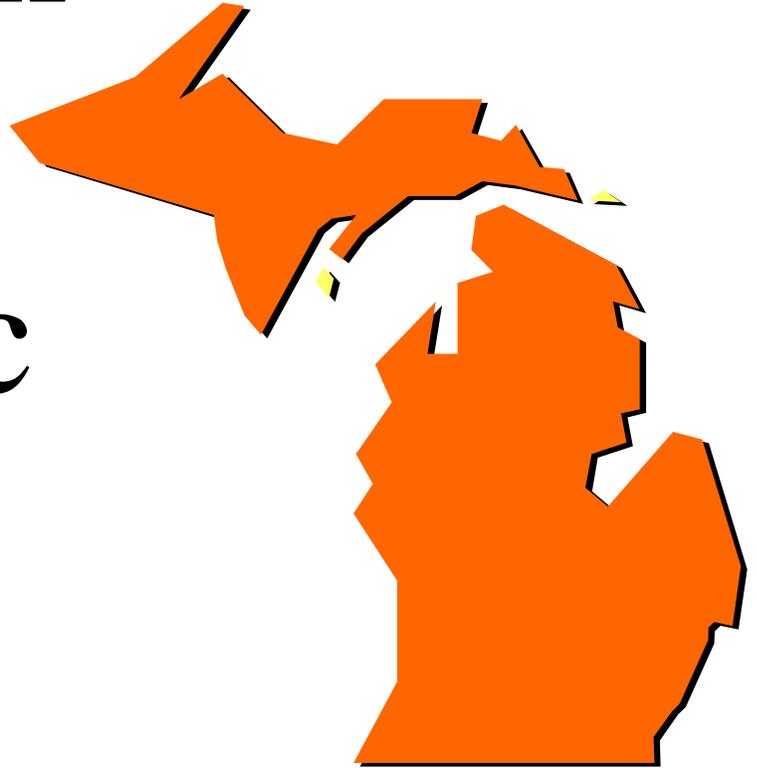


Michigan Journal of Public Health

(ISSN) 1937-2515



**A PEER REVIEWED JOURNAL PROMOTING
PUBLIC HEALTH PRACTICE, RESEARCH AND POLICY OF
NATIONAL RELEVANCE, WITH A FOCUS ON
THE GREAT LAKES REGION AND MICHIGAN**

**2012
Volume 6 (Issue 1)**

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The mission of the Michigan Journal of Public Health is to promote public health practice, research and policy on topics of national relevance, with specific focus on the Great Lakes Region and Michigan. We encourage contributions from the field of practice, original research, opinion and commentary. It is the expressed interest of this Journal to encourage dissemination from the field of public health practice.

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EDITORIAL

Consumer Health Information Technology and Public Health

Julie Gleason-Comstock, PhD, MCHES
Editor, *Michigan Journal of Public Health*

Health information is at the heart of public health; technology has facilitated the dissemination of best practices and research to consumers and their communities (Healthy People, 2020; CDC, 2010). There are multiple constituencies of public health consumers, among them, local, state, national and international jurisdictions. Over the past couple years, with other public health colleagues at Wayne State University, I have begun to reflect on a theoretical framework hypothesizing the relationship of *consumer health information technology* to desirable *public health outcomes*. Using a modified Information, Motivation and Behavior Skills (IMB) model (Fisher & Fisher 2002; Osborn & Egede, 2002), we have identified four elements as fundamental for engagement leading to desirable public health outcomes.

- Information = knowledge about factors to modify risk
- Motivation = attitudes and beliefs, social norms, support systems
- Behavioral skills = learning specific skills which facilitate lifestyle modification and prevention behavior

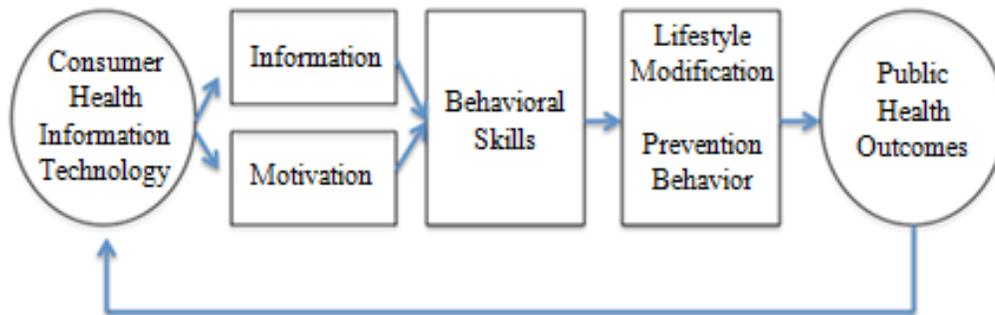


Figure 1: Consumer Health Information Technology and Public Health Outcomes Framework

A recent review of seven years of the *Michigan Journal of Public Health (MJPH)*, in preparation for a National Library of Medicine MEDLINE/PubMed Review Application, provided impetus to promote the *MJPH* as an embodiment of consumer health information technology. First, from a technology perspective, the *Journal* uses an electronic venue – open access - to inform, educate and empower people about health issues.

Secondly, through the lens of *Journal* expert peer reviewers, consumer issues with potential for impacting positive public health outcomes are presented. These include a variety of strategies. In one article, a local public health department described how they addressed a women’s health crisis by “Using Motivational Interviewing in Public Health Practice to Prevent Fetal Alcohol Syndrome” (Fiker et al, 2009). Another article explored enforcement of state law regarding the sale of pet turtles and health implications for families (Ballester, Vazquez, Saeed & Bartlett, 2010). Infectious disease and international cross-border issues were addressed in “Contact Investigation of Bus Travelers Exposed to a Passenger with Contagious Tuberculosis (Pillai et al, 2011).

Finally, illustrations of information technology impact are imbedded in the *Journal*, i.e., web-based education exercises on emergency preparedness terminology with medical and public health graduate students (Gleason-Comstock, Spannaus, Marks, Charbonneau & Streater, 2006). Geographical information systems (GIS) in public health have been a popular topic, i.e., using GIS to map the adequacy of prenatal care (Borders, 2007), GIS as a tool for health surveillance of illicit drug use (Polverento, 2010), and facilitation of lead screening (Kruger, Shirey & Taylor, 2012),

In an interview with Dr. John Finnegan, Dean of the University of Minnesota School of Public Health, highlighting public health futures and community-based participatory research, he identified the themes of transitioning from analog to digital culture, and the subsequent need for public health capacity building through cross-sectoral and boundary-spanning leadership.

We believe the *Michigan Journal of Public Health* will continue to be a partner in that transition, and look forward to continued promotion of consumer health information technology to our public health families.

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Fruit and Vegetable Intake and Food Store Access: A Cross-Sectional Survey Study in Ypsilanti, Michigan

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Abstract

Given declines in supermarkets in Washtenaw County, Michigan (MI), we aim to characterize the relationship between food store access and fruit and vegetable intake in Ypsilanti, MI. A cross-sectional, convenience sample survey was conducted in March 2011 at the Ypsilanti District Library (n=83). Self-reported food store access, perceived food environment, and fruit and vegetable intake were assessed. Linear and logistic regressions were performed between store access, fruit and vegetable intake, and meeting dietary recommendations. Perception was evaluated for effect modification. Adjusting for demographics, each food store within one mile of participants' homes increased odds of meeting recommended intake by 105% (OR 2.05, 95% CI: 1.02, 4.10). However, contrary to previous literature, each additional minute to the food store was associated with consumption of 0.37 (95% confidence interval [CI]: 0.10, 0.64) more servings of fruits and vegetables per day. Perception was not a statistically significant effect modifier, but data suggest differences for those with divergent perceptions. Food environment is associated with fruit and vegetable intake in Ypsilanti, MI. Inconsistent findings suggest that programs should focus on enhancing the food environment within the context of perceptions and preferences.

Keywords : Vegetables; Fruits; Dietary Requirements; Food Intake; Environment and Public Health; Environment Design; Neighborhood; Residence Characteristics

Introduction

As the result of the growing obesity epidemic among Americans (Flegal, Carroll, Ogden, & Curtin, 2010), factors related to food access have received increasing attention (Baker, Schootman, Barnidge, & Kelly, 2006; Hendrickson, Smith, & Eikenberry, 2006; Jetter & Cassady, 2006; Moore & Diez Roux, 2006; Morland, Wing, & Diez Roux, 2002). The “food environment,” refers to environmental influences on nutritional behavior and has been hypothesized as a mechanism linking neighborhood characteristics to nutrition-related diseases (Glanz, Sallis, Saelens, & Frank, 2005). Current research demonstrates a negative association between presence of food stores, fruit and vegetable intake and cardiovascular disease risk factors (Bodor, Rice, Farley, Swalm, & Rose, 2010; Michimi & Wimberly, 2010; Morland, Diez Roux, & Wing, 2006). With only an estimated 32.5% of U.S. adults consuming two or more servings of fruit per day and 26.3% consuming three or more vegetable servings per day (Grimm et al., 2010), the food environment may play a key role in increasing healthful eating, decreasing obesity, and reducing cardiovascular risk (He, Nowson, Lucas, & MacGregor, 2007).

Despite national research focusing on food environments and the low levels of fruit and vegetable intake (Serdula et al., 2004), there is little data investigating this relationship in the Midwest state of Michigan (MI). Obesity rates in MI rose 21.8% between 2001 and 2008, resulting in the 8th highest prevalence in the U.S. (Anderson, Lyon-Callo, Monje, Boivin, & Imes, 2009). One study in the urban city of Detroit, MI found that having a neighborhood supermarket was associated with a 69% increase in the number of daily fruit and vegetable servings (Zenk et al., 2009). Washtenaw County, approximately fifty miles west of Detroit, has had no research on these relationships. In 2008, the Washtenaw County Department of Public

Health (WCDPH) reported a decreasing availability of supermarkets (Washtenaw County Department of Public Health [WCDPH], 2008). Between 1950 and 2005, the number of supermarkets per capita in Washtenaw County decreased by 56% (Waller, 2005). In Ypsilanti, MI, a city in Washtenaw County, the Public Health Department reported that only 12% of adults eat the recommended amount of fruits and vegetables (Bacolor, Guzmán, & Waller, 2007). These findings may be linked to the food environment and have important implications for cardiovascular risk factors and subsequent health outcomes.

In addition to the physical characteristics of the food environment, perceptions of the local food environment influence dietary patterns (Moore, Diez Roux, Nettleton, & Jacobs, 2008).

Researchers have shown that perception is associated with physical food environments but is not identical (Freedman & Bell, 2009; Moore, Diez Roux, & Brines, 2008). In addition to the physical presence or absence of a store, perceiving that one does not have food store access may play a role in determining health behavior. Currently, no research has investigated whether perception changes the influence of the physical environment on health behavior.

To increase the understanding of the food environment in MI, we investigated the association between food store access and fruit and vegetable consumption in Ypsilanti, MI. Secondly, we investigated whether perceptions of the food environment modified the association between food store access and fruit and vegetable consumption. We hypothesized that participants with greater food store access will consume more fruits and vegetables. We also hypothesized that those with a positive perception of their food environment will be impacted differently by food store access than those with a negative perception.

Method

Study Design: We conducted a cross-sectional, in-person survey investigating the association between food store access, measured as travel time to the preferred food store and number of food stores within one mile of home, and fruit and vegetable intake in Ypsilanti, MI. Participants were recruited using convenience sampling from the Ypsilanti District Library Whittaker branch [YDL-Whittaker] on three separate days (two weekend days and one weekday) during March 2011. Potential participants were approached in the library foyer; those that refused were asked to complete a brief form for demographic data collection. Informed consent was provided prior to the survey. The University of Michigan Institutional Review Board approved this study's protocol and materials.

Study Population: In the 2005-2009 American Community Survey (U.S. Census Bureau, 2011), Ypsilanti township had 32,693 adults older than 25. Of those, 86.4% have a high school education or higher and 30.1% have a bachelor's degree or higher. Ypsilanti consists of 61.9% white, 30.1% black, 1.9% Asian, 0.5% American Indian, and 3.8% two or more races. Additionally, 5.5% of the total population identify as Hispanic or Latino. Roughly 69.4% are in the workforce, with a mean travel time to work of 24.1 minutes. The median household income of Ypsilanti is \$46,944, lower than the U.S. median of \$51,425. Potential participants were excluded from the study if they were under 18 years of age, not a resident of Ypsilanti, or were pregnant or unsure of their pregnancy status. Figure 1 illustrates the recruitment process and exclusion criteria for study participants.

Fruit and Vegetable Intake: The primary outcome variables were average daily fruit intake, average daily vegetable intake, and combined fruit and vegetable intake over the past year. Food frequency questions were modified from the 2007 Harvard Grid Food Frequency Questionnaire (FFQ) (Rimm et al., 1992). The Harvard FFQ has been validated in a range of populations including the elderly, young adults and minority groups (Field et al., 1998; Willett et al., 1985). The fruit and vegetable portions of the Harvard Grid FFQ are semi-quantitative and cover a broad variety of fruits, vegetables and juices. The FFQ asks respondents to indicate for each food item how often they have consumed the specified serving size, averaged over the past year. Eight responses are possible, ranging from never or less than once per month to four or more servings per day. Pictures and descriptions of the serving size for each item on the FFQ were provided to study participants as visual cues. We calculated the total number of fruits and vegetables consumed per month and determined the average number of servings consumed per day. Lastly, we created a binary variable indicating whether a participant met the recommendations of the United States Department of Agriculture (Thompson & Veneman, 2005) for daily fruit and vegetable intake of nine servings per day (based on a 2000 calorie diet).

Food Store Access: The first measure of food store access was self-reported average time in minutes needed to reach the most frequented food store. Participants were asked, “How much time, in minutes, would you estimate it takes you to get to the grocery store or supermarket that you use most frequently, if travelling by your usual transportation?” Since 98.8% of participants (n=82) reported that they usually use a car to get to the grocery store and supermarket, and only one participant (1.2%) reported use of a taxi/hack, this variable was not converted into a distance measure using average estimated speeds for different transportation modes. The second measure,

food store density, was obtained by asking participants the number of food stores within one mile or a twenty-minute walk of their home. This measure is analogous to GIS-created measures of the density of supermarkets within 1 mile (Moore, Diez Roux, Nettleton, et al., 2008) and with perceived food environment questions (Moore, Diez Roux, & Brines, 2008). While neither of these specific questions have been used in previous literature, they are substitutes for more objective GIS measures of accessibility and density used in several studies (Inagami, Cohen, Finch, & Asch, 2006; Moore, Diez Roux, & Brines, 2008; Moore, Diez Roux, Nettleton, et al., 2008; Rose & Richards, 2004; Zenk, et al., 2009). To validate travel time, we tested self-reported time for a separate sample of non-participants against timed trips. There was no substantial difference between the self-reported time and the validated timed measures in these non-participants (correlation coefficient of 0.908).

Food Environment Perception and Demographics: We used five questions from an eight-item questionnaire developed by Freedman and Bell (2009) to assess participants' perception of their food environment. Since we were not interested in substance use, we eliminated two questions pertaining to cigarettes or alcohol. One question about the perceived ability to purchase healthy foods was removed to avoid redundancy between perception and food store access. Each question was scored on a Likert scale (1 = strongly disagree to 5 = strongly agree) and the arithmetic mean of the five scores was calculated. Using the median (perception=3), we created a binary variable representing negative perception (3 or less, where 3 = neutral) and positive perception (greater than 3) to facilitate interpretation.

To control for possible confounding demographic and socioeconomic status (SES) variables, we collected data on participants' age (continuous), sex (male/female), race (Black, White, Asian, Native Hawaiian or Pacific Islander, American Indian or Alaskan Native, Other, Refuse), ethnicity (Hispanic, Non-Hispanic), highest education level attained (none, elementary, some high school, high school graduate, some college or technical school, college graduate, graduate or professional degree), household income (less than \$10K, \$10K to less than \$15K, \$15K to less than \$20K, \$20K to less than \$25K, \$25K to less than \$35K, \$35K to less than \$50K, \$50K to less than \$75K, \$75K or more), and employment status (employed for wages, self-employed, out of work for less than one year, out of work for more than one year, homemaker, student, retired, unable to work).

Statistical Analysis: A researcher other than the interviewer entered completed surveys into a Microsoft Access database. Variables from the FFQ were double entered and compared to original surveys to avoid data entry error. All surveys had complete data and a final data set including all subjects was compiled for analysis.

We compared the study population's demographic characteristics with those who refused participation using Student's t-test (age), Pearson's chi-square (race, sex), and Fisher's exact test (ethnicity). We used simple linear regression to investigate the crude relationship between time to preferred food store and density of food stores with fruit and vegetable intake alone and combined (model 1). Logistic regression was used to investigate the relationship between food store access measures and whether subjects met recommendations for food and vegetable intake

(yes/no). The variables annual household income, age, race, sex and education were then incorporated into a fully adjusted model (model 2).

