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2011

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Social Network Characteristics and Breast Cancer Screening Behavior
in Vietnamese American Women

by

Minh-Tram Gem Le

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Philosophy

in

Epidemiology

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor William A. Satariano, Chair

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Professor Joan R. Bloom

Professor Emeritus Stephen J. McPhee

Spring 2011

Abstract

Social Network Characteristics and Breast Cancer Screening Behavior in Vietnamese American Women

by

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Doctor of Philosophy in Epidemiology

University of California, Berkeley

Professor William A. Satariano, Chair

The last 40 years have seen a large influx of Vietnamese immigrants to the United States (U.S.) as a result of the Vietnam War. The Vietnamese now constitute one of the fastest growing Asian and Pacific Islander populations in the U.S. Breast cancer is the most commonly diagnosed cancer in Vietnamese American women, with incidence rates steadily increasing in this immigrant population. Early detection of breast cancer through mammography screening and clinical breast examination is critical for reducing breast cancer morbidity and mortality. However, Vietnamese American women are less likely to be screened than non-Hispanic white women. This dissertation investigates social network characteristics and their relationship to breast cancer screening behavior in Vietnamese American women aged 40 and older within a community-based breast cancer screening intervention study based in Santa Clara County, California. Because this intervention study was embedded in the framework of interpersonal relationships, it presents an ideal opportunity and optimal approach to exploring how social networks influence breast screening behavior in an underserved and hard-to-reach population.

A positive association between social network integration and breast cancer screening was found for recent receipt of a clinical breast examination (CBE) but not for mammography. Women in the highest tertile of social network integration were more likely to receive a CBE than women in the lowest tertile (OR = 1.20, 95% CI: 1.07-1.33). This dissertation also examined perceived availability of different types of social support (emotional, instrumental, informational, affectionate, and positive social interaction) and the relative contributions of each type of support to recent use of mammography and CBE. Findings indicate that Vietnamese American women generally perceived moderate to high levels of available social support across all types. Instrumental support was the single most important social support predictor for recent use of mammography (OR = 1.05, 95% CI: 1.02-1.08). Because breast cancer screening is only optimally effective for early detection if women adhere to annual screening guidelines, this dissertation also examined breast cancer screening norms as one type of social network influence on intention to receive screening in the future. Results showed no associations between social influence and intention to receive a mammogram or CBE within the next 12 months. Findings from this analysis suggest challenges in measuring both social influence and screening intention constructs in Vietnamese American women and warrant further methodological investigation in developing more culturally appropriate, accurate, and comprehensive measures.

Overall, findings from this dissertation have laid the necessary groundwork for identifying new opportunities for future research on social networks and health. Such research will enable us to gain a better understanding of ways in which social networks can inform more effective interventions and programs to close the gap in breast cancer health disparities.

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Acknowledgements

This dissertation on social networks would not have been possible without support from my own social network. First, my dissertation chair and faculty advisor, Professor Bill Satariano, provided me with guidance, mentorship, and support throughout my doctoral training. He never failed to make time for me and to give me the encouragement I needed to keep me going. I am thankful to Professor Amani Nuru-Jeter who challenged me to think more critically about my work and always pushed me to be more rigorous. I thank Professor Joan Bloom for being a critical reviewer and for our stimulating conversations on my dissertation.

I am deeply grateful to my mentor and committee member at UCSF, Dr. Steve McPhee, a pioneer and highly-esteemed researcher in Vietnamese American health who co-founded the Vietnamese Community Health Promotion Project (*Suc Khoe La Vang!*) at UCSF, where I conducted my dissertation project. I am honored to have worked with him closely and to officially be his “last” student. His commitment and dedication to the health of the Vietnamese American community inspired me to pursue this avenue of research. I am extremely thankful to Dr. Tung Nguyen at VCHPP/SKLV who supported my dissertation work over the years and gave me valuable opportunities to learn outside the classroom, with regard to conducting intervention research and understanding the complexities of community-based participatory research. There is no better training for this kind of work than to actually do it, and for that, I am grateful. My friends at VCHPP/SKLV (Thoa Nguyen, Ching Wong, Hy Lam, and Janice Tsoh) were always there to cheer me on. I also thank Dr. Khanh Le and Dr. Ky Lai, who were instrumental in helping me collect data for my dissertation. To all the lay health workers and participants who gave their time and energy to this project, I express my sincerest gratitude.

Dr. Scarlett Lin Gomez is a long-time mentor, colleague, and friend whom I have been fortunate to work with since my master’s internship at the Cancer Prevention Institute of California more than ten years ago. I still tell her to this day that getting the CPIC internship on my birthday was the most memorable birthday gift I ever received. She inspired me to pursue doctoral training and without her support, from beginning to end, I would not have completed my degree. I can honestly say that she has supported me at every level (i.e., academically, professionally, and personally) as I struggled through many difficult life changes over the years. Her support has meant the world to me.

I thank my peers in the doctoral program (June Kittikraisak, Tapashi Dalvi, Kevin Urayama, and Natalia Sadetsky) for their friendship and continued support. Many others gave me moral support during my last and most difficult year, including Dr. Rena Pasick, Dr. Thu Quach, and Dr. Bang Nguyen.

I want to give a special thank you to the Liu family for their support, especially during the most difficult times. My mother-in-law, Mrs. Annie Liu (“Nai Nai”), was always there with food when I did not have time to cook (which was often). While working on my dissertation, I never had to worry about my son knowing that he was in her loving care. I also thank my family, especially my mother for bringing me to this country and instilling in me the value of hard work and perseverance to achieve my goals. My sister, Thanh Le, listened to me whenever I needed to vent my frustrations and gave me loving care packages to keep my spirits up.

Last, but certainly not least, I thank my husband, Roger Liu, who was by my side through thick-and-thin and understood all the sacrifices I needed to make to accomplish my goals. My son, Ethan Liu (who is now only 28 months, but will someday read this) gave me perspective and brought joy and sunshine to my life. I thank them for their unconditional love and support.

Chapter 1. Introduction and Hypotheses

“People are interconnected, and so their health is interconnected.”

– Christakis and Fowler (1)

Background and Significance

The Cultural Context for Social Networks and Health

The last 40 years have seen a large influx of Vietnamese immigrants to the United States as a result of the end of the Vietnam War in 1975 (2). From 1980 to 1990, the population of Vietnamese Americans in the U.S. increased 125.3%. From 1990 to 2000, the Vietnamese American population had grown another 80.7% to over 1.2 million and constituted the fourth largest Asian subgroup in the U.S. in 2000 (3). Though no U.S. Census 2010 data are yet available for this population, recently released data showed a 31.5% increase in the overall Asian population, whom now comprise the fastest growing racial/ethnic population in California; this indirectly suggests continued population growth among Asian subgroups, including Vietnamese, from 2000 to 2010 (4).

Vietnamese Americans, like many other immigrants, often rely on their connections through personal networks as they migrate and adapt to living in a new country (5, 6). The notion that social networks are a valuable asset to immigrants before, during, and after the migration process, has been widely acknowledged (7-11). Culture is a key factor in shaping the socio-structural conditions that directly influence social network structure and dynamics (12, 13). However, the extent to which social network characteristics vary among racial/ethnic groups is not well understood, particularly among immigrant groups.

The impact of social networks on health has been a rapidly growing area of interest as recent findings show that how and with whom people connect has a profound impact on their own health behaviors and outcomes (1, 14-18). As research on social networks continues to grow, more recognition of the role of culture and ethnicity is needed to understand how these underlying factors influence the relationship between social networks and health (8). In a study of White, African American, and Vietnamese American populations, Nguyen and colleagues found that older Vietnamese Americans were more likely to use interpersonal sources (e.g., friends, family, or physician) than electronic (e.g., television, radio, or internet) and print (e.g., newspapers, books, or pamphlets) sources when seeking cancer information. These findings suggest that interpersonal contact through social networks play an important role in seeking cancer information. In addition, the authors found that Vietnamese American women were more likely than men to engage in help-seeking behavior through social networks (19), implying that social networks may have more relevance to Vietnamese American women in terms of seeking cancer information and influencing cancer screening behavior.

To date, there are few studies that address the role of social networks on breast cancer screening in diverse communities despite the high burden of breast cancer. To add to the empirical data on social networks and preventive health, this dissertation focuses on how the structure and function of social networks influence breast cancer screening behavior in Vietnamese American women with the goal to more clearly elucidate the relationship between social networks and health in this and other populations. It explores social network characteristics such as social integration, social support, and social influence, to evaluate in

greater depth the emerging phenomenon of social networks as it relates to breast screening behavior in a one Asian monolingual immigrant population.

Burden of Breast Cancer in Vietnamese American Women

According to the most recent national cancer surveillance data from the Surveillance, Epidemiology, and End Results (SEER) Program, breast cancer is the most commonly diagnosed cancer and the third leading cause of cancer death among Vietnamese American women (20). Breast cancer continues to be a significant public health burden in this population, as rates have been shown to be steadily increasing over time. Using population-based cancer surveillance data from the California Cancer Registry, Gomez and colleagues reported increasing breast cancer incidence rates in all Asian subgroups, with annual percent changes ranging from 0.8% to 4.2% during the period 1988-2004; incidence rates for foreign-born Vietnamese showed a 2.5% increase each year (21).

