical activity time through school and that they fail to meet the recommendation of having physical activity for 60 min or more per day, the mandatory physical education seems necessary and crucial. At the same time, more effort is needed to educate parents about the importance of involving their children in more extracurricular activities.

It is common to see a gender difference in terms of the involvement in physical activities; specifically, girls tend to be less active compared to boys (X. Zhang et al., 2012). The results of this study are reiterative of the same theme in the literature. Zhang and Li (2008) reported that concern for getting sweaty and smelly, becoming tan after exposure to sun, and lack of female-oriented equipment and facilities contributed to the gender difference. Though boys tend to be more physically active (Zhang et al., 2012), they were more likely to be obese or overweight (Yu et al., 2012). This paradox again indicates that obesity and overweight is a complicated issue that requires a multifactor approach to understand the issue fully and address it successfully.

In China, children usually start elementary school, middle school, and high school at the ages of 8, 13, and 16, respectively. The results of this study indicate that high school students are more likely to engage in Other Extracurricular Activities and all ESA (including watching TV, reading, and others) compared to other age groups. At the same time, high school students are more likely to engage in some IPA, specifically Track and Other In-School Physical Activities, compared to the 6–12 age group, but not the middle school students. In this

study, the high school students group was a reference group, which means that results were based on the comparisons between all other groups and the reference group. Students in high school seem more active, but also spend more time in reading, writing, and so forth. Stronger coefficients can be seen in other extracurricular activities including team sports and other sedentary activities, such as playing video games and with toy cars. These contradictions require future quantitative studies to shed light on the reason for this phenomenon.

Significant random intercept and year effects were found in all EPA except gymnastics, dancing, and acrobatics. Those effects indicate that there were individual differences in those activities in 1997 (the baseline year) and that school children may have experienced different growth rates across years while controlling for gender and age. The results imply that individuals have more control not only on the type but also on the length of extracurricular activities. From a health educator's view, this increases the difficulty of intervention for improving out-of-school physical activities. It is surprising that there were no random year effects on individual growth rate in in-school activities except on gymnastics, dancing, and acrobatics when great changes have taken place throughout the country in all aspects. School staff have the authority to control the type and the length of in-school physical activities, which could explain the homogeneous growth rates among school children in those activities.

Limitations and Implications

Missing data are common in some longitudinal studies. This study is no exception. To address this issue, linear mixed models were adopted as they are good for unbalanced designs. Still, the representativeness may be challenged. Considering that huge social economic changes have occurred in China, more data points could be used to reveal a better picture of the physical activities among Chinese school youth.

The average growth rates of physical activities were obtained while controlling for gender, age, and random effects, which complicates the interpretation of the results. This is due to the diversity of the participants who were from different provinces. It is not uncommon that the in-school situation and the out-of-school situation are different across villages, cities, and provinces. Many factors could contribute to the physical activity patterns. To have a better understanding of physical activity patterns among Chinese school youth, nationwide studies and studies in which homogeneous groups are targeted should be initiated. The nationwide studies would help researchers have a comprehensive view of the issue, and homogeneous group studies would help remove confounders and make results less complex and more meaningful.

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Youth-Driven Innovation in Sanitation Solutions for Maasai Pastoralists in Tanzania: Conceptual Framework and Study Design

Sheri Bastien, *University of Calgary*
Erin Hetherington, *University of Calgary*
Jennifer Hatfield, *University of Calgary*
Susan Kutz, *University of Calgary*
Mange Manyama, *Catholic University of Health and Allied Sciences, Tanzania*

Abstract

Open defecation, poor sanitation, and hygiene are associated with transmission of diarrheal diseases, one of the leading causes of mortality in children under 5 in developing countries. The main objective of this study was to develop and evaluate an intervention called Project SHINE (Sanitation and Hygiene INnovation in Education), in which a school-based participatory science education, empowerment, and social entrepreneurship model of health promotion was used among Maasai pastoralists in the Ngorongoro Conservation Area, Tanzania. The aim of this approach was to improve sanitation and hygiene through engaging youth as change agents to develop and sustain locally relevant health promotion strategies. The intervention was built on formative research and workshops and consisted of school-based lessons, extracurricular activities, sanitation clubs, community outreach events, and a sanitation science fair. In this article, the background, conceptual framework, and the Intervention Mapping process used to guide the development of the study are described. The project will enhance understandings of pastoralist norms and practices related to sanitation and hygiene. The intervention and the sanitation science fair will provide a unique opportunity to build linkages between schools and the wider community and to foster youth interest in science and social entrepreneurship through innovative youth-driven projects.

Sheri Bastien is an adjunct assistant professor for the Department of Community Health Sciences at the University of Calgary. **Erin Hetherington** is a PhD candidate at the Department of Community Health Sciences at the University of Calgary. **Jennifer Hatfield** is an associate dean, Strategic Partnerships and Community Engagement at the University of Calgary. **Susan Kutz** is a professor in Ecosystem Public Health at the Faculty of Veterinary Medicine at the University of Calgary. **Mange Manyama** is the associate dean of Medicine at the Catholic University of Health and Allied Sciences, Tanzania. Please send author correspondence to sbastien@ucalgary.ca.

Keywords

hygiene; school-based intervention; youth innovation; pastoralists; Tanzania; intervention mapping; participatory action research; OneHealth; health promotion

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Background

Approximately 215 million people practice open defecation in sub-Saharan Africa (Galan, Kim, & Graham, 2013). Open defecation, poor sanitation and hygiene are associated with transmission of diarrheal disease, which is one of the leading causes of mortality in children under five in developing countries. Further studies are needed in order to understand associations with childhood stunting and cognitive delays and deficits (Spears, Ghosh & Cumming, 2013; UNICEF, 2012). At the policy level, recent debates concerning the post-2015 development agenda have drawn attention to neglected diseases and have been focused on the importance of consensus regarding WASH (water, sanitation, and hygiene) targets and indicators. This has been highlighted as particularly important considering that access to basic sanitation has been identified as one of the most off-track Millennium Development Goals (World Health Organization [WHO], 2014).

Traditional top-down approaches to changing sanitation and hygiene behaviors and messaging based on eliciting embarrassment, disgust, and shame have been called into question with respect to ethics, in addition to the effectiveness and sustainability of behavior change triggered by these cam-

paigns (Bartram, Charles, Evans, O'Hanlon, & Pedley, 2012; Lupton, 2015). Approaches in which local knowledge, capacity, and preferences are not recognized cannot be sustainable. Evidence shows that integrated interventions are effective for achieving behavior change as well as a host of other important nonhealth outcomes, such as improving school attendance and gender equity (Asaolu & Ofoezie, 2003; Freeman, Clasen, Brooker, Akoko, & Rheingans, 2013; Greene et al., 2012).

Interventions need to be built on local capacity through innovations that are relevant, affordable, and accessible. Focusing on partnerships with communities can leverage the potential of knowledge sharing and mutual learning (Bradley, 2007). The promise of "frugal innovation," which is the development of reliable low-cost medical devices specifically adapted to the needs of resource-constrained settings, is increasingly being recognized as essential to improving health equity (Crisp, 2014).

Tapping into the creativity of youth by leveraging the education and entrepreneurship nexus can help develop the human capital required to promote healthy communities and to spur innovation. Engaging youth as change agents in health promotion recognizes that their experiences and perspectives are of value and gives them voice to articulate concerns. It also allows youth to develop the skills to create sustainable and locally relevant strategies to improve the health of their community. Youth-led social entrepreneurship and microfinance are also approaches that empower young people to generate income from their innovations (DeJaeghere & Baxter, 2014). Finally, engagement of youth in health promotion has been linked to a decreased likelihood of engaging in risk behaviors, increased self-esteem, increased self-efficacy, and an improved sense of social cohesion and connectedness (Bernat & Resnick, 2006).

In this article, we describe the conceptual and theoretical development of an intervention in which schools are used as gateways to engage the community in developing youth-driven and locally relevant strategies to improve sanitation and hygiene among pastoralists in Tanzania. Results of the intervention based on the evaluation plan outlined will be presented in future papers.

Method

Study Setting

This study took place among Maasai communities in the Ngorongoro Conservation Area (NCA) in Tanzania. The Maasai are semi-nomadic pastoralists who depend primarily on livestock for their livelihoods. Extended families live in groups of semipermanent houses called bomas in close proximity with their livestock. The NCA is a unique setting in that it functions as a national park where the primary industry is tourism; however, the Maasai have been granted the right to maintain their traditional livelihoods. There are limited

schools and health centers, and improved infrastructure exists predominantly to serve the tourist industry (McCabe, Perkin, & Schofield, 1992). Our study focus stems from concerns expressed by the communities in the NCA regarding the effect of parasitic infection on child health and hospital records, which indicate that helminth infections (parasitic worms) and protozoa contribute to fecal–oral transmitted diseases, including diarrhea, typhoid, dysentary, and trichuris trichiura. This study was conducted in parallel with another study by our research team, in which we are investigating the prevalence of helminth infections in primary school children in the NCA.

The research project was developed on the basis of a collaboration among the University of Calgary, Canada; the Catholic University of Health and Allied Sciences, Tanzania; and communities of Maasai pastoralists in the NCA, Tanzania. This collaboration began in 2004 and has been focused on various community-driven health promotion projects (Allen, Hatfield, DeVetten, Ho, & Manyama, 2011; Birks et al., 2011; Fenton, Hatfield, & McIntyre, 2013). Our transdisciplinary research team consists of members with expertise in the fields of education, psychology, anthropology, global health, and veterinary medicine and who embrace a One Health approach to understanding the interrelationships among humans, animals, and the evironment (Zinsstag, Schelling, Waltner-Toews, & Tanner, 2011).

Study Overview

The purpose of Project SHINE (Sanitation and Hygiene INnovation in Education) is to use innovative and participatory approaches to science education and social entrepreneurship to create sustainable solutions to issues regarding sanitation and hygiene. Specifically, the aim of the project is to (a) improve knowledge, attitudes, and practices among students related to sanitation and hygiene as well as increase interest and motivation for science and (b) engage secondary school students and the wider community in developing and evaluating sanitation and hygiene prototypes and health promotion strategies to reduce parasitic infection.

The Project SHINE intervention and the process of using Intervention Mapping (IM) as a planning tool are described in greater detail next. Briefly, the intervention consists of a series of workshops, community events, school-based lessons, and extracurricular activities, which culminate in a sanitation science fair (see Figure 1).

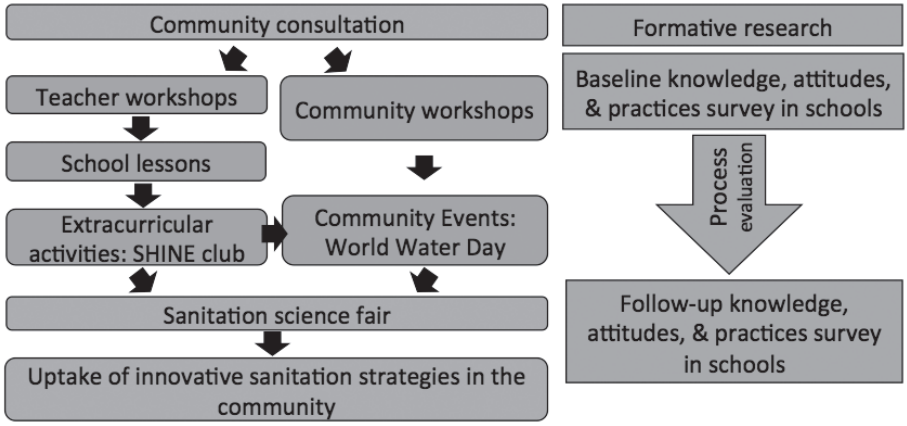

Figure 1. Project SHINE intervention overview.

Study Development

Theoretical Framework

Health promotion interventions are more likely to be effective if they are grounded in social and behavioral science theory, which may help predict or explain the pathway to a desired outcome (Glanz & Bishop, 2010). In a recent systematic review, it was found that some interventions with a focus on improving sanitation and hygiene in resource-limited settings have had positive effects on certain behavioral determinants, whereas behavioral changes in other interventions have been difficult to sustain and have tended to diminish over time (Dreibelbis et al., 2013). Strategies to increase the sustainability and effectiveness of an intervention include ensuring that interventions are multilevel and go beyond individual behavior change and that they are appropriately tailored to the context (Kreuter, Lukwago, Bucholtz, Clark, & Sanders-Thompson, 2003).

Project SHINE is situated within a social ecological framework that draws attention to the multiple overlapping factors influencing behavior at several levels of analysis (Golden & Earp, 2012), in particular the Integrated Behavioral Model for Water, Sanitation, and Hygiene (IBM-WASH) framework (Dreibelbis et al., 2013). Among a plethora of WASH models and frameworks, the IBM-WASH framework was designed based on a systematic review of other models that specify factors that influence WASH behaviors and is distinguished by its multilevel approach. The IBM-WASH framework consists of several levels, namely, societal/structural, community, interpersonal/household, individual, and habitual, and also three dimensions including contextual, psychosocial ("software"), and technological ("hardware"; Dreibelbis et al., 2013). Although

the scope of Project SHINE does not allow for engaging or addressing every level or dimension, the IBM-WASH framework was a useful tool to use in conjunction with IM to guide the specification of barriers and facilitators that may be influential in our context. An action research approach to youth and community engagement in health promotion was used in Project SHINE, and as such, theories concerning community mobilization were also particularly relevant for the conceptual design of the project (Baum, MacDougall, & Smith, 2006).

Intervention Mapping Process

The Project SHINE intervention development process was guided by an adapted IM approach, which involves six steps: (1) assessing the problem and community capacities; (2) specifying program objectives; (3) selecting theory-based intervention methods and practical applications; (4) designing and organizing the program; (5) planning, adopting, and implementing; and (6) developing an evaluation plan (Bartholomew, Parcel, & Kok, 1998). The first step, for instance, involved determining the availability of relevant prevalence data and data at the household level to develop an understanding of sanitation and hygiene within pastoralist communities. It also entailed establishing relationships with stakeholders, such as village executive officers and ward education officers, to enhance our understanding of the community context. A key aspect of applying an IM lens involves developing matrices with explicit key assumptions and elements underpinning an intervention. Two psychosocial theories in particular informed the development of the matrices: the health belief model and social cognitive theory (Bandura & McClelland, 1977; Rosenstock, Strecher, & Becker, 1988). For instance, key constructs, such as perceived severity and susceptibility, perceived benefits and barriers, and self-efficacy, as well as the role of modeling and outcome expectancies that underpin these theories guided the identification of outcomes and change objectives, in addition to the selection of theory-based methods and practical strategies to change health-related behaviors. The matrices served as important planning tools to assist in developing the intervention. The research team developed these based on literature as well as their emerging understandings of the context.

Matrices for each target population—teachers, students, and members of a local women's group—were developed for Project SHINE. An overview of the intervention matrices developed for the project is presented in Table 1. In Table 2, a truncated version of a matrix developed for students is presented, which was focused on identifying individual-, community-, and structural-level determinants related to specified characteristics and behaviors to be targeted by the intervention. IM matrices are available on the following website under Health Sciences Projects, Africa: http://www.ucalgary.ca/ghealth/projects. Performance objectives identify characteristics and behaviors intended to be

fostered in the intervention; for instance, in Project SHINE, the focus is on leadership development and empowerment, knowledge related to important sanitation and hygiene issues, and key behaviors, such as handwashing and appropriate latrine use. As key behavioral determinants, perceived benefits and barriers (pros and cons), perceived social norms, and self-efficacy are specified as key intervention targets. Finally, findings from the wider literature indicate that action plans and goal setting may be better predictors of behavior than intentions and therefore are important to specify among intervention change objectives.