A stratified analysis was done using a model fully adjusted for the demographics and SES to examine whether the effects of food store access on fruit and vegetable intake varied by food environment perception. Results are shown stratified by negative perception (Model 3-*NP*) and positive perception (Model 3-*PP*). All analyses were performed using SAS Version 9.2 (SAS Institute, Inc., Cary, NC).

Results

Ninety-one people agreed to participate in our study, of which 83 met eligibility criteria. Of those who refused to participate, 69 people completed refusal forms. Our study population consisted of 48 women (57.8%) and 35 men (42.2%) with a mean age of 43.6 years (SD=12.8). Table 1 compares baseline demographic characteristics of our study participants to Ypsilanti demographic statistics taken from the American Community Survey (2005-2009). Participants were similar to residents of Ypsilanti, with the exceptions that they were more highly educated and less likely to be Hispanic. Demographic characteristics of those who refused to participate were similar to study participants (data not shown).

Descriptive statistics of food store access and fruit and vegetable consumption can be found in Table 1. Participants traveled an average of 9.9 minutes (SD=6.7) to their preferred store and had an average of 1.3 stores (SD=1.3) within one mile of their homes. Overall, participants reported eating more vegetables than fruits. A higher percentage of females (37.5%) and those with some college (36.7%), college (34.8%) and graduate degrees (35.0%) met dietary recommendations compared to males (25.7%) or those with high school degrees or less (10.0%).

Table 2 displays the results of the linear regression analysis of fruit and vegetable intake. The simple linear regression (model 1) revealed a positive association between travel time and fruit and vegetable intake. For each additional minute of travel time to the food store, fruit and vegetable consumption increased by 0.18 fruits or vegetables per day ($\beta=0.18$; 95% CI: -0.02, 0.39). Vegetable intake alone was positively associated with distance ($\beta=0.16$; 95% CI: 0.01, 0.31), while fruit intake alone was not associated with distance ($\beta=0.02$; 95% CI: -0.06, 0.10).

There was no association between reported food store density with fruit and vegetable intake, either separately or combined. The addition of demographic and SES variables to our model (model 2) strengthened the relationship between travel time and fruit and vegetable intake, while the relationship between food store density and fruit and vegetable intake remained unchanged.

There was no statistically significant effect modification by perceived food environment. However, the relationship between travel time and fruit and vegetable intake (model 3) was different for those with negative versus positive perceptions. For participants with a negative perception of their environment, controlling for demographics and SES, each additional minute of travel led to an increased consumption of fruits and vegetables per day (0.56 95% CI: 0.25, 0.88) while those with a positive perception had no association between distance and fruit and vegetable intake (0.37 95% CI: -0.47, 0.1.20). A similar pattern emerged with vegetable intake but perception did not differentially affect fruit intake (Table 2). The association between density and fruit and vegetable intake was also not statistically different between those with negative and positive perceptions of their food environment. After controlling for demographic and SES covariates, those with negative perception had a positive relationship between density and fruit and vegetable intake (0.19 95% CI: -1.32, 1.71) while those with positive perception had an inverse relationship between density and fruit and vegetable intake to -1.38 (95% CI: -3.88, 1.11).

In the logistic regression models, travel time was not associated with the odds of meeting recommendations for fruit and vegetable intake (OR 1.03, 95% CI: 0.96, 1.10), even after controlling for potential confounding variables (OR 1.10, 95% CI: 0.94, 1.29). The density of

food stores, however, was associated with the odds of meeting recommendations. For every additional store within one mile of participants' homes, the odds of meeting the recommended intake of fruits and vegetables increased 52% (OR 1.52, 95% CI: 1.04, 2.12). Controlling for confounding factors, each additional store within one mile of participants' homes increased the odds of meeting recommendations by 105% (OR 2.05, 95% CI: 1.02, 4.10).

Discussion

Using self-reported measures of food store access and fruit and vegetable intake, we found that the food environment is associated with fruit and vegetable intake in Ypsilanti, MI. We observed increasing fruit and vegetable intake with increasing travel time to the food store, driven primarily by vegetable intake. The odds of meeting recommended daily levels of fruit and vegetable intake approximately doubled for each additional food store within one mile of participants' homes. Perception of the food environment did not statistically modify the effect of food store access on fruit and vegetable intake.

The positive relationship between travel time and fruit and vegetable intake is contrary to our initial hypothesis and previous research (Inagami, et al., 2006; Laraia, Siega-Riz, Kaufman, & Jones, 2004; Morland, et al., 2006; Rose & Richards, 2004). This may be due to the slight difference between food store access and food store preference. While our measure was intended to capture distance to food stores, a measure of neighborhood food environment, it more accurately reflects the store most frequently used. This may not be the nearest store or even be in the same neighborhood that a participant resides in. It may be possible that individuals who visit food stores outside of their local neighborhood do so to gain access to specific offerings at their preferred store, such as availability and quality of fresh produce. Thus, reverse causation may have occurred in which increased fruit and vegetable intake may actually result in farther drives to seek produce. Since a higher percentage of our participants (32.5%) met the required fruits and vegetables compared to the percentage reported by the Washtenaw County Department of Health (Bacolor, et al., 2007), it is plausible that reverse causation played a role in our findings.

The difference in percentage of our participants meeting required intake compared to Washtenaw County overall may also suggest that our sample is not representative of the broader Ypsilanti population, although Table 1 shows that our sample was equivalent to the Ypsilanti, MI American Community Survey in all demographic characteristics with the exception of education and Hispanic ethnicity. According to previous research, Hispanic individuals are equally likely to consume fruits and vegetables (Blanck, Gillespie, Kimmons, Seymour, & Serdula, 2008) and should not have caused any additional bias. The higher education level of participants compared to Census data for Ypsilanti residents is a limitation of the non-random sample, and may be a source of bias among our study, since fruit and vegetable consumption is patterned by education (Blanck, et al., 2008; Cooke et al., 2004). Within the context that individuals of higher education may be better informed about the importance of fruit and vegetable intake, or have more material resources to seek out and purchase fruits and vegetables, findings on increased travel time may make sense. Since participants' knowledge of the number of fruits and vegetables they should eat or the importance participants attach to consuming fruits and vegetables were not assessed, we are unable to evaluate whether these factors drive findings. Future research should gauge participants' knowledge and beliefs regarding fruit and vegetable consumption when assessing the effects of the food environment.

The increased odds of meeting recommended daily levels of fruit and vegetable intake with increased food store density is consistent with our hypothesis and previous literature (Moore, Diez Roux, Nettleton, et al., 2008; Rose & Richards, 2004). Individuals with more stores around their homes may have increased options, wider variety, or varying quality of produce. An increase in stores may benefit participants by increasing ease of access to produce. Additional

qualitative research on store preference and produce options should be done to explore why this relationship exists.

Although perception of the food environment did not statistically modify the effect of food store access on fruit and vegetable intake, patterns that arose in our research suggest that this modification should be explored further. Previous research has investigated the accuracy of individuals' perceptions of their food environment (Moore, Diez Roux, & Brines, 2008; Moore, Diez Roux, Nettleton, et al., 2008), but has failed to investigate whether perception changes the effect of the physical food environment on health behaviors. In our study, the association between food store access and intake were stronger for those with a negative perception of their local food environment. It is possible that those who have a negative view of the food choices available locally are more willing to travel farther to a food store and could have a higher priority placed on consuming fresh produce. Shopping preferences should be explored as a possible mechanism in this relationship. Our results indicate that attention should be paid to perception of the food environment in the role of determining store choice and ultimately fruit and vegetable intake, but additional research is necessary to confirm the moderating role of perceived food environment.

The cross-sectional design limits our ability to make causal inferences from our data and a small sample size restricts power to detect associations. The reliance on a convenience sample may have introduced selection bias and prevents generalization to the broader population. As previously noted, while many sample demographics were consistent with Ypsilanti Census data, the higher educational status and lack of Hispanic respondents in our study indicate that our

study population may not be representative. Moreover, YDL-Whittaker is not accessible by public transportation, which may narrow our sample to those who have cars and can use them to access food stores. Patrons of a library may also represent a subgroup of the population with atypical characteristics and health behaviors. Restaurant use and frequency of eating out was not evaluated in our study and may be unmeasured factors influencing fruit and vegetable intake. Specifically, concentration, access, and use of fast food establishments has been shown to be important to eating habits (Ford & Dzewaltowski, 2008) but was not measured in our study.

The use of self-reported exposures, outcomes, and third variables results in the possibility of measurement error. Participants who consume more fruits and vegetables could potentially be more familiar with their local food stores and likely to report a more accurate account of the food environment, while participants who consume less fruits and vegetables may underreport food stores due to lack of use. However, utilizing self-report may provide insight into the true influence of the environment, especially when the perceived and physical food environments are disparate. More research synthesizing both constructs is necessary to better tease apart these relationships (Moore, Diez Roux, & Brines, 2008).

Our study suggests that individuals in Ypsilanti with higher food store density are more likely to meet recommendations for fruit and vegetable intake. As a decrease in fruit and vegetable intake is associated with a multitude of chronic diseases, increasing the number of food stores has the potential to reduce disease burden within the community. Contrary to our hypothesis, people who travel longer to their preferred food store consume more fruits and vegetables. Further investigation as to the directionality of this relationship should be conducted. Continued research

should focus on the complex interplay between a person's built food environment, their perception, and ultimately fruit and vegetable intake.

Acknowledgements

The authors acknowledge the valuable contributions of Monica Uddin, PhD and Sarah Leasure Reeves, MPH for their support and guidance throughout the research process. We also thank the YDL-Whittaker branch and our study participants for their valuable contributions to this research. No funding was used in this research.

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Table 1: Demographic information and descriptive statistics for Ypsilanti, MI^a and Study Participants recruited in Whittaker Branch Library Ypsilanti, MI (n=83)

	Ypsilanti	Study Participant
Demographics:		
Race (%) ^b		
White	61.9	61.7
Black or African American	30.1	25.9
Asian	1.9	3.7
American Indian	0.5	1.2
Multiracial	3.8	7.4
Hispanic/Latino (%)	5.5	0.0
Median Household Income	\$46,944	\$35,000-\$50,000 ^c
Employed (%)	69.4	67.1
Education (%)		
Less than High School	13.6	1.2
High School to bachelors	56.3	47.0
Bachelors or higher	30.1	51.8
Food Environment:		
Mean time to supermarket in minutes (SD)	---- ^d	9.9 (6.7)
Mean density of food stores within one mile (SD)	----	1.3 (1.3)
Perception of food environment		
Number with positive perception (%)	----	49 (59.0)
Number with negative perception (%)	----	34 (41.0)
Fruit and Vegetable Consumption:		
Mean fruit and vegetable intake (SD)	----	8.4 (6.3)
Mean fruit intake (SD)	----	3.4 (2.4)
Mean vegetable intake (SD)	----	5.1 (4.7)
Number meeting recommended daily intake ^e (%)	----	27 (32.5)

^aAmerican Community Survey 2005-2009 (U.S. Census Bureau, 2011)

^bPercentages for race may not sum to 100% due to rounding and the possible use of “other” race category.

^cSurvey used income categories for privacy. This represents the median income category.

^dValues not reported because they represent the entire base population rather than study sample

^eEating nine servings per day for a 2000 calorie diet considered meeting recommended daily intake of fruits and vegetables.

Table 2: Effect estimates of food environment measures (distance and density) on fruit and vegetable intake among study participants in Ypsilanti, MI (n=83). Models unadjusted, adjusted for demographics and stratified by perceived food environment.

Predictor and Outcomes	Model 1 ^a	Model 2 ^b	Model 3-NP ^c	Model 3-PP ^c
Time (minutes) to the most frequently used food store				
Fruit and Vegetable Intake	0.18 (-0.02, 0.39)*	0.37 (0.10, 0.64) **	0.56 (0.25, 0.88)**	0.37 (-0.47, 1.20)
Fruit Intake	0.02 (-0.06, 0.10)	0.02 (-0.08, 0.13)	0.07 (-0.04, 0.19)	0.23 (-0.16, 0.62)
Vegetable Intake	0.16 (0.01, 0.31)**	0.35 (0.14, 0.55) **	0.49 (0.22, 0.76)**	0.14 (-0.44, 0.72)
Density (1 store) of food stores within one mile of participants' homes				
Fruit and Vegetable Intake	0.61 (-0.47, 1.70)	0.48 (-0.72, 1.67)	0.19 (-1.32, 1.71)	-1.38 (-3.88, 1.11)
Fruit Intake	0.23 (-0.18, 0.63)	0.27 (-0.16, 0.71)	0.14 (-0.31, 0.59)	-0.29 (-1.54, 0.97)
Vegetable Intake	0.38 (-0.44, 1.20)	0.20 (-0.74, 1.15)	0.06 (-1.26, 1.38)	-1.09 (-2.73, 0.55)
NP= Negative perception of the food environment PP= Positive perception of the food environment *Statistically significant at the $P<0.10$ level ** Statistically significant at the $P<0.05$ level ^a Unadjusted model: only including food store access measure ^b Demographics/Socioeconomic status adjusted model: includes age, race, income, sex, education ^c Fully adjusted model: includes age, race, income, sex, education, and stratified by perceived food environment.				

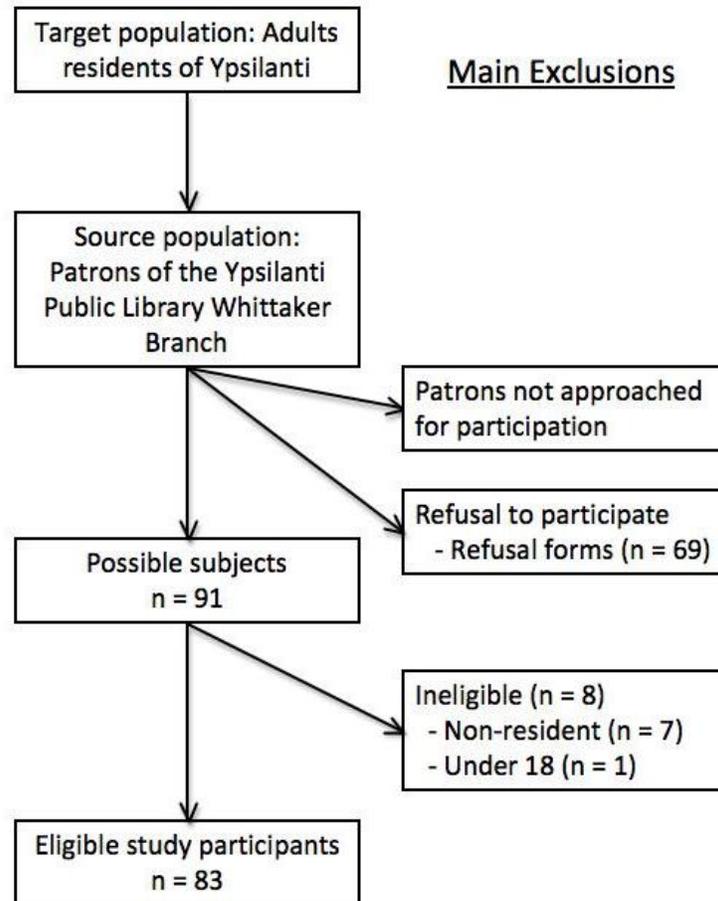


Figure 1: Selection of study participants from the Whittaker Branch Public Library in Ypsilanti, MI. Recruitment and study completed during March 2011.

Geographical Information Systems Facilitate Child Lead Screening Efforts

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ABSTRACT

Background: Children at the highest risk for lead poisoning are African American, living in families with low incomes, or are living in housing built prior to 1946. The Greater Flint Lead Safe Children Program (GFLSCP) was designed to increase the proportion of African Americans under 6 years of age who are tested for lead in a State-designated high risk area for childhood lead poisoning.

Objective: We used Geographical Information Systems to create maps that facilitate program process and evaluation.

Methods: We created maps of neighborhood outreach coverage and lead screening results. We identified areas with higher concentrations of African American children under 6 years of age and housing units constructed prior to 1940.

Results: Digital maps organize program information and facilitate program process. Maps visually demonstrate the association between older housing stock and elevated blood lead levels, and assist GFLSCP staff in prioritizing areas at highest risk of lead poisoning. Analyses indicated that the proportion of houses built prior to 1940 predicted blood lead levels.

Conclusions: Geographic Information Systems provide an intuitive, visual means of tracking program progress and correspondence of intervention activities within the focus demographic and identified areas of concentrated risk.