As breast cancer incidence rates continue to increase for Vietnamese women, early detection of breast cancer through mammography screening and clinical breast examination is critical for reducing morbidity and mortality. The American Cancer Society recommends that women receive annual mammography screening beginning at age 40 to improve the likelihood that breast cancer is diagnosed at an early stage and treated successfully (22). In addition, the ACS recommends that clinical breast examination be part of routine check-ups and conducted roughly every three years for women in their 20's and 30's and every year for women aged 40 years and older (22). However, breast cancer screening rates are lower in Vietnamese American women than in non-Hispanic white women. In California, 75% of Vietnamese women aged 40 and older reported having a mammogram in the past 2 years versus 80% of non-Hispanic whites in 2007 (23). As a result, Vietnamese American women tend to be diagnosed at more advanced stages of disease and experience greater risk of death from breast cancer than non-Hispanic white women (24, 25).

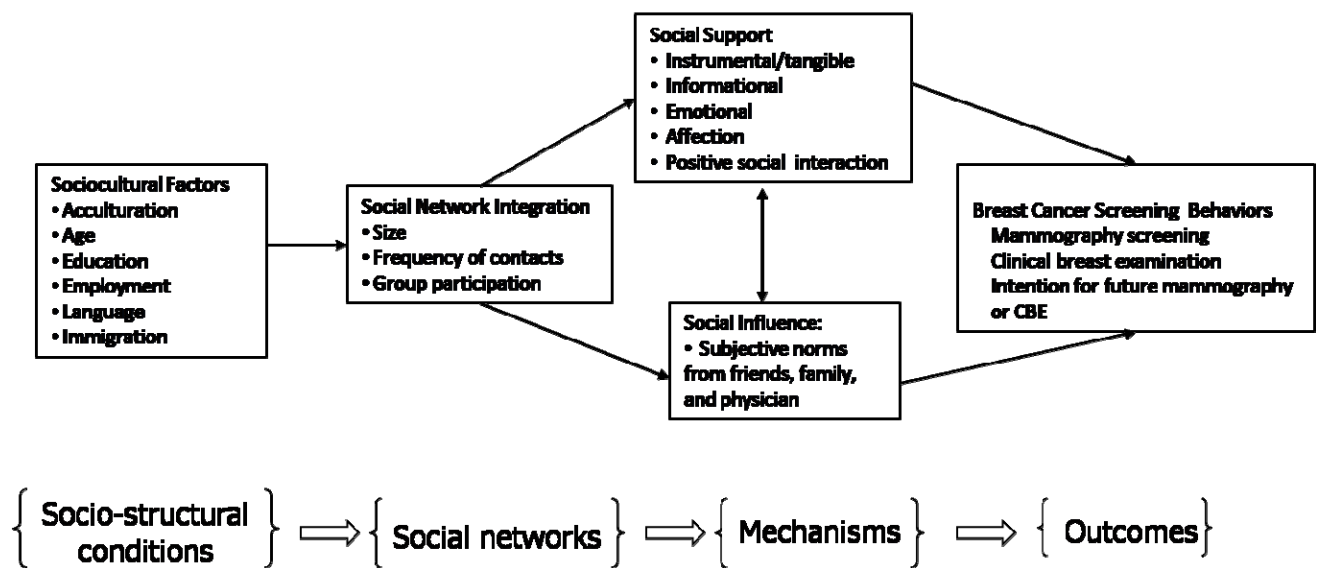
As a recent immigrant population, Vietnamese American women are vulnerable to barriers to accessing cancer screening services. Previous studies have identified both patient and health care system factors associated with low cancer screening utilization among Vietnamese, including having attained a low level of education, not having a regular doctor, and lack of health insurance (26-29). The concept of social networks may play an important role in influencing these factors. Because social networks are naturally embedded in friends, families, acquaintances, and communities, the proposed study has tremendous potential to uncover new information about characteristics of social networks in Vietnamese American women and may have important implications for overcoming barriers to screening and for more effective delivery of health interventions and programs aimed at reducing cancer disparities in this underserved and racial/ethnic minority population.

Conceptual Framework

According to Berkman's conceptual model of how social networks impact health (12), social networks are hypothesized to influence health and health behavior through five main pathways: social support, social influence, social engagement, interpersonal contact, and access to resources (30). I adapted this social network and health conceptual framework to the research questions proposed in this dissertation as a theoretical guide for examining social networks and two proposed mechanisms through which social networks might impact breast cancer screening

behavior, independent of sociodemographic factors (Figure 1). The modified conceptual framework shows that social network integration can exert its influences on breast cancer screening behavior through pathways such as social support and social influence. There may be other pathways or intervening factors through which social networks influences breast cancer screening behavior in this population.

Figure 1. Conceptual framework of the effects of social network characteristics on breast cancer screening behavior in Vietnamese American women



Specific Research Aims and Hypotheses

The overarching goal of this dissertation is to investigate social network characteristics and their relationship to breast cancer screening behavior in Vietnamese American women within a community-based intervention study. This dissertation aims to lay the groundwork for identifying opportunities for intervention and for informing prevention strategies that may use social network approaches to reduce breast cancer screening disparities.

In this dissertation, I first examine the overall association of social network integration with breast cancer screening among Vietnamese American women in Santa Clara County, a geographic region with one of the most concentrated populations of Vietnamese in the U.S. Although social network integration may confer either positive or negative effects on breast cancer screening, I examine the assumption of a positive relationship and hypothesize that greater integration is associated with greater use of breast cancer screening. I next examine social support as one potential mechanism by which social networks may impact breast cancer screening behavior. Finally, I examine the role of subjective norms as one form of social influence on intention to receive future breast cancer screening.

The specific aims and hypotheses of this dissertation are to:

Aim 1: Determine the overall association between social network integration and breast cancer screening behavior in Vietnamese American women.

Hypothesis 1: Vietnamese American women with a higher level of social network integration will be more likely to receive breast cancer screening than women with less integration.

Aim 2: Examine the different types of social support (emotional, informational, affection, instrumental, and positive social interaction) and their association(s) with breast cancer screening in a community-based intervention.

Hypothesis 2: Vietnamese American women who have greater social support will be more likely to receive breast cancer screening than women who have less social support.

Aim 3: Evaluate the extent and types of social influence (i.e., perceived approval of breast cancer screening from friends and family, perceived approval of breast cancer screening from their physician, and perceived use of breast cancer screening by their peers) on the intention to undergo breast cancer screening among Vietnamese American women. The specific hypotheses for this aim are:

Hypothesis 3: Vietnamese American women who perceive that their friends and family approve of breast cancer screening will have greater intention to receive screening than women who do not perceive their friends' and family's approval of screening.

Hypothesis 4: Vietnamese American women who perceive that their physician approves of breast cancer screening will have greater intention to receive screening than women who do not perceive their physician's approval of screening.

Hypothesis 5: Vietnamese American women who perceive that their peers undergo breast cancer screening will have greater intention to receive screening than women who do not perceive the use of screening among their peers.

Data Source

Data for this dissertation were drawn from a sub-sample of the Racial and Ethnic Approaches to Community Health (REACH) 2010 Breast Cancer Screening Lay Health Worker Outreach (LHWO) Study (hereafter referred to as the LHWO study). Funded by the Centers for Disease Control and Prevention (CDC), the LHWO study was a randomized controlled community intervention trial to improve breast cancer screening among Vietnamese American women in Santa Clara County, California. The LHWO study was conducted from September 2004 to March 2007. The study investigators collaborated with five community-based organizations that recruited 10 lay health workers (LHWs) each. Each LHW, in turn, recruited 22 participants from their social networks. Eligibility criteria for participants were: self-reported Vietnamese ethnicity, aged 40 and older, and residence in Santa Clara County. A total of 1,100 participants were enrolled in the intervention study. The participants were then randomized to either the LHWO plus media-based education group (LHWO + ME, n=550), or to a media-based education only group (ME-only, n=550). LHWs received two half-day training sessions from researchers on procedures for the LHWO study. LHWs were also trained to use a flip chart and a booklet to teach participants about breast cancer and its screening by clinical breast examination and mammography.

In 2004-2005, a member of the research team administered a pre-intervention survey by telephone to all participants one month before the first LHWO intervention session and a post-intervention survey approximately two months after the second session. All 1,100 Vietnamese American women were administered a pre-intervention survey regarding their sociodemographic characteristics, health care utilization and insurance coverage, and knowledge of and receipt of breast screening and 100% responded. In 2006-2007, 1,100 women were administered a very similar post-intervention survey and 99% responded. More extensive details of the intervention and comparison group educational activities are described extensively elsewhere (31).

Then, in 2008, 526 of the post-intervention responders were randomly selected and administered a follow-up telephone questionnaire on characteristics of their social networks and receipt of breast cancer screening. This data source was selected for its large sample of Vietnamese American women and for its network-based intervention study design which used lay health workers to deliver breast cancer screening education to women in their social circles. Because this intervention study was embedded in the framework of interpersonal relationships, it presents an ideal opportunity and optimal approach to explore how social networks influence breast screening behavior in an underserved population.