Table 1

Intervention Matrix Overview

Students: Behaviors/Characteristics to promote

- Increased motivation and interest in science
- Participation/capacity/leadership to promote health (See details in Table 2)
- Increase correct and consistent handwashing
- Increased knowledge and appropriate use of latrines
- Increased knowledge of water and link to health outcomes

Teachers: Behaviors/Characteristics to promote

- Increase student motivation and interest in science
- Increase participation/capacity/leadership skills in students to engage as health promotion change agents
- Enhance knowledge and skills to teach about parasitic infection
- Promote handwashing in school setting
- Enhance knowledge about latrines and appropriate use/maintenance
- Extend knowledge of water quality and link to health outcomes

Women's Group: Behaviors/Characteristics to promote

- Participation/capacity/leadership to promote health
- Increased awareness and skills related to low-cost options to improve sanitation and hygiene
- Increase correct and consistent handwashing
- Increase knowledge and appropriate use of latrines
- Increase knowledge of water quality and link to health outcomes

Project Activities

Community Engagement

Knowledge of the project setting and context, developed through long-standing research collaboration with the communities, included interviews, group discussions, and community consultations in which we explored community concerns regarding the project. This process of community engagement was instrumental in developing the matrices and identifying, for instance, important protective behaviors and practices as well as barriers within

Table 2

Sanitation and Hygiene Intervention Planning Matrix for Students

Behavior/ characteristic to promote	Performance objectives (PO)	Pros (perceived benefits)	Cons (perceived barriers)	Perceived social norms/ influences	Self-efficacy	Action plans
Increased motivation and interest in science	PO1: Students will develop an appreciation of how engaging in science can positively affect and contribute to individual/community health. PO2: Students will develop critical thinking and leadership capacities and understand how this may positively affect employability and potential to engage in social entrepreneurship/income-generating activities. PO3: Students will participate in a range of science lessons, activities, experiments, and a sanitation science fair to develop skills and raise awareness among the wider community about the potential of science education, interest, and motivation to improve health outcomes/livelihood prospects.	1. I will increase my scientific knowledge and skills and learn about how this may lead to improved health at the individual/community level. 2. I will develop leadership and other skills that may improve my livelihood prospects. 3. I will feel that I'm making an important contribution to the wider community by drawing attention to important issues in my community.	1. Science education is not important to me/I don't like it/find it difficult. 2. The science classes at this school are boring, we do not have any equipment, and all the teacher does is talk. 3. "Western" science is limited and not relevant to my life.	1. School infrastructure influences. 2. School policy influences. 3. Teacher confidence/efficacy influences. 4. Student/school/community perceptions of importance of science.	It will be difficult to increase motivation and interest in science when: 1. I don't understand much about science or the links between science education, health, and livelihoods. 2. I don't believe science education can improve the health/livelihood prospects for youth. 3. The school does not have any lab equipment/resources/the class is too big/I cannot hear the teacher/understand the lessons. 4. Science classes are not relevant to issues to my life (textbooks and approaches based on "Western" science).	1. I will pay attention in class and learn more about how science education can positively affect health and livelihood prospects. 2. I will participate in extracurricular science activities to build my understanding of the importance of science education. 3. I will be an advocate for science education, including indigenous ways of knowing and its benefits in the school/community. 4. I will be an active participant in the sanitation science fair so that I can learn more about science education, health, and livelihoods.

Table 2 (cont.)

Behavior change strategies and methods:

1. Awareness raising and knowledge acquisition through participatory lessons, experiments, and activities related to science that are fun, are engaging, and demonstrate practical value for lives of students.
2. Skill-building sessions using role play to develop leadership skills for engaging in health promotion.
3. In-class debates about ongoing health promotion efforts in the community, which methods/strategies suit the local context and culture.
4. Debates about the relative merits of "Western" science versus traditional knowledge systems and discussion on commonalities and differences and how to value each and draw on the strengths of both.
5. Community awareness meetings and events (World Water Monitoring Day) involving parents, teachers, health workers, traditional leaders, pastoralist council, and other relevant community stakeholders to showcase student activities and project and raise the profile of students in the community.
6. Invite guest speakers (i.e., prominent Tanzanian scientists, doctors from Endulen hospital, NCA staff) to discuss the value and potential of science to affect health of communities.
7. Start a science club to encourage student inquiry and discussion about science, the nature of knowledge, and how "Western" science and local/traditional knowledge relate to each other.
8. Sanitation science fair, an opportunity for students to share their innovative ideas with parents and the wider community. Select top 3 for consideration for scale up.

Information provision
Consciousness raising
Active learning
Skill building
Role play
Planning/goal setting
Mobilization for social support/social change

Table 2 (cont.)

Behavior/ characteristic to promote	Performance objectives (PO)	Pros (perceived benefits)	Cons (perceived barriers)	Perceived social norms/ influences	Self-efficacy	Action plans
Participation/ capacity/leadership to promote health	PO1: Students will develop an awareness of how active citizen engagement and participation in health promotion at school and in the community can positively affect and contribute to individual/ community health. PO2: Students will develop specific skills, including science literacy and leadership, that will empower them to play a role in school and community health. PO3: Students will actively participate in health promotion efforts through outreach to the community via a science fair project.	1. I will increase my knowledge/skills about health and health promotion and learn about how efforts to improve health may have an effect at different levels. 2. I will develop leadership and other skills to enable active participation in community health issues. 3. I will be making an important contribution to the community by drawing attention to important health issues in my community. 4. I will get to demonstrate what I've learned about sanitation and hygiene to my parents and the wider community.	1. There are more important health issues than those related to sanitation and hygiene in the community. 2. Youth are ignored in school and in the community; we cannot make an impact. 3. I don't know enough about these issues to make a contribution. 4. Even if I come up with a good idea, we probably don't have the resources to implement it. 5. People are stubborn and will not change. 6. NCA won't support changes.	1. NCA policy influences. 2. School policy influences. 3. Community norms/preferences. 4. Cultural perceptions of youth.	It will be difficult to participate in health promotion efforts when: 1. I don't understand enough about health issues or how to engage in health promotion efforts. 2. I don't believe I can make a difference. Youth do not have the power to make changes. 3. The school/the NCA are not supportive of students getting involved in advocacy or planning health activities. 4. I am more concerned with day-to-day survival and getting enough food and water than with thinking about and finding energy for these issues.	1. I will learn more about how I can play a role in promoting healthy behaviors and practices in my community. 2. I will participate in activities at school that relate to health promotion and advocate for more student participation. 3. I will develop my leadership skills to enable me to influence health promotion efforts in my school and community. 4. I will be an active participant in the sanitation science fair to learn more about science education, health, and livelihoods and share my experience.

Table 2 (cont.)

Behavior change strategies and methods:

1. Skill-building sessions using role play to develop leadership skills for engaging in health promotion.
2. In-class debates about ongoing health promotion efforts in the community, which methods/strategies suit the local context and culture.
3. Community awareness meetings and events (World Water Monitoring Day) involving parents, teachers, health workers, traditional leaders, pastoralist council, and other relevant community stakeholders to showcase student activities and project and raise the profile of students in the community.
4. Participation in the youth advisory council/reference group for Project SHINE or the school sanitation club (opportunities for leadership development).
5. Sanitation science fair, an opportunity for students to share their innovative ideas with parents and the wider community. Select top 3 for consideration for scale up.

Information provision
Consciousness raising
Active learning
Skill building
Role play
Planning/goal setting
Mobilization for social support/social change

Table 2 (cont.)

Behavior/ characteristic to promote	Performance objectives (PO)	Pros (perceived benefits)	Cons (perceived barriers)	Perceived social norms/ influences	Self-efficacy	Action plans
Correct and consistent handwashing	PO1: Students will understand the rationale and importance of handwashing. PO2: Students will understand when it is most important to wash their hands. PO3: Students will practice correct and consistent handwashing techniques. PO4: Students will avoid potential behaviors that may increase their risk of worm infection.	1. It will improve my health in both the short and long term. 2. It makes me smell good. 3. I will feel better about myself.	1. I don't know how to wash my hands. 2. I don't have access to water or soap/ash/mud. 3. I don't believe it will have any effect or may have a negative effect on my health. 4. I don't have time to wash my hands. 5. I don't have anything to dry my hands after handwashing. 6. I find it difficult to remember to wash my hands. 7. My friends/ parents don't wash their hands.	1. Religious influences. 2. Cultural influences. 3. Peer group influences. 4. Parental/teacher monitoring and control. 5. Norms surrounding handwashing. 6. Norms related to water scarcity/use/ prioritization.	It will be difficult for me to wash my hands correctly and consistently when: 1. I am unsure how to do it properly. 2. There is no water/ soap/mud/ash available. 3. I am not convinced there will be a positive effect on my health. 4. I am in a rush to get back to class at school or go somewhere else. 5. I don't like having wet hands and nothing to dry them with. 6. I have difficulty remembering when it is most important to wash my hands. 7. I don't believe others my age are washing their hands. 8. I am unaware of the risks associated with not washing my hands. 9. I don't believe worm infections are very harmful to my health or I have other health concerns/priorities.	1. I will find out how to wash my hands properly. 2. I will learn when it is most important to wash my hands and why. 3. I will carry soap/ mud/ash with me whenever possible so that I can clean my hands. 4. I will prioritize making the time to wash my hands before and after important actions. 5. I will identify and try to avoid situations in which I may contaminate my hands when I don't have access to water/washing/drying material. 6. I will remind myself and pay attention to signs about washing hands. 7. I will talk to and convince my parents/ friends that it is a good thing to wash hands properly.

Table 2 (cont.)

Behavior change strategies and methods:

1. Use of Glo-Germ's UV light to illustrate "invisible" germs on hands.
2. Provide instructions on correct and consistent handwashing.
3. Forge links with health services. Invite health care workers to give demonstrations and practice sessions for students so they can practice and get feedback on correct and consistent handwashing.
4. Use of drama/theatre/songs to promote handwashing.
5. Reminders/cues (posters/stickers) to action to wash hands in key areas, such as in toilets and around kitchen/eating areas. Key messages to reinforce intentions.
6. Awareness raising of consequences of lack of correct and consistent handwashing to increase motivation.
7. Set behavioral goals and identify potential obstacles and strategies for overcoming barriers.
8. Stop-action role play, theatre involving community/school members.
9. Use comics to get students to reflect on and decide what they would do in various scenarios, and give feedback and tips on action plans.
10. Homework assignments that involve parents.
11. Debates about hygiene practices and norms.
12. Encouragement to support positive role modeling with peers and family members.
13. Community awareness meetings and events (Global Handwashing Day) involving parents, teachers, health workers, traditional leaders, pastoralist council, and other relevant community stakeholders to focus on the importance of handwashing and develop locally and culturally relevant efforts to promote handwashing in schools and communities.

Information provision
Intention formation
Active learning
Skill building
Role playing (if–then scenario)
Barrier identification
Planning/goal setting
Self-reevaluation/value clarification
Consciousness raising
Prompting identification as a role model
Mobilization for social change

the community to increasing uptake of handwashing, such as water scarcity. Participatory techniques, such as open defecation mapping (an exercise that involved having students draw their communities and describe human and livestock defecation practices), were used to encourage youth to think about potential contamination "hot spots" and modes of transmission of parasites. In addition, aspects of pastoralist lifestyle, including semi-nomadism and a close relationship to livestock, were discussed with study participants and stakeholders and carefully considered during all phases of intervention development. Finally, the development of theory-based behavior change strategies and methods for each priority group was an important aspect of program development and will continue to inform the project moving forward. Careful consideration of access to resources and sustainability is particularly crucial in resource-limited settings and when working with vulnerable populations. Community engagement is an integral and iterative process within the project that will deepen our understanding of pastoralist needs, norms, and practices as well as inform the development of the intervention.

School-Based Activities

Between May and September 2014, undergraduate, graduate, and faculty from the University of Calgary delivered a series of four workshops for 18 secondary school teachers that was designed to (a) enhance their knowledge of parasitism, water, sanitation, and hygiene and the link to health outcomes; (b) equip them with participatory lessons and activities that they could use in their classroom setting; and (c) prepare them to plan and implement science fairs in their schools. These interactive workshops were a unique knowledge-sharing opportunity for the Project SHINE team and the school teachers and contributed to the refinement of the project teacher manual and the intervention.

The teacher manual for secondary school biology and civics teachers was developed based on a review of the existing curriculum and was revised based on lessons learned during workshops and discussions with teachers. An overview of the topics covered in the school-based intervention is displayed in Table 3. The Project SHINE team developed lessons and adapted them from a range of other sources, including the World Health Organization (WHO), Centers for Disease Control and Prevention (CDC), Centre for Affordable Water and Sanitation Technology (CAWST), Glo Germ, and Safe Water. The lessons were designed to align closely with the objectives stated in the Secondary School Biology and Civics curriculum as mandated by the Ministry of Education in Tanzania. This was explicitly done to ensure that the lessons and activities contained within Project SHINE would serve as useful tools that would enable teachers to meet their existing teaching responsibilities, instead of increasing their teaching load. Participating teachers were provided with a teacher manual and log book so their experience with implementing project lessons could be documented.

Table 3
Overview of topics covered in the teachers' manual

Topic	Lesson objectives	Activities
Parasitism	• Discuss the symptoms, physical manifestations, and transmission of relevant sanitation-related illnesses in the area.	• Discuss the symptoms, physical manifestations, and transmission of relevant sanitation-related illnesses in the area.
Sanitation options in resource limited settings "Sanitation Spectrum"	• Describe the community's sanitation situation. • Identify options for improving sanitation. • List the steps that can be taken to improve sanitation in the household/community.	• Group work and discussions to identify sanitation issues and potential areas for change visually.
Hygiene	• Explain the importance of handwashing. • Describe the effectiveness of different methods of handwashing for removing germs.	• Glo Germ (use of Glo Germ powder/gel and UV light) used to observe microscopic germs that are invisible to the naked eye.
Water quality testing	• Understand that water quality cannot always be assessed visually. • Explain the difference between water testing techniques and the advantages and disadvantages of each.	• Conduct a variety of tests to distinguish between safe versus unsafe water, including a physical test to assess whether water looks safe to drink, a turbidity test to examine water quality, and a pH test to examine water quality.
Water treatment	• Discuss water treatment options. • Describe the advantages and disadvantages of each treatment method.	• Observe water samples under microscope and with naked eye from different sources, describe properties, and examine differences according to treatment method.

Diarrheal disease transmission	• List common ways of transmission of diarrheal diseases. • Describe a general path of bacteria from feces to mouth. • Discuss transmission routes in the community. • List problem areas and behaviors that put people at risk of infection.	• Participatory mapping exercises to examine open defecation, relationship between humans and livestock and spread of disease, flash cards, group discussion.
Use of microscopes and Foldscope	• Demonstrate how to use a microscope and Foldscope. • Demonstrate how to prepare slides.	• Hands-on exercises with microscopes and Foldscope to examine common water and sanitation-related parasites, bacteria, and viruses that are common in the area.