Keywords: Geographical Information Systems, lead screening, children, Community Based
Participatory Research

INTRODUCTION

Lead poisoning is a substantial health threat to individuals and communities. Once lead is ingested, it affects the absorption of iron – one of the building blocks of brain, nerve, and bone structures (Haner, 2000). Lead can produce adverse effects on virtually every system in the body; it can damage the kidneys, the nervous system, the reproductive system, and cause high blood pressure. Research has shown that lead poisoning and lead exposure are linked to aggression, learning problems, anemia, hearing loss, hyperactivity, developmental delays, as well as liver, kidney, and brain damage (for a review, see Michigan Department of Community Health, 2004). Extreme cases can result in coma and even in death (Michigan Department of Community Health, 2004). Treatment can reverse some damage; however, long-term exposure can cause lifelong problems (Haner, 2000).

Lead exposure in children under the age of 6 years is of particular concern because children absorb lead more readily than adults and are more likely to ingest lead from contaminated sources through normal hand-to-mouth activity (Michigan Department of Community Health, 2001; Centers for Disease Control and Prevention, 1997a). Lead-contaminated dust in the home from lead-based paint is a primary contributor to children's lead exposure (Centers for Disease Control and Prevention, 1997a). Although peeling, cracked, and/or chipped lead-based paint may be the most obvious source of ingestion, painted surfaces may produce lead dust even when they appear to be in good condition (Michigan Department of Community Health, 2001). Although progress has been made in reducing other sources of lead exposure, the Environmental Protection Agency (1995) reports that nearly 83% of homes built prior to 1978 still have a significant concentration of lead-based paint. Children living in homes built prior to 1946 are at greatest risk

for exposure to lead-based paint as the likelihood of containing lead-based paint increases with age of the home (Michigan Department of Community Health, 2005).

Medicaid providers in Michigan are required by the Federal Centers for Medicare and Medicaid Services through Medical Services Administration to screen all Medicaid-enrolled children for lead as part of the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) during their well-child visits. As stated in a May 2004 letter from the Michigan Surgeon General to local health care providers, the State of Michigan has consistently demonstrated lead testing rates that are considerably lower than currently required and recommended by the Michigan Department of Community Health (MDCH) and Centers for Disease Control and Prevention (CDC). As of December 2004, Medicaid blood lead testing data shows that only 39% of two year old children and 45% of three year old children who are enrolled in Medicaid had undergone a blood lead level test on or before their 2nd birthday or on or before their 3rd birthday, respectively (Michigan Department of Community Health, 2004). Thus, a significant gap in lead poisoning prevention services exists in that providers are not appropriately testing all Medicaid-enrolled children, as they are required to do.

Although provider compliance is problematic, there is also a lack of knowledge and skills of parents/guardians of at-risk children. Parents/guardians are often not aware that their child may be at risk for lead poisoning or that their child may meet MDCH criteria for recommended or required testing. Children with elevated blood lead levels (EBLL) are often asymptomatic, so it may not be outwardly obvious that a child is sick (Michigan Department of Community Health, 2001). Also, many parents believe paint chips to be the main source of lead exposure and

poisoning, and so in the absence of any paint chips, do not realize the child is susceptible. However, as stated previously, lead dust is likely the major contributor to childhood lead poisoning present in homes today (Centers for Disease Control and Prevention, 1997a).

An additional issue is that parents/guardians may not be aware that their Medicaid-enrolled child is entitled to a lead test as part of the EPSDT portion of their well-child visit. Even if parents/guardians know that their child is potentially at risk for lead poisoning or is entitled to lead test through their provider, they may lack the confidence and skills to request a health care provider test the child's blood lead level. Therefore, parents/guardians are an important influence on whether or not children are appropriately tested for lead.

Lastly, health care access, particularly for uninsured children, is a major determinant of appropriate lead testing for children. In a 2003 population survey, 13.3% of Genesee County respondents reported that youth in their household age 17 years or under were without health insurance coverage at some time in the past year (Prevention Research Center of Michigan, 2003). Prior to the creation of the Greater Flint Lead Safe Children (GFLSC) program in spring 2005, the ongoing lead poisoning prevention program at the Genesee County Health Department (GCHD), the Childhood Lead Poisoning Prevention Program, provided a monthly lead-testing clinic for uninsured Genesee County children. However, in FY2003-2004, only six children were seen in this clinic, suggesting that there is a lack of awareness of the clinic or a lack of understanding of the important services it offers or barriers to access.

The Greater Flint Lead Safe Children Program: The Greater Flint Lead Safe Children Program (GFLSCP), funded through the Health Disparities Reduction Program at MDCH, conducted an outreach and education campaign to households and physician offices within the 48505 ZIP Code. In addition, the GFLSC involved the creation of a countywide coalition to raise awareness and increase collaboration in regards to childhood lead poisoning prevention. The 48505 ZIP Code is an MDCH designated high-risk area for childhood lead poisoning and is also home to the largest concentration of African American children in Flint. Although reliable data on lead poisoning and testing is difficult to ascertain by race, the Centers for Disease Control and Prevention (CDC) report that nationally the children at the highest risk for lead poisoning are African American, living in families with low incomes, or living in housing that was built prior to 1946 (Centers for Disease Control and Prevention, 1997a).

Genesee County has 10 MDCH-designated high-risk ZIP Codes for childhood lead poisoning (Michigan Department of Community Health, 2005). The 48505 ZIP Code area is one of those so designated and was chosen as the GFLSCP target area because it has the largest percentage (85.3%) and number (3,319) of African American children under the age of 6 years of all the designated high-risk ZIP Code areas (U.S. Census, 2001). The 48505 ZIP Code area is a very impoverished area of Flint, with 30.5% of families and 35.7% of individuals falling below the federal poverty level (U.S. Census, 2001). Additionally, the 48505 area is one of the most at risk ZIP Codes for childhood lead poisoning due to its high percentage (38.2%) of housing stock built before 1950 (U.S. Census, 2001).

According to the current MDCH Childhood Lead Poisoning Prevention Program Statewide Screening/Testing Plan (Michigan Department of Community Health, 2004), which is endorsed by the CDC, all Medicaid-eligible children in Michigan should be tested at 12 and 24 months of age, or between 36 and 72 months of age, if they were not previously tested. Also, all non-Medicaid children living in a geographic area with 27% or greater pre-1950 housing should be tested for lead poisoning (Michigan Department of Community Health, 2004). However, only 21.7% (270) of 1 and 2 year olds in 48505 and 14.6%, or 569, of all children under 6 years were tested in calendar year 2003 (Michigan Department of Community Health, 2004).

A review of the literature reveals that the majority of childhood lead poisoning interventions focus on reducing the blood lead levels of children already identified to have elevated blood lead levels (Schultz, Pawel, & Murphy, 1999; Aschengrau, Beiser, Bellinger, Copenhafer, & Weitzman, 1997). However, a significant proportion of children do not receive timely and appropriate blood lead level testing. Greater Flint Lead Safe Children Program (GFLSCP) utilized a multi-pronged approach to increasing lead testing rates for at-risk children. GFLSCP staff believe that addressing the knowledge, beliefs, and skills of parents/guardians in relation to lead poisoning prevention, in addition to increasing the knowledge of health care providers serving the geographic high-risk area, as well as the systems perspective of the proposed Genesee County Childhood Lead Poisoning Prevention Coalition, would result in increased testing rates in the 48505 ZIP Code area.

METHODS

The Greater Flint Lead Safe Children Program (GFLSCP) worked to increase the proportion of children under age 6 years in the 48505 ZIP Code who are tested for lead. The original program was modified due to challenges in implementation and results of process evaluation. The GFLSCP distributed lead poisoning information door-to door to all occupied homes in 48505, as well as to pediatric and family practice physician offices located in the ZIP Code area. These information packets are educational and contain resources aimed at increasing the proportion of African American children under 6 years of age in 48505 who have their blood lead level tested. As part of the program, children covered by Medicaid or without health insurance were eligible for free blood lead level testing at the GCHD clinic located in the target area. Additional efforts identified other sites for conducting lead testing, such as local churches. As part of this testing initiative, parents/guardians participated in a curriculum based on the Health Belief Model (Strecher & Rosenstock, 1997), which was aimed at increasing parent/guardian knowledge, confidence, and skills in relation to lead poisoning prevention and lead testing.

GFLSCP partnered with University of Michigan School of Public Health faculty to facilitate and evaluate the implementation of the GFLSC Program. We followed the principles of Community-Based Participatory Research (CBPR; Israel, Schulz, Parker, & Becker, 1998) during these efforts. We used Geographical Information Systems (GIS) to aid and document GFLSC efforts. GIS is an effective tool for graphically portraying important information about health problems within a community. GIS is increasingly being utilized for detecting and monitoring public health issues (Cromley & McLafferty, 2002). One of the most popular public health applications of GIS is for environmental health issues, such as exposure to multiple environmental

contaminants and breast cancer incidence (Gardner & Harrington, 2003; Elmes, 2004). GIS is also an effective planning tool for informing decision makers about the specific health care needs of population groups (Barnard & Hu, 2005).

The GLFSCP program used maps created with GIS to facilitate program process and evaluation. Stakeholders in Genesee County, including representatives from local community-based organizations, have been receptive to the use of GIS in mapping local health data in previous Genesee County projects (Kruger, Brady, & Shirey, 2008). We created digital maps to track the city blocks covered by neighborhood outreach efforts, the number of households reached, the distribution of informational packets, and lead screening results (See Figure 1). These maps displayed the number of informational packets distributed per street segment by month. With Census data, we identified areas with higher concentrations of African American children under 6 years of age and housing units constructed prior to 1940. We used Hierarchical Linear Modeling (Raudenbush & Bryk, 2002) to examine the relationship between the concentration of houses built prior to 1940 in a Census blockgroup and elevated blood lead levels in children in the 48505 ZIP Code area who have been tested for lead.

RESULTS

By June 30, 2006, 3,349 informational packets were distributed to homes in the 48505 ZIP Code area. A total of 419 African American children under age 6 years residing in this area had their blood lead level tested through the GLFSCP program from April 2005-June 2006, accounting for 33% of the tests conducted for children residing in 48505 during that time period. The percent of children age 6 years and under in 48505 who have been tested has increased from 21.2% from June 2004-June 2005 to 30% from June 2005-June 2006 (Michigan Department of Community Health, 2004). Sixty-five percent ($n = 194$) of parents/guardians of children tested through GFLSC have participated in the curriculum. Participant knowledge about symptoms, risk reduction, and rights regarding lead disclosure has increased dramatically from pre to post-test.

The creation of maps facilitated the documentation of program activities, encouraging precise and detailed record keeping of intervention events. As program staff often change during the course of an intervention, it is important to clearly document activities to prevent omission or duplication. GIS requires precise address information when mapping data. Program staff conducting outreach efforts knew which blocks were covered during neighborhood activities, however this information was not recorded in a manner suitable for mapping. For example, in the first iteration of maps, outreach staff provided only the name of streets covered. Thus, the entire street was mapped within the 48505 ZIP Code. Outreach staff then clarified that only certain blocks were covered, and were able to provide cross streets marking the boundaries of outreach efforts. Outreach staff and the evaluation researcher were able to work together to identify coverage information suitable for mapping; complete street addresses for starting and ending points, including street orientation (North, South, East, West) were provided. Thus, the

institutional memory of outreach efforts was standardized and preserved for future reference (See Figure 1).

Maps created with Census data depicted the concentration of African American children under 6 years of age and housing units constructed prior to 1940 by Census blockgroup. Program staff used these maps to compare risk prevalence, concentration of the focus population, and locations of program outreach activities. African American children under 6 years of age were most concentrated in the central and south-central regions of the 48505 ZIP Code. The southern portion of the 48505 ZIP Code had the highest concentration of houses built prior to 1940 (See Figure 2). Maps of blood lead levels suggested clustering of lead poisoning cases in this area. HLM analyses indicated that the proportion of houses built prior to 1940 predicted blood lead levels, $t(30)=5.733$, $p<.001$. Program staff thus guided and prioritized outreach efforts towards the southern and south-central portions of the 48505 ZIP Code.

DISCUSSION

The use of Geographic Information Systems in presenting data has resulted in an intuitive, visual means of tracking program progress and has enhanced the correspondence of intervention activities with the concentration of at risk individuals in the focus demographic. GIS presentation of the data allow for precise, visual tracking of program efforts and program evaluation measures, such as lead testing and blood lead level. Maps combining blood lead level screening results with the prevalence of older housing stock visually demonstrate this association and assist GFLSC staff in prioritizing those areas within 48505 at highest risk of lead poisoning.

The intuitive nature of maps for presentation of quantitative data has enhanced accessibility by a broad audience, including community members, health care providers, and university researchers. Trends can be displayed visually for evaluating outcomes associated with community projects aimed at increasing blood lead level testing rates. This project demonstrates the utility of Geographic Information Systems in facilitating and assessing community based lead screening programs. Similar processes would be valuable in other communities and other types of interventions with a spatial component.

GIS is increasingly adopted in public health efforts because of its broad utility of applications. For example, GIS can be used to locate clients or participants to assess spatial distribution; comparing health indicators across geographical areas; examining the health impact of neighborhood characteristics; assessing health needs, e.g., comparing the distribution of risk factors and screening coverage (Kruger, Brady, & Shirey, 2008); facilitating health education and promotion efforts (Kruger, Lewis, & Schlemmer, 2010); community outreach and data

dissemination; informing local health policy (Kruger, Shirey, Morrel-Samuels, Skorcz, & Brady, 2009), and examining patterns of pollution and its impact on health (Mohai, Kweon, Lee, & Ard, 2011). Although considerable training is required for the use of professional GIS software, basic activities such as mapping locations and hyperlinking information to spatial coordinates is now possible with Google Maps and other freely available software. The notion that one picture is worth a thousand words of description rings true for those utilizing GIS in their health research and practice.

Acknowledgments

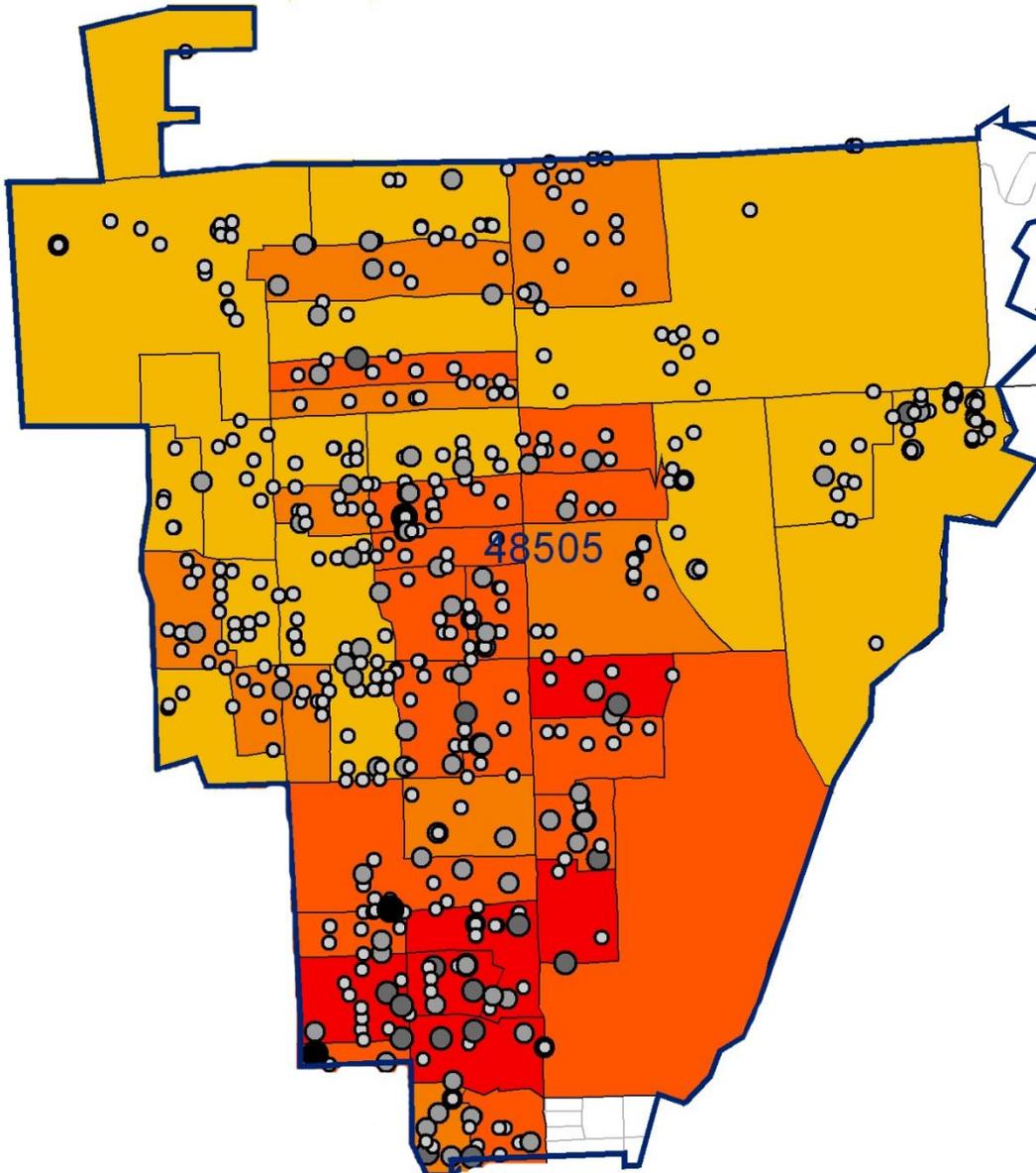
This work was made possible by funding from the Michigan Department of Community Health's Health Disparity Reduction Program. The authors also wish to extend their thanks to Kim Noble who was instrumental in early program efforts and evaluation.