Organization of Dissertation

This chapter has provided an introduction, rationale, and conceptual framework for examining the relationship between social network characteristics and breast cancer screening behavior in Vietnamese American women. Chapter 2 provides a synthesis of the literature and a discussion of key terms and definitions that will be used throughout the dissertation. Chapter 3 examines the overall main effects of social network integration on breast cancer screening behavior. Chapter 4 evaluates the multidimensional construct of social support and their relative contributions to breast cancer screening behavior. Chapter 5 examines the extent and types of social influence that may impact women's intentions for future breast cancer screening. Finally, Chapter 6 presents a summary of the main findings in the dissertation and discusses implications and future directions for research.

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Chapter 2. Literature Review

Introduction

The purpose of this chapter is to provide relevant definitions and to review and synthesize the literature on key concepts of social networks and their relationship to breast cancer screening behavior. First, I review the existing literature on social networks with a focus on the structural aspects of social networks. I then review the literature on the functional aspects of social networks, including social support and social influence, as they relate to breast cancer screening behavior. This literature review highlights areas in which more research could increase our understanding of how social network-related processes can influence preventive health behaviors and reveals some methodological strengths and limitations of the existing literature.

History of social network research

To give a brief historical perspective, the study of social networks and health is rooted in the early work of Emile Durkheim, a French sociologist, who through his work on suicide, was the first to recognize and document how individual health is influenced by the social environment, particularly through social integration with religious groups (1). By comparing rates of suicide in areas of Europe that were predominantly Protestant to those that were predominantly Catholic, he found that regions that were predominantly Catholic had consistently lower rates of suicide despite the fact that suicide is forbidden in both religions. Durkheim observed that Catholic groups were more structured and much more integrated than Protestant groups, leading him to hypothesize that Catholic regions had lower rates of suicide because of stronger ties between the individual and the community. His work concluded that “suicide varies inversely with degree of integration of the social groups of which the individual forms a part,” (1) suggesting that suicide is not simply an isolated event, but one that is associated with the social environment that surrounds an individual. Durkheim’s work laid the foundation for better understanding the influence of social integration and community cohesion on individual health and formed the basis for developing a framework for the study of social networks and health (2).

Epidemiologic research on social networks and health began to appear in the 1970’s when pioneering researchers conducted studies that provided empirical support for the effects of social networks and mortality (3, 4). One of the earliest epidemiologic studies was the Alameda County Study which demonstrated, using a prospective study design with nine-years of follow-up, that socially isolated individuals (defined as having the fewest social connections) were at greater risk for overall mortality; socially isolated women had a 2.8-times higher mortality rate than women with the most social connections, whereas the rate in socially isolated men was 2.3-times higher than men with the most social connections (5).

Definition of Social Networks

Theoretical background

Social network theory was formally developed in the 1950’s by British anthropologists Barnes (6) and Bott (7). This theory is based on the premise that the social structure influences individual health and health behavior. Barnes and Botts observed that behavior could be shaped by social ties that extend beyond traditional social units of study that were defined by family,

class, and geography. These observations led to a broader definition of community and focused more attention on the social structure defined by relationships rather than by geography or space (2). Following the work of Barnes and Bott, research in various disciplines, including sociology, anthropology, and epidemiology, has suggested that social networks can impact a wide range of health behaviors and outcomes through behavioral, psychological, and physiological pathways.

The influence of social networks on health behavior is also based on social learning theory, which conceptually explains how an individual's health behavior is the result of modeling or learning from other people's behaviors (8). Through social reinforcement, this theory implies that people are more likely to adopt a behavior if they see that others are rewarded for those behaviors. Thus, this theory views behavior change as a dynamic and reciprocal process between the individual and his/her social network.

Levels of social network data

Valente provides a useful overview of the various types of social network data that can be collected and draws distinctions between individual- and network-level variables. As an overview, the types of network data that can be collected are (in the order of increasing relational information and complexity): 1) individual-level survey data 2) egocentric data 3) sequenced data 4) census data and 5) two-mode or jointness data (9). Only the first category (individual-level survey data) are considered individual-level, while the other levels of data (egocentric, sequenced, census, and two-mode or jointness data) comprise network-level data. The majority of epidemiologic studies on social networks and health have predominantly operationalized the construct of social networks as an individual-level measure of personal networks, in large part due to the difficulty in collecting network-level data that often involve extensive time and resources. In this dissertation, I focus on individual-level measures of social networks and their related characteristics as a beginning step to understanding how these concepts apply to Vietnamese American women and breast cancer screening behavior. The remaining types of network data are a separate topic not considered here, as they are beyond the scope of work undertaken in this dissertation.

Individual-level measurements of social networks

Individual-level measurements of social networks consist of asking individuals about whether they talked to or consulted anyone about a health topic or asking them to identify the number of people whom they feel close to, depending on the aim of the researcher. These measures may be framed in terms of the research topic of interest; for example "Have you spoken to anyone about breast cancer screening?" For these types of questions, the types of contacts are usually presented as response categories, such as family member, co-worker, neighbor, etc. These questions capture the most basic level of network concepts. The level of social network connectedness, also referred to as social integration, can additionally be measured by frequency of contacts with family and friends and formal and informal group memberships, such as attendance of religious services and participation in community activities. Most instruments that measure social networks have been developed in non-health related disciplines and are often lengthy in administration (10-12). However, they provide in-depth understanding of the complexity of social network dynamics and measure structural dimensions such as homogeneity (similarity between network members) and density (the extent to which network members are connected to each other) (9, 13). Based on network instruments developed in fields such as sociology, anthropology, and psychology, less lengthy instruments have been developed

in the field of epidemiology. For example, a common epidemiologic measure may ask “How many close friends do you have?” while a lengthier measure may ask more detailed questions about the quality of relationships with friends, including the ways in which they interact and the types of topics they may talk about. Although the epidemiologic measures are not as detailed in their assessment, these shorter instruments try to capture the same dimensions as well as population health outcomes (5, 14, 15).

Social Networks and Breast Cancer Screening

A small, but growing body of epidemiologic research suggests that social networks influence cancer screening behaviors (16-19). In terms of breast cancer screening, there are few studies that examine structural characteristics of social networks and existing research has reported mixed findings overall. Shown in Table 1 is an overview of studies that have investigated the relationship between social networks and breast cancer screening in various populations; of these studies, four found a positive association, two found null associations, and one found a positive correlation based on discriminant analysis. All except one of these studies conceptualized social networks as some variation of individual-level measures frequently adapted from the Berkman-Syme Social Network Index (5). Only one study to date has collected network-level data in terms of obtaining information on actual use of breast cancer screening in members of a participant’s social network, as opposed to relying on the participant’s report of her sister’s/friend’s/co-worker’s screening behavior (20). Findings from this study supported a small increase in breast cancer screening among women whose sister(s) had also received a mammogram in the previous year (OR=1.034, 95% CI: 1.000-1.065), but no effects were observed from friends’ or co-workers’ screening behavior. Overall in the studies listed in Table 1, the positive effect estimates ranged from an OR of 1.03 to an OR of 3.11. The myriad ways in which social network exposures and breast cancer screening outcomes are defined, differences in study design, and lack of covariate adjustment across studies undoubtedly contribute to the inconsistencies and wide range of effect estimates.

Moreover, the extent of this relationship and how it varies in cultural and ethnic communities are not well understood. The few studies that have been conducted regarding social networks and cancer control and prevention have focused primarily on the general population or African American and Latino racial/ethnic populations in the U.S. (16, 18, 19, 21, 22). The published literature on social networks and cancer screening in Asian and Pacific Islander populations is scarce (17, 23). To our knowledge, no studies have been conducted in the Vietnamese American population despite that need for a better understanding of issues related to cultural and ethnic variations in the structure and function of networks and how they impact health to help us develop critically needed interventions to improve health.

Definition and Types of Social Support

Social support is defined perhaps in its simplest and broadest form as “resources provided by others” (24). House offers a more specific definition of social support as “the positive, potentially health-promoting or stress-buffering aspects of relationships such as instrumental aid, emotional caring or concern, and information” (25). Social support represents one mechanism through which social networks are hypothesized to influence health (3, 25-27) and can be appraised both objectively and subjectively between network members. Although there is no

clear consensus of its conceptualization, there are at least four types of social support: 1) emotional support, 2) affectionate support, 3) informational support and 4) instrumental/tangible support (27-29). Emotional support includes expressions of empathy, concern, caring, love, and trust. Affectionate support involves expressions of love and affection. Informational support includes the provision of advice, information, feedback, or guidance. Instrumental or tangible support is the most concrete form of social support and includes support in the form of money, time, or logistical support such as cooking, driving, etc. The individual's perception of support that is available to him or her when needed may be more important than how much support the individual actually receives, depending on the situation. This distinction between received and perceived support is important in clarifying how social support influences health. *Perceived* support is suggested to be more important than *received* support when it comes to dealing with stressful life events and for ongoing health benefits (30).