The school-based lessons and sanitation science fair took place in the latter phases of the intervention in November 2014 and targeted approximately 400 Form 3 students at the secondary schools. To prime the students for the science fair, the Foldscope, which is an origami-based microscope that costs less than a dollar to manufacture, was presented as an example of frugal innovation inspiration (Cybulski, Clements, & Prakash, 2014). Students were given their own Foldscope and had the opportunity to work with members of the Prakash Lab at Stanford University to assemble and experiment with using the Foldscope, in some cases as part of their science fair project. Students developed their own research projects based on needs in the community, focusing on the interactions between animal and human health.

The science fair was attended by all students enrolled and present on the day of the fair and by members of the community. In addition, students and teachers were invited to participate in the community awareness–raising events. To the best of our knowledge, this is the first sanitation science fair to be held worldwide, making this a unique opportunity in which students showcase their innovative ideas and projects designed to improve sanitation and hygiene to parents and the wider community. It is also the first One Health science fair of which we are aware, which draws attention to the need for health promotion strategies with a focus on pastoralists to be explicitly designed to address the interrelationship among man, animals, and the environment.

Evaluation Process

School-Based Data

There are two secondary schools in the NCA, and both schools agreed to participate in the study. In this study, a nonexperimental, before and after design was used to assess effectiveness of the intervention. This included a multistage consent process to ensure that the rights of children were protected and respected. After obtaining ethical permissions from Tanzanian and Canadian ethics boards, we obtained community consent from district officials and school headmasters. Given the low-risk nature of the educational intervention, which was consistent with the existing Tanzanian curriculum, a passive parental consent procedure was used whereby parents were provided with an information letter indicating the nature of the study and an option to withdraw their child. These consent methods have previously been used in Tanzania (Kajula, Sheon, De Vries, Kaaya, & Aarø, 2014; Kiragu & Warrington, 2013). We did not register any parental or student refusals for participation in the study.

Qualitative data in the form of in-depth interviews and group discussions with students, teachers, health care workers, and members of a local women's group were gathered as part of the formative research at the beginning of the study to understand perceptions of parasitism in humans and livestock as well as sanitation and hygiene practices and norms among pastoralists. An interpretive phenomenological approach was applied as an analytic framework for grasping local norms, attitudes, and practices, by accounting for verbal and nonverbal communication as documented by note takers (Fade, 2004). The findings from the formative research phase will be forthcoming.

The primary method of quantitative data collection in schools was a self-completed questionnaire. The questionnaire consisted of a set of sociodemographic questions, followed by a series of questions related to sanitation and hygiene knowledge and behaviors, sources of information and discussion about sanitation and hygiene, participation in health promotion planning and activities at the school and community level, and interest and valuation of science. Many of the scales were drawn from surveys, such as the Global School-Based Student Health Survey (GSHS), which has been validated among school children aged 13–17 years worldwide, including in Tanzania, and other validated tools (Seha, Klepp, & Ndeki, 1994; WHO, 2013). The questionnaire was pilot tested at a school in the Arusha region and revised accordingly. In April 2014, students in all grades (approximately 1,000 in total) at the two secondary schools in the NCA were invited to complete a self-administered questionnaire, with each question presented in English and Swahili to maximize comprehension. A follow-up survey was conducted at 6 months.

Upon completion of the sanitation science fair in November 2014, the evaluation team, which consisted of a wide cross-section of community representatives, and the research team reviewed the strengths, limitations, and feasibility of the projects to determine which could hold potential for scale up and youth-led social entrepreneurship. Particular emphasis was placed on low-tech solutions and suitability to local context. Discussions with the community and schools are ongoing, and details concerning the sanitation science fair and the outcomes will be presented in a forthcoming article.

To understand how the lessons were implemented and how school events, including the sanitation science fair, were carried out, a process evaluation was completed using interviews and group discussions, teacher log books, and classroom observation.

Community and Hospital-Based Data

To assess availability of sanitation facilities, we identified existing data collected as part of the Tanzania National Sanitation Campaign concerning sanitation facilities in the communities nearby participating Project SHINE secondary schools. In partnership with local authorities, we collected complementary data concerning the location, type, use, and maintenance of sanitation facilities at selected households. The data collection instrument and database were modified based on tools available from Sanitation Mapper, a free software program to map sanitation facilities using GIS funded by SHARE (Sanitation and Hygiene Applied Research for Equity). This tool has been used in low- and middle-income countries (Roma, Pearce, Brown, & Islam, 2012). In addition, monthly records from a rural hospital in the study setting dating to 6 months prior to the start of the intervention and 6 months after were included in the database to enable investigation of patterns of sanitation-related diagnoses in the community. Although we will not be able to attribute any changes to our intervention at this stage, we view this as an important first step in a process of engaging local authorities and assisting with the establishment of a monitoring and surveillance system.

In partnership with other community members, such as traditional leaders, hospital and dispensary staff, a local women's group, and policy makers, we evaluated the project on an ongoing basis to ensure that students and teachers found the project relevant and engaging and that it was having a positive effect on knowledge, attitudes, and practices; interest and valuation of science; and capacity to develop and sustain health promotion strategies.

Discussion

We believe Project SHINE is well positioned to make a unique contribution to health promotion and global health scholarship for several reasons: First, it is one of few studies in which the aim is to develop an understanding

of pastoralist knowledge and practices related to parasitic infection, sanitation, and hygiene using a One Health approach and in which a systematic development process, such as IM, is used. We also believe it is among the first to truly work in partnership with pastoralist youth and communities and within a salutogenic framework with a focus on factors that support human health rather than causes of disease. Finally, in recognition of the potential of frugal innovation, this study is also the first to test an innovative science education and social entrepreneurship model of health promotion engagement. We anticipate that if this model were found to be effective, it would have broad applicability to other settings and health issues. Support for the project has been high, with active participation and engagement in the project activities, and with students, teachers, and community members, including traditional leaders and local government officials, expressing support and enthusiasm for the study.

In Project SHINE, we attempt to deepen understandings of the context of pastoralist practices and norms related to sanitation and hygiene by situating our inquiry within a One Health framework. In addition to baseline and follow-up surveys of knowledge, attitudes, and practices of secondary school students, we collected formative research data throughout the project to explore issues such as pastoralist and livestock relationships, equity and access to resources, gender, social change effects on pastoralist sanitation and practices, seasonal variations, and sanitation and hygiene practices and norms in settings such as the school, the home, grazing pastures, and the wider community. Because of contextual constraints, such as water scarcity and lack of soap, researchers in formative research and students in the science fair projects have begun to explore the local practice of using plants for handwashing and anal cleansing. Traditional treatments for parasitism, including medicinal plants, were also explored through group discussions and interviews, as well as perceptions of hospital versus traditional treatment. We have also discussed with community members and teachers the valuation and incorporation of local knowledge in the national school curriculum, which may not always be relevant to the NCA context and which tends to privilege "Western" science and knowledge. In our setting, we see this as particularly important given that the majority of school teachers come from regions in Tanzania where cultural practices and norms are different from the NCA. It has been noted that although teachers in Tanzania may be encouraged to adapt the curriculum to the local context and culture, few make an attempt at "border crossing" or diverge from the primary material to engage with the discontinuities between a student's life world and school science or the foundational differences between Western science and indigenous knowledge systems (Semali & Mehta, 2012). Awareness and careful consideration of these tensions at all stages of the intervention are essential to ensure community buy-in and intervention effectiveness. The IM process was instrumental in encouraging systematic consideration and planning around

these key contextual features of our setting and provided added rigor to the intervention.

In this study, we used schools as settings to engage youth as change agents in the development and uptake of culturally relevant health promotion strategies to improve sanitation and hygiene among pastoralist communities. This strategy is in line with the WHO (2011) recommendations that emphasize the importance of school-based programs as effective and cost-efficient settings for health education, to reach not only school children and teachers, but also the wider community. We also used schools as gateways to the wider community in recognition that youth require support for their ideas to truly hold change-making potential. By engaging community stakeholders at multiple levels through all stages of the research process, we hope that the necessary supports and structures will be in place to increase the likelihood of uptake of promising youth ideas and strategies to improve sanitation and hygiene.

As mentioned, our model of science education and social entrepreneurship for health promotion presents a novel opportunity to foster youth-driven innovation. To that end, students participating in the project had the unique opportunity to be among the first students in the world to experiment with using the latest prototype of the Foldscope, an inspiring example of frugal innovation. The Project SHINE Sanitation Science Fair, held in November 2014, showcased student projects that may hold potential for improving sanitation and hygiene among humans and livestock in pastoralist communities or other resource-limited settings worldwide. These projects may serve as examples of successful reverse or frugal innovation, or they may simply spark an awareness, interest, and capacity among youth and communities in the NCA to continue to improve the health of their communities.

Several assumptions, limitations, and challenges associated with the Project SHINE approach merit discussion. First, a participatory action research project in which youth are engaged as agents of change assumes that youth are given voice within their communities. Given the complex nature of power structures within any community, youth participating in Project SHINE may face resistance to their ideas and strategies within the community, leading to a sense of frustration and disempowerment (Allen-Scott, Hatfield, & McIntyre, 2014). We also acknowledge that the uniqueness of the NCA context may present particular challenges to improving sanitation and hygiene practices and conditions. In addition to water scarcity, the NCA is a UNESCO World Heritage site and has land tenure rules that restrict the construction of permanent structures, including households. Furthermore, the NCA Authority has the right to prohibit and control grazing, collection of firewood, and residence, among other issues (Galvin, Thornton, Boone, & Knapp, 2008). At the same time, there is a governmental expectation that each household have a toilet, and this is reportedly enforced particularly during times of disease outbreak.

Political will at the national, regional, district, and ward levels as well as competing health priorities may present challenges to efforts to improve sanitation and hygiene. Thus, the capacity of youth and community members to exercise agency within this structure may be limited. This could be due to lack of voice within the context or to limited capacity and access to the resources required to make desired changes.

Our study will contribute toward building the evidence base for a model of participatory science education and social entrepreneurship for health promotion. We aim to test the assumption that this approach will lead to the development of effective, culturally relevant strategies to improve sanitation and hygiene among pastoralists, but we also recognize that schools are complex settings within which to work. Among the many challenges currently facing science education in Tanzania are overcrowded classrooms, shortage of textbooks, a reliance on rote learning, irrelevant curricula, poor learning outcomes, and poor linkages to the employment sector (Semali & Mehta, 2012). Teachers have multiple competing demands, and hosting a science fair requires knowledge, experience, and resources. Science fairs are not commonly held in Tanzanian schools, and none of the teachers with whom we spoke were familiar with science fairs. We hope that by partnering with our two pilot schools and by sharing resources and other teaching and learning supports with them, we can overcome some of these challenges.

Conclusion

In this article, we presented the Project SHINE design and conceptual framework that we used in an attempt to foster youth-driven innovation in sanitation and hygiene strategies for pastoralists in Tanzania. To the best of our knowledge, this is the first attempt to apply IM to a sanitation and hygiene intervention in which a pastoralist population is the priority. We have found it to be an effective planning tool that has added rigor to the study and that has fostered an iterative cycle of reflection and adaptation concerning project approaches and outcomes. It is our hope that Project SHINE will contribute to the body of evidence concerning health promotion more generally and of health promotion among pastoralist populations more specifically.

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Breast Self-Examination Education Among Dominican Women: A Pilot Study

Robin M. White, *Ohio Northern University*
Laurie Camper, *St. Rita's Medical Center*

Abstract

Purpose: Dominican women have limited exposure to breast health/breast self-examination (BSE) techniques. With increased incidence of breast cancer internationally and the burden of breast cancer deaths in low-income countries, it is challenging to develop effective strategies to decrease mortality. The purpose of the pilot study was to assess and educate Dominican women on breast health/BSE. Study objectives included collect data on current breast cancer knowledge and BSE practices; provide education and demonstrate proper BSE; have participants return-demonstrate proper BSE on a model; and determine the need for larger scale breast health programs. **Methods:** In this descriptive feasibility study, we surveyed rural Dominican women (N = 73) to determine BSE knowledge and provided education/demonstration during medical mission clinics. **Results:** All women reported limited previous knowledge of breast health/BSE, with 6% reporting monthly BSE. After instruction, 100% of women reported knowledge, with 90% reporting intentions of monthly BSE. **Conclusion:** Despite limitations, this project increased BSE knowledge in rural Dominican communities.

Keywords

breast; breast self-examination (BSE); breast health; breast cancer; health promotion; Dominican

Robin M. White, PhD, MSN, RN is an Assistant Professor of Nursing at Ohio Northern University and a research consultant to St. Rita's Medical Center. **Laurie Camper**, BSN, MBA, RS is a perioperative clinical nurse for St. Rita's Medical Center. Please send author correspondence to r-white.5@onu.edu.

Introduction/Purpose

With an increased incidence of breast cancer internationally over the last several decades and an even greater burden of breast cancer deaths in low-income countries, a challenge exists to develop effective strategies to reverse this trend of increasing mortality (Porter, 2009). The global incidence of breast cancer increased from 641,000 in 1980 to 1.64 million in 2010, making it the leading type of cancer and also the leading type of cancer mortality (Shetty, 2013). Furthermore, approximately 60% of the breast cancer deaths occurred in less developed countries with 5-year survival rates ranging from 12% to 60% (Sankaranarayanan & Ferlay, 2013).

Early detection of breast cancer through diagnostic imaging may be a promising long-term intervention requiring less extensive treatment to prevent cancer deaths, although the economic investment required to provide screening programs may not be feasible for lower income countries (Porter, 2009; Shetty, 2013). Inexpensive screening methods are more practical for developing countries and must be used to overcome financial barriers. Effective methods to improve early diagnosis include breast cancer screening through breast self-examination (BSE) and clinical breast examination (CBE), followed up with ultrasound if a breast lump is detected (Porter, 2009; Shetty, 2013). Studies have shown that the survival of women with early breast cancer diagnosis is 90% (Moodi, Mood, Sharifirad, Shahnazi, & Sharifzadeh, 2011). Sorensen, Hertz, and Gudex (2005) reported that about 95% of breast cancers can be diagnosed in primary stages if BSE is used regularly. Porter (2009) suggested addressing the breast cancer burden through partnerships between the government, public health system, health care professionals, and community advocates and organizations.

In low-resource countries, such as the Dominican Republic, women present at medical clinics with breast masses that are in the advanced stages, leading to high mortality rates (Porter, 2008, 2009). For example, breast cancer mortality to incidence is less than 0.20 in North America, whereas it is 0.35 in Latin America and the Caribbean (Porter, 2008). Public health systems in many Caribbean regions are focused on the health challenges of infectious diseases and infant mortality, ignoring chronic disease, including cancer. Global mortality rates from breast cancer total 465,000, whereas approximately 35,000 women die each year from breast cancer in the Caribbean region alone (Knaul, Lozano, Arreola-Ornelas, & Dantes, 2008; Moodi et al., 2011). When performed, regular screening for breast cancer has been found to be one of the most effective methods to promote timely treatment and improve survival (Flórez et al., 2008; Petro-Nustas, Tsangari, Phellas, & Constantinou, 2013). Early diagnosis of breast cancer requires the education of women on disease signs and symptoms as well as the importance of seeking care early, especially in rural settings (Shetty, 2013). In fact, the Breast Health Global Initiative

Guidelines support breast health awareness education, BSE, and CBE when health care resources are scarce (Shetty, 2013).

The purpose of this pilot study was to assess and educate Dominican women on BSE and breast health. The specific aims of this project were to (a) collect data on the Dominican women's baseline knowledge of breast cancer and BSE techniques; (b) provide education and demonstrate proper BSE self-examination to Dominican women; (c) encourage Dominican women to return-demonstrate breast examination on a breast model; and (d) determine the need to produce a breast cancer screening program on a larger scale. We hypothesized that the Dominican women (a) would have little or no previous knowledge of BSE and (b) would not know what to do if they found a suspicious lump in their breasts.