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Figure 2. Proportion of housing units built pre-1940 and elevated blood lead levels



Elevated Lead Levels

- ◊ No Exposure (0-4 $\mu\text{g}/\text{dl}$)
- ◐ Some Exposure (5-9 $\mu\text{g}/\text{dl}$)
- Lead Poisoned (10-19 $\mu\text{g}/\text{dl}$)
- Lead Poisoned (20+ $\mu\text{g}/\text{dl}$)

Evaluating the Recidivism Rates for Parolees Enrolled in M-COIT, a Community Mental Health/ Substance Abuse Treatment Program

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Abstract

This paper focuses on an evaluation of recidivism rates of parolees with severe and persistent mental illness enrolled in a mental health/ substance abuse treatment program (M-COIT) at a community mental health center in southeastern Michigan. The two partners in the study were a community mental health center located in a city bordering the southern part of Detroit and Eastern Michigan University located in Ypsilanti, Michigan. The purpose of the study was to identify the recidivism rates and factors that affected these rates for parolees who participated in the M-COIT Program. This was a retrospective medical record review. The practical participatory evaluation was stakeholder driven; the organization's staff initiated the evaluation and participated directly in the process from start to finish, including setting objectives and expectations, instrument development, data collection, analysis and interpretation, and reporting of outcomes. Results reported are for the parolees who participated in the program from 2004 to 2006. Implications for public health are addressed.

Overview

The chief executive officer of a non-profit community mental health center, located in a Downriver city bordering Detroit, Michigan, was interested in identifying the recidivism rates and factors that affected these rates for parolees who participated in the outpatient mental health and substance abuse treatment program (M-COIT) operated by the agency, and in identifying interventions that needed to be continued, modified and/or enhanced. The M-COIT (Mental Health/Substance Abuse Corrections Outreach Intensive Treatment Program) located in Wayne County, Michigan, is a multi-disciplinary, outpatient mental health and substance abuse treatment program for parolees with severe mental illness and/or substance use disorders.

Mental illness as a public health issue negatively affects an individual's overall health and well-being. According to Healthy People 2020, mental illness refers collectively to all diagnosable mental disorders; mental disorders are health conditions that are characterized by alterations in thinking, mood, and/or behavior that are associated with distress and/or impaired functioning (USDHHS, 2012). The National Institute of Mental Health (2012) reports that an estimated 26.2 percent of Americans ages 18 and older, about one in four adults, suffer from a diagnosable mental disorder in a given year; six percent suffer from a serious mental illness. The prevalence rates of many of the mental disorders among inmates are higher than the rates for these conditions among the U.S. population as a whole (Feucht & Gfroerer, 2011; NCCHC, 2002). Sixty to eighty percent of individuals under the supervision of the criminal justice system have a substance use related issue (Feucht & Gfroerer, 2011).

“Mental health disorders are the leading cause of disability in the United States and Canada, accounting for 25 percent of all years of life lost to disability and premature mortality”

(USDHHS, 2012). Mental illness is associated with such chronic medical diseases as cardiovascular disease, diabetes, and obesity (CDC, 2011). Although rates for asthma among inmates are higher than for the total U.S. population (NCCHC, 2002). The prevalence rates for diabetes and hypertension are lower for inmates than the U.S. population, perhaps because these inmates are a relatively young population (NCCHC, 2002). A more serious threat to the public's health is the high prevalence rates of certain communicable diseases, HIV/AIDS, sexually transmitted diseases, Hepatitis B and C, and Tuberculosis infection and disease. These are significantly higher among inmates and those released than among the total U.S. population (NCCHC, 2002).

Participatory evaluation is applied social research that involves a partnership between a trained evaluator and practice-based decision makers, organization members with program responsibility or people with a vital interest in the program, primary users (Cousins & Earl, 1992). Practical participatory evaluation fosters evaluation use with the implicit assumption that evaluation is geared toward program, policy, or organizational decision-making (Cousins & Whitmore, 1998). Cousins (2001) defines practical participatory evaluation in which primary users of evaluation data participate directly in the evaluation process from start to finish, including technical activities as instrument development, data collection, processing, interpretation, and reporting. Practical participatory evaluation represents a pragmatic problem-solving approach where the primary concern is the creation of meaningful evaluation knowledge that will be useful in supporting program decision making (Sylvestre, Cousins, Sundar, Aubry, & Hinsperger, 2008). Involvement of staff will increase the likelihood that the outcomes of the study will be used to improve the effectiveness of the program and enhance organizational learning (Kopczynski &

Pritchard, 2004) and ownership of outcomes (Hudson, Hardy, Henwood, & Wistow, 1999).

In this paper, the authors first describe Assertive Community Treatment, the evidence-based practice on which the M-COIT Program is modeled, and the M-COIT Program itself. Secondly, the authors discuss the participatory evaluation process, results regarding recidivism rates and associated factors, lessons learned, and implications for public health practice.

Assertive Community Treatment: The evidence-based practice model for M-COIT is Assertive Community Treatment, which provides comprehensive mental health services in the community utilizing an interdisciplinary treatment team based on consumers' needs (Dixon, 2000; Lamberti, Weisman, & Faden 2004; Morrissey, Meyer, & Cuddleback, 2007; Osher & Steadman, 2007). In an ACT Program, the interdisciplinary team provides intensive treatment through supportive and cognitive-based psychotherapy, psychiatry, and case-management services and facilitates dual-diagnosis treatment, psychotropic medication management, educational/vocational assistance and promotes community re-engagement (Allness & Knoedler, 2003). Staff are to be available 24 hours a day, seven days a week, with an average of three contacts per week with the clients (Allness & Knoedler, 2003). The original intent of the ACT Model was to treat individuals with severe and persistent mental illness in the community to prevent repeated psychiatric hospitalizations (Dixon, 2000, & Morrissey et al., 2007). Morrissey et al. (2007) report that the ACT model needs to be modified with extra interventions that specifically target reduction of criminal behavior, and that there is a definite need for ACT-like interventions for mentally ill offenders, because as a group, individuals with severe mental illness are incarcerated more often than they are hospitalized. Forensic ACT (FACT) is the emerging designation for

ACT teams that focus on preventing psychiatric hospitalizations, jail detention and recidivism for those individuals with severe mental illness who are involved with the criminal justice system (Lamberti et al., 2004; Morrissey et al., 2007; Osher & Steadman, 2007).

M-COIT Program: The M-COIT Program is a certified ACT program adapted to meet the needs of the parolees who are severely and persistently mentally ill, the majority of whom have co-occurring substance-use disorders. M-COIT provides intensive case-management, psychotherapeutic, psychiatric, nursing, and referral services. The goals of M-COIT are to assist parolees with severe mental illness who were discharged from Michigan's prison system in adjusting to community living and maintaining a crime-free life style. The premise is that parolees who comply with treatment will have lower recidivism rates, have reduced inpatient psychiatric hospitalizations, and be productive members of society. For many parolees, participating in intensive mental health and substance use/abuse services is a parole condition, and they risk violating parole if they do not participate.

To be admitted into M-COIT, parolees need to meet a criterion as being severely and persistently mentally ill. This includes, but is not limited to, a severe DSM-IV-TR Axis I diagnosis, a history of psychiatric hospitalizations, the present and/or historical usage of major psychotropic medications for the stabilization of a profound mental illness, and referral from prison, a parole officer or parole board. Further consideration is given to individuals with significant chemical dependency histories as defined by substance abuse inpatient treatment histories, as well as legal and diagnostic data. Almost all of the parolees in M-COIT have some form of chemical dependency (primarily crack, alcohol, marijuana, and heroin).

Parolees enrolled in the M-COIT Program are required to participate in mandatory, weekly mental health and substance abuse didactics (education), weekly group psychotherapy, monthly psychiatric and medication reviews, individual psychotherapy, and be in contact with nurses and case-managers, on an outpatient basis. Individuals in need of inpatient substance abuse services are referred to one of three residential substance abuse treatment sites with M-COIT contracts. The length of the program is the term of the individual's parole, which is generally between 18 and 24 months. This is the amount of time for which the funder will pay for services. Once a parolee completes parole and is still in need of services, M-COIT staff refers him or her to a treatment program within the Agency or another community agency, as appropriate.

M-COIT meets the fidelity requirements of the ACT standards, and its adaptations comport with the four elements that Lamberti (2007) and Morrissey (2007) identified to distinguish a forensic ACT program from a traditional ACT program. These four elements are: 1) the goal of the program is to prevent arrest and incarceration; 2) requirement of all participants admitted to M-COIT to have criminal-justice histories; 3) acceptance of the majority of referrals from criminal justice agencies; and 4) the development and incorporation of supervised residential treatment components for parolees with co-occurring substance use disorders (Lamberti et al, 2007; Morrissey et al., 2007).

Evaluation process

This evaluation study was a participatory process that involved stakeholders as partners with the external evaluator in the study design, data analysis, and reporting. The key component of participatory evaluation was stakeholder involvement (Cousins & Whitmore, 1998; Israel, Eng, Schulz, & Parker, 2005; Plottu & Plottu, 2009); Sylvestre, Cousins, Aubry, & Hinsperger, 2008).

If stakeholders are involved, this increases the likelihood that the evaluation results will be used.

In this study, the stakeholder was the organization, with the CEO as the driving force for the evaluation of M-COIT. The CEO wanted to identify the recidivism rates of the parolees and to identify factors contributing to these rates for program improvement. The internal evaluator was M-COIT's Program Coordinator, and the external evaluator was a faculty member from Eastern Michigan University in Ypsilanti, Michigan. Before the commencement of the study, the CEO, Deputy Director for Programs, the Program Coordinator, and the faculty member met informally to discuss the study and to clarify roles. The CEO and the Deputy Director were to develop overall objectives for the evaluation and serve as a resource during the evaluation process. The Program Coordinator and external evaluator would collaborate on the data collection process, analysis, reporting of results, and joint authorship of papers. Resolving differences and concerns was not specifically addressed at the preliminary meeting, but it was implied the internal and external evaluators were to work together and not expect the CEO to resolve them. This was important because of the personal (spousal) relationship between the CEO and the external evaluator.

Prior to the commencing the study, the CEO informed the Agency's Board of Directors about the study and that his wife would be the external evaluator. No compensation would be provided to the external evaluator and that he would apprise the Board of progress on a regular basis. At this point, the CEO was in control of the agenda. His objective, as stated in the beginning, was to identify factors that contributed to recidivism rates, new conviction rates, and inpatient psychiatric hospitalization rates for parolees who participated in M-COIT. The information

would be shared with funders and be used for program improvement. Once the Board of Directors approved the study, the CEO, Deputy Director for Programs, Program Coordinator, and the external evaluator met to finalize the objectives of the study and the data collection process. After the initial meeting, the evaluators met on a regular basis.

Data collection included a retrospective medical record review of parolees who were discharged from the M-COIT from 2004 through 2006 and were not enrolled in M-COIT during the study period that commenced in 2007. These years were selected because there needed to be an interval of at least one year between discharge from M-COIT and assessment of recidivism status. According to Austin and Hardyman (2004), most arrests occur during the first year out of prison. The data collection tool was designed to collect demographic data (age, gender, education, race), the number of contacts the consumers had with members of the ACT team, the type of contact (individual and group), psychiatric diagnosis, past and current history of substance use, past treatment for mental illness and substance abuse, discharge status from M-COIT, and other factors.

Another source of data was the state of Michigan's online offender database, the Offender Tracking Information Service (OTIS), to ascertain the incarceration status of the individuals under study. This database lists demographic data about the offenders, their status (prisoner, parolee, probationer, absconder, or discharged), and the type of sentences (active and inactive) (Michigan Department of Corrections).

The external evaluator developed the first draft of the data collection tool based on the literature

review, discussions with the Program Coordinator, and forms that the Agency used to collect data on all consumers enrolled in its various programs. After both evaluators agreed on the data collection tool, the external evaluator submitted a request to the University's Human Subjects Review Committee (UHSRC) for approval. Upon approval from the UHSRC, in March of 2007, the external evaluator started collecting data from 2004, 2005 and 2006 years' program data. Data was scattered throughout the record, so after reviewing several records, the evaluator redesigned the tool to follow the sections of the medical record for ease of data retrieval. Once agreement was reached regarding revisions, the external evaluator continued with data collection.

Data collection was a slow and time-consuming process because the medical records were voluminous, the external evaluator was unfamiliar with the records and had limited time for the project. For the time period under study, agency providers manually documented each contact from the medical record. Many parolees had more than 200 contacts, and some had more than 500 contacts with M-COIT staff, which contributed to the substantial size of the medical record. The external evaluator spent approximately three hours per record collecting data. To assist and expedite the process, the CEO assigned the Agency's Quality Improvement (QI) Assistant to assist with the data collection because she was familiar with the records. The external evaluator instructed the QI Assistant in the use of the tool and reviewed each form after the QI Assistant finished collecting data from the medical record. The number of contacts a parolee had with M-COIT staff was an important variable because one of the criteria for ACT is the number of contacts a consumer has with the ACT program team, which is to be at least three or more contacts per week (Allness & Knoedler, 2003) and the effect of this factor on recidivism rates.

The Program Coordinator reviewed several records that the evaluator completed on ascertain if there was consistency in data retrieval. No parolees' names, addresses, nor medical record numbers were written on the surveys to maintain confidentiality. The forms were coded with a number that was cross-referenced to a list of names that was kept separate from the completed forms.

The external evaluator inputted and analyzed the data with a statistical analysis program. Discussions were ongoing between the evaluators regarding data analysis and interpretation of the results. For example, information about the parolees' inpatient psychiatric hospitalizations was not consistently documented in the medical record; therefore, these rates were not calculated and not reported in this paper.

Results

In this section, we describe the characteristics (gender, age, race, education, and employability) of the 74 parolees who were discharged from M-COIT, in calendar years 2004 through 2006, (see Table 1), and report the results of cross tabulation analysis.

The percent of women enrolled in M-COIT is higher than the percent of women in prison, which is approximately four percent (MDOC, 2007). The mean age of the consumers was 40.1 years, which is higher than the prison population's mean age of 36 years (MDOC, 2007). High school graduates included a general equivalency diploma and/or had education beyond high school.

Special training or skills was used as a proxy for employability. Criminal history was measured in two ways: one was the number of sentences per consumer and the other was the type of most recent offense. Sung and Rickter (2006) refer to criminal history as number of adult arrests. The

mean number of sentences was 3.27 (n= 70). The OTIS system reports the number of sentences with which a prisoner is charged and not the number of arrests. The number of arrests may be higher, if the offender had been arrested for a misdemeanor and jailed in a local jurisdiction that is not included in the Michigan Department of Corrections database. The most recent offenses for which the parolees were serving a sentence prior to release and enrollment in M-COIT are listed in Table 2.

Approximately 93% (69, n=74) of the parolees had a co-occurring disorder of some form of substance abuse; only 16.4% (12, n=73) were sentenced for drug offenses. Forty (54.1%, n=74) had a thought disorder (various forms of schizophrenia), and 34 (45.9%, n=74) had a mood disorder (e.g., bi-polar and major depression) as their primary Axis I diagnosis. The average length of stay in M-COIT was 48.93 weeks, ranging from .29 weeks to 153.29 weeks. The mean number of contacts was 4.5 per week, and 71.6% (53, n=74) had at least three or more contacts per week. One year after discharge from M-COIT, 36.9% (n = 65)³ returned to prison. This is lower than the 42.5% parolees who were re-incarcerated in Michigan in 2006 (Bureau of Justice Statistics, 2007). Of those who returned to prison, only three were charged with a new sentence of a felony. In Michigan, 38.8% were imprisoned with a new sentence (Bureau of Justice Statistics, 2007).