Social Support and Breast Cancer Screening

The social support literature is much vaster than the social network literature. While numerous epidemiologic studies have assessed the effects of social support on various health outcomes (31-39), few have focused on directly quantifying the relationship between social support and use of breast cancer screening. The link between social support and breast cancer screening is not clear because findings from previous studies have not been consistent. The majority of studies in this area have focused predominantly on perceived availability of social support (40-45). Using a multidimensional measure of social support, Messina and colleagues found that emotional/informational support and positive social interaction, but not instrumental support or affection support, were significantly associated with regular use of mammography screening, clinical breast examination (CBE), and breast self-examination, in a large population-based sample of a predominantly educated white population across various regions of the US (43). However, two other studies that included African American and Hispanic women found no associations between social support and breast cancer screening (41, 45). Both studies were limited by their measurement of social support, which used five or fewer items to capture this complex construct. Together, these results show that the association between social support and breast cancer screening will vary depending on the population being studied, the study design, the conceptualization and measurement of social support, and the specific screening outcome being studied.

Little is known about the function of social support in Asian and Pacific Islander women; cultural differences in the perception of social support in breast cancer screening likely exist, but have not been extensively explored. Two qualitative studies have suggested that social networks primarily provide instrumental support in Japanese American women (46, 47), though no quantitative studies have been conducted. Given the heterogeneity within Asian and Pacific Islander populations, these findings are not generalizable to Vietnamese American women and no study has yet examined the association between social support and breast cancer screening in this population.

Distinguishing Between the Constructs of Social Networks and Social Support

The term "social networks" has become ubiquitous and widely used in the colloquial language, in large part due to the growing popularity of social media networking tools such as

Facebook and Twitter. It has also been loosely used in the burgeoning scientific literature; one salient example is how the term “social networks” and “social support” are often used interchangeably in the literature. Although they are related phenomena, the concept of social networks is defined as “the web of social relationships that surround an individual and the characteristics of those ties” (3). Social support usually refers to the qualitative and functional aspects of the social network. Social support occurs within networks and refers to the help and support exchanged between network members when needed. Smith and Christakis recently reviewed the conceptual and empirical differences between social network and social support analyses in the broadly defined social network literature (13) and have referred to the frequent interchangeability of these two terms as a “conflation that still continues to a large extent today despite calls for change” (13), a conceptual distinction and critique also raised by Berkman and Glass (3). In recognition of this key point, it should be clarified that the structural concept of social networks in this dissertation is operationalized and analyzed as individual-level measures of personal networks. Related phenomena such as social integration, social support, and social influence are collectively referred to as social network characteristics and are examined in terms of their relationship to breast cancer screening behavior.

Other Key Definitions Related to Social Network Characteristics

Based on the literature, there are no standardized definitions and conceptualizations that have been agreed upon for social network-related terms such as *social networks*, *social integration*, *social support*, *social connectedness*, and *social ties*, and therefore no agreement on how these constructs should be operationalized in measurement. Thus, for clarity, I use the following definitions in this dissertation: *Social integration* is defined by the “existence or quantity of social ties or relationships, which may be in turn be distinguished as to type (e.g., marital, kin/non-kin) and frequency of contact” (25); *social connectedness* is similar in meaning and is used interchangeably. *Social network* refers to the “structure which characterizes a set of relationships” (25) or the “the web of social relationships that surround an individual and the characteristics of those ties” (48). As described earlier, a network may be measured in multiple ways, such as its homogeneity or density. Unlike House’s definition which precludes size as a measure of structure, I use size as a basic individual-level measurement of social networks, in accordance with Valente’s framework of the levels of network data. *Social support* is defined as “the positive, potentially health-promoting or stress-buffering aspects of relationships such as instrumental aid, emotional caring or concern, and information” (25) and which fall into at least the four categories described previously. *Social ties* is a broad general term that refers to an individual’s connections to others and can be considered weak or strong (49).

Social influence and breast cancer screening intention

Social influence is broadly defined as influenced by an individual’s social context. Within an individual’s social network, shared values and norms around health and health behavior can be an important source of social influence. Norms refer to perceptions of what others believe and do and how these perceptions pressure one another to uptake the same belief or behavior. These normative beliefs are strongly influenced by interactions within an individual’s social network. Norms are often learned from individuals observing other people’s behaviors and/or hearing what other people tell them. Norms are also strongly influenced by the

cultural context, as some members of one's network may be regarded as more influential than others. Similar to social learning theory (8), norms are learned from observing people's behaviors and/or hearing what other people tell them. Norms are also strongly influenced by cultural context since some members of one's network may be regarded as more influential than others (50).

Studies of breast cancer screening behavior have often been guided by behavioral theories that include constructs such as intention, self-efficacy, perceived benefit, perceived susceptibility, and subjective norms. When using some variation of this conceptual framework, several studies have consistently found that norms are strongly associated with intention to receive screening (51-54). However, subjective norms and behavioral intention are constructs that can differ across cultures (50) and researchers have suggested that these relationships be explored further in various ethnic cultures (55). To date, there are no quantitative studies that directly examine the relationship between subjective norms and intention to receive breast cancer screening among Vietnamese American women.

Summary

Further investigation of cultural and racial/ethnic differences in the characteristics of social networks and how they impact health is warranted in order to inform interventions to improve health. Public health screening interventions are often embedded in the framework of interpersonal relationships which (despite limited empirical data) are presumed to influence cancer screening behavior through social network interactions, provision of social support and access to resources, and social influence. This dissertation aims to offer a more in-depth understanding of the mechanisms through which social networks promote breast cancer screening behavior in Vietnamese American immigrant women.

Table 1. Epidemiologic studies of social networks and breast cancer screening

Author, Journal, Year	Study Design	Study Population	Measurement of social networks	Measurement of Outcome	Strength of Association	Covariate Adjustment
Kang, JNCI, 1993 (19)	Cross-sectional analyses from community intervention study	Older black population, 55+ years old, San Francisco and Oakland, 1986-1991 N=361 women	SNI ¹ (continuous measure)	Ever had a routine mammography	OR = 1.27 (1.01-1.61)	Health status, age, education, health insurance, access to regular care, time of survey
Allen, Health Ed and Behav, 2007 (56)	Longitudinal analyses from intervention study, 2-year follow-up	Predominantly white, insured, educated, employed, high income, married, 40+ years old in Massachusetts, LHW intervention study based on work-sites N=1,475	SNI (network size items)	Mammography at 2-year follow-up	No association OR = 1.01 (for age stratum 40-51 years); OR = 1.03 (for age stratum 52+ years)	Intervention arm and work-site cluster
Suarez, JNCI, 1994 (18)	Cross-sectional analysis using baseline data from intervention study	Older, low-income, uninsured Mexican-American women in Texas, 1991 N=450	SNI (tertile categories)	Mammography screening within the past 2 years	OR = 1.40 (1.02-1.93)	Age, marital status, health insurance, education, birthplace, and traditional attitude toward family
Suarez, Am J Prev Med, 2000 (16)	Cross-sectional analysis using baseline data from Redes En Accion intervention	Hispanic women 40+ years old; Puerto Ricans (New York), Cubans (Miami), Mexicans (California and Texas), and Central Americans (San Francisco) N=2,383	SNI (3 categories with equidistant cut-points)	Mammography within the past 2 years	No association Mexican American OR=1.16 (0.98–1.38); Central American OR=1.19 (0.70–2.05); Puerto Rican OR=1.03 (0.68–1.56); Cuban American OR=1.22 (0.79–1.89); Overall OR=1.15 (1.00–1.33)	Age, education, insurance, English-language acculturation, and birthplace (overall OR additionally adjusted for Hispanic subgroup)
Calnan, Soc Sci Med, 1985 (57)	Cross-sectional analysis	Age 45-64, England N=2,079	Number of close friends	Mammography and/or breast physical examination	Discriminant analysis; no ORs presented	No adjustment

					Positive correlation found between number of close friends and breast cancer screening	
Levy-Storms, Soc Sci Med, 2003 (23)	Cross-sectional analysis	Older migrant Samoan women, 50+ years old, low education, attended churches in LA, 1996-1997 N=260	Informal support networks (church connection and central role)	Mammography (conceptualized as stages of change)	OR = 3.05 (1.33-7.01) for plan mammogram vs. knowledge/persuasion OR = 3.11 (1.12-8.62) for recent mammogram in 2 years or first mammogram in last 5 years vs. knowledge/persuasion	Church size and clustering within churches
Keating. Cancer, 2011 (20)	Prospective cohort	Women aged 41-70 from Framingham Heart Study; N's=1,660 index cases; 597 sisters; 175 female friends; and 174 female coworkers enrolled in the same study	Network-level data; assessed actual screening behaviors of network members	Mammography in the previous year	No association among friends or coworkers Slight association for the effect of sisters' breast cancer screening on screening behavior of index OR=1.034 (1.000-1.065)	Number of siblings, friends, and coworkers eligible for screening, survey wave

¹SNI = Social Network Index, a composite score that includes items on the number of close friends, relatives, group memberships, and frequency of interactions with close friends and family. Details of how this index was developed and scored are provided elsewhere (5).