This pilot study was initiated in the Dominican Republic in May 2013 to determine inhabitants' knowledge of breast cancer and their responses to breast cancer screening education. The theoretical framework for this project was the Health Belief Model (HBM; Becker, 1976), which asserts that people's health-related behavior depends on their perception of (a) the severity of the potential illness, (b) their susceptibility to that illness, (c) the benefit of taking preventive action, and (d) barriers to taking that action.

Literature Review

The HBM has frequently been applied to breast cancer screening because health behaviors are often influenced by people's perception of threat to their health as well as the value of their actions to decrease that health threat (Dundar et al., 2006). Women may decide to practice BSE on contextual and personal factors including (a) their knowledge of breast health, (b) their attitudes toward breast cancer, and (c) their health beliefs (Petro-Nustas et al., 2013).

The HBM supposes that each woman's perception of a perceived threat to her health due to breast cancer affects her health-related behavior, such as performing a monthly BSE. According to the HBM, if a woman perceives that she is susceptible to breast cancer, she will start practicing BSE at an early age (Petro-Nustas et al., 2013). If a woman believes that performing a BSE is beneficial to breast health (perceived benefit), and if she is proficient at performing the BSE (confidence), fear (barrier) will be overcome, and she will routinely practice BSE (Dündar et al., 2006; Petro-Nustas et al., 2013). The HBM accounts for personal health behaviors by identifying factors associated with individuals' beliefs. Moodi et al. (2011) found that breast health education had a positive effect on increasing knowledge and attitude about BSE.

Although research shows that breast cancer incidence is highest in more developed regions, overall breast cancer mortality rates are greater in developing countries as a result of late detection, diagnosis, and treatment (Akpo, Akpo, & Akhator, 2010; Porter, 2009). With over 1 million new breast cancer

diagnoses worldwide in 2009, lower resource countries were burdened with 45% of these breast cancer cases and 55% of the breast cancer deaths (Porter, 2009). Knaul, Bustreo, Ha, and Langer (2009) cited that in low- and middle-income regions approximately 317,000 women died from breast cancer, as compared with high-income countries where 155,000 women died. The elevated breast cancer mortality rates in developing countries are often due to late-stage diagnosis and inadequate health care systems. In addition, the incidence of breast cancer widely varies across regions because of differences in culture, health resources, and lifestyles (Porter, 2009). Furthermore, there is a lack of health statistics in developing countries as well as the need for cancer registries to better realize the extent of cancer incidence and mortality rates in these regions (Knaul et al., 2009; Shetty, 2013).

Regardless of culture or socioeconomic status, improved cancer screening participation can result in early breast cancer discovery, decreased incidence of Stage 3 and 4 cancer diagnoses, and improved health outcomes, thereby improving cancer survival rates (Gany, Trinh-Shevrin, & Aragones, 2008). Some common Hispanic cultural values that must be included in breast health education include (a) family, (b) respect, (c) folk illnesses, and (d) spirituality (Siatkowski, 2007). Decisions about health care are often made as a family in a collaborative fashion. Respect for self and others, especially elders in the community, is of high value. Folk illnesses may even be considered a "curse" caused by another individual. Finally, spirituality and prayer are often an integral part of daily life and the healing process (Siatkowski, 2007).

The global incidence of breast cancer varies widely and is most likely due to differences in ethnicity, culture, health resources, and lifestyle patterns, requiring diverse strategies (Porter, 2009). In developing countries, resources and health care services are lacking, although the need for effective strategies has increased. In rural areas of developing countries, breast health awareness is even more challenging than in urban areas (Shetty, 2013). Some methods for early detection of breast cancer are expensive, but the most cost-effective strategy is the monthly BSE to detect individual tumors, prompting clinical examination, diagnosis, and treatment. Furthermore, BSE is a patient-centered, noninvasive, cost-effective method of monitoring for breast abnormalities, especially in rural, low-resource areas (Shetty, 2013). This is often an accepted starting point to increase awareness and acceptance of breast health in developing countries, especially as it is unrealistic for developing countries to perform mammograms for all women over age 40 years (Knaul et al., 2009; Porter, 2009).

The fundamental purpose of developing breast health strategies is to promote diagnosis of breast cancer in early stages to improve mortality (Shetty, 2013). BSE is a viable option in rural areas of low-resource, developing countries and may still detect breast cancers early enough for effective treatment, whereas access to CBE and mammography is often limited (Dündar et al.,

2006). The American Cancer Society (ACS, 2013) recommends that women know how their breasts normally feel and report any changes to their health care professionals. Fancher et al. (2011) reported that women who regularly practiced BSE monthly presented with smaller tumors that less often involved axillary lymph nodes. Developing countries must, therefore, place a greater emphasis on early detection through BSE to reduce the proportion of breast cancers diagnosed in Stages 3 and 4 (Knaul et al., 2009).

Current international breast cancer incidence has increased by 3.1% annually, and the prevalence is even greater in young women in developing countries (Kelly & Shetty, 2013). Furthermore, in low-resource countries, approximately 63.5% of the new cases of breast cancer occur in women under age 50, with 72.1% of the deaths from breast cancer occurring in this age group. A recent report on global breast cancer showed that 23% of breast cancer cases occurred in the 15–49 year age group in developing countries, as compared with 10% in developed countries, suggesting breast screening should begin at earlier ages (Shetty, 2013).

Cultural beliefs may be a barrier to effective BSE education. For women in some cultures, the perceived inability to cope with a potential breast cancer diagnosis can result in the circumvention of breast cancer screening (Kudadjie-Gyamfi, Magai, & Consedine, 2010). Although there is research supporting the concept of fatalism as a deterrent to breast cancer screening, a recent qualitative study by Flórez et al. (2008) showed that Latino and Dominican women supported breast cancer screening and held positive attitudes and proactive behaviors toward breast cancer prevention and cancer survival ($N = 25$). Fatalism refers to the belief that events are predetermined by external forces and that little can be done to change their course; breast cancer may be seen as a predetermined condition that is unavoidable (Chavez, Hubbell, Mishra, & Valdez, 1997). Flórez et al. emphasized the importance of understanding cultural factors that may determine either barriers or incentives to breast cancer screening. In addition, Flórez et al. found that Dominican women were more motivated to participate in cancer screening if they believed late diagnosis or no treatment would lead to death. Dominican women in the United States cited a lack of health care access as the most significant barrier to cancer screening (Flórez et al., 2008).

Roth et al. (2010) conducted a retrospective, quantitative study using secondary, self-reported National Health Interview Survey answers from 361 female breast cancer survivors between 1980 and 2003. They sought to determine why so many women in their clinics reported breast cancers that were detected by methods other than screening mammograms, as 70% of women in the United States reported having a screening mammogram in the previous 2 years (Roth et al., 2010). Roth et al. reported that 56% of breast cancers since the 1980s had been discovered either through CBE or a patient-reported

abnormality. These findings support the importance of teaching women BSE techniques to expedite women seeking clinical diagnosis and treatment of breast malignancies in earlier stages (Roth et al., 2010).

Funke, Krause-Bergman, and Nave (2008) conducted a longitudinal, quantitative study to examine the long-term effects of teaching BSE and breast health awareness. They used self-reported data from women who had attended in-depth breast health seminars in Germany to learn about the effectiveness of a campaign promoting BSE and breast health awareness. Individual and group seminars were taught by female gynecologists, including discussions about the importance of BSE (Funke et al., 2008). Questionnaires were distributed before and after the event as well as 1 year later. They examined the percentage of women who reported performing a monthly BSE before the teaching sessions (21.4%) and at the 1-year follow-up (61.9%; Funke et al., 2008). A significant clinical effect of educating women on BSE was seen; 5.4% of the women had palpated a lump in their breasts poststudy, all had consulted a gynecologist, and one was diagnosed with breast cancer (Funke et al., 2008).

Duda and Bhushan (2011) assessed the baseline knowledge, attitudes, BSE practices, and CBE practices among rural Nicaraguan women. Their research validated the benefits through an informal breast health campaign in an area where breast cancer is the second most common malignancy among female Nicaraguans (Duda & Bhushan, 2011). A community project was designed to increase breast health awareness using a BSE teaching model specifically developed for instructing rural Nicaraguan women (Duda & Bhushan, 2011). The study involved 198 Nicaraguan women initially, with 60 available for the 2-week follow-up assessment. Comparisons made between the pre- and postinstruction survey questions showed substantial improvement in all areas. Duda and Bhushan noted that the surveys demonstrated positive outcomes even with a relatively informal breast health campaign.

In a recent study with Latinas residing in the United States, volunteer lay health advisors ($N = 74$) performed an interactive training program on breast and cervical cancer screening (Saad-Harfouche et al., 2010). Results showed that health education programs led by lay health advisors that are focused on breast health and other health promotion topics may be an effective strategy in improving health in underserved populations, as they often share similar socioeconomic and cultural characteristics (Saad-Harfouche et al., 2010).

Although each study was focused on various minority populations, the underlying theme of the data collected was consistent: Regardless of community location, community education level, or community availability of resources, health education on BSE is an inexpensive yet effective technique for helping to identify breast cancers in earlier stages. This may allow for earlier treatment initiatives, thus improving the long-term chances of survival (Gany et al., 2008). Because research supports the need for early detection of breast cancer, spe-

cific cost-effective strategies need to be developed for the promotion of breast health, including BSE for women in developing countries (Knaul et al., 2009).

Method

Design and Sample

After obtaining approval through the institutional review board at Ohio Northern University, we discussed the feasibility study details with medical mission team members, including the director (physician) and clinical coordinator (nurse). This pilot project was created in response to the need for basic BSE teaching in the rural areas of the Dominican Republic as expressed by physicians working with medical teams in this region. Preliminary research shows a pervasive lack of knowledge regarding BSE for cancer screening throughout the Latin America/Caribbean region. In this feasibility study, we used a descriptive research design with a convenience sample of 73 rural Dominican women. The project was implemented in mobile medical clinics in the rural areas of the western Dominican Republic

Measures

While Dominican women were waiting to receive medical care at mobile medical clinics offered by U.S. volunteers in four barrios, they were individually approached and asked if they would like to participate in a brief survey and breast health education session. Each barrio was notified several weeks prior by the community leader about the mobile clinic with health promotion education. They were surveyed in Spanish pre- and posteducation through the use of a female interpreter and were asked questions regarding their current knowledge of (a) breast cancer, (b) BSE technique, (c) BSE frequency, and (d) medical treatment options for breast health. The questions were asked through the interpreter because many of the women stated they were more comfortable being asked the questions verbally. The researchers also provided (a) a pamphlet with written breast health information in Spanish, (b) simple line drawings of BSE technique, (c) discussion of cancer warning signs and risk factors, and (d) verbal instructions and demonstration of a breast exam on a breast model. The HBM served as a conceptual framework throughout the study.

Three registered nurses provided instruction, with the assistance of a female Dominican interpreter. In an attempt to encourage enthusiastic participation in the study, as well as to start to promote breast cancer awareness in general, we and the female interpreter wore pink uniforms or pink breast cancer awareness T-shirts and handed out pink parachute rope bracelets. We employed a 20-year-old female Dominican interpreter, who worked closely and enthusiastically with the project. She actively engaged the women by discussing and demonstrating the BSE techniques and by coaching the participants

during their practice sessions on the plastic breast model. At the conclusion of the study, this interpreter continued BSE education among the local women while accompanying subsequent medical mission groups visiting the region.

The survey was developed for this pilot, with validity testing performed by having several Spanish-speaking women complete the survey prior to the study. After a baseline 3-point Likert scale survey (*none, some,* or *a lot*), women were shown a poster with drawings of BSE performed while standing in front of a mirror, lying on a flat surface, and in the shower. Second, the women were shown three breast palpation patterns and instructed to use three fingers flat on the breast to perform their examinations. Finally, the women were given the opportunity to palpate lumps in a plastic breast model, demonstrating BSE techniques. Women were surveyed on breast health pre– and post–breast health education/demonstration to determine teaching effectiveness as well as their intentions to begin monthly BSE. In addition, the women were encouraged to disseminate their new knowledge of breast cancer awareness and BSE techniques to female friends and family members.

Findings and Analysis

The short-term effect of the project incorporated into a medical mission trip was evaluated by comparing Dominican women's survey responses before the individual teaching session to their survey responses after the breast health education. The HBM was used as a conceptual framework throughout the study to look at personal decisions to perform routine BSE. Seventy-three women aged 18 years and over from four rural communities in the Dominican Republic received basic breast cancer education and instructions on two methods of BSE. Many of the women attempted to find lumps by poking the breast model lightly in random locations. They were then retaught a three-finger palpation technique. Study participants ranged in age from 18 to 78 years. The average age of the participants was 35.8, and the most frequently surveyed participants were 20 to 22 years old.

Surveys were analyzed using basic descriptive statistics (means, mode). Analysis of this breast health project demonstrated a significant increase in BSE knowledge. Of the women, 37% indicated BSE knowledge prior to breast health education, whereas 91% indicated BSE knowledge after education, demonstrating a 54% increase. Most significantly, the BSE education provided in this study resulted in a dramatic increase in the number of women who indicated their intention to perform monthly BSE. Before the study, 94% of the participants performed BSE less than monthly or never. After instruction, 90% stated that they would perform a monthly BSE (Figure 1). In addition, 100% of the women surveyed agreed to share the information with female family and friends (Table 1).

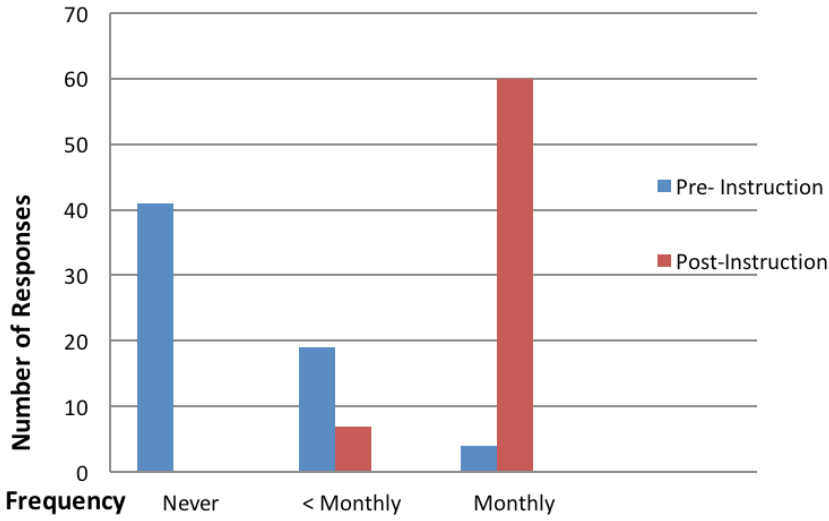

Figure 1. Frequency of Breast Self-Examinations in Rural Dominican Republic Women

Table 1

Dominican Women Pre– and Post–Breast Health Education Questions and Responses

Pre–breast health questions	Pre–breast health results	%
Have you ever heard of a disease called breast cancer or such things as breast lumps or breast tumors?	None = 13 Some = 59 A lot = 0	18 82
Do you know anything about examining your own breasts for lumps or abnormalities?	None = 40 Some = 24 A lot = 0	63 37
How often do you perform an examination of your breasts to check for problems?	Never = 41 Less than monthly = 19 Monthly = 4	64 30 6
Are you aware of what you should do or who you should talk to if you have a lump or abnormality in your breast?	No = 12 Some = 53 Definitely = 3	18 78 4

Post–breast health questions	Post–breast health results	%
Do you feel that you now have some knowledge of breast cancer?	None = 0 Some = 63 A lot = 5	 93 7

Do you feel that you now have some knowledge about BSE?	None = 0 Some = 62 A lot = 6	 91 9
How often do you feel that you will examine your breasts from now on?	Never = 0 Less than monthly = 7 Monthly = 60	 10 90
Do you feel that you now know what you should do or who you should talk to if you find a lump or abnormality in your breast?	No = 0 Some = 60 Definitely = 8	 88 12
Do you think you will share this information with other women so they will know what problems to look for in their own breasts?	Yes = 73 No = 0	100

Prior to breast health education, 91% stated they had little or no previous knowledge of BSE and 88% answered that they did not know what to do if they found a suspicious breast lump. After BSE education, 100% stated that they had some or much knowledge of how to examine their breasts for lumps and who to contact if they detected a breast lump. The women who participated expressed their intent to perform routine BSE as well as share the BSE information with friends and family.