Cross tabulation analysis was used to identify relationships between the dependent and independent variables. The dependent variable was whether or not a parolee returned to prison within one year of discharge from the M-COIT Program. The independent variable was a

³ There was missing data on 4 of the prisoners and 5 died either while they were in M-COIT or within one year of discharge.

dichotomous variable, whether or not a participant had three or more contacts per week with the M-COIT team, controlling for age, education, race, gender, employability and mood disorder. Characteristics that can affect a parolee's return to prison are age, gender, education, race, type of mental disorder, employment-related skills, substance abuse, criminal history, (Austin & Hardyman, 2004, Belenko, Foltz, Lang, & Sung, 2004; Sung & Rickter 2006), residence, and family relationships (Austin & Hardyman, 2004). The premise was that the more contacts the parolee had with the ACT team, the greater the likelihood the parolee would not recidivate. If a parolee had three or more contacts per week with the team, this was coded as 1, and if there were fewer than three contacts, it was coded as 0. First, the relationship between the dependent variable and the individual independent variable was analyzed, excluding the primary independent variable of interest, three or more contacts per week, to ascertain if there were statistically significant relationships between them. Secondly, the relationship between the dependent variable and the variable, three or more contacts per week, controlling for the other variables, individually was analyzed. Pearson's Chi Square was used to test for statistical significance among the relationships because cross tabulation analysis takes into consideration all tabular data (Pollock, 2003). The p value of .05 was used to determine statistical significance. Parolees' ages were grouped into two categories, 30 years and younger and 31 years and older. Education was categorized as high school education or higher (including general equivalency diploma or GED) or not a high school graduate. Race was transformed into a dichotomous variable, white and nonwhite. Employability measure was defined through the consumer's self-report as having or not having special training or skills. Mental disorders were grouped as thought or mood disorders. The number and percent of parolees who returned to prison, number of weekly contacts, and control variables are included in Table 3.

Individuals who had three or more contacts per week with the M-COIT team had a higher rate of return to prison than those with fewer than three contacts, 43.8% (21, n=48) and 17.6% (3, n=17), respectively. This was not a statistically significant relationship at the $p < .05$ level. In analyzing the relationship between number of contacts and return to prison, controlling for the other independent variables, there were statistically significant relationships when we controlled for age and type of mental disorder at the $p < .05$ level. There were no statistically significant relationships between returning to prison, the number of weekly contacts, controlling for the other variables. (See Table 3). There is a statistically significant relationship between three or more contacts, parolees under age 30, and return to prison, $\chi^2 (1) = 6.429, p < .05$. The relationship between parolees with thought disorders and number of contacts and return to prison is not statistically significant. The relationship between parolees with mood disorders and number of contacts and return to prison is statistically significant at the $p < .05$ level (See Table 3).

Discussion and Lessons learned

As indicated above, the recidivism rates for 2004 through 2006 appear to be lower for the parolees who participated in M-COIT than that for the state of Michigan. One year after discharge from M-COIT, 36.9% (n = 65) parolees returned to prison. The premise was that if parolees had three or more weekly contacts with the M-COIT team, they were less likely to recidivate. In reviewing the data, it appears that the opposite occurred. The only statistically significant relationships with return to prison within one year of discharge, and number of contacts with the MCOIT team, were younger parolees and those with mood disorders.

Baillargeon et al. (2009) reported that parolees with comorbid disorders (psychiatric and

substance use) have a twofold greater risk of parole revocation as a result of a parole violation and nearly a threefold greater risk for revocation as a result of a new offense. Approximately 93% of the parolees participating in M-COIT have co-occurring psychiatric and substance abuse disorders. Individuals who have co-morbid psychiatric disorders have multiple service needs, resulting in more frequent contacts with the M-COIT team. Having contact with the M-COIT team that includes parole officers and case managers may increase the likelihood that parolees' technical violations are identified at a higher rate than those who have less contact with the team. In their study, Balillargeon et al. (2009) state that reincarceration rates may be partly attributable to more frequent and focused surveillance by case managers and parole officers. Our results indicate that there is a need for more in-depth analysis.

Developing a trusting relationship is a key component of a participatory evaluation process, not only among the management staff, but also with line staff. Although line staff were informed about the study, they were not involved in the preliminary discussions regarding the purpose and objectives of the evaluation study. There needs to be a formal mechanism to address staff concerns, which the evaluators did not do. There is a need to involve all staff from start to finish (Cousins, 2001).

The Agency learned how time consuming it is to conduct an evaluation study and that it consumes indirect resources. Even though the external evaluator was not paid, the CEO allocated staff time to assist in data collection, and clerical staff assisted in retrieving records on-site and off-site and filing them. The Program Coordinator is a therapist in the M-COIT Program; therefore, time dedicated to this project was time away from treatment and productivity. Indirect

Agency costs were not calculated. The outcomes affirmed the need for intensive resources to meet the multiple service needs of the parolees. Finally, the external evaluator learned that internal communication is extremely important among all parties and that evaluators need to be more assertive in that regard.

Implications for Public Health

Inmates and parolees have higher rates of mental disorders, substance use, asthma, and communicable diseases. Once released from prison, many do not have access to primary care because of their ineligibility for Medicaid services, limited or no funds, or no usual source of medical care. Lack of access to medical care is a major problem because disease conditions may go untreated until an individual is very ill and treatment will then be costly, as well as presenting the potential to spread communicable diseases, if left undiagnosed and untreated. With limited budgets and overcrowded correctional facilities, states are discharging prisoners earlier into the community where there are scarce resources to care for both the public and mental health needs of the individuals. There is a need to develop systems to coordinate services among the correctional, the public health, and mental health sectors to address the needs of the individuals and to protect the public's health.

Summary

This evaluation study was a participatory process and the stakeholder, organization was involved from the initiation of the study, forming objectives, designing the data collection tool, assisting in data collection, analyzing and interpreting results. Results were reported to the Board of Directors and funders and disseminated at a conference. The authors described the Assertive Community Treatment, the evidence-based practice on which M-COIT is based, the Agency's M-COIT Program, its goals, the target population, the type of study, analysis, and

outcomes. The primary focus of this paper was on the participatory evaluation process of an academic-agency partnership to identify the recidivism rates of parolees who were treated for severe and persistent mental illness and substance use disorders in a community mental health agency in Wayne County, MI. Overall, the recidivism rates were lower than the state of Michigan's; however those consumers who recidivated had a greater number of contacts with M-COIT providers. There is a need to explore, in more depth, the reasons for this.

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Table 1: Parolees' Demographic Characteristics, 2004-2006

Variable	N	Percent
Gender	74	
Male	61	82.4
Female	13	17.6
Age	74	
< 30 years	11	14.9
> 30 years	63	85.1
Race	73	
White	31	42.4
African American	40	54.8
Other Minority	2	2.7
Education	74	
< 12 years	24	32.4
≥ high school graduate	50	67.6
Special skills- self report	65	
Yes	32	49.2
No	33	50.8

Table 2: Most Recent Offense Before Enrolling in M-COIT

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Violent	25	33.8	34.2	34.2
	Property	29	39.2	39.7	74.0
	Drug offense	12	16.2	16.4	90.4
	Public disorder	5	6.8	6.8	97.3
	Other offenses	2	2.7	2.7	100.0
	Total	73	98.6	100.0	
Missing	9	1	1.4		
Total		74	100.0		

Table 3: Number of Parolees who Returned to Prison, Weekly Contacts, and Control Variables

Variables	N	#RTP	< 3 weekly contacts	≥ 3 weekly contacts	X ²	DF	Sig.
Age							
<30 years	10	6	0	6	6.429	1	p ≤ .05
≥30 years	55	18	3	15	1.089	1	p ≥ .05
Mental disorder							
Thought	33	12	2	10	.589	1	p ≥ .05
Mood	32	12	1	11	3.720	1	p ≤ .05
Education							
< high school	20	8	1	7	1.111	1	p ≥ .05
≥ high school	45	16	2	14	2.548	1	p ≥ .05
Gender							
Male	54	19	2	17	3.620	1	p ≥ .05
Female	11	5	1	4	.244	1	p ≥ .05
Race							
White	28	7	0	7	2.545	1	p ≥ .05
Nonwhite	36	17	3	14	1.648	1	p ≥ .05
Employability							
Yes	28	10	1	9	1.207	1	p ≥ .05
No	29	11	2	9	1.368	1	p ≥ .05

SPECIAL SECTION

Community-Based Participatory Research

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Community-Based Participatory Research Guest Editorial

Guest editors: Talat Danish, MD, MPH, Richard Douglass, MPH, PhD

According to the WK Kellogg Foundation Community Health Scholars Program (2001) the definition of Community based participatory research (CBPR) is, a *"collaborative approach to research that equitably involves all partners in the research process and recognizes the unique strengths that each brings. CBPR begins with, a research topic of importance to the community, has the aim of combining knowledge with action and achieving social change to improve health outcomes and eliminate health disparities."*

Traditional research methods have failed to help resolve health disparities while leaving community members feeling disconnected given lack of outcomes driven research that impacts communities. CBPR not only promotes trust between researchers and communities but is important if research tools are to be of value to the community while also being culturally sensitive. It is with this mind that the MJPH Editorial Board decided to devote a special section to CBPR, including inviting perspectives from public health leaders as well as presenting research articles and notes from a community partnership.

Interviews were solicited from prominent public health figures and academia to get their thoughts on CPBR. Three interviews were designed to initiate the *Journal's* discussion of CBPR in public health, and provide national, state and local perspectives on challenges and rewards experienced as colleagues in the field. The editors interviewed Jean Chabut, retiring this year as the Deputy Director for Public Health at the Michigan Department of community Health. With a B.S. in nursing from the State University of Iowa and MPH from the University of Michigan, Ms. Chabut began her career in 1964 as a public health nurse for the Detroit Health Department.

Mr. Steve Gold currently serves as the Director of the Macomb County Department of Health and Community Services. His career spans thirty years of public health roles in Macomb and Wayne Counties, and he also received his MPH from the University of Michigan. Dr. John Finnegan is Dean of the University of Minnesota School of Public Health from which he received a doctorate in mass communication. He has more than 25 years of experience in public health research, including the community-based research Minnesota Heart Health Program, and currently has specific research interests in digital information technology and its impact on public health. Some of their thoughts are expressed in the discussion that follows.

Mr. Gold sees CBPR as a “valuable model which can break down the historic silos between practice and community, the academic community, and the residential population of different areas”. This is echoed by Ms. Chabut, who decried the intensity of turf issues and market protection by many medical and health care organizations, especially with proprietary data, that does not serve the need for comprehensive understanding of local and community needs. She feels “improving the interface between public health and medicine requires more and more visible CBPR throughout Michigan”. These sentiments have been expressed succinctly by Dr. Finnegan, who sees CBPR as being a really important “set of concepts, values and tools because of its psychosocial and value framework which is aimed at community self-actualizing”. He perceives the whole concept of engaging with communities changing from expert-driven to expert-informed/assisted/partnered.

While Ms. Chabut sees a dearth of operational and implementation guidance for new or innovative efforts based on practical research, conducted at the local level preventing “research driven practice” in public health programs, Dr. Finnegan feels that we have to move away from the store front culture of “they will come” and form critical partnerships with the community.

As identified by Mr. Gold CBPR may be particularly valuable in the area of aging where “adaptations will be needed at the population as well as the individual level as the proportion of the elderly doubles in the course of a generation or two”. Demographic changes as a result of ethnic migration is another area that he feels will benefit from such research.

Moving towards a more collaborative approach to improving health outcomes does not come without its challenges which can range from “staff having little time, inappropriate or insufficient training to lack of advanced education or simply lack of money” as expressed by Ms. Chabut.

She recognizes the opportunity created for academics to reach out to local public health departments to share resources that would “benefit the mission of both sectors” as “local public health units need more applied research academics need more research productivity, meaningful projects for faculty and students, and opportunities to combine scholarly work with service”.

Mr. Gold is in agreement when he sees that “public health academia does not uniformly have linkages with the public health practice community”. He feels the challenges to CBPR can be better defined by universities which must also figure out ways of delivering effective training in CBPR methodologies.

This issue has two articles that illustrate the principals of community based participatory research. The first is a project from Eastern Michigan School of Nursing focused on increasing awareness of colorectal cancer screening in an underserved population in Michigan. It required participation from the community to develop educational events. The help of the middle and high school students was enlisted in educating elders in their homes after nursing students provided age appropriate education to the students focusing on colorectal cancer risk factors. A survey developed by researchers then assessed for increased awareness in the target population and their willingness to participate in colorectal cancer screening in the future. CBPR as

research that focuses on relationships between academic and community partners with an opportunity to co-learn and benefit from each other mutually is demonstrated by this project.

The second article has used community based participatory research to investigate the effectiveness HIV/AIDS risk reduction counseling in an urban African-American community. Community and academic investigators jointly developed the study design in response to a community suggestion that single risk reduction counseling session would be less effective than a two session counseling approach.

As academic institutions move to make community collaborations that are critical to meaningful research, we will see the movement from expert-driven to expert-informed/assisted/partnered research which is not only mutually beneficial but also ensures that outcomes are usable to the community.

Community based participatory research by enlisting the help of the community members in various aspects of research not only helps identify what is most important to the community, but also helps them understand the direct benefits to their community. In summary, as expressed by Mr. Gold, we see community based participatory research working to address a whole host of issues, from environmental justice and how it relates to health to the impact of social determinants on long- term well-being, to the effects of changing population demographics.

Note: Public health leader interviews were collaboratively conducted and summarized by Dr. Talat Danish, Dr. Richard Douglass and Dr. Julie Gleason-Comstock.

Increasing Colorectal Cancer Screening Awareness: An Innovative Participatory Intervention

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Abstract

Among American men and women, colorectal cancer (CRC) is the third most commonly diagnosed cancer as well as the third leading cause of cancer death. The importance of CRC screening is supported by improved survival rates associated with early diagnosis. Despite these well known facts, half of eligible adults in the United States have not been tested. This paper reports on a novel intervention utilizing a uniquely designed community-based CRC education program to promote CRC awareness and increase participant's intention to participate in CRC screening. Trained teams of oncology nurses worked with senior level nursing students who provided a two-tier intervention that engaged both children and adults. Surprisingly, a survey of participants indicated that within this sample, screen rates were 84.1%. This is higher than the Healthy People 2020 screening target of 70.5%. Participants in the educational intervention program still reported the program increased their awareness of CRC and the need for screening. Results also show that a doctor's recommendation influences a person's decision to participation in CRC screening.

Introduction

This paper describes the development and evaluation of a community-based intervention. The goal of the partnership was to increase colorectal cancer screening awareness and intention to participate in CRC screening. The paper describes the process of developing, planning, and implementing this service-learning project that involves engagement from local nursing professional organizations, nursing students, and stakeholders. Innovative educational programming needs specific to the aggregate population's needs were developed regarding CRC screening, and delivered within the community. The long-term goal of this team is to continue the work to implement effective strategies that increase CRC screening for at-risk and underserved populations that will lead to early detection and decrease mortality from this disease.

Colorectal cancer (CRC) is the third most commonly diagnosed cancer and also a second leading cause of cancer-related death among men and women in the United States (American Cancer Society, 2009; Centers for Disease Control and Prevention, 2009). Approximately 565,650 Americans will die from colorectal cancer and another 1,437,180 new cases will be diagnosed in 2008. In Michigan in 2007, there were nearly 1,800 deaths from CRC and more than 5,000 individuals newly diagnosed with CRC (Michigan Cancer Consortium, 2011).

Among American men and women, colorectal cancer is the third most commonly diagnosed cancer as well as the third leading cause of cancer death (American Cancer Society, 2009; Centers for Disease Control and Prevention, 2009). African American men and women have the highest rates of colorectal cancer (CRC) diagnosis and death, followed by Whites, Asian

American/Pacific Islanders, Hispanic/Latinos, and American Indian/Alaskan Natives respectively (American Cancer Society, 2009).

Colorectal cancer screening can reduce morbidity and mortality by detecting both precancerous polyps and cancers early (Hardcastle et al., 1996; Kronborg, Fenger, Olsen, Jorgensen, & Sondergaard, 1996; Mandel et al., 1993; Shelton, 2002). CRC screening is recommended for individuals age 50 years and older (U.S. Preventive Services Task Force, 2002). Maciosek, Solberg, Coffield, Edwards, and Goodman (2006) estimated that routine screening for CRC could prevent 18,800 deaths per year, yet according to Ferreira et al. (2005) screenings for CRC are the least utilized cancer screening tests in the United States. According to the American Cancer Society's Colorectal Cancer Facts and Figures for 2008-2009, half of the people in the United States aged 50 or older have not been tested. CRC screening rates are low in the general population (Seef, Nadel, & Blackman, 2003), and African Americans and Latinos have even lower rates than Whites (Breen, Wagener, Brown, Davis, & Ballard-Barbash, 2001; Etzioni et al., 2004). There is an evident need to increase CRC screening.