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Chapter 3. Social network integration and breast cancer screening awareness and behavior among Vietnamese American women

Introduction

The view that “people are interconnected and therefore their health is interconnected” (1) has been a fundamental principle underlying the study of social networks and health. Research in various disciplines, including sociology, anthropology, and epidemiology (1-6), has suggested that social networks can impact a wide range of health behaviors and outcomes through behavioral, psychological, and physiological pathways. Social networks are thought to influence health and health behavior through five main mechanisms: social support, social influence, social engagement, interpersonal contact, and access to resources (7). Social network integration or extent of connectedness to one’s social network, as measured by some basic variation of the number, frequency, and type of contacts, is the most commonly examined characteristic of social networks.

The last 40 years have seen a large influx of Vietnamese immigrants to the United States as a result of the end of the Vietnam War in 1975 (8). By 2000, the U.S. Vietnamese population had grown to over 1.2 million, constituting the fourth largest Asian subgroup in the United States (9). As a recently immigrated population, Vietnamese Americans have used their social networks to help them adapt to a new environment (10, 11). Little is known about how these naturally occurring networks influence health or health behavior among immigrants. Like many immigrant populations, Vietnamese are vulnerable to barriers to accessing health care services, suggesting a potential area in which social networks may play a role to influence health. Breast cancer screening is an important health behavior to consider in terms of how social networks can shape the health of the Vietnamese community. Breast cancer is the most commonly diagnosed cancer and the third leading cause of cancer death among Vietnamese women in the U.S. (12). Vietnamese women also tend to be diagnosed at more advanced stages of disease and experience greater risk of mortality following breast cancer than non-Hispanic white women (13, 14). These disparities are in part attributable to lower rates of cancer screening among Vietnamese; according to the most recently available population-based screening data in California, 75% of Vietnamese women aged 40 and older reported having a mammogram in the past two years versus 80% of non-Hispanic whites in 2007 (15). Previous studies have identified patient and health care system factors associated with low cancer screening utilization among Vietnamese, including having attained a low level of education, not having a regular doctor, and lack of health insurance (11-16).

Epidemiologic research suggests that social networks also influence cancer screening behaviors, though the extent of this relationship and how it varies in cultural and ethnic communities is not well understood. Furthermore, the published literature on social networks and cancer screening in Asian and Pacific Islander (16) populations is scarce (17, 18), with no studies conducted in the Vietnamese population despite this being a high-risk group. The majority of studies in social networks and cancer control and prevention have focused primarily on the general population or African American and Latino racial/ethnic populations in the U.S. (16, 19-22) To further understand how social networks impact health and health behavior, Berkman & Glass stated that, “issues related to cultural, ethnic, and class-related variations in the structure and function of networks will help us to develop critically needed interventions to improve health” (23). Toward this goal, I examined the relationship between social network integration

and use of breast cancer screening among Vietnamese American women in Santa Clara County, California, a geographic region with one of the most concentrated populations of Vietnamese in the U.S.

Methods

Study population

The Racial and Ethnic Approaches to Community Health (REACH) 2010 Lay Health Worker Outreach (LHWO) Breast Cancer Screening Study is a randomized controlled community intervention trial to improve breast cancer screening among Vietnamese women in Santa Clara County, California. Funded by the Centers for Disease Control and Prevention, the LHWO Breast Screening Study was conducted from 2004-2007 and included 1,100 Vietnamese women aged 40 and older. Details of the study design and protocol are provided in Chapter 1 of this dissertation and modeled after previously successful cancer screening interventions in the Vietnamese community (24-27). The study investigators collaborated with five community-based organizations that recruited ten LHWs each. Each LHW, in turn, recruited 22 participants from their social networks. The participants were then randomized to either the LHWO plus media-based education group (n=550) or to a media-based education only group (n=550). In 2004-2005, these 1,100 Vietnamese American women were administered a pre-intervention (baseline) survey regarding their sociodemographic characteristics, health and health care utilization and coverage, and knowledge of and receipt of breast screening, and 100% responded. In 2006-2007, these women were administered a very similar post-intervention survey and 99% responded. Then, in 2008, 526 of the post-intervention responders were selected and administered a follow-up telephone questionnaire on characteristics of their social networks and receipt of breast cancer screening, 100% responded. Two participants were excluded in this analysis due to missing data on social networks and breast cancer screening data, yielding a final sample size of 524. Telephone interviews were conducted in Vietnamese by bilingual and bicultural staff. Respondents were offered a \$5 grocery gift card as compensation for their participation. The study protocol was approved by the institutional review boards of the University of California, San Francisco and the University of California, Berkeley.

Measures

Survey measures assessing sociodemographic characteristics included age, educational attainment, number of years lived in the U.S., language proficiency, employment, health care access, and family history of breast cancer; these questionnaire items derived from items on the baseline survey in the LHWO Breast Cancer Screening Study. Specifically, breast cancer screening behavior used items from the baseline questionnaire which had been developed, pre-tested, and administered to measure breast cancer screening outcomes in older Vietnamese women.

The primary outcome variables for this analysis were receipt of breast cancer screening examinations which were measured as dichotomous (yes/no) variables: (1) ever had a clinical breast examination (CBE), (2) CBE within the last two years, (3) ever had a mammogram, and (4) mammogram within the last two years. To assess the uptake of breast cancer screening information and behavior in relation to social networks, I also included dichotomous (yes/no) secondary outcome variables of breast cancer screening awareness: (1) ever heard of CBE and (2) ever heard of a mammogram.

As a measure of social networks, I used a modified version of the Berkman-Syme Social Network Index (SNI), which includes items on the number of close relatives and friends, frequency of contacts, marital status, and group memberships (28). Modifications were made to be more culturally appropriate to the types of groups and organizations that Vietnamese American women were more likely to recognize and participate in (e.g., temples). The SNI measure is commonly used and has been well validated in numerous epidemiologic studies of cancer screening and health outcomes in various populations (16, 19, 21, 29-31). I selected this measure because of its brief length to minimize respondent burden and to allow comparability of findings across different studies. To obtain a Social Network Index (SNI) for analysis, the five index items were scored and summed with equal weighting to characterize the level of social network integration. Possible scores ranged from 0-16 and were initially analyzed as a continuous variable. Scores were then categorized into tertiles for ease of interpretation and for enabling comparability of findings. The low tertile (scores 0-6), medium (scores 7-11), and high (scores 12-16) levels of the Social Network Index, with the low Social Network Index tertile representing the weakest level of network integration and the high Social Network Index tertile representing the strongest level of network integration. The questionnaire was translated into Vietnamese, back-translated, and pilot-tested to ensure lexical equivalency and culturally appropriate wording.

Analysis

Descriptive analyses were performed using chi-square tests and Fisher's Exact Test, where appropriate, to assess differences in breast cancer screening behavior across Social Network Index tertiles. Multivariate logistic regression using a Generalized Estimating Equation (GEE) approach was used to provide estimates for the effects of social networks on screening. Because lay health workers were used to recruit participants and sampling was therefore not random or independent, GEE was used to account for potential clustering by lay health worker since participants recruited by one lay health worker may be similar to each other than participants recruited by a different lay health worker. One important advantage of the GEE approach is that it provides consistent estimates of the beta coefficients and robust standard errors regardless of whether the working correlation is correct (32). However, a limitation to this approach is that the number of LHWs needs to be large enough to ensure more accurate standard error estimates.

Based on published literature regarding barriers to cancer screening in Vietnamese Americans, certain sociodemographic characteristics, specifically age, education, language proficiency, employment, family history of breast cancer, and years lived in the U.S. were treated as potential confounders in the multivariate models. In addition, I adjusted for recruitment agency and intervention group assignment, which were treated as potential confounding variables related to the study design. Each SNI tertile was examined independently in association with all primary and secondary breast cancer screening outcomes of interest in bivariate unadjusted models, then adjusted for sociodemographic characteristics, and finally adjusted for study design factors. All analyses were performed using SAS v.9.1.3 (33).

Results

The final sample consisted of 524 Vietnamese American women aged 40 years or older who resided in Santa Clara County, California. Sociodemographic characteristics of survey

respondents are shown in Table 1. The mean age of respondents was 56.7 years (range 40 – 91). All respondents were born outside of the U.S. with a mean duration of residence in the U.S. of 13.9 years (range 0 – 31). The vast majority (97.5%) of respondents reported speaking English poorly or not at all. Almost 60% of respondents had less than a high school education. The majority of respondents were married (74.4%) and unemployed (65.8%). About one-fifth (19.5%) of the sample had no health insurance. Thus, the majority of the sample consisted of older, low socioeconomic status, foreign-born Vietnamese women.