Examination of the results by age indicated that women in the youngest and oldest age brackets were the most likely to change their BSE practices after receiving education. In the 18 to 30 age group, none of the women performed monthly BSE before instruction, and 92% indicated an intention to perform monthly BSE after the teaching project. In the 51–60 age bracket, none of the women performed monthly BSE before instruction, and 100% indicated an intention to perform monthly BSE after the project. Similarly, in the over-60 age group, only 14% of the women performed monthly BSE before education, and 100% said they intended to perform monthly BSE after the instruction (Table 2).

Table 2
Dominican Women Pre– and Post–Breast Health Education BSE Frequency by Age Group

Age range	Frequency of BSE prior to instruction	%
18–30 years	Never = 20	80
	Less than monthly = 5	20
	Monthly = 0	0
31–40 years	Never = 7	41
	Less than monthly = 7	41
	Monthly = 3	18
41–50 years	Never = 14	74
	Less than monthly = 5	26
	Monthly = 0	0
51–60 years	Never = 4	80
	Less than monthly = 1	20
	Monthly = 0	0
61+ years	Never = 5	72
	Less than monthly = 1	14
	Monthly = 1	14
Age range	**Frequency of BSE (intended) after instruction**	**%**
18–30 years	Never = 0	0
	Less than monthly = 2	8
	Monthly = 23	92
31–40 years	Never = 0	0
	Less than monthly = 3	18
	Monthly = 14	82
41–50 years	Never = 0	0
	Less than monthly = 3	21
	Monthly = 11	79
51–60 years	Never = 0	0
	Less than monthly = 0	0
	Monthly = 5	100

Discussion

The two study hypotheses were supported by survey results. First, we hypothesized that the Dominican women would have little or no previous knowledge of BSE (37% preeducation). With breast health and BSE education, posteducation survey results demonstrated a 54% increase. Next, we hypothesized that women would not know what to do if they found a suspicious lump in their breasts (88% preeducation). Health care follow-up if a breast lump is discovered improved significantly with breast health education (100%).

The youngest and oldest women demonstrated their intent to practice a routine BSE after breast health and BSE education. These results are monumental as Fancher et al. (2011) found that young women are more likely to present with advanced stage breast cancer. In addition, Fancher et al. found that 69% of younger women (under 41 years) and 39% of older women (over 40 years) discovered their breast lumps through BSE. Although the ACS (2015) recently recommended that monthly BSE be optional, it also recommends that women be educated on the benefits and limitations of BSE. The ACS (2015) also suggests that women start using the BSE technique in their 20s, get to know how their breasts normally feel, and report any changes to their health care provider.

Although the intent of the pilot study was to survey and educate Dominican women on breast health/BSE, several of the communities had multiple immigrant Haitian families residing there and attending the medical clinics. During the 4 days of this feasibility study, we met and taught primarily Dominican women and a small number of Haitian women. Haitian immigrants are affected by barriers shared by other underserved populations, such as language, undocumented status, and limited health care benefits, and often exhibit limited knowledge of cancer screening and treatment (Gany, Herrera, & Avallone, 2006). Furthermore, Haitians living in the Dominican Republic have even greater limitations on health care because of their immigration status as well as language barrier as their primary language is Creole. Conversation and instruction took place in three languages: (a) English, (b) Spanish, and (c) Creole.

Regardless of culture or socioeconomic status, improved cancer screening participation can result in early breast cancer discovery and more favorable outcomes (Gany et al., 2008). Many studies have shown that women who routinely practice BSE present with smaller tumors and less frequently have axillary node involvement (Fancher et al., 2011; Porter, 2009). Furthermore, cultural values must be included in breast health education, including (a) family, (b) respect, (c) folk illnesses, and (d) spirituality (Siatkowski, 2007).

It should be noted that this project was implemented in areas of the Dominican Republic where women often become pregnant at an early age. One study limitation was the exclusion of pregnant women and girls under age 18. This trend was especially true in the Elias Piña community, an area located within 15 miles of the Haitian border where primarily young, Haitian women, many of whom were pregnant, lived.

Additional limitations of this study include (a) the language barrier (including the need for translation in Spanish and Creole), (b) illiteracy, (c) a significant gap in baseline research to assess attitudes and beliefs of Dominican women on breast cancer screening, (d) limited number of personal contacts at each of the four locations, (e) a large number of pregnant women and girls under age 18 that may have benefited from BSE education, and (f) limited com-

parison data between Dominican and Haitian women on their breast health education and beliefs.

Suggestions for Applying Research Findings

It is possible for cancer screening rates to be improved by (a) targeting health promoters in rural communities to assist with breast health programs, (b) improving Dominican women and health promoter understanding of BSE guidelines, (c) determining Dominican women's attitudes toward breast cancer screening, and (d) continuing BSE education programs with health promoters and community members. In addition, the use of health promoters to educate Dominican women on BSE and other health education programs may be an effective sustainable strategy in improving health in underserved populations, often sharing similar socioeconomic and cultural characteristics (Saad-Harfouche et al., 2010).

As a result of this pilot study based on educating rural women in the Dominican Republic on breast health awareness and BSE practices, and to improve the sustainability of the project, a breast model was purchased for the mobile medical clinic, and future medical mission volunteers will have the opportunity to continue this project.

Conclusions

In contrast to developed countries where the main source of breast health information may be the media (radio/television/newspaper/magazines), health care professionals and rural health promoters are the major information sources in developing countries. An increase in breast health awareness and BSE practices may reduce barriers even in low-resource, developing countries. Proper breast health education on BSE can be an important step in shaping women's breast health behaviors and promoting earlier detection of breast cancer in an effort to improve mortality rates.

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A Bosnian Refugee Community's Hidden Capacity in Preparation for a Natural Disaster in the United States

Huaibo Xin, *Southern Illinois University Edwardsville*
Ajlina Karamehic-Muratovic, *St. Louis University*
David Cluphf, *Southern Illinois University Edwardsville*

Abstract

The aim of this study was to map out the internationally resettled Bosnian community's current capacity to overcome a natural disaster and identify the strengths and limitations for future community capacity building to increase disaster resilience. Thirty-three Bosnian refugees were interviewed to identify its community's capacity to respond to and recover from a natural disaster, including community social capital, institutional support, access to resources, economic development, and knowledge and coping. Data were analyzed thematically and theoretically. Four themes emerged: Bosnian community represents a home to its individuals, Bosnian community is a cohesive whole with empowered community outreach, Bosnian community is capable of responding to a natural disaster because of its individuals' aggregated coping skills learned from the war, and environment change affects the Bosnian community's capacity to respond to a natural disaster. The Bosnian community has a strong capacity for social networking, social cohesion, coping, and economic development needed in case of a natural disaster. Future endeavors should be focused on further strengthening the community's current capacity, expanding community links to social capital, and developing volunteer capacity.

Keywords

community capacity building; social vulnerability; Bosnian refugees; natural disasters

Huaibo Xin is an assistant professor Department of Kinesiology and Health Education at Southern Illinois University Edwardsville. **Ajlina Karamehic-Muratovic** is an assistant professor for the Department of Anthropology and Sociology at St. Louis University. **David Cluphf** is a professor for the Department of Kinesiology and Health Education at Southern Illinois University Edwardsville. Please send author correspondence to hxin@siue.edu.

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Government takes the primary responsibility for disaster management and risk reduction. It plays a major leadership role in community vulnerability assessment, disaster preparedness planning, and mobilization of emergency resources (King, 2008; Perry & Lindell, 2003). However, the literature increasingly demonstrates that a top-down government command approach is no longer sufficient and suggests a collaborative effort among government agencies, nongovernment organizations, and local communities. A bottom-up community-based participatory approach is more appropriate in addressing a community's concerns, mobilizing community assets, and mitigating the effects of a disaster (Pandey & Okazaki, 2005; Van Aalst, 2008; Waugh & Streib, 2006).

Disaster researchers and practitioners have shifted their focus to the involvement of community partners in the process of community capacity building through the lens of social ecological systems. Ecosystems generally include the characteristics of natural environments, such as biodiversity, environmental functions, and spatial patterns. Social systems are characterized by the links and interactions among a variety of influences, such as demographics; organizational capacity; social capital and cohesion; infrastructure; communication patterns; community norms, attitudes, and values; community involvement; and political forces (Adger, Hughes, Folke, Carpenter, & Rockstrom, 2005; Maguire & Hagan, 2007; Park & Miller, 2006; Patterson, Weil, & Patel, 2010).

The notion of community capacity building has been widely applied to diverse disaster situations. For instance, Buckland and Rahman (1999) examined the determinants of community preparation and response to the 1997 Red River Flood in Canada. They concluded that the levels and patterns of community development in physical, social, economic, and human capital were critical to community-based disaster management.

In an analysis of the California's Portola Valley case, the local community was fully engaged in the process of disaster management and community disaster planning, decision making, and partnering with government authorities in preserving physical and human environments. The results demonstrated the effectiveness of the sustained mitigation of hazards, such as earthquakes and landslides (Pearce, 2003).

Similarly, an integrated community-based disaster management program was successfully piloted with the Shang-An village in Taiwan to empower the community to become a disaster-resistant, resilient, and sustainable community. The actions undertaken in this program included empowering the village residents to identify their community's vulnerabilities to natural disasters, developing solutions, and implementing disaster management strategies and trainings through their own community organizations (Chen, Liu, & Chan, 2006).

Evidence was also presented in the Philippines, Fiji, and Samoa for emphasizing the importance of mapping, building, and enhancing multilevel

and multifaceted community disaster response and recovery capacities with their community stakeholders (Chen et al., 2006; Gero, M´eheux, & Domineу-Howes, 2011). Ultimately, community capacity building often expands the community's adaptive capacity, which underlines the value of the availability, accessibility, and mobilization of natural, human, institutional, information and technology, and economic resources in the event of a public emergency (Dolan & Walker, 2004; Wall & Marzall, 2006).

Levels of community capacity in populations vary for many reasons. An important composite indicator commonly used for measuring community capacity during all phases of a natural disaster is the Social Vulnerability Index. Zou and Wei (2010) established 361 social-economic impacting factors that can determine the level of a community's social vulnerability to responding to and recovering from disasters as well as providing direction for community capacity building. Social vulnerability comprises income, poverty, employment, education, age, household parenting patterns, disability, race, ethnicity, culture, language proficiency, availability of and accessibility to resources, community development patterns, human interactions, infrastructures, institutional support, and natural environments (Bjarnadottir, Li, & Stewart, 2011; Flanagan, Gregory, Hallisey, Heitgerd, & Lewis, 2011; Zou & Wei, 2010).

The Social Vulnerability Index was adopted to examine cases, such as Hurricanes Katrina and Rita. The inequities of these preexisting social economic conditions among the diverse communities affected by the hurricanes in New Orleans regulated the levels of their community's resilience during the process of disaster preparation, response, and recovery (Finch, Emrich, & Cutter, 2010; Laska & Morrow, 2006; Masozera, Bailey, & Kerchner, 2007). However, social vulnerability is not static and can change over time depending on the dynamics of interactions and modifications of the impacting factors. It is also important to note that social vulnerability can be seen solely as a snapshot during a particular process (Cutter & Finch, 2008; Tapsell, McCarthy, Faulkner, & Alexander, 2010). Findings from the Kuhlicke, Scolobig, Tapsell, Steinfuhrer, and Marchi (2011) study regarding multiple flood events throughout Europe suggest that a community may be socially vulnerable to one type of event or one phase of an event but not to others, and the impact of one area of vulnerability may be canceled out by the impact of an area of strength. In the Italian case, because of the social support that a group of residents received from volunteer organizations, government authorities, and civil protection services, their vulnerability to floods due to lack of information of hydro-geographical risk was alleviated (Kuhlicke et al., 2011).

Thousands and thousands of Bosnian refugees fled from their home country more than 20 years ago, and the majority of them now live in the Greater St. Louis area. The city of St. Louis is home to the largest population of Bosnians outside of Bosnia (International Institute-St. Louis, 2012; Matsuo, Tomazic,

Karamehic, Cheah, & Poljarevic, 2008). Refugee communities often have major linguistic, cultural, social, and economic disadvantages aligned with contemporary definitions of social vulnerability. In addition, numerous and frequent natural disasters have occurred in the state of Missouri, such as ice storms, snow storms, flooding, and tornadoes (State Emergency Management Agency, 2013). All 55 of the major disasters declared in Missouri between 1957 and 2013 were natural disasters. These disasters were widespread and frequently affected several of Missouri's cities and counties. Because of the effects of severe winter storms, drought, flooding, and Hurricane Katrina, eight state emergencies were declared in Missouri between 1976 and 2011 (Federal Emergency Management Agency, 2013a; State Emergency Management Agency, 2013). In 2013, the number of state emergency declarations in Missouri was ranked 18th in the nation, and Missouri was ranked 10th among the 64 states and tribes in the United States in the number of declared major disasters (Federal Emergency Management Agency, 2013b).

In spite of the prevalence of natural disasters and the designation of the St. Louis Bosnian community as a socially vulnerable population, no research has been conducted to examine the capacity of this community to mitigate its social vulnerabilities to natural disasters. The purpose of this study was to map out the Bosnian community's current capacity to resist a prospective natural disaster and identify the strengths and limitations for future community capacity building to increase the community's disaster resilience.

Method

Study Design

The data used in this research project are from a larger qualitative study based on the premises of the theory of planned behavior (TPB) in which a grounded theory approach was used. The aim of this larger study was to use a grounded theory approach to extend the TPB and build a framework within a social-ecological domain to understand systematically and conceptually Bosnian refugees' potential response to a natural disaster in the United States in order to develop a tailored multilevel and multidimensional pilot public health intervention to promote their resistance and strengthen their resilience to a complex public emergency, such as a natural disaster.

Using the grounded theory approach, researchers can interpret a pure description of an experience, an event, or a phenomenon into a theoretical framework or "an abstract analytic schema" (Creswell, 2007, p. 62). The grounded theory approach is characterized by the systematic examination of data gathered from participants with similar experiences for the purpose of elaborating, generating, extending, or discovering a theory or theoretical framework. It can also be used to explain an interaction, action, or process or to guide future re-

search (Strauss & Corbin, 1998). Behaviors beyond volitional control are clarified by the TPB, and the theory applies to "individual motivational factors as determinants of the likelihood of performing a specific behavior" (Montano & Kasprzyk, 2002, p. 67).