The American Cancer Society (2009), and the American College of Gastroenterology (2010), and others (Mahon, 2009; Rex, Johnson, Lieberman, Burt, & Sonnenberg, 2000, Winawer et al., 1997) have recommend the following screening for average-risk men and women beginning at age 50:

1. Guaiac based fecal occult blood test annually.
2. Flexible sigmoidoscopy every five years.
3. Double contrast barium enema every five years.

4. Colonoscopy every ten years.

Of the above screening options, colonoscopy remains the “gold standard” according to the American College of Gastroenterology, the Department of Health and Human Services (2010), and Medical News Today (2010). Colonoscopy is recommended because polyps can be identified and removed during this single procedure.

Early detection of pathology in the CRC disease process is likely to yield the best patient outcomes (Bazensky, Shoobridge-Moran, & Yoder, 2007; Shelton, 2002). Despite this knowledge, screening rates hover around 50%, according to the Centers for Disease Control and Prevention (2009). The American Cancer Society set a goal of 75% screening participation by 2020 (American Cancer Society, 2009). Innovative education programs targeted to vulnerable populations may help achieve this goal. Individuals must be aware of CRC as a potential health threat, they need to know what steps can be taken to prevent and/or decrease severity of the disease process, and they need to be knowledgeable of all screening options. Colonoscopy should be explained and encouraged as the best choice for detecting potential health risks related to CRC.

CRC Screening Issues: Screening rates for CRC remain at less than optimal levels. This is especially true in underserved populations. Review of past publications supports this fact (Agrawal et al. 2005; Davis et al., 2001; Greiner et al, 2005a, 2005b; Katz et al, 2009; McAlearney et al. 2008; Palmer et al. 2008). The reviewed literature also suggested the need for innovative programs to educate underserved communities about the risk factors of CRC and the importance of screening (Agrawal et al. 2005; Bazensky et al, 2007; Hamlyn, 2008; Mahon,

2000; Mahon, 2009; and Portelli, 2008). *Community-based* education programs was also emphasized as a priority (Gipsh, Sullivan, & Dietz, 2004; Green and Kelly, 2004; and Greenwald, 2006).

Disparities in Screening: Several studies indicated less than optimal screening levels among underserved populations (Agrawal et al. 2005; Davis et al, 2001; Green & Kelly, 2004; Hamlyn, 2008; Katz et al, 2009; McAlearney et al. 2008; Palmer et al. 2008; Shokar et al. 2005; and Shokar et al. 2008). Underserved populations include minorities, people who are un- or underinsured, those with fewer years of education, and/or low socioeconomic status. A specific example of disparity in screening is reported in Agrawal et al. (2005). That publication shows that Whites are 82% more likely to receive colonoscopy and 61% more likely to receive sigmoidoscopy than their African-American counterparts. Shokar et al. (2008) revealed screening rates of 67.5% in non-Hispanic whites compared to 54.3% in African-Americans and 48.6% in Hispanics.

Using the Behavioral Risk Factors Surveillance System (BRFSS), 22% of Michigan respondents age 50 and over reported having had a blood stool test within the past two years and 69% have ever had a sigmoidoscopy or colonoscopy. Interestingly, only 19% of those with less than a high school education had a blood stool test and 62% reported ever having a sigmoidoscopy or a colonoscopy (compared to 74% of college graduates). Racial and ethnic minorities are less likely than whites to have ever had at least one of these tests. Only 31% of Michigan men and women 50 years of age or older reported having any appropriately timed CRC screening as indicated by the Michigan Cancer Consortium recommendations. The American Cancer Society concurs that

these low rates of CRC screening within underserved populations are less than the optimal 75% screening goal hoped to be reached by 2020 (American Cancer Society, 2009).

Beliefs and Attitudes: To increase individuals' participation in screening, their personal health beliefs and attitudes must be examined (Gipsh et al., 2004). Of the studies that addressed beliefs and attitudes, many commonalities were uncovered. The belief by many minority populations that early detection does not influence the course or outcome of the disease was discussed in McAlearney et al. (2008), Palmer et al. (2008), Shokar et al. (2005), and Shokar et al. (2008). Another misconception among minority populations was that there is no need for testing if symptoms are not present (Greiner et al., 2005a; Shokar et al., 2005; and Palmer et al., 2008). Cancer fatalism, the belief that a cancer diagnosis always leads to death, is addressed as a usual phenomenon in African American communities (Greiner et al., 2005a; and Hamlyn, 2008). A general mistrust in White health care providers may decrease screening in minority populations as well (Greiner et al., 2005a; Hamlyn, 2008; and Shokar et al., 2008).

Barriers to Screening: Barriers to CRC screening include, (a) lack of screening education among the general public, (b) inadequate communication between health care providers and individual patients regarding screening importance, and (c) cost issues related to lack of, or inadequate, health care insurance. Barriers were discussed in many studies (Agrawal et al., 2005; Davis, et al., 2001; Ferreira et al., 2005; Green & Kelly, 2004; Greenwald, 2006; Greiner et al., 2005a; Greiner et al., 2005b; Hamlyn, 2008; Katz et al., 2009; McAlearney et al., 2008; Palmer et al., 2008; Shokar et al., 2005; and Shokar et al., 2008). Of reported patient barriers, lack of knowledge concerning CRC and its associated screening tests, as well as lack of physician

recommendation are mentioned most often. Other hindrances given are, embarrassment due to the nature of screening, time constraints, and inadequate health insurance. The previously noted studies also cite low socioeconomic status, low levels of education, and being of a racial or ethnic minority as demographic barriers associated with low CRC screening rates. Four studies (Aragrawal et al., 2005; Greiner et al., 2005a; McAlearney et al., 2008; and Hamlyn, 2008) address fear of receiving a positive cancer diagnosis as a barrier to screening.

Purpose

This project focused on increasing awareness of colorectal cancer (CRC) screening in an underserved population in Michigan. The program used participation from the community to develop the educational events. This included partnering with the American Cancer Society-Colorectal Cancer Awareness Network (ACS-CRAN), the Healthy Asian Americans project, an oncology nurses organization, a university school of nursing, and two school districts in Ypsilanti, Michigan. The program was a unique two-tiered intervention aimed at educating middle and high school students who were then to share information with older adults in their lives. Additionally, it provided a unique service learning opportunity for the nursing students. (For more information on the evaluation of the student nurse service learning component see Wu, Wozney, & Raymond, 2011.) The purpose of this paper is to report on the survey results obtained from the adults engaged by middle and high school student who participated in this community-based CRC educational program.

Methods

This program utilized unique multimedia education programs within primary education classrooms. Additionally students within the classrooms were given specific take-home materials to be shared with older adults in their homes or neighbors. The classroom interventions included brief PowerPoint lectures, videos, a letter-writing session, and evaluation games.

Senior nursing students enrolled in a community health nursing course first met with Oncology Certified Nurses to learn about CRC issues. The training for the student nurses included general planning information about the project they were participating in, the role of a community education volunteer, cancer rates among minority and underserved populations, and introduction to CRC risk factors, screening techniques, diagnosis, and treatments. The nursing students then were given the freedom to create unique age appropriate education sessions for implementation with middle school and high school students. Nursing students were generally directed to focus on CRC risk factors appropriate to their audience. Where appropriate, efforts were made to integrate key beliefs and barrier findings from the literature (e.g., importance of screening in the absence of symptoms toward early detection and improved health outcomes). Additionally, all groups were asked to incorporate a letter writing activity and distribute a folder that contained some pre-prepared take-home materials.

During classroom presentations, the middle and high school students were asked to write letters to family members and/or friends 50 years old or older, encouraging them to participate in CRC screening. Additionally they were provided with the pre-prepared take-home materials that included a CRC fact sheet with information on risks, screening options and techniques. Folders

also included a survey to be completed by an adult family member or neighbor and returned to the researcher in an enclosed pre-stamped envelope. Students were encouraged to present their letters along with the folder materials to a family member or neighbor age 50 or older.

A few weeks following the middle school and high school education sessions a celebratory event entitled Healthy Colon, Healthy Family took place as the culmination of the campaign. The middle school and high school students were given invitations to share with their family for the event. Health care professionals, community leaders, CRC cancer survivors, and project participants spoke during the event and shared experiences and expertise to reinforce importance of CRC screening. Door prizes were provided to encourage event attendance.

Human Subjects Internal Review Board approval was obtained prior to beginning the program.

Design: This is a pre-experimental action intervention that seeks to increase CRC awareness. It is also characterized by Burns and Grove (2005) as a one-group posttest-only design. A treatment exists in the form of the educational intervention, yet there is no control or comparison group.

Study Population, Setting, and Sampling: The study setting resided in two school districts that were ethnically diverse in southeastern Michigan. School district A reported the distribution of student ethnicity as 30% white, 63% black, and 17% of others. The ethnicity distribution reported by School district B noted students as 32% black, 62% white, and 6% other. The median household income for district B was also reported to be lower than average for the

county. In fact, 58% of student population in district A as classified as “Economically Disadvantaged” (National Statistics for Educational Statistics, 2010). The County health reports showed that although rates of CRC diagnosis are decreasing for the overall county on average, one of the highest incidences remains in the geographic area where these two school districts reside. Evidence from the literature suggests this study population exhibits higher CRC risk relative to their minority make-up and lower socioeconomic status.

A convenience sampling was used in this study. The sample consisted of adults solicited by a middle- or high-school student who had become a Colon Ambassador after completing the student nurse-led program at their school. Evaluation surveys were returned by a total of 126 participants. Surveys were returned by one of two methods, via pre-stamped envelopes provided to the middle- and high-school students in the take home folders, or in person by adults attending the post-educational celebration.

Survey Instrument: The current study used an survey developed by the researchers. Surveys were completed confidentially and voluntarily. Demographic information collected consisted of respondent’s age only. The survey asked participants about their past CRC screening practices, type of screening method used, if a doctor had recommended and/or ordered CRC screening in the past. Finally, participants were asked to indicate if this current educational program had increased their awareness of CRC screening, and their intention to be screened in the future. Surveys were returned by mail using a preaddressed and stamped envelope included in the take home materials. To further encourage those not returned in the mail, surveys were also available at the culminating celebration event.

Data Analysis: Data were obtained from respondent surveys following participation in the educational program. Aggregate data were compiled from surveys returned. Data were analyzed using Statistical Package for the Social Sciences PASW Statistics Version 18 software. Descriptive statistics were used to analyze and report the survey data. Chi-square test of independence was used to examine for statistically significant associations between physician's recommendation for screening and past screening participation as well as physician's ordering of screening and past screening participation.

Results

There were a total of 121 participants. Respondents ranged in age from 25 to 82 years of age. The mean age for the full sample was 54.01 years (SD = 12.25). Twenty four participants (19.8%) did not indicate their age. Given the relationship of CRC screening guidelines and age, the responses were also examined by age groups, (i.e., those under 50 years of age, and those 50 years and older). Table 1 shows the item response data for the full sample, and the two age-related sub-groups.

History of CRC Screening & Colonoscopy: CRC screening guidelines suggest a colonoscopy for people over the age of 50 at average risk. Of those participating in the study at or over 50 years of age, 84.1% reported previously engaging in a CRC screening activity. Of those who had engaged in a CRC screening activity, 93.8% had completed a colonoscopy. It was also interesting to note that 58.3% of participants under 50 years of age also reported participating in a CRC screening activity.

Past Influence of Doctor on Past CRC Screening: The frequency of doctors making a recommendation for, and for ordering a CRC screening differed by age group. For participants under 50 years of age, less than 20% had received either a doctor's recommendation or order to get a CRC screening. For those 50 years of age and older, 75.4% had received a doctor's recommendation to get a CRC screening, and 58.9% had received a doctor's order to obtain a CRC screen.

A Chi-square was used to examine for associations between the distributions of those who had received recommendations or orders from a doctor and their history of attaining a CRC screening. The findings were significant for both the association of having a doctors recommendation and having been screened in the past [$\chi^2(1, n = 116) = 36.04, p < 0.001$], and having a doctors order and having been screened in the past [$\chi^2(1, n = 108) = 38.73, p < 0.001$]. The group distributions indicated that those who received a recommendation for a CRC screening and those who received an order for a CRC screening were associated with those participants indicating having participated in a past CRC screening.

Program Impact on CRC Awareness: Of the 121 surveys returned, 111 people (94.9%) reported that the information received did increase awareness about the importance of colorectal screening. Consistent with this finding, 75.6% of participants reported that they intended to be screened for CRC in the future. Within the 50 years of age and older group, the percent of participants reporting and increased awareness (93.5%) was slightly lower than that total population while those in this age group were more likely to indicate the intention to be planning for CRC screening (83.9%).

Discussion

The data from this sample suggest that CRC screening rates are at a desirable level relative to the Healthy People 2020 goals. It was additionally somewhat surprising to note fairly high screening rates within the sample participants under 50. This could reflect members being a high-risk for CRC. The results also support the importance of the doctor's role toward influencing the engagement in CRC screening behavior. To support this practice it is important that people have a primary care provider from which they seek regular preventative care. Additionally, it will be key that primary care providers adhere to the CRC screening guidelines for recommending participation in and writing orders for CRC screening participation.

Physician recommendation was frequently cited in the literature review as encouragement for screening participation. Results from Ferriera et al. (2005) revealed actual screening participation increased by 9% following physician recommendation. This research confirmed that physician recommendation is influential in CRC screening participation. Research by Green & Kelly (2004) suggests that once an individual has participated in screening, continuation of the practice is likely.

The reports that the majority of participants found the information provided increased their awareness about CRC is also encouraging. Reaching people through community-based initiatives has been encouraged from past studies. Previous studies (Gipsh et al., 2004 & Greenwald, 2006) found that community education programs increase awareness of CRC. This program adopted a unique multi-level approach to interview with the community. Beginning by pairing practicing oncology nurses with a senior level nursing students, and then having the

student nurse teams develop and present educational material to middle and high school students, preparing them as “Colon Health Ambassadors”. Finally, the Ambassadors were to pass on their newly acquired knowledge of CRC and its recommended screening guidelines to adult family members and friends. Utilizing personal relationships between the primary education students and family members, neighbors and friends, is an intriguing aspect of this study. Information was disseminated through multiple pathways, and to many different age groups. The actual impact on the future CRC screening behaviors of the K-12 students relative to this action intervention is unknown. Reports from the nursing students suggest the programming was generally well received (Wu et al., 2011). This concept builds on findings from Palmer et al., (2008) which suggested publicly discussing CRC might decrease embarrassment and increase knowledge of screening. Ideally, educating people about the importance of CRC screening across the lifespan may increase participation when age appropriate.

Limitations inherent to pre-experimental studies pertain to this current research. Sampling limitations were also present. Convenience sampling is not representative of the general population. Additionally, social desirability, (as described in Wood & Ross-Kerr, 2006) may also produce a margin of error. The context for the information delivery may have encouraged respondents to report being interested in the programming, and report positive intentions for future screening.

Colorectal cancer is a very real threat to the health and well-being of society. Morbidity and mortality from CRC is greatly reduced when the disease is discovered in the early, more treatable stages. Screening rates are improving, yet a need persists for accurate public education,

especially in communities with higher risk and lower screening rates. This study provided a unique and effective educational intervention. Examining health care practices among communities and orchestrating educational programs to fit individual community needs may continue to increase awareness of this country's third deadliest cancer.

Acknowledgement

Support for this project was provided in part from a grant titled *A Community-Based Colorectal Cancer Screening Awareness Program*. A collaborative grant was submitted on behalf of the Ann Arbor Chapter of the Oncology Nursing Society and Eastern Michigan University in response to a call from the Michigan Public Health Institute's Michigan Colorectal Cancer Awareness Campaign. Funding was received from the Michigan Public Health Institute (MPHI), in partnership with the Michigan Department of Community Health.