Univariate descriptions of social network size, frequency of contact, and group affiliations are also presented in Table 1. Overall, about a third (34.4%) of respondents had a relatively large family network of ten or more close relatives while only 18.1% reported only one or two close relatives and only 4% reported none. Friendship networks were generally smaller than family networks with 12.4% of respondents reporting ten or more close friends. About one-quarter (28.4%) of respondents reported only one or two close friends and one-fifth (20.4%) reported no close friends at all. In terms of frequency of contact, the majority (32.3%) of respondents interacted with three to five of these relatives and friends at least once a month. Overall, the majority (59.2%) reported not belonging to any particular group. Of those who did report belonging to a group, most (30%) participated in a religious group (either a church or temple).

Table 2 shows the bivariate association between sociodemographic characteristics and social network index tertile. Education level, length of residence in the U.S., and employment status were significantly associated with the social network index. More specifically, being in the highest tertile (vs. low or middle tertile) of the SNI was associated with limited educational attainment and recent immigration history (less than ten years in the U.S.) vs. having been in the U.S. for more than ten years. U.S. In a bivariable plot of the association between SNI tertile and receipt of breast cancer screening, there was more breast cancer screening among respondents in highest SNI tertile than the medium or low tertiles, but the relationship was not consistently linear across the type and frequency of screening examinations (Figure 1). For clinical breast examinations (CBE), there was a significant association between SNI tertile and ever receiving a CBE and between SNI tertile and receiving a CBE in the last two years ($p < .001$). A similar association was observed between SNI tertile and receiving a mammogram in the last two years ($p < .01$), but not for ever receiving a mammogram ($p = NS$).

In the multivariable analysis of CBE awareness and screening behavior outcomes, women in the highest and mid-level SNI tertile had greater odds of ever receiving a CBE and receipt of a CBE in the last two years, but not with ever hearing about a CBE (Table 3) compared to women in the lowest SNI tertile. In the unadjusted GEE Model 1 of Table 3, none of these CBE screening outcomes was associated with higher SNI tertile. When adjusted for sociodemographic characteristics, including age, health insurance status, education, language proficiency, employment, years in the U.S., and family history of breast cancer (Model 2, Table 3), there was a significant (negative) association between SNI tertile and ever receiving a CBE (OR = 0.89, 95% CI: 0.80-0.99) and for receiving a CBE in the last two years (OR = 0.87, 95% CI: 0.78-0.97). But after additional adjustment for study design factors including recruitment agency and intervention group assignment (Model 3, Table 3), the strength of the association between SNI tertile and these outcomes increased further. For ever receiving a CBE, the OR in the highest SNI tertile increased to 1.17 (95% CI: 1.05-1.29) while the OR in the medium tertile increased to 1.14 (95% CI: 1.03-1.27). Similar increases were observed in the strength of association for receipt of a CBE in the last two years: the OR in the highest tertile group

increased from 0.87 (95% CI: 0.78-0.97) to 1.20 (95% CI: 1.07-1.33), and the OR in the medium tertile increased from 1.06 (95% CI: 0.96-1.16) to 1.14 (95% CI: 1.02-1.27). However, in the fully adjusted model, there was no association for ever hearing about a CBE.

In the unadjusted GEE model (Model 1, Table 4), all of the mammography outcomes examined, except for ever receiving a mammogram, were associated with the higher tertiles. When adjusted for sociodemographic factors (Model 2, Table 4), none of the outcomes (ever heard of a mammogram, ever had a mammogram, and receipt of a mammogram in the last two years) were associated with the social network index. None of the outcomes were associated with the SNI tertile in the final multivariable model (Model 3, Table 4).

Discussion

In a community-based sample of 524 Vietnamese American women in California, I found a positive association between social network integration and certain breast cancer screening behaviors, with a significant relationship observed for receipt of CBE but not for mammography. Women with more social integration were more likely to receive a CBE than less socially-integrated women. These associations were not explained by differences in age, health insurance status, educational attainment, language proficiency, employment status, years in the U.S., family history of breast cancer, recruitment agency or intervention group assignment. Given the lack of consistent associations between social network integration and breast cancer screening behavior in this study, these findings suggest that other properties of social networks, including the quality and characteristics of social ties as well as norms around breast cancer screening may be important in influencing these health behaviors (23, 34, 35).

The relationship between social network integration and CBE has not yet been assessed in previous studies of breast cancer screening; rather, research in this area has focused exclusively on mammography screening. Thus, the finding of a positive association for CBE is both novel and informative for understanding the full spectrum of breast cancer screening behavior as it relates to social network influences.

The lack of an association between social network integration and mammography screening in this study is perhaps not surprising, given the mixed findings that have been documented in the published literature (16, 18, 19, 21, 36, 37). Using a similar measure of social networks, Kang and colleagues assessed recent mammography use in African American women aged 55 and over and found that, for each unit increase in the Social Network Index, the odds of routine mammography increased by 1.27 (95% CI: 1.01-1.61), after adjusting for health status, age, education, health insurance, access to regular care, and time of survey. A similar, though stronger effect was reported in a sample of Mexican-American women by Suarez and colleagues (OR = 1.40, 95% CI: 1.02-1.93) after adjustment for age, marital status, health insurance, education, birthplace, and traditional attitude toward family (21). However, in a later study, this same group of investigators reported null results for mammography screening in a different sample of Hispanic women using the same Social Network Index and similar covariate adjustment (16). In the only longitudinal assessment of social networks and mammography screening to date, Allen and colleagues reported no association between social network size and mammography in a predominantly non-Hispanic white population aged 40 and older after two years of follow-up. In light of these mixed findings, these results lend support to the hypothesis that social network integration, as measured by network size and frequency of social interactions,

may not be associated with breast cancer screening by mammography, but do appear to have some impact on screening with CBE.

In the findings for CBE, I found that the associations between SNI tertile and CBE outcomes changed slightly from an OR less than 1.0 to an OR greater than 1.0 after adjusting for recruitment agency and study arm, indicating positive confounding. The modest change in the direction of these odds ratios after adjustment for these factors suggests that the recruitment agency and study arm may have suppressed the effect of social network integration on CBE. This intriguing finding warrants further analysis to examine the relative contributions of these factors to the association between social network integration and CBE.

The differences in the associations for CBE and mammography in this study may be in part due to the way each screening test is conducted. A mammogram requires a referral to a different place, while a CBE can be performed during a routine physical examination in the physician's office. Thus, these findings suggest that social networks may be an important factor in influencing the initial visit to the physician's office, but it is possible that additional support or stronger network influences may be needed in accepting the doctor's recommendation for mammography screening and in following through with the scheduling and receipt of the mammogram. Such support or network influences should be explored further through a more detailed assessment of the quality of social ties and types of social interactions, rather than simply the size of or frequency of interactions within social networks which may be less important in determining breast cancer screening and perhaps other preventive health behaviors.

Furthermore, social network members with presumably more influence on the screening behavior of others may potentially be those who themselves believe in the importance of screening. The belief in the importance of breast cancer screening within social networks is especially relevant and important to consider in certain ethnic groups in which the concept of preventive health is unfamiliar. In Vietnamese culture, for example, it is not common to see a doctor unless one is sick and experiencing symptoms (38) which runs counter to the concept of preventive health and cancer screening in Western cultures. Thus, social norms as a type of social influence among network members may be an important area that warrants further investigation in future studies of social networks and cancer screening.

This study had several limitations. First, the analysis was based on cross-sectional data, thereby limiting a causal interpretation between social networks and breast cancer screening behavior. However, the likelihood of breast cancer screening causing a change in one's social network seems small and counter-intuitive. Second, this study relied on self-report of receipt of breast cancer screening. There are no published studies validating Vietnamese American women's self-report of breast cancer screening. The only published validation study in an Asian population compared self-reports of mammography with information from the medical record and showed 66.7% agreement among Chinese American women compared to 89.3% among non-Hispanic white women (39). Thus, the high rates of screening reported in this study may be due to social desirability of these behaviors. Third, because social networks, by their nature, are not randomly formed, there is a strong possibility that the selectivity of social networks may bias these findings. Like the old proverb, "birds of a feather flock together," people have a tendency to join social networks in which they share some similar characteristics or other commonalities with those of other network members. This notion, which is a type of selection bias that is inherent in social network studies, makes it difficult to disentangle the effects of the networks from the effects of the characteristics of the network members themselves. Thus, the women who were surveyed may have already decided to obtain breast cancer screening, and what appears to

be the influence of social networks may simply be due to selection bias. Women with more social integration were indeed different from women with less social integration as shown in Table 2; they are more likely to be recent immigrants and have less education. Although these characteristics have been controlled for in multivariable analyses, other unmeasured characteristics or residual confounders that would make women more or less likely to get breast cancer screening may be a possible alternate explanation of these findings.

In spite of these limitations, this study has notable strengths. First, this study had a relatively large sample of Vietnamese American women with minimal attrition in the follow-up survey. Second, this study fills an important gap in the literature of better understanding the effects of social networks on breast cancer screening in an understudied population. The extent to which social network integration may be an important factor in cancer screening behavior in different ethnic cultures is poorly understood; this study adds to the growing literature in this area, providing evidence that social networks influence some aspects of breast cancer screening behavior in Vietnamese American women. These findings have important implications for the delivery of health interventions and programs aimed at increasing cancer screening in underserved and ethnic minority populations. Future research should explore how social networks are defined and how they function to more clearly elucidate the relationship between social networks and health and to inform the design of more effective network-based interventions to reduce cancer disparities.