The purpose of this study was to identify the socioecological determinants, including community social support and social network, accessibility and availability of community resources, community aggregated coping, and community norms, which can eventually affect individuals' "attitudes towards a behavior," "subjective norm" to comply with a behavior, and "perceived behavioral control" to perform a behavior (Montano & Kasprzyk, 2002, p. 67). Attitudes, subjective norm, and perceived behavioral control are the key components of the TPB and were used to explain Bosnian refugees' disaster response behaviors.

Subjects

A well-developed theory with saturated data determines the original sample size (Creswell, 2007; Strauss & Corbin, 1998). Because of the potential for a relatively high loss of refugee participants due to language difficulties, frequent movements, and culture barriers, a 10%–15% decrease in the initial number of participants recruited was planned. Criterion sampling was the first step of the sampling process. Inclusion criteria included (1) aged 38 years old or older, (2) originally having the status of a refugee, (3) Bosnian war (1992–1995) survivor, (4) one participant per household, (5) residing in the Greater St. Louis area, and (6) having the willingness to give in-depth information. The one exclusion criterion for participants was cognitive impairment. Participants were intentionally selected from refugees who survived the Bosnian war (1992–1995) because the emphasis of the original qualitative study was the contribution of prior war trauma to individuals' responses to natural disasters later in life. Based on the inclusion and exclusion criteria, snowball sampling was initiated to recruit the participants through personal connections, a local Bosnian radio channel, and local Bosnian organizations and community religious centers. Then each interviewee was asked to provide two or three potential participants for an interview. Interviews were conducted with 33 Bosnian refugee adults resettled in the City of St. Louis and south St. Louis County (Xin et al., 2015a, 2015b).

Measures

The original semistructured interview guide for Bosnian refugee participants was based on the TPB and existing literature and comprised preconstructed complex questions to generate a dialogue between the investigators and participants and to gather in-depth information, including the Bosnian community's capacity to respond to and recover from a natural disaster, such as community social links and social cohesion, organizational support, access

to natural and man-made resources, economic development, and knowledge and coping skills for a natural disaster. Sample questions include the following: How would you describe the Bosnian community in St. Louis in general? How do you think the Bosnian community would respond to a natural disaster (e.g., flood, severe storm, tornado, hurricane, and earthquake)? What are the Bosnian organizations that you may rely on during a natural disaster? How would you describe your relationship with your neighbors? How would you describe the relationship among Bosnians in St. Louis? How do you think Bosnians would help each other in the face of a natural disaster? How do you think living in the United States may influence the Bosnian community's capacity to respond to a natural disaster? How do you think the city of St. Louis would respond to a natural disaster? A group of academic and nonacademic refugee experts validated the interview guide.

Procedures

Thirty-three semistructured, face-to-face, dialogue-based interviews were conducted at the home of each refugee participant or at a public place. Professional translators confirmed the consent form after it was translated and back translated into the Bosnian language. The consent form was signed prior to each interview. Each interview lasted approximately 2 hr. Participants were asked to respond to the preconstructed complex questions and other specific or new questions that emerged from prior interviews. A professional interpreter hired from the St. Louis Bosnian Media Group was present at each interview. Interviews were conducted between August and December 2013 and recorded digitally. The institutional review board at Southern Illinois University Edwardsville approved the study (Xin et al., 2015a, 2015b).

Analysis

Three trained undergraduate students worked to transcribe the audio data verbatim in English. Content analysis and thematic analysis approaches by ATLAS ti 6.2 (GmbH, Berlin) were used to analyze the data. The raw data were coded line by line; codes, subcategories, categories, and themes emerged from the data; in each category, properties (subcategories) were filled; to fit them into suitable categories, subcategories, and codes, quotations were constantly compared to each other; and top-down coding was employed for part of the categories based on existing scholarship. To maintain the interreliability of the data, the members of the research team analyzed the data individually and then repeatedly compared with each other's coding (Xin et al., 2015a, 2015b).

Results

Interviews were conducted with 16 female and 17 male Bosnian refugees (see Table 1). Roughly 76% of interviewees were employed in a full-time job,

such as nursing home caregiver, electrician, mechanic, sewing worker, cleaner, or truck driver. Almost all of them had access to a basement, and about 85% of them were homeowners at the time of the interview. Every participant had at least two children. Most of their children lived somewhere within 30-min driving distance, if not at their parents' home. About 94% of the interviewees owned a car and drove on their own. Over half of the participants reported being fluent in English, and most of them learned English over the course of their everyday lives after resettling in the United States. Each participant lived in St. Louis for at least 10 years, and the participants who have lived in St. Louis longest reported residing in the area for 17 years (Xin et al., 2015a, 2015b).

Table 1
Bosnian Participants' Social and Demographic Characteristics

Characteristic	Number of participants	%
Gender		
Male	17	52
Female	16	48
Age		
< 40	1	3
40–50	28	85
> 50	4	12
Marital Status		
Married	30	91
Separated/Divorced/Widowed	3	9
Employment		
Full-time	25	76
Part-time	3	9
Unemployed	5	15
Home Ownership		
Yes	28	85
No	5	15
Car Ownership		
Yes	31	94
No	2	6
Spoken English		
Yes	20	61
No	13	39
Years in St. Louis, Missouri		
< 10 Years	0	0
10–13 Years	22	67
> 13 years	11	33

Bosnian Community Represents a Home to Its Individuals

With the exception of five participants, all owned a house in the Greater St. Louis area and maintained homeowners insurance. The participants universally stated that they would not move to another city or state and indicated that St. Louis was considered a second home after their country of origin. Participants felt settled and fulfilled as they had their immediate and extended families living in town and raised their second and/or third generation in St. Louis. Children were well acculturated in their schools, and living expenses were affordable. Although a considerable number of the participants did not speak English fluently, they indicated that they could work things out perfectly around here. Many essential services were available and accessible to them. Given that a significant number of Bosnians live in the city and work in the same place, a variety of Bosnian professionals offer their services to the Bosnian community, including health care, law, food and grocery, construction, and engineering. There are plenty of job opportunities; freedom of practicing their own religions; and a safe, quiet, and friendly social environment. As the participants described,

> Lots of Bosnian [live] here. I know lots of [Bosnian] people are living in other states. I mean cities. And they don't have like shopping and restaurants. Like everything we do here. I feel like I am at home, you know. I mean we have everything here. [Bosnian] culture was maintained in St. Louis, and I have lots of Bosnian friends.

> What makes me happy here, first my children are here, [and] my family is here. They make life over here and went to school. It's safe. After the war, it wasn't safe [in Bosnia]. I think I'm safe here. I don't know what else. I'm happy. [If I am] still in Bosnia, I can't work because when I went [back] in 2009, my friend was hospitalized and I went there and thought, "I should work in a hospital over there." [However], I couldn't see myself working there though. Because the war makes one religion more open than the other. In my city, it's Serbia that I think non-Muslims working in the hospital. The doctors, [they are] all gone. They are just fired. How can I be in some place when everybody is indifferent? I don't care if I'm here and Muslim, I don't care what religion you are, but over there it was a war about that. What I see here, just to compare, the residents who I'm working [with here], how we are doing so much for the people, my work, how we are acting to the residents, all people, but when I see there, my friend, she was sick, but she tried to feed other residents. The woman, she had a stroke and she didn't know what she was doing, but there was nobody around to help. I just disappointed.

> I got really used to [living here]. I like it here. Let's say I'm used to it here. I've traveled to several different states like North Carolina, Kentucky, and Illinois . . . But I always come back here. It's really nice here to live. I like here the best. St. Louis was the first place when I came to the United States. I got used to it. It's the same like when you get board for the first time in some city and you like that city more than any other one. Maybe if I went to Chicago the first time I would like Chicago more than here. Maybe, I don't know.

Bosnian Community Is a Cohesive Whole With Empowered Community Outreach

The participants were asked about how their community would respond to and recover from a natural disaster. Every participant stated that Bosnians would primarily depend on themselves and their immediate and extended family members and friends. The participants mentioned that geographically, many Bosnians lived close to each other and socialized frequently. They believed that Bosnians would help each other in any circumstance. Although some Bosnians might be physically and socially drifting away from their ethnic community, they were still connected by the community's native media outlets or Facebook. If they knew that any Bosnian was in need, they would help no matter what. The participants provided detailed examples for evidence.

> It's just the case that you have so many people from Bosnia living in that part of the city. From this incident about the boy who was the owner of the store [and was shot to death], he [the owner] was well known to be helping anybody else who was coming to the store saying, "I don't have any money, can you help me?" He helped people from the community. He didn't care what kind or race or nationality or ethnicity or who people are. Everybody knew it and everybody loved him. When that happened, actually, all of the Bosnian community got together and they helped with money, they helped with any kind of needs they needed. Anything they asked. The entire community was there, really. On [the day of] the funeral, they had like three thousand people or something like that. It was really an incident that put the community together without any special organization involved.

> The community, when we ask for help, if somebody is sick, needs some surgery, or he is in bad health, he lost job, we are pretty good, very good community. One girl, she was a ten or eleven year old, she had a bad kidney. At that time, I worked for a Bosnian TV station; it's in Illinois. We helped the family to pay some bills for hospital, and we got in touch with Mayor Slay, with Congressman Carnahan, and all other

> people. We got together and she had kidney surgery. She is now a big girl. This was five, six years ago, at least. And many other examples when people have big surgery, they don't have money, they don't have insurance and stuff like this, they don't work for six months or a year, we get together and collect money to give them.

Besides the strong tie to their own ethnic community, participants also demonstrated close relationships with their neighbors, which often consisted of a variety of ethnicities. The participants believed that their neighbors would be another reliable source of support in the event of a natural disaster. As one participant noted, "Our neighbors are more important to us than brothers in Chesterfield, which is like 20 miles away."

> I have an older neighbor here and she is always watching around. We had a situation here that someone was doing car robberies and she saw some unknown people and she knows they shouldn't be there, so she lets us know, and that is how we kind of organizes.

> So we have really good neighbors around here. We have on this side, on the left side, we have some young people. And they are really nice to us and they check on our house when we go to Kentucky and they look over and keep eye on it. Also, across the street we have some neighbor, I think she's a doctor or something, and she always look over. One time we had situation some man came with truck and he really came to get his stuff, but, you know, she saw him and thought I'm gonna call police if you don't leave the property. So he had to leave. The neighbor across the street is really good. Situation [like] when he forgot to turn off the stove. He was kind of cooking something. [He was] cooking meat but his daughter came over to get him to the hospital for the treatment and he forgot to turn it off. And he went to the hospital and the stove was still on. And it started smoking of course after a while. And alarm and everything goes off. And another neighbor called firefighters. They are really, really nice to us. We never argue or anything.

> Yeah, we had one year storm. It was very bad snow. And everything was freezing. I think there was snow and there were raining. And everything was freezing and my neighbors, my first neighbors here, have wood, big wood, [which was] blown across the street [and fell on] my driveway. And my husband, he just got out and went to work. And my neighbor, he came out and he asked me if everybody was ok. And then, you know, he told me he would pay for it. It damages my roof little bit. I said it was ok. It was not bad.

The participants were also well aware of their community's ties to the city of St. Louis. The mayor of St. Louis has been interviewed by the Bosnian Media Group multiple times, and Bosnian presidents have paid frequent visits to the city and the Bosnian community in the past few years. For one participant living in St. Louis, he claimed that he was very satisfied because Americans and Bosnians were helping each other and that there was good communication with U.S. government officials, such as senators and congressmen.

Bosnian Community Is Capable of Responding to a Natural Disaster Because of Individuals' Aggregated Coping Skills Learned From the War

A small number of participants were uncertain how resilient the Bosnian community would be in response to a natural disaster. Concerns included the following: "Bosnians acclimate and customize here. They kind of get used to living here in this entire community. Year after year, they are becoming part of a big group. I don't think they would react much differently than any other groups here"; "It all depends on personal experience and [varies] from person to person"; and "it doesn't really matter if it's American, Vietnamese, Mexican, or Bosnian." However, the majority of participants were convinced that compared to the general population, the Bosnian community had more emotional and problem-solving skills to cope with a natural disaster because of their war experiences. They believed that because of their intense war experiences, they had a better survival instinct in response to an emergency. That Bosnian families typically store more food and water than the general population is indisputable. Bosnians are used to storing canned food and a variety of snacks that do not need refrigeration or cooking, and they know how to use fewer ingredients to make food and learned how to share, save, and allocate limited resources for survival during the war. They experienced everything and anything that a person can possibly imagine and survived the genocide. As a result, they became patient, tolerant, calm, and optimistic.

> [Responses to a natural disaster vary] from person to person; that's probably different, but let's say maybe that the Bosnians, when I say Bosnians, I did not split any religion or ethnicity or whatever, I say Bosnians, like I mention the Bosnian army: They are united, they are the same people, and they grew up together. They do the same things every day. They survived such bad things together; united, they are so strong. Bosnia, it's really one of the special countries in the whole world, in so many ways special. The Bosnian people are very nice, very friendly, hard-working people, very good friends. It's so much the whole world they can learn from Bosnia.

> In all these situations [during the war], anything could happen. I know for sure that we know how to deal with it. It's hard to explain. In some unpredictable ways, we would know how to deal with it. I've seen many situations in that Americans were surprised how we react, and sometimes they don't have any action, while we do so much of the action. What was the last thing you said? They panic too much. They call in for help too much. No action at all.

> So basically we didn't have much disaster here. But one example was snowing. And my company is in the south city area. When it was snowing, in my company, [there were] only about 10 employees showed up. And most [of them were] Bosnians. How they came in and how they made it, I didn't know, but they made it. Other people they didn't come even [for] little snow. Everybody was panicking, in such little things like snow.

Environment Change Affects the Bosnian Community's Capacity to Respond to a Natural Disaster

Living away from their home country and resettling in the United States introduced uncertainties to the current Bosnian community's capacity to respond to a natural disaster. The primary concern was the differences of the natural and man-made environments between Bosnia and the United States, which might compromise the Bosnians' ability to master their environment and respond. For instance, some said, "I know the territory [Bosnia] better. I know where to find the natural and clean resources of water"; "In Bosnia, you could find a water source every two seconds and it is clean and safe to drink without boiling. Here, I could not do that"; "Let's say back to Bosnia, we knew where to go for shelters. Here, I don't really know. We should know, but I really don't. I don't even know that we have any big shelters here for emergency situations." The structure of their houses and the materials used to build these houses were also different, which could provide a different level of protection. They lost the familiarity with their living environment and lacked knowledge of locating new resources.

> I believe it would be much different here [in terms of responding to a natural disaster]. In Bosnia, I could have a small or bigger garden right next to my house. Here, I couldn't find a place to have that to have my own food to survive. So for me, it would be really hard to imagine if I had a tornado here and I lost my house. I don't have the money to buy another one. In Bosnia, it was much easier to think about anything. If I have a bad situation I have my garden and I can have my fruits and vegetables and I can have all kinds of stuff made by my own hands.

> If you ask me the difference is not about environment, it's about bodies. People here like to drink cold and they don't want to drink anything but cold or they have same temperature in house no matter if it's winter or summer. So let's say [if] we don't have that to regulate people, they will get probably sick because just, you know, for years and year their bodies get used to some discipline, which wasn't [the] case in Bosnia. We had different temperature, different water, which is not cold just regular water, stuff like that. So I think the big difference is in bodies [and] in general how anybody get used to something. And there is a lot of vegetables or natural stuff outside [in Bosnia that] you can use for food. You don't have to eat meat, but you do have to know which is which or what is what.