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Table 1: Percent (*n*) Participant Responses on CRC Screening Survey Items

	Total (<i>n</i> = 121)	Under 50 (<i>n</i> = 34)	50 & Over (<i>n</i> = 63)
Age [Mean, (SD)]	54.01 (12.55)	40.62 (6.25)	61.24 (8.47)
Had previous CRC Screen	62.8 (76)	58.3 (14)	84.1 (53)
Of those screened, who had a Colonoscopy	91.3 (63)	85.7 (6)	93.8 (45)
Doctor has recommended a CRC Screening	57.3 (67)	18.2 (6)	75.4 (46)
Doctor has ordered a CRC Screening	44.0 (48)	15.2 (5)	58.9 (33)
Materials did increased CRC awareness	94.9 (111)	97.1 (33)	93.5 (58)
Are planning to be Screened	75.6 (90)	55.9 (19)	83.9 (52)

Using Community-Based Participatory Research to Investigate the Effectiveness of HIV/AIDS Risk Reduction Counseling in an Urban African-American Community

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ABSTRACT

Introduction: Risk reduction counseling is an important component in HIV/AIDS prevention. Community-based participatory research (CBPR) was conducted to determine if a single counseling session was as effective as a two-session intervention in reducing risk behavior.

Methods: Community and academic investigators jointly developed the study design. A convenience sample of 242 persons was randomized to receive either a two session intervention with Conventional HIV Testing (CHT) or a one session intervention with HIV Rapid Testing (HRT). Participants completed a risk assessment immediately preceding the test and a risk reduction plan after the test; CHT participants received a second risk reduction session.

Results: Of 130 participants completing a one-month follow-up, 86.9% were African American and 72.3% were male. All participants demonstrated a significant decrease in risk behaviors regardless of procedure.

Conclusions: Findings suggested that a brief client-centered risk reduction counseling intervention can be equally effective with either CHT or HRT. CBPR allowed the academic partner to answer study questions as the community agency received information to make informed decisions during a transition period from CHT to HRT.

Keywords: Brief risk reduction counseling, community-based participatory research, HIV risk reduction, African-American community, HIV Rapid Test

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Funding: The authors declare the following financial support for the research and authorship of this article. The study was funded by Blue Cross Blue Shield of Michigan Foundation as a Community-Academic Partnership Grant (#0351.CAP) “HIV/AIDS OraQuick Special Project on Education and Counseling” with Cindy Bolden Calhoun, Community Research Director, Community Health Awareness Group, Inc., and Julie Gleason-Comstock, PhD, MCHES, WSU Principal Investigator, Wayne State University.

Introduction

Community-based Participatory Research (CBPR) is a collaborative approach to research that equitably involves all partners in the process and recognizes the unique strengths that each brings (Israel, Schulz, Parker and Becker, 1998). CBPR is more process than method (Minkler & Wallestein (2003) and includes the reciprocal transfer of expertise by all research partners, shared decision making power, and mutual ownership of the processes and products (Viswanathan, Ammerman, Eng, Gartlehner, Lohr, Griffith, et.al. 2004). With CPBR, members of the community are full participants in the research process. They are not only a source of information about a particular health issue but also decision-makers and co-learners with academic researchers in all phases of the study from identifying the health concern to planning and seeking funding, to implementing, to interpreting and disseminating findings. When done properly, CPBR can improve the quality of research, produce findings that have immediate and direct use in the community, and ultimately improve health outcomes (Viswanathan, et al., 2004).

Application of CBPR to HIV prevention counseling

Despite advances in screening, detection, and treatment, HIV/AIDS remains a public health problem in the United States. This is particularly evident for African Americans who accounted for more new HIV infections (44%), more new AIDS diagnoses (46%), and more persons living with HIV (46%) than any other racial group in 2009 (Kaiser Family Foundation, 2012). Testing alone is unlikely to prevent or eliminate HIV/AIDS, particularly if access to health care is limited (Fullilove, 2006). Another strategy is using client-centered Risk Reduction (RR) counseling to

decrease risk behaviors (Kanekar, 2011). Counseling can be done alone; but, when combined with testing, it provides a teachable moment while waiting for results (Reitmeyer, 2007).

One of the first methods with statistical evidence of effectiveness was the Project RESPECT model (Kamb et al., 1998; Zenilman, 2005). Project RESPECT uses Social Learning Theory (Bandura, 1997) and the Stages of Change Model (Prochaska, DiClemente and Norcross, 1992) and motivational interviewing (Miller & Rollnick, 2002) to promote behavior change. During the brief 10-15 minute session the counselor uses a risk assessment to guide the client in identifying behaviors that place him/her at increased risk for sexually transmitted infections. The client selects a specific behavior to change and works with the counselor to develop an achievable action plan to reduce risk. In parallel with conventional HIV testing (CHT), which requires a return visit for results, the model includes a second session one week later. This session is frequently done in conjunction with delivering test results and includes reviewing the client's progress in implementing the plan and helping the client revise the plan to overcome identified obstacles. Project RESPECT was effective in increasing condom use and preventing new sexually transmitted infections six months later among clients in an STD clinic (Kamb et al., 1998).

Community Adaption of Project RESPECT: Using the original Project RESPECT intervention manual (CDC, 1993), a large urban community-based organization (CBO) adapted the RESPECT model for use with HIV counseling and testing in nonclinical settings. For the past 25 years, the CBO has provided outreach and HIV counseling, testing, and referral (CTR) services in a variety of community (e.g., homeless shelters, substance abuse treatment centers)

and outreach settings using mobile units in high need areas. Its target population is primarily African-American adults at high risk for HIV/AIDS due to injection drug use, exchanging sex for drugs or money, and/or having sexual partners who are the same sex. To meet client needs, the organization expanded the RESPECT model to include injecting and non-injecting substance use. The CBO had successfully implemented the two-session risk reduction counseling model for over five years until HIV rapid testing (HRT) was FDA approved for use in a non-clinical outreach setting. With HRT, test results are ready within 20-30 minutes, eliminating the need for a return visit. This change created a need to adjust the counseling procedures to meet the single-session format.

Development of the Community Based Participatory Research: The academic investigators, who had been working with the CBO as evaluators for over five years, began meeting with agency administrators and CTR staff to redesign their procedures to align with the new testing protocols. The staff and the CBO's Consumer Advisory Group, were concerned that cutting the second session would diminish the effectiveness of the RR counseling. They viewed the anxiety experienced while waiting a week for test results to be a necessary component of counseling effectiveness. They reasoned that the interval offered the clients the opportunity for reflection and to put their plan into action. Because the agency anticipated a year-long transition from using CHT to HRT exclusively, there was a window when both testing procedures would be used, allowing the opportunity for a randomized trial to test the staff's hypothesis.

A CBPR strategy was chosen as the best approach developing the study design, given the origin of the questions and the CBO's stake in the findings. CBO administrators and academic

researchers served as co-principal investigators. The investigators worked closely with staff to develop the research questions, design the study, and seek funding. The community partners selected the recruitment locations and provided the staff to conduct the study. Cross-training between CBO staff and investigators enabled the development of research protocols that accommodated both CBO and research objectives. A detailed description of the process and utilization of CBPR critical elements for this study has been published previously (Gleason-Comstock, Streater, Bolden Calhoun, et al., 2006).

The study sought to answer the following research questions:

1. Are clients who learn their results immediately following risk reduction counseling less likely to recall creating a risk reduction plan than those who learn their results a week later?
2. Can a single risk reduction counseling session be as effective in reducing risk behavior as a two-session intervention?

Methods

Sample and Recruitment Procedures: The agency and investigative team jointly identified three outreach HIV testing sites to conduct the study. All sites were located in Detroit, Michigan and served primarily African American adults at-risk for HIV/AIDS due to situational (e.g., homeless, paroled) and/or behavioral factors (e.g., sexual and/or drug). Two sites were agencies serving substance-abusing clients. The third site was a social services agency providing food, temporary and permanent shelter, and medical and/or mental health care to primarily homeless clients with co-occurring disorders. Additionally, walk-in clients at the testing agency's central office were invited to participate. A convenience sample of 242 participants was drawn among all clients seeking HIV testing services from these sites.

Study recruitment was incorporated into the agency's usual procedure for recruiting clients for HIV testing. Counseling and testing staff gave a brief HIV/AIDS educational presentation to a group of about 20-30 clients at each outreach location. The presentation included a description of the two testing procedures, an introduction to the study, and an opportunity for questions. Those interested in participating were asked to see the research staff immediately following the presentation for more information. To accommodate the additional time needed to complete study procedures, those wanting to test but not participate in the study were given the opportunity to test when the agency returned or referred to another testing location, as appropriate. However, CTR staff had the option of testing a high-risk client who did not want to participate in the study and considered not likely to test later.

Measures: The investigators, in consultation with CBO staff, made minor modifications to the standard counseling and testing assessment forms to accommodate both CBO and research needs. All tools were printed on carbonless forms to allow both researchers and test counselors to retain copies of completed tools. Of the three instruments used only the follow-up interview was specific to this study.

Pretest Counseling Assessment Form (PCAF): The self-report PCAF contained limited demographic information such as race/ethnicity, marital status, age, HIV testing history, drug and sexual HIV risk behaviors in the past month, and a self-rating of perceived HIV risk. Drug-related risk behavior was assessed using a series of close-ended items in which clients checked which substances they used in the past three months (e.g., alcohol, heroin, cocaine). Two “yes/no” items on ever using a needle to inject drugs and/or sharing needles assessed risk from injection drug use. HIV risk from sexual behaviors was assessed through another series of items: the number of sexual partners in the past year, sexual partner gender (males, females, both), if they exchanged sex for drugs or money, and their consistency of condom use. Sexual partner-based risk was assessed by a series of “yes/no” items asking them to indicate whether in the last three months they had a sexual partner(s) who shoots drugs, is bisexual, a man who has sex with another man (MSM), HIV+, has a sexually transmitted disease (STD), and/or exchanged sex for drugs or money. Clients checked if they currently had an STD. Test counselors reviewed the responses with the client as the starting point in the pre-test counseling session.

Risk Reduction Plan Guide Form (RRP): The CBO developed the RRP form to guide clients in creating their risk reduction plan through a series of open-ended questions. Clients identify

one or two key behaviors that place them at risk for HIV and specify what they could do to change these behaviors, including alternative behavior strategies. Clients received a copy of the plan to take with them.

The form was modified for this study to standardize responses for analysis. Although the questions were asked open-ended, a checklist of typically discussed behavior changes was provided to reduce error in interpreting handwriting. Examples of listed behavior changes include using condoms more often, having fewer sex partners, changing to non-injection drugs, and reducing drug use. A line for additional activities was provided to record other responses. The form was produced in triplicate to allow the counselors, investigators, and clients to have a copy of the plan. The changes did not affect how the tool was used in the counseling session.

Follow-up Interviews: This was the only instrument that was developed and used exclusively for the study. The interview contained questions about the HIV testing experience, creation of a risk reduction plan, their perceived progress in implementing the plan, and engagement in risky behaviors in the past month. Additionally, the instrument included the same checklist of risk reduction actions from the RRP, as well as, the same drug and sexual risk behavior questions as in the pre-counseling form. The same investigative staff conducted all of the 30-minute interviews.

Procedure: Prior to study implementation, the investigators, agency administrators, and counseling and testing staff held a series of meetings to discuss adapting counseling and testing forms and procedures to accommodate the study. Counseling staff received training on study

protocols, including randomization procedures. Figure 1 displays the randomization process utilizing the two testing protocols.

Study procedures and instruments were approved by the Wayne State University Institutional Review Board prior to beginning the study. To accommodate anonymous HIV testing, as allowed in Michigan, participants were not asked to provide their names or any contact information. An encrypted unique identifier was generated for each participant to match forms and the consent form was signed with this identifier.

Once the consent form was signed, participants completed the PCAF and selected a sealed opaque envelope containing their testing group assignment. This procedure produced nearly equal groups: 132 (54.7%) were randomized to receive HRT and 110 (45.3%) were randomized into CHT. All participants completed the PCAF before meeting with the counselor. In the CHT group, the RRP was completed after testing was done and reviewed when participants received their results one week later, resulting in two-session risk reduction counseling. Those in the HRT group completed the RRP while waiting for test results, resulting in single-session risk reduction counseling.

Participants were given an appointment card with a specific date, time and location and the phone number of the research assistant for the one-month follow-up interview. They were instructed to call the research staff to reschedule the interview if necessary. Interviews were done at the same location as the HIV counseling and testing procedure. All participants received a

hygiene kit at the time of study entry and a \$15 cash incentive upon completion of the follow-up interview.

After the preliminary analyses were completed a debriefing session was held with the academic and community investigators, CTR staff, and staff and community advisory members. The resulting discussions provided valuable insight into study results and helped guide further exploration of the data.

Statistical Analysis: Univariate analyses were used to describe the characteristics of the study sample. Chi-square tests were used to test for significant differences between groups for categorical data. ANOVA and t-tests were used to test differences between the two testing groups for interval level data. A two-sided p value ≤ 0.05 was considered statistically significant. Data were entered into a SPSS database and all analyses were completed using SPSS Statistics Version 18 (IBM SPSS, Somers, NY).

Results

Of the 242 persons who agreed to participate, 157 (64.9%) were recruited from the two substance abuse treatment agencies, 71 (29.3%) were from the social service agency and 14 (5.8%) were walk-ins at the CBO office. Four participants were excluded from the study because they had previously tested positive. Twelve participants were dropped from the analyses because there were too many missing responses on their pretest forms. Out of the 226 remaining persons, 130 participants (57%) completed the one-month follow-up interview: 70 (53.8%) in the HRT group and 60 (46.2%) in the CHT group. There were no statistically significant differences found between those who completed the follow-up interview and those who did not, with respect to testing site, gender, age, HIV risk behaviors, and test assignment. Additionally, except for the four who had previously tested positive, none of study participants tested positive for HIV/AIDS. These results suggested that there was no systematic bias operating that would impact study findings.

Table 1 displays the distribution of demographic characteristics by group. The majority of the 130 study participants were male ($n=94$; 72%) and most self-identified as African American/Black ($n=113$; 87%). Only a few were currently married or in a committed relationship; 87 (67%) were never married, and 31 (24%) were widowed, divorced or separated. Ages ranged from 18- 61 with an average age of 43.1 ($s.d. = 7.8$). Three fourths of the sample had taken an HIV test previously, with 24 (24.7%) testing in the past six months. The majority of participants were at risk for HIV because of illicit substance use and/or having sex with a high-risk sexual partner. Only a fifth of the participants had ever injected drugs. Differences between

the two groups were not statistically significant for any of the demographic characteristics or for HIV risk behaviors at the pretest assessment.

Risk Reduction Plan Recall: Most of the participants recalled creating a risk reduction plan and receiving a copy to take home when they were tested. Although it was not statistically significant ($\chi^2(1, N=128) = 1.622, p=0.16$), participants in the CHT group were more likely to recall making the plan (84% versus 92% for HRT and CHT, respectively).

Accuracy of plan recall was measured by comparing the risk reduction behaviors selected on the original RRP with the recalled list of behaviors during the interview. The degree of matching was categorized into three groups: “none correct”, “partially correct”, and “all correct”.

Table 2 displays the recall accuracy of the plan by group. Only about a third of the participants in either group correctly recalled all elements of the plan they created at testing. Twenty-five percent ($n=30$) did not recall any of the original risk plan correctly at follow-up and 41% ($n=50$) correctly recalled only part of the plan. Additionally, the majority of participants ($n=101$; 84%) added other behaviors which were not on the original plan. Recall accuracy did not vary significantly by type of test ($\chi^2(1, N=125) = 1.849, p=0.12$) or by testing location ($\chi^2(1, N=125) = 2.734, p=0.07$).

Changes in Risk Behavior: A composite risk behavior score was calculated to investigate if a single risk-reduction counseling session was as effective as a two-session in reducing risky behavior. The total number of self-reported risk behaviors was summed to create a total

behavioral risk score. Scores ranged from 0 to 10 with an average score of 3.50 (s.d. = 2.3) at the time of the HIV test. At the one month follow-up, scores ranged from 0 to 4, with an average score of 0.31 (s.d. =0.7). Table 3 shows the pre and follow-up risk behavior scores for the two groups by testing location.

A repeated measure ANOVA was used to test if there were statistically significant differences in risk scores by RR counseling sessions received over time. The results indicated that both groups significantly decreased their risky behavior at the one month follow-up ($F(1,128) = 208.09, p < .001$). However, differences between groups were not statistically significant ($F(1,128) = 0.405, p = .52$).

Discussion

This study began in response to a community suggestion that a single risk reduction counseling session would be less effective than a two-session counseling approach. Anxiety and time for reflection were hypothesized to be important for preparing to change behaviors. The results, however, did not support this hypothesis. Although only a third of either group could accurately recall their risk reduction plan, both groups engaged in significantly fewer high risk behaviors one month after testing. These results were similar to a RESPECT-2 study comparison of RHT and CHT (CDC, 2001) in which counseling with either test had similar effects on STD incidence. Both of these studies suggest that the number and timing of risk reduction counseling sessions may be less important than the cognitive process involved in constructing the risk reduction plan.