Table 1. Characteristics of Vietnamese American Women Respondents, Age \geq 40, Santa Clara County, California, 2004-2007 (N = 524)

Characteristic	n	%
Study arm		
Intervention group	277	52.9
Comparison group	247	47.1
Mean age, yrs (\pm SD)	56.7 (10.2)	
Min-max	40-91	
Mean length of residence in the U.S., yrs (\pm SD)	13.9 (7.8)	
Min-max	0-31	
Self-rated English-speaking ability, poorly/not at all	511	97.5
Educational level < 12 years	307	58.6
Marital status		
Married	390	74.4
Widowed	40	7.6
Divorced or separated	85	16.2
Never married	9	1.7
Unemployed		
Yes	345	65.8
No	179	34.2
Health insurance		
No health insurance	102	19.5
Public insurance	314	59.9
Private insurance	108	20.6
Number of close relatives		
None	21	4.0
1 or 2	95	18.1
3 to 5	155	29.6
6 to 9	73	13.9
\geq 10	180	34.4
Number of close friends		
None	107	20.4
1 or 2	149	28.4
3 to 5	172	32.8
6 to 9	27	5.2
\geq 10	65	12.4
Don't know	4	0.8
Number of friends and relatives seen at least once a month		
None	14	2.7
1 or 2	88	16.8
3 to 5	169	32.3
6 to 9	119	22.7
\geq 10	133	25.4
Don't know	1	0.2
Number of groups to which belonged		
0	310	59.2
1	138	26.3
2	40	7.6
3	30	5.7
4	4	0.8
5	1	0.2
6	1	0.2

Participation in the following types of groups ¹		
Church or temple	157	30.0
Social or recreational group	74	14.1
Group concerned with community betterment, charity, or service	56	10.7
Group concerned with children	10	1.9
Labor union, commercial group, or professional association	1	0.2
Other group	19	3.6

¹ Respondents may participate in more than one group.

Table 2. Characteristics of Vietnamese American Women Respondents by Social Network Index (SNI) Tertile*

Characteristics	Low SNI Tertile (n=171)	Medium SNI Tertile (n=172)	High SNI Tertile (n=181)	p-value
Age group (yrs)				
40-49	22.9	29.7	28.7	.11
50-59	35.5	34.9	37.6	
60-69	28.3	25.0	22.1	
≥ 70	13.9	10.5	11.6	
Self-rated English-speaking ability				
Poorly/not at all	75.3	98.8	95.6	.11
Proficient/well/fluent	24.7	1.2	4.4	
Highest level of education				
Less than high school education	31.9	42.4	49.2	.005
High school education or higher	68.1	57.6	50.8	
Length of residence in the U.S.				
< 10 years	57.2	72.7	74.6	.001
≥ 10 years	42.8	27.3	25.4	
Health insurance				
No health insurance	23.5	19.1	16.6	.26
Has health insurance	76.5	80.8	83.4	
Employment status				
Unemployed	75.3	64.5	58.6	.004
Employed	24.7	35.5	41.4	

*Tertiles were determined using a modified version of the Berkman-Syme Social Network Index (SNI)(28) with scores ranging from 0-16; the low SNI tertile consisted of women with scores of 0-6; the medium SNI tertile of women with scores of 7-11; and the high SNI tertile, of women with scores of 12-16)

Table 3. Generalized Estimating Equation Logistic Regression Models of Clinical Breast Examination (CBE) Awareness and Screening Behavior and Social Network Index (SNI) Tertiles* Among Vietnamese American Women ≥ 40 Years, Santa Clara County, California, 2004-2007

	Ever heard of CBE	Ever had CBE	CBE in last 2 years
<u>Model 1^a</u>			
Social Network Index			
Low SNI tertile	1.0	1.0	1.0
Medium SNI tertile	1.07 (1.01-1.14)	1.16 (1.05-1.28)	1.14 (1.03-1.27)
High SNI tertile	1.08 (1.02-1.14)	1.18 (1.07-1.29)	1.23 (1.11-1.35)
<u>Model 2^b</u>			
Social Network Index			
Low SNI tertile	1.0	1.0	1.0
Medium SNI tertile	1.00 (0.96-1.05)	1.03 (0.94-1.13)	1.06 (0.96-1.16)
High SNI tertile	0.96 (0.91-1.02)	0.89 (0.80-0.99)	0.87 (0.78-0.97)
<u>Model 3^c</u>			
Social Network Index			
Low SNI tertile	1.0	1.0	1.0
Medium SNI tertile	1.03 (0.97-1.09)	1.14 (1.03-1.27)	1.14 (1.02-1.27)
High SN tertile	1.04 (0.98-1.10)	1.17 (1.05-1.29)	1.20 (1.07-1.33)

^aUnadjusted model.

^bAdjusted for age, health insurance status, education, language proficiency, employment, years in the U.S., and family history of breast cancer.

^cAdjusted for Model 2 covariates + intervention group assignment and recruitment agency.

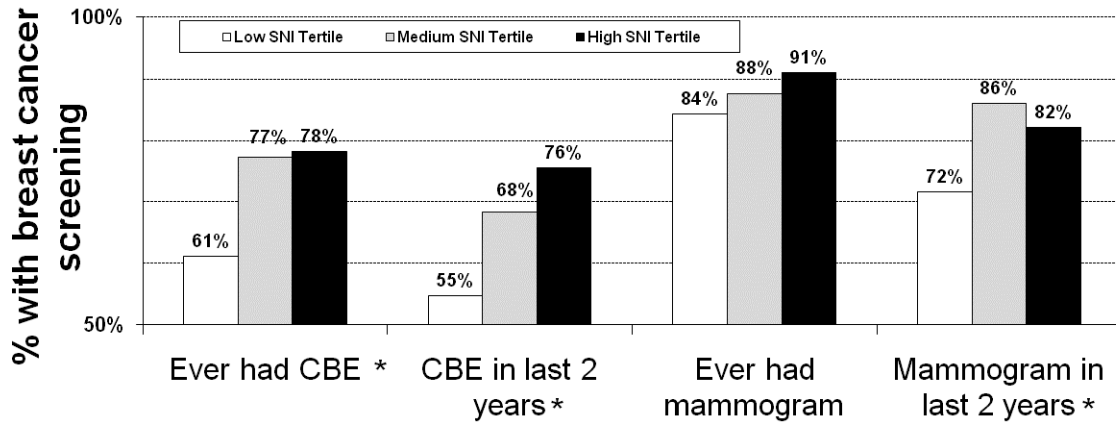
*Tertiles were determined using a modified version of the Berkman-Syme Social Network Index (SNI)(28) with scores ranging from 0-16; the low SNI tertile consisted of women with scores of 0-6; the medium SNI tertile of women with scores of 7-11; and the high SNI tertile, of women with scores of 12-16)

Table 4. Generalized Estimating Equation Logistic Regression Models of Mammography Awareness and Screening Behavior and Social Network Index (SNI) Tertiles* Among Vietnamese American Women ≥ 40 Years, Santa Clara County, California, 2004-2007

	Ever heard of mammogram	Ever had mammogram	Mammogram in last 2 years
<u>Model 1^a</u>			
Social Network Index			
Low SNI tertile	1.0	1.0	1.0
Medium SNI tertile	1.00 (1.00-1.00)	1.03 (0.96-1.10)	0.97 (0.90-1.05)
High SNI tertile	0.89 (0.81-0.98)	0.97 (0.90-1.05)	0.88 (0.81-0.96)
<u>Model 2^b</u>			
Social Network Index			
Low SNI tertile	1.0	1.0	1.0
Medium SNI tertile	1.00 (1.00-1.00)	1.02 (0.95-1.09)	0.96 (0.88-1.04)
High SNI tertile	0.97 (0.94-1.00)	1.00 (0.93-1.07)	0.92 (0.84-1.00)
<u>Model 3^c</u>			
Social Network Index			
Low SNI tertile	1.0	1.0	1.0
Medium SNI tertile	1.03 (1.00-1.06)	1.01 (0.94-1.09)	1.09 (1.00-1.19)
High SNI tertile	1.03 (1.00-1.06)	1.03 (0.95-1.10)	1.06 (0.96-1.16)

*Tertiles were determined using a modified version of the Berkman-Syme Social Network Index (SNI)(28) with scores ranging from 0-16; the low SNI tertile consisted of women with scores of 0-6; the medium SNI tertile of women with scores of 7-11; and the high SNI tertile, of women with scores of 12-16)

Figure 1. Breast Cancer Screening Awareness and Behavior by Social Network Index (SNI) Tertiles* Among Vietnamese American Women ≥ 40 Years, Santa Clara County, California, 2004-2007



* $p < 0.001$

*Tertiles were determined using a modified version of the Berkman-Syme Social Network Index (SNI)(28) with scores ranging from 0-16; the low SNI tertile consisted of women with scores of 0-6; the medium SNI tertile of women with scores of 7-11; and the high SNI tertile, of women with scores of 12-16)

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Chapter 4. The role of perceived social support on breast cancer screening in Vietnamese American women

Introduction

Social support has been commonly understood as the assistance provided among people; more specifically, one of the earliest formal definitions of social support was put forth by Cobb in 1976 as “the individual belief that one is cared for and loved, esteemed and valued, and belongs to a network of communication and mutual obligations” (1). Much research in social epidemiology has supported a positive relationship between social support and lower rates of morbidity and mortality (2-8). Social support has been shown to have a direct positive effect on improving an individuals’ health or to lessen the effects of stressful life events by acting as a buffer to reduce adverse consequences for health. Social support is often considered to be a construct distinct from that of social networks and has been proposed to be one of the primary mechanisms through which social networks impact an individual’s health and health outcomes (9). Although the specific definition and components of social support remains debatable, there are generally four types or dimensions of supportive behaviors that have been broadly identified: emotional, instrumental, informational, and appraisal support. In the context of breast cancer screening, social support can play several important roles: 1) by providing information about screening (informational support), 2) by providing the means to help obtain breast cancer screening (instrumental or tangible support), and 3) by providing encouragement and reinforcement to obtaining screening (emotional and appraisal support) (2, 10-12).