Discussion

More than 10 years after resettlement, the Bosnian community is thriving in Greater St. Louis. Many have become owners of small local businesses, such as cleaning companies, construction companies, restaurants, and grocery stores and, as a result, have a positive effect on the local economy. They have also become professionals in many areas of expertise, including medical doctors, nurses, lawyers, accountants, and skilled workers. Furthermore, Bosnians operate their own native-language media outlets, such as radio and newspaper. They not only maintain and promote their own Bosnian culture, but also are acculturated into American culture and have proven to be diligent and hard-working people. As participants indicated, they feel confident and comfortable living in St. Louis because even though their English is not fluent, they still manage their lives well and are able to access a variety of services.

The Bosnian community also has a strong sense of family and community. The majority live close to each other, and they like to socialize and organize events in their spare time. One soccer game between Bosnia and Argentina in St. Louis attracted hundreds of thousands of local Bosnians to a local stadium to watch and cheer on their national team. They assist each other spontaneously in any circumstance by any means, such as sharing job opportunities, fundraising, and providing emotional support. They reach out to their neighbors regardless of their culture, language, and ethnicity and develop a solid and long-lasting relationship with them. They are also highly valued by their local government. The social capital that the Bosnian participants described during their interviews presents the capacity of Bosnian community's survival and adaption to a potential public disaster.

In the current literature, social capital is defined as social networks, social cohesion, social norms, social interactions and solidarity, and social participation, which has an effect on the social and economic activities of individuals and communities (Nakagawa & Shaw, 2004). The role of social capital in

preparing for, responding to, and recovering from a natural disaster has been examined in a number of studies. Mathbor (2007) interpreted the three levels of social capital theory in bonding within communities, which starts with close ties and individual ethnic communities; bridging between or among communities, which represents a higher level of social networking and reaching out to other communities; and linking through ties with government and nongovernment organizations and volunteer groups, representing the highest level of collaboration.

Built on this theory, Hawkins and Maurer (2010) studied the management and utilization of existing social capital in the responses of 40 families to Hurricane Katrina in New Orleans. Their results emphasized the significant value of close ties, including families and relatives, in providing immediate support during the disaster and in bridging and linking social capital, including neighbors, neighborhood coalitions, other communities, and organizations outside of New Orleans, in sustaining the long-term support in the aftermath of the disaster through sharing essential resources and information and offering emotional support.

Nakagawa and Shaw (2004) conducted two case studies in Kobe, Japan, and Gujarat, India, to examine the effectiveness of mobilizing social capital in planning and implementing rehabilitation and reconstruction of communities postearthquake. The results demonstrated that the communities engaged in a variety of social capital-building activities, including sustained trust for community leaders and members, collective decision making, adoption of multilevel and multidimensional social networks, and formal collaboration with government officials, facilitated a satisfying and speedy disaster recovery process. Social capital measures and shapes the adaptive capacity of a community to a natural disaster and has tremendous implications in community capacity building and disaster preparedness (LaLone, 2012; Pelling & High, 2005).

Expectedly, the participants also felt confident in their ability to cope with a natural disaster because of the survival skills learned from their influential war experience, which they believed they would use whenever they needed it. They were confident that compared to others, Bosnians were more prepared for a disaster emotionally and physically. However, they also raised concerns that their resilience to a natural disaster might be compromised by being resettled in a foreign country and being unfamiliar with their current natural and manmade environments. They did not believe that the majority of Bosnians would know where to locate a shelter, how they would be evacuated, where to find emergency resources, whom they should be expecting to come and help, and how sturdy their houses might be to overcome a natural disaster. Similar concerns in an early study were raised and shared by a group of Vietnamese refugees resettled in North Carolina. They had no idea how to navigate and become

connected to the resources that they needed that were outside of their ethnic community in case of an emergency, primarily because of the isolation caused by the differences of language and culture (Xin, Aronson, Lovelace, Strack, & José, 2014). Based on the Social Vulnerability Index, the Bosnian community can be identified as culturally, linguistically, and economically vulnerable to a natural disaster in the United States (Bjarnadottir et al., 2011; Flanagan et al., 2011; Zou & Wei, 2010). Yet given the nature of the changeability of social vulnerability, the strengths that the Bosnian community presents in regard of its individuals' aggregated coping skills and the bonding, bridging, and linking social capital that the community possesses may eventually reduce the community's risk and mitigate the effects of a natural disaster (Cutter & Finch, 2008; Tapsell et al., 2010).

This study has some considerable limitations. For instance, we sampled a relatively small number of Bosnian refugees residing in the Greater St. Louis area of Missouri. Every participant survived the Bosnian war before being resettled in the United States. It is therefore possible that this sample might not be representative of Bosnian populations living elsewhere or members of the second and third generations who reside in St. Louis and have no memory of a war and are more adapted to the American culture. Loss of data during the interpretation process is an additional and potential concern. Because all of the interview questions dealt with a natural disaster, the applicability of these results to other disasters could be limited to some extent (Xin et al., 2015a, 2015b).

Conclusions and Implications

The Bosnian community is recognized as a thriving and self-sustained community. Compared to other immigrant and refugee communities, Bosnians are relatively socially, economically, and politically empowered, which can be beneficial for an effective response and rapid recovery during a public emergency. In practice, public health preparedness professionals and disaster response teams may consider further enhancing the community's current hidden capacity and minimizing the community's vulnerability to a natural disaster. Both community capacity and vulnerability explain and determine Bosnian individuals' disaster response behaviors within a socioecological domain. Given, in particular, the social networks and social cohesion that the community demonstrates as a foundation, and given their trust of the local government, practitioners may continue solidifying and expanding the community's current social capital through involving community partners in a collective disaster planning process, disseminating emergency preparedness and response instructions using the community's native media outlets, and linking the community with more government and nongovernment institutions for external emergency re-

sources. Moreover, the survival skills and the diversity of the professions in the Bosnian community provide the community with potential assets for soliciting volunteers in risk reduction and disaster management.

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The GOLD Card: Evaluation of an Instrument to Improve Health Literacy and Promote Patient-Centered Care in Urban Vietnam

Minh-Tri H. Nguyen, *Wright State University*
Ashley K. Fernandes, *The Ohio State University*

Abstract

Patient-centered care (PCC) is respectful of and responsive to individual patient preferences, needs, and values and ensures patient values guide clinical decisions. Large components of PCC are physician–patient communication and health literacy (HL). Little research has been focused on understanding strategies to promote HL and effective physician–patient communication in developing countries, such as Vietnam. Herein, we conducted a pilot study to assess Vietnamese patients' satisfaction with a PCC intervention (GOLD card). Forty-nine patients were recruited and encouraged to use the GOLD card during their exchange with their physician. Overall, the majority of participants either agreed or strongly agreed that using the GOLD card helped to create a more satisfying doctor visit, improved communication between the physician and themselves, and made them feel comfortable/confident in managing their conditions, and they deemed the card easy to use. In conclusion, paper cards written in the patient's own hand and using a teach-back methodology appear to be practical and effective. The use of simple reminder cards could improve confidence in Vietnamese patients' ability to manage their conditions.

Keywords

teach back; patient-centered care; physician; patient communication; global health; health literacy

Minh-Tri H. Nguyen, BA, is a medical student, Boonshoft School of Medicine at Wright State University. **Ashley K. Fernandes**, MD, PhD, is an associate professor of pediatrics and associate director, Center for Bioethics at The Ohio State University and Nationwide Children's Hospital. Please send author correspondence to nguyen.132@wright.edu.

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Introduction

Historically, medicine had been largely physician centered (Draeger & Stern, 2014; Laine & Davidoff, 1996; Tennstedt, 2000). This model of care assumed that the medical decision-making process was mainly an interaction among medical specialists, in a top-down approach in which information exchange and decision making were prioritized with physicians on top and were allowed to trickle down selectively to the patient and family (Buchanan, 1978; Kon, 2010). The ethical and medical drawbacks to this model in practice have been elucidated in the academic literature (Häyry, 2002; Kon, 2010; McKinstry, 1992) and therefore a more patient-centered delivery of care has been promoted (Barry & Edgman-Levitan, 2012; Davis, Schoenbaum, & Audet, 2005; Peschel & Peschel, 1994; Stewart, 2003).

The delivery of patient-centered care (PCC) is now a primary focus for health care professionals and medical educators in the United States. Professional organizations as large and diverse as the Institute of Medicine (Bloom, 2002) and the American Academy of Pediatrics (2012) have embraced the concept of patient- and family-centered care over the last 15 years. More recently, efforts to bring and sustain the PCC paradigm internationally have increased (Martin & Félix-Bortolotti, 2014), but many of these efforts have been focused on subspecialty care, such as critical care (Ciufo, Hader, & Holly, 2011; Mammen, Laude, & Costello, 2014) or psychiatry (Cox, 2008; Verbeek, van Rossum, Zwakhalen, Kempen, & Hamers, 2009), rather than on primary care. Often, there is a Western or European focus to international initiatives to introduce PCC (Svavarsdottir, 2006; Winsor et al., 2013).

The literature on the benefits of non-Western PCC is scarce, with serious challenges, particularly in resource-poor countries where health literacy is low and where cooperation between developed and developing countries about best practices has not been ideal (Eguzo & Camazine, 2015). Nevertheless, with attention to culturally sensitive communication, evidence suggests that PCC can be successful (Foster, Whitehead, & Maybee, 2010). Although much has been written about PCC, particularly in the United States, precise definitions have been elusive (Ishikawa, Hashimoto, & Kiuchi, 2013; Robinson, Callister, Berry, & Dearing, 2008). PCC is care that is respectful of and responsive to individual patient preferences, needs, and values and that ensures that patient values guide clinical decisions. The goal of this model is to empower patients to be active participants in managing their care. Research into the clinical effectiveness of PCC has demonstrated better health outcomes with its adoption (Bechel, Myers, & Smith, 2000; Oates, Weston, & Jordan, 2000). In 2001, the Institute of Medicine included PCC as one of the six essential aims of health care systems (Bloom, 2002).

Two large components of PCC are physician–patient communication and health literacy (HL). HL has been defined as "the ability to access, un-

derstand, and use health information in ways that promote optimal health. In other words, HL involves active participation in the uptake and use of information" (Davis, Jones, Logsdon, Ryan, & Wilkerson-McMahon, 2013, p 1124). The use of HL principles is known to deepen cultural inclusion, promote positive health outcomes, and reduce disparities (Baker, Parker, Williams, & Clark, 1998; Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011; DeWalt & Hink, 2009; Nielsen-Bohlman, Panzer, & Kindig, 2004). However, in relation to PCC as a whole, HL is underused and understudied in developing countries, which has had a negative effect on the health of patients in those countries (Atilola, 2015; Rodríguez, Holgado, & Salinas, 2015).

Both HL and physician–patient communication have been extensively studied and correlated with improved health outcomes (Baker et al., 2002; Berkman et al., 2011; Epstein et al., 2005). Studies have also shown that patients in primary care settings strongly want a patient-centered approach (Burman, Robinson, & Hart, 2013; Little et al., 2001); however, the majority of this work has mostly been studied in regions such as the United States and United Kingdom. One study conducted in Pakistan on a pediatric population showed the effectiveness of HL principles on family-centered rounds in the intensive care unit (Ladak et al., 2013). However, to our knowledge, no other peer-reviewed research has been focused on understanding strategies to promote HL and effective physician–patient communication in developing countries, such as Vietnam. Therefore, we conducted a pilot study to evaluate patient attitudes toward a simple intervention (the use of the "GOLD" card) to promote HL and a PCC model in Da Lat, Vietnam.

The purpose of our study was to evaluate patient satisfaction in a developing country with the use of a novel communication intervention (the Going Out with Linked Directives, or GOLD card) focused on increasing PCC and improving patient confidence in managing and understanding a condition after use of the GOLD card. We hypothesized that with effective use of a simple, inexpensive interviewing intervention, patients in our population would be more satisfied with care and more confident with managing and understanding their own condition.

Method

Geographic Setting and Public Health Context

Da Lat is the capital of the Lam Dong Province of Vietnam. Da Lat is located 1,500 m (4,900 ft) above sea level and has a population of approximately 206,105 people. There are three major hospitals within the city borders (Lamdong General Hospital, Hoan My General Hospital, and Pham Ngoc Thach Traditional Medicine Hospital; U.S. Department of State, 2015) and several small clinics scattered throughout the province. With the recent economic

growth in Vietnam (Abrami, 2003), city infrastructures and planning have improved, allowing easier access to hospitals and clinics. However, Vietnam only allocates a small portion of its GDP to health care. In 2012, Vietnam allocated 6.0% of its GPD to health care, compared with 17.1% in the United States and 9.1% in the United Kingdom (The World Bank Group Database, 2012).

Da Lat is one of the larger cities in Vietnam, but compared to health care delivery in larger cities (e.g., Ho Chi Minh City), the delivery of health care here—and even its people—is far too different to generalize. Although Western influences have changed the way of life, customs, delivery of health care, type of patients (tourists), and even the dialect within these cities, Da Lat has remained largely untouched. Health care to these areas is largely more private and Western, with foreign-recruited physicians. Hospitals and clinics in Vietnam, in general, are often overcrowded with a small physician-to-patient ratio (The World Bank Group Database, 2013). Da Lat physicians are afforded only minutes with their patients, and the conversation is largely dominated by the physician, a traditional physician-centered approach. Examination rooms are continuous with the waiting area, and multiple patients are often privy to individual physician–patient interactions. Medical equipment varies in terms of working condition and advancement. The city lacks technical support for its medical equipment and little to no government subsidies to fund the purchase of used and outdated technology. A direct means of purchasing equipment, even with sufficient funds, is another barrier to expanding technological advancement within the hospital. If medical equipment breaks, the physicians typically send their broken equipment to "local mechanics" for repair.

Study Design

Our study was approved by the Wright State University School of Medicine Institutional Review Board and by formal approval of the participating Vietnamese hospital. It was completed as part of an international health curricular elective. The primary investigator (M. H. Nguyen), a native-born Vietnamese-American, recruited 49 patients from Lam Dong General Hospital, an urban public hospital located in Da Lat, Vietnam.

Patients were recruited if they were adults (aged 18–80) from the internal medicine clinic of the hospital, had scheduled an initial visit to be seen by a Vietnamese physician from June 2014–July 2014, and agreed to fill out a survey pertaining to their experience. Participants were given a verbal consent and a cover letter affirming that they had received informed consent. Patients consented with the understanding that their participation would not reflect negatively upon their care, that no personal identifying information would be collected, and that their responses would be blinded to the physician after initial consent. Patients who were illiterate, unable to give consent, or otherwise unable to answer written surveys were excluded from the study. Basic demo-

graphic information (e.g., age and gender) was recorded within the scope of the consent forms and was linked to a study number chosen by randomization (see Table 1).