Study Limitations: In this study, investigative procedures needed to be integrated with the CBO's regular outreach counseling and testing activities. Testing locations had to be carefully selected so that they would not overlap with sites covered by the agency's regular funding sources. Moreover the monetary incentives offered for completing the follow-up interview may have attracted some clients who may not have tested otherwise to participate in the study. Both constraints created the potential for respondent and selection bias. Although study participant characteristics were similar to others tested by the agency, the sample may not be representative of the general at-risk population.

The inclusion of clients while in restricted environments also may have impacted study results. Clients who voluntarily entered substance abuse treatment may have been more ready to change their risk behaviors before receiving risk reduction counseling than those in the general

population. Additionally the one-month interval for follow-up may have been too short to allow time for those recently out of treatment to freely resume their life in a less restrictive environment. Although no statistical difference was found in changes in risk behavior scores between participants recruited from treatment centers and multi-service agencies, the higher percentage of participants who entered through treatment centers may have influenced the results.

Another limitation was the reliance on recall of drug use and sexual risk behaviors as an outcome measure. Recall accuracy depends on the type and frequency of the behavior (Napper, Fisher, Reynolds, & Johnson, 2010). Generally, recall of drug related behaviors are reliable across any time interval, although one month is somewhat more reliable. In contrast, longer recall periods are more reliable for sexual behaviors: three months for most sexual behaviors and six months for the number of sexual partners. Therefore, the one-month follow-up period may have affected the reliability of self-reported sexual behaviors. Future studies should include a three and six month follow-up period.

Study Strengths: The strength of this study rests in the successful integration of community and investigative procedures to answer a question relevant to both the CBO and to the researchers. To achieve this level of successful integration, both academic and community entities had been working together for at least five years, building trust and mutual respect. The study further solidified this relationship and has led to continued partnerships in presentations and publications to multiple public health audiences (Gleason-Comstock, Simpson, & Bolden-Calhoun, 2005;

Gleason-Comstock, Streater, Rolack, Bolden-Calhoun, & Simpson, 2005; Gleason-Comstock, Streater, Bolden-Calhoun, Simpson, Rolack, & Norman, 2006).

The study was also strengthened by the randomization of participants into the two testing and counseling groups. Randomization produces comparable groups, minimizing the role of extraneous factors that can confound results. Unfortunately randomization in CBPR studies is rare. In their review, Viswanathan, et al., (2004) found only a third of the CBPR studies used a control group. Although randomization may be perceived as unethical because not everyone receives the new treatment, there are acceptable alternatives such as wait-listed control groups in which those in the control group receive the new treatment once the study is complete. In this study, randomization was readily acceptable to the community partners because the two testing procedures were proven to be equally effective and all clients would receive RR counseling.

Additionally monthly meetings encouraged free discussion and transparency between community outreach staff and academic researchers. Given their extensive knowledge of the community, staff articulated the potential problems in recruitment and implementation of the study, including the need to accommodate participants who tested anonymously. These discussions lead to a study protocol which was well integrated into the CBO's usual procedures, decreasing staff burden and increasing ownership of the study findings.

The investigators presented preliminary findings to the CBO administrators, staff, and the community advisory group to solicit their comments and interpretation of the data. Testing counselors reported that participation in the randomization process challenged them to better

articulate similarities and differences between conventional testing and rapid testing when responding to questions from clients. They noted that clients did not care which test was used as long as both were equally accurate. One unanticipated benefit in using CBPR was that the agency was able to use the study to pilot test their new procedures for transitioning to rapid testing.

Implications for Practice

Although HIV screening tests do not require risk-reduction counseling, findings from the present and other studies suggest that brief counseling at the time of the test may be a worthwhile HIV prevention strategy. RR counseling using motivational interviewing also has been shown to be effective in enhancing behavior change in other public health arenas such as increasing leisure exercise time among hypertensive patients (Sjöling, Lundberg, Englund, Westman, & Jong, 2011) and in increasing self-efficacy and motivation for physical activity among older patients with chronic heart failure (Brodie, Inoue and Shwa, 2008). Although the effects were limited, a single motivational interviewing intervention changed some oral health behaviors (Ismail, Ondersma, Jedele Little, & Lepkowski, 2011).

Conclusions

This research was conducted within the context of community outreach for HIV counseling and testing in an urban, mostly African-American, population at risk for HIV/AIDS. Study results suggest that a brief risk reduction intervention, using motivational interviewing techniques with either CHT or RHT can be equally effective in reducing high risk behaviors, at least in the short-term. The findings also suggest that while it is important to offer HIV testing, it is equally important for public health efforts to include brief risk reduction counseling to decrease the likelihood that someone will test HIV positive in the future. A longer follow-up period is suggested to determine if observed reductions in self-reported risk behavior is sustained over time. CBPR can be challenging and may require compromises between competing demands of scientific rigor and practical constraints in real world settings (Kamb et al., 1998; Blumenthal, 2011). However, the benefits of real world applications and building community capacity as co-investigators make this process worthwhile in public health research.

Acknowledgements

The authors gratefully acknowledge research project outreach staff, including Ms. Rosalind Rolack, and guidance provided by the Community Advisory Group at Community Health Awareness Group, Inc.

Declaration of Conflicting Interests

The authors declared no conflicts of interests with respect to the authorship and/or publication of this article

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Figure 1: HIV Counseling & Testing and Randomization Flow Chart

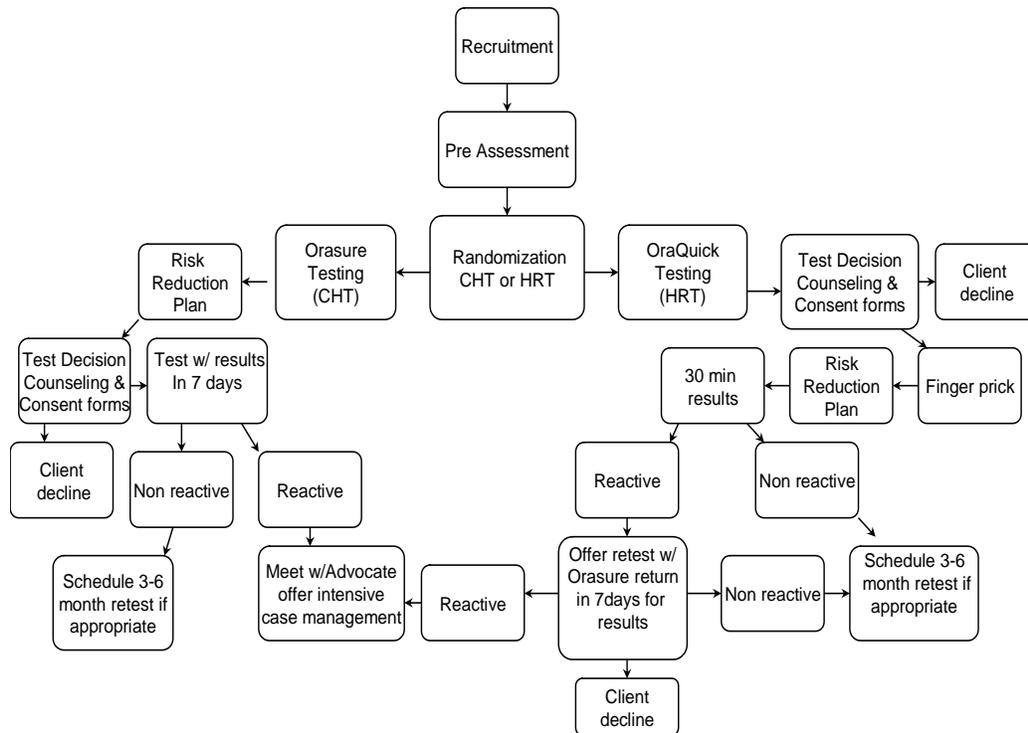


Table 1
Demographic Characteristics, Prior HIV Testing and Risk Behaviors by Testing Method

Characteristic	Single Session	Two session	Total
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Gender			
Male	53 (75.7)	41 (68.3)	94 (72.3)
Female	17 (24.3)	19 (31.7)	36 (27.7)
Race			
African American	61 (87.1)	52 (86.7)	113 (86.9)
White	6 (8.6)	4 (6.7)	10 (7.7)
Other	3 (4.3)	4 (6.7)	7 (5.4)
Age (years)			
18-25	1 (1.4)	2 (3.3)	3 (2.3)
26-35	14 (20.0)	5 (8.3)	19 (14.6)
36-45	25 (35.7)	27 (45.0)	52 (40.0)
46+	30 (42.9)	26 (43.3)	56 (43.1)
Marital Status			
Married/living together	7 (10.0)	4 (6.8)	11 (8.5)
Divorced/Separated/Widowed	19 (27.1)	12 (20.3)	31 (24)
Single never married	44 (62.9)	43 (72.9)	87 (67.4)
Tested Previously			
Yes	48 (69.6)	49 (81.7)	97 (75.2)
Recruitment Location			
Drug treatment center	43 (61.4)	37 (61.7)	80 (61.5)
Multi-service agency	27 (38.6)	23 (38.3)	50 (38.5)
HIV Risk Behavior			
Injection drug use ever	14 (20.0)	13 (21.7)	27 (20.8)
Other illicit drug use	66 (94.3)	53 (88.3)	119 (91.5)
Had STD in past 12 months	4 (5.7)	5 (8.3)	9 (6.9)
Number of sex partners in past 12 months			
< 2	36 (56.2)	27 (50.9)	63 (53.8)
2-5	20 (31.5)	19 (35.8)	39 (37.3)
≥ 6	8 (12.5)	7 (13.2)	15 (12.8)
Exchanged sex for drugs or money	19 (27.1)	21 (35.0)	40 (30.8)
Had same sex partner	4 (5.7)	5 (8.3)	9 (6.9)
High risk sex partner in past 12 months	32 (45.7)	29 (48.3)	61 (46.9)
No reported risk behavior in past 90 days.	4 (5.7)	4 (6.7)	8 (6.2)

Table 2
Accuracy of Risk Plan Recall at Follow-up by Test Group

Plan recall	RHT <i>n</i> (%)	CHT <i>n</i> (%)	Total <i>n</i> (%)
Recall Accuracy			
None Correct	17 (25.8)	13 (23.6)	30 (24.8)
Partially Correct	26 (39.4)	24 (43.6)	50 (41.3)
All Correct	23 (34.8)	18 (32.7)	41 (33.9)
Added more (% yes)	62 (88.6)	47 (78.3)	101 (84.2)

Table 3
HIV Risk Behavior Scores at Pre-test and Follow-up by Number of Counseling Sessions

	Single Session <i>n</i> =70	Two Sessions <i>n</i> =60
Pretest	6.97 (5.1)	7.70 (5.8)
Follow-up	0.46 (1.3)	0.37 (1.0)

NOTES FROM THE FIELD

**Building Capacity for Community-Based Participatory Research:
Experiences from the Grand Valley State University
Student Consulting Center**

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And

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The nascent Information Age witnessed the birth of the Internet, increasingly rapid advancements in technology and is now bringing with it the "democratization of data." Data democratization is making information that once was available to only a select few now the purview of nearly everyone. Democratizing data refers to a combination of policy and technology innovations that make government and other administrative data available to anyone with a computer and access to the Internet. Indeed, President Obama campaigned on the idea of open government and the democratization of data, launching Data.gov – a single website to making economic, health, environmental and other government data available on a single website. These and other powerful forces have aligned, *potentially* putting new knowledge into the hands of those who can make the appropriate changes to improve the health and well-being of their communities.

As communities have come to recognize the potential to use information in making local decisions, so has a growing sense of need to measure program outcomes. This in turn has brought with it a renewed interest and the proliferation of community-based participatory research (CBPR). The Agency for Healthcare Research and Quality (AHRQ) defines CBPR as a “collaborative research approach designed to ensure and establish structures for participation by communities affected by the issue being studied, representatives of organizations, and researchers in all aspects of the research process to improve health and well-being through taking action, including social change.” Yet harnessing the full power to wholly realize the potential of CBPR remains an elusive goal for many reasons. A 2004 evaluation conducted by the RTI International and the University of North Carolina for AHRQ outlined a number of challenges

inherent in CBPR while providing recommendations to enhance the outcomes and usefulness of such projects. Among the challenges and recommendations offered by the authors:

- Improving the quality of the research through the selection of appropriate study design and research methods while also considering an analysis and dissemination plan that benefits the entire community;
- Ensuring that capacity-building in collaborative research occurs for both the community and research team; and
- Improving the quality of the CBPR technical reports and publishing those in peer-reviewed literature.

As researchers and educators in the School of Public, Nonprofit and Public Administration (SPNHA) at Grand Valley State University (GVSU), recent experiences broadened the list of challenges to include:

- A problem of “information overload” whereby the amount and types of data available result in numerous and often disconnected measures thereby creating difficulties for consumers to draw meaningful and appropriate conclusions from the analysis; and
- A dearth of skills, knowledge and understanding among students to apply theoretically-based information provided through traditional classroom settings to undertake CBPR and CBPR-like projects without close, expert supervision.

In response to the opportunities and challenges afforded by CBPR projects, we designed a vehicle to foster active learning through the creation of the SPNHA Student Consulting Center. The Student Consulting Center is an inter-disciplinary, faculty led, graduate student program

designed to provide healthcare and nonprofit organizations in Michigan the opportunity to work together in solving real-life challenges. As the developed world moves toward knowledge-based industries, traditional, hybrid and online instruction are unlikely to meet the educational needs of neither the students nor the demand for talent and skills that employers require. New pedagogical practices are essential, such as those deemphasizing the traditional teacher-centered dissemination of information to students toward one focused on guiding students in the creation of knowledge and skills. While the graduate programs within GVSU share a number of core courses, such as research methods and organizational theory, there are few opportunities for students to truly engage in cross-disciplinary teamwork in any real or applied way. The Student Consulting Center was created in response to address the limitations of the tradition classroom setting to provide opportunities to hone skills and further cultivate the knowledge acquired as students in SPNHA.

Today, student consultants have engaged in CBPR with the Ottawa County Health Department (OCHD) in building community capacity toward addressing food insecurity. With nearly 20% of the Michigan populations receiving food stamps coupled with increasing rates of obesity and obesity-related chronic disease, student consultants conducted an environmental scan for OCHD in support of a larger food security strategic planning initiative. Students employed Geographic Information Systems to map measureable health indicators at the census tract level with the ultimate goal of the project to provide stakeholders with the information required make appropriate investment decisions at the community level. Based on Healthy People 2020 indicators, the analysis and subsequent baseline measures are being used to monitor changes and to gain understanding of the extent to which community needs are being met relative to other

areas of the state and nation. For example, student consultants are creating a website to map the proportion of the population with access to nutrient dense foods (Objective NWS-4) while also surveying emergency food providers (churches and nonprofits) about capacities to provide such staples as lean meats, fresh fruits and vegetables to those seeking services. In addition, student consultants analyzed health indicators associated with social determinants of health, such as poverty, ethnicity, age, and income. As a result, students are developing practical skills and expertise required of future public health leaders to bridge the gap between research and practice within the communities of Ottawa County to improve health while reducing food insecurity.

In Newaygo County, a second team of student consultants recently completed an important component of a larger strategic planning initiative, for the Fremont Area Community Foundation (FACF). Student consultants also conducted an environmental assessment to provide stakeholders a deeper and more focused understanding of community needs to assist the FACF with appropriate investment decisions at the community level. Within FACF's mission of improving the quality of life for people in Newaygo County, the focus of the project was to develop and map important summary measures to assist with monitoring community health and well-being. By using the information provided from the student consultants' analysis the overall goal of the project was simple - to better inform both grantors and grantees. In essence, better ideas result in a wiser use of funds. With this key tenet in mind, the work is envisioned as a tool for community advocates to visualize and develop appropriate interventions for creating healthy, inspired, and sustainable communities in Newaygo County.

While the nascent development and approach of the Student Consulting Center have yielded promising results, the push to elevate and broaden active learning will continue. These active and real-time learning laboratories can advance CBPR models while demonstrating how learning and practice can come together in an authentic context. By encouraging innovative thinking, developing competencies and initiating truly collaborative work, the full potential and promise of data democratization and CBPR may be realized. To read more about the SPNHA Student Consulting Center or to contact the Center Director about a potential CBPR project, please see:

- <http://faculty.gvsu.edu/borderss/index.html>

To read more about the FACF CBPR project, please see the temporary website created for the FACF. This work will be transferred to a permanent location on the FACF website in the future. <http://www.tfaf.org> and <http://faculty.gvsu.edu/borderss/project.html>.

To read more about the OCHD CBPR project, please see:

- <http://www.feedingtottawa.org>

This work was an Oral presentation at the 2012 140th Annual APHA Meeting in San Francisco, California.