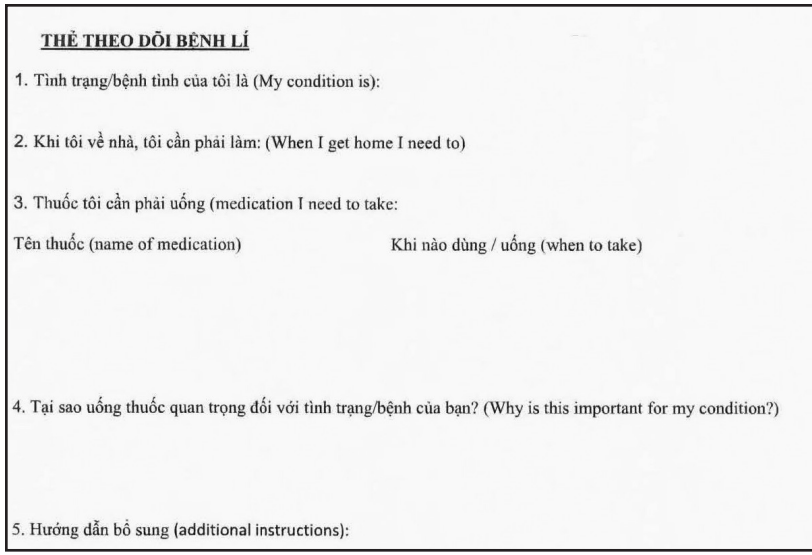
Table 1
Patient Demographics

Variable	*N* (%) or *M* (*SD*)
Gender	
Male	20 (46.5%)
Female	23 (53.5%)
Age (Years)	48.6 (15.3)

Use of the GOLD (Going Out with Linked Directives) Card

GOLD cards (Figure 1) are simple paper cards that contain basic information about the diagnosis and plan after a patient encounter. A GOLD card is a novel intervention; face validity for the card design was obtained through consultation with a group of pediatric hospitalists at Dayton Children's Hospital (Ohio, USA). Of the four physicians involved in the design of the GOLD card, one was a senior professor and medical education specialist, another an expert in in-patient and family-centered rounds, another an expert in HL, and the last an expert in medical education and bioethics (coauthor, A. K. Fernandes). The GOLD cards were written and designed in English initially and then translated by a native speaker (first author, M. H. Nguyen) into Vietnamese and verified for accuracy by the physician at the hospital in Vietnam. We sought to further test their efficacy and practicality in a developing country. GOLD cards cost $0.05 USD to print.

GOLD cards were handed to the patient and discussed with the physician prior to discharge. Specifically, completed GOLD cards have instructions for immediate care of the patient's symptoms upon discharge and for continued care (e.g., finish 3 more days of medicine, change wound dressing every night) that are written in plain language. GOLD cards also contain information about the patient's condition (e.g., high blood pressure) as discussed with the medical care provider and general management instructions (e.g., rest, drink plenty of fluids).



THẺ THEO DÕI BỆNH LÍ

1. Tình trạng/bệnh tình của tôi là (My condition is):

2. Khi tôi về nhà, tôi cần phải làm: (When I get home I need to)

3. Thuốc tôi cần phải uống (medication I need to take:

Tên thuốc (name of medication) Khi nào dùng / uống (when to take)

4. Tại sao uống thuốc quan trọng đối với tình trạng/bệnh của bạn? (Why is this important for my condition?)

5. Hướng dẫn bổ sung (additional instructions):

Figure 1. Vietnamese GOLD card with English translation in parentheses.

At the end of the visit with the physician, each patient, with our help, filled out a GOLD card. We reemphasized key points from the physician instructions to the patient in plain language, asking the patient to then write these instructions on the GOLD card. This method is a modified use of the teach-back method to improve HL; the teach-back method of health communication, in which patients are asked to recall or explain in their own words what has been discussed in an encounter, has been shown to improve HL in a variety of settings in Western countries (Kripalani, Bengtzen, Henderson, & Jacobson, 2008; White, Garbez, Carroll, Brinker, & Howie-Esquivel, 2013). But it has also been shown to improve outcomes in developing countries in initiatives ranging from maternal immunization in Jamaica (Wilson, Mayeta-Peart, Parada-Webster, & Nordstrom, 2012) to diabetes management in Iran (Negarandeh, Mahmoodi, Noktehdan, Heshmat, & Shakibazadeh, 2013). In our study, we asked patients to write down what they understood, which we in turn discussed and verified. Surveys were administered in Vietnamese (Figure 2). English translation of the questions can be found in Figure 3. For the qualitative survey, a 5-point Likert scale was used to ascertain patient satisfaction with use of the GOLD card. The patients were asked to rank their level of agreement or disagreement of the statement using *strongly disagree, disagree, neutral, agree,* and *strongly agree.* Because of small sample size, statistical significance testing could not be performed. We offer our results as descriptive measurements only.

ID nghiên cứu_____ **Ngày Tháng Năm** _____

Phiếu khảo Sát Sự Hài Lòng Thẻ theo dõi bệnh lí

Khảo sát này hỏi về những trải nghiệm của bạn khi sử dụng thẻ GOLD trong khi và sau khi khám bác sĩ. Xin hãy khoanh câu trả lời cho mỗi câu hỏi dưới đây.

1. Tôi cảm thấy sự trao đổi của tôi với bác sĩ đã được tốt hơn sau khi sử dụng thẻ theo dõi bệnh lí

a. Không đồng ý chút nào
b. Không đồng ý
c. Trung lập
d. Đồng ý
e. Đồng ý rất nhiều

2. Thẻ theo dõi bệnh lí đã giúp tôi hiểu rõ hơn về tình trạng/bệnh tình của tôi.

a. Không đồng ý chút nào
b. Không đồng ý
c. Trung lập
d. Đồng ý
e. Đồng ý rất nhiều

3. Với thẻ theo dõi bệnh lí, tôi cảm thấy thoải mái/tự tin hơn trong công việc theo dõi bệnh tình của tôi so với khi tôi không có nó.

a. Không đồng ý chút nào
b. Không đồng ý
c. Trung lập
d. Đồng ý
e. Đồng ý rất nhiều

4. Thẻ theo dõi bệnh lí là một công cụ hữu hiệu nhắc nhở tôi tuân theo sự hướng dẫn của bác sỹ

a. Không đồng ý chút nào
b. Không đồng ý
c. Trung lập
d. Đồng ý
e. Đồng ý rất nhiều

5. Tôi cảm thấy cách sử dụng thẻ theo dõi bệnh lí rất dễ dàng.

a. Không đồng ý chút nào
b. Không đồng ý
c. Trung lập
d. Đồng ý
e. Đồng ý rất nhiều

6. Tôi muốn đề nghị sử dụng các thẻ theo dõi bệnh lí trong mỗi phòng khám.

a. Không đồng ý chút nào
b. Không đồng ý
c. Trung lập
d. Đồng ý
e. Đồng ý rất nhiều

7. Nói chung, việc sử dụng các thẻ theo dõi bệnh lí đã giúp tôi chủ động trao đổi với bác sỹ về bệnh tình hơn những lần khám trước khi sử dụng thẻ theo dõi bệnh lí.

a. Không đồng ý chút nào
b. Không đồng ý
c. Trung lập
d. Đồng ý
e. Đồng ý rất nhiều

Figure 2. Translated Vietnamese survey.

STUDY ID _____ Date_____

GOLD Card Satisfaction Survey

This survey asks about your experience using the GOLD card during and after your doctor visit. Please answer each of the following questions by circling an answer for each question.

1. **I felt the GOLD card improved my communication with my physician.**
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
2. **The GOLD card helped me better understand my own condition.**
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
3. **I feel more comfortable/confident managing my condition with the GOLD card than if I didn't have it.**
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
4. **The GOLD card was an effective tool reminding me to follow my prescribed medical care.**
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
5. **I felt the GOLD card was easy to use.**
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
6. **I would recommend the use of the GOLD card in a clinical setting.**
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
7. **Overall, the use of the GOLD card has helped to create a more satisfying doctor visit than my previous doctor visits without use of the GOLD card.**
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree

Figure 3. English survey.

Table 2
Survey of Patient Satisfaction With GOLD Card (n = 43)

Survey question[a]	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Did not answer
1. I felt the communication between me and my physician improved upon using the GOLD card.	0	0	1	31	11	0
2. The GOLD card helped me better understand my own condition.	0	1	0	32	10	0
3. With the GOLD card, I feel more comfortable/confident managing my prescribed medical care than if I did not have it.	0	1	2	34	6	0
4. I believe the GOLD card was an effective tool to remind me to follow my prescribed medical care.	0	0	1	33	9	0
5. I felt the GOLD card was easy to use.	0	0	2	31	9	1
6. I would recommend the use of the GOLD card in a clinical setting.	0	0	3	28	11	1
7. Overall, the use of the GOLD card has helped to create a more satisfying doctor visit than my previous doctor visits in the past (without the GOLD card).	0	0	2	28	12	1

[a]These questions were translated into Vietnamese shown in Figure 2. They are presented here in English.

Results

Forty-nine participants were recruited. Six patients were dropped from analysis because of incomplete surveys. Forty-three (88% response rate) participants were included in the final analysis. Of the 43 participants, 23 were female (53.3%) and 20 (46.5%) were male. The average age was 48.6 years. Table 2 illustrates the results of the patient perspective on a 5-point Likert scale pertaining to their experience with the use of the GOLD card intervention. Overall, 40 participants (93.0%) out of 43 either agreed or strongly agreed that using the intervention GOLD card helped to create a more satisfying doctor visit. Forty-two participants (97.7%) also stated that they believed the GOLD card helped to improve communication between the physician and themselves. A majority of the patients (n = 42, 97.7%) also indicated that using the GOLD card helped them to understand their own condition better. It is also worth noting that patients felt comfortable/confident in managing their conditions with the use of the GOLD card and that the majority also deemed the card easy to use (n = 40, 93.0%; Table 2).

Discussion and Conclusion

In our small pilot study, we evaluated patient perceptions of a PCC intervention (the GOLD card) in an urban city hospital in Vietnam. Our aim was to understand how the promotion of a simplified tool to improve HL could promote PCC in the health care system of a newly industrialized country. Because health care resources are scarce, economic costs of any intervention become critical. Paper cards written in the patient's own hand and use of a teach-back methodology appear to be practical and effective.

Vietnam, with its limited mobility in health care expansion and development within the past decade, has relied heavily on private donations and has few infrastructures and resources to manage the health care of its people. This, in addition to limited research initiatives in the country and a cultural deference to "authority figures," has forced many patients and physicians to rely ultimately on traditional views of communication in medicine, particularly a paternalistic model of medicine. Other contextual factors—often taken for granted in developed countries—may also be barriers to the development of PCC and the use of HL, such as low doctor to patient ratios, crowded and aging physical structures, a lack of privacy between physician and patient, and the slow pace of technology, as we have pointed out. Therefore, we believe that the use of simple reminder cards, such as the GOLD card, could improve confidence in patients' ability to manage their condition and, at least in literate populations, serve as a reminder of medical plans after discharge from office or even hospital visits.

The GOLD card being filled out by the patient, with the help of either the physician or the physician's aide/team member, and then reviewed *with the pa-*

tient in a modified teach-back method creates an environment of patient centeredness and moves the patient–physician team relationship toward a greater level of shared decision making (Kon, 2010). For example, 93% of participants were more satisfied after using the GOLD card and almost 98% felt the cards improved communication between the physician and themselves. Satisfaction and improved communication are hallmarks of the PCC model (Wanzer, Booth-Butterfield, & Gruber, 2004). With respect to the teach-back method, educational success was demonstrated by the majority of patients who understood their condition better (97%) and were more confident in managing their conditions. Although a longer study could have shown improvement in outcomes, we believe this attitudinal shift is a good predictor of future outcomes.

From our point of view, the GOLD card should always be used in conjunction with an oral debriefing either with the physician or a physician's team member. This approach better encapsulates the spirit of patient centeredness, would improve oral and written HL, and would improve patient satisfaction. Although this may make it more difficult to ascertain whether outcomes are improved by the GOLD card alone (or the oral debriefing), we believe this separation is artificial and would eschew use of the cards alone. Furthermore, the GOLD cards can operate in crowded conditions; do not require technology; do not require a physician at each encounter (the patient can fill out the card with the help of a nurse or other team member); and according to 93% of participants, are easy to use. We feel implementing the GOLD card helped overcome some contextual barriers to PCC in this developing country.

Our pilot study had several limitations. With the small sample size and time limits to our study, we can only provide descriptive statistics from the results. We considered adding open-ended qualitative data including patients' own words of their experience in using the GOLD card or participating in the study. However, because of time constraints with each patient, the small recruitment period, and the uncertainty of reaching recruitment goals with added participation burden, we chose to obtain only descriptive results with the Likert-scale survey. Having been successful with recruitment goals for this small pilot study and determining the recruitment flow, we believe that future work could include more questions, more participation, and qualitative data to further strengthen the results.

We also concede that the level of high satisfaction of the intervention could have been culturally confounded by the researcher's perceivable status as an authoritative figure. Albeit this deference would exist for any researcher, we tried to minimize the effect of such deference by having the recruitment conducted with the researcher who is a born native to the location and who speaks and is fluent with the same language, customs, and culture. We also stressed within our cover letter and verbal consent to the patient that their participation should in no way affect their care. Personal information was not collected and

survey responses were coded with a randomized study ID and blinded from the Vietnamese physicians.

Recruitment for this study was from a single, urban hospital (Da Lat General Hospital), and therefore, we can only generalize the results for similar populations. Although Vietnam owes its recent economic successes to its urban cities, the majority of the country still remains very rural, and we did not consider patient perspectives from those areas (who we hypothesize would have stronger cultural deference to authority) in this study. Physician compliance with recruitment and implementation was another issue for completion of the study. As physicians are often inundated with patients in Vietnam, it became a challenge to find working physicians willing and able to help with recruitment and implementation.

Prior to participating in the study, the Vietnamese physician had concerns about the debriefing and waiting for the patient to fill out the card while maintaining the immense workflow. For these reasons, we only asked the physician to have a dialogue with the patient concerning the questions on the GOLD card, and from there, we would take the time burden to debrief and allow the patient to fill out said card aside from the physician's time. Because of this, it may be hard to assess whether the debriefing with the researcher or the GOLD card was the reason for a satisfactory visit. We believe that both the interaction of discussing the questions on the card and the card as a tool to prompt, teach back, and remind patients of important instructions regarding their care are required for increased satisfaction during a visit to a physician.

The purpose of the card is to act as a tool to interject core questions that may need additional time between the physician and patient and to allow the patient to register, process, and write down parts of that discussion on a reminder tool that they can carry home with them. Having the questions on the card and allowing the patients to fill out the card means that a debriefing needs to happen whether it be with the physician or (as in this case) with the researcher. Because of the physician's current resistance to using a foreign tool that has yet been shown to be effective in patient care, we ultimately conducted the debriefing in the hopes that the subsequent results would support and encourage Vietnamese physicians to take up this role in the future.

Future studies should be focused on expanding the sample size of the patient population within urban and rural settings and diversifying the clinical setting to include other complex populations, such as pediatric, intensive care, and obstetrics and gynecologic patients. Use of the GOLD card tool (or similar cards) ideally should be studied over time, with patients asked to bring GOLD cards back for follow-up visits, at which time the cards can be altered with new information. Because of the time constraints of practicing physicians in Vietnam or other developing countries, the use of trained physician extenders or nursing staff to aid patients in completing the GOLD card at discharge could

be implemented and studied, although ideally GOLD cards seem to improve attitudes toward the physician–patient relationship.

Clearly, many economic, political, and cultural factors contribute to the current model of health care in Vietnam, still principally physician centered. Our study is the first study to gauge the interest in and the effectiveness of the GOLD card as a tool to broaden the appeal of particular PCC components of care among the Vietnamese population. Further studies will be required for a more full understanding of the effect, cost effectiveness, or feasibility of providing a PCC model in Vietnam.

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