Despite the plethora of literature on the relationship between social support and health in several disciplines including sociology, nursing, and social welfare, few epidemiologic studies have specifically focused on quantifying the impact of social support on breast cancer screening behaviors and identifying the type of support that is most beneficial to improving such screening. There have been inconsistent findings regarding the association between social support and use of mammography and clinical breast examination (CBE). This inconsistency is due in part to small sample sizes and variability in the measures of social support. Women who have received mammography screening have been shown to report higher levels of social support than women who have not (13). Higher self-reported levels of social support have been shown to be significantly associated with greater adherence to screening guidelines for breast self-examinations (BSEs) and clinical breast examinations (CBE) in a multiethnic sample of women (14). One study revealed that social support was positively related to frequency of BSE in a multiethnic sample of women 55 years of age and older (15). However, another study showed that emotional support and instrumental support were not significantly related to use of mammography or CBE in a sample of 670 African American women (16). In a large study of employed, predominantly white women 52 years of age and older, social support was only marginally related to regular breast cancer screening (17).

Findings from these previous studies have been mixed, and the results are not generalizable to all populations. Little is known about the function of social support in Asian and Pacific Islander women; cultural differences in the perception of social support in breast cancer screening are likely evident, but have not been extensively explored. One qualitative study in Japanese American women reported that social networks primarily provided instrumental support, though the study was small in sample size and included only female family members

(18). To my knowledge, no studies have examined the relationship between social support and breast cancer screening in Vietnamese American women. Despite the lack of studies in this population, the burden of breast cancer continues to be an important public health problem in Vietnamese American women. According to the most recent cancer incidence and mortality data from the nationwide Surveillance, Epidemiology, and End Results (SEER) Program, breast cancer is the most commonly diagnosed cancer and the third leading cause of cancer death among Vietnamese women in the U.S. (19). Vietnamese American women also tend to be diagnosed at more advanced stages of disease and experience greater risk of mortality from breast cancer than non-Hispanic white women (20, 21). These disparities are in part attributable to lower rates of cancer screening among Vietnamese In California, 75% of Vietnamese women aged 40 and older reported having a mammogram in the past two years versus 80% of non-Hispanic whites in 2007 (22). As recent immigrants, Vietnamese American women are vulnerable to barriers to accessing cancer screening services, suggesting a potential area in which social support-based programs may play a role to influence their health. Previous studies have identified patient and health care system factors associated with low cancer screening utilization among Vietnamese, including having a low level of educational attainment, not having a regular doctor, and lacking health insurance (23-28).

Community-based cancer screening programs and interventions that use lay health workers to deliver cancer screening education to the community have been shown to be effective in increasing rates of screening in underserved populations (29-31). Despite little empirical data to support this, these interventions are often embedded in a framework of interpersonal relationships which are presumed to influence cancer screening behavior through provision of social support and access to resources. To add to the empirical evidence regarding the effects social support on breast cancer screening, I aim to examine perceived social support among Vietnamese American women using cross-sectional data from a community-based intervention trial aimed at promoting breast cancer screening using lay health worker outreach and education in Santa Clara County, California, a geographic region with one of the most concentrated populations of Vietnamese in the U.S. This chapter will specifically examine the perceived availability of various types of social support and its association with recent use of two types of breast cancer screening procedures: clinical breast examination and mammography. I hypothesize that Vietnamese American women with more social support (assessed in a variety of ways) are more likely to receive breast cancer screening than women with less social support in the context of a community-based breast cancer screening intervention.

Methods

Study population

The Racial and Ethnic Approaches to Community Health (REACH) 2010 Lay Health Worker Outreach (LHWO) Breast Cancer Screening Study is a randomized controlled community intervention trial to improve breast cancer screening among Vietnamese women in Santa Clara County, California. Funded by the Centers for Disease Control and Prevention, the LHWO Breast Screening Study was conducted from 2004-2007 and included 1,100 Vietnamese women aged 40 and older. Details of the study design and protocol are described in Chapter 1 and modeled after previously successful cancer screening interventions among Vietnamese Americans (31-34). Briefly, the study investigators collaborated with five community-based organizations that recruited 10 LHWs each. Each LHW, in turn, recruited 22 participants from

their social networks. The participants were then randomized to either the LHWO plus media-based education group (n=550) or to a media-based education only group (n=550). In 2004-2005, these 1,100 Vietnamese American women were administered a pre-intervention (baseline) survey regarding their sociodemographic characteristics, health and health care utilization and coverage, and knowledge of and receipt of breast screening, and 100% responded. In 2007, these women were administered a very similar post-intervention survey and 99% responded. Then, in 2008, 526 of the post-intervention responders were selected and administered a follow-up telephone questionnaire on characteristics of their social networks and receipt of breast cancer screening, 100% responded. Telephone interviews were conducted in Vietnamese by bilingual and bicultural staff. Respondents were offered a \$5 grocery gift card as compensation for their participation. The study protocol was approved by the institutional review boards of the University of California, San Francisco and the University of California, Berkeley.

Measures

Sociodemographic characteristics including age, marital status, education level, employment status, number of years lived in the U.S., health care access, and family history of breast cancer were measured using questions from the baseline survey in the LHWO Study Breast Screening Study (29). Similarly, breast cancer screening behavior was assessed using items from the baseline study questionnaire which had been developed, pre-tested, and administered to measure breast cancer screening outcomes in older Vietnamese American women in the LHWO Study.

The primary outcome variables for the current analysis were receipt of breast cancer screening examinations measured at post-intervention follow-up and reported as dichotomous (yes/no) variables: (1) ever had a clinical breast examination (CBE), (2) CBE within the last two years, (3) ever had a mammogram, and (4) mammogram within the last two years.

To measure social support, I used the 19-item Medical Outcomes Study Social Support Survey (MOS-SS) to assess multiple functions of perceived social support across five sub-scales, including: 1) emotional support (4 items on expressions of positive affect, empathetic understanding, and encouragement), 2) informational support (4 items on the provision of advice, information, guidance, and feedback), 3) instrumental support (4 items on the offering of material or concrete aid), 4) affection (also referred to as appraisal) support (3 items on expressions of love and affection), and 5) positive social interaction (4 items on the availability of other people to do fun things with) (10). This measurement has been widely and consistently validated across diverse populations (35) and was selected for its ability to assess multiple dimensions of social support. Participants were asked how often each type of support was available to them when they needed it, with responses allowed in the following categories and point assignments: none of the time (0), a little of the time (1), some of the time (2), most of the time (3), and all of the time (4). Raw sums were computed across each sub-scale and then transformed into a scale of 0 to 100 (from low to high perceived social support) for ease of interpretation and analyzed as a continuous variable to increase statistical power. Although there are no published data on the validity and reliability of the MOS-SS in the Vietnamese American population, this instrument has been widely validated in other populations and it has performed well in predicting utilization of screening services as well as in predicting morbidity and mortality in community samples (36). We selected the MOS-SS for its brevity and consistent cultural meaning to enable potential comparability of findings across different studies. The

MOS-SS questionnaire was translated into Vietnamese, back-translated, and pilot-tested to ensure lexical equivalency and culturally appropriate wording.

Analysis

The present analysis was based on 418 of the 526 women respondents for whom there were no missing data on the social support measures and breast cancer screening outcomes. There were no significant differences in sociodemographic characteristics between respondents included in the analysis and respondents with missing data on the social support measures. The social support subscales were used and scored separately to determine which functions of social support influence different screening outcomes. The internal reliability coefficient (Cronbach's alpha) of the entire scale was calculated with no missing data and found to be high, with an alpha of 0.91. The subscale alphas were also consistently high, with one exception, which is described in greater detail in the results section of this chapter. Cronbach's alphas for each subscale were 0.74 (instrumental support), 0.42 (affection support), 0.84 (informational support), 0.86 (emotional support), and 0.83 (positive social interaction). The low alpha for the affection support subscale was driven by one particular item: "how often do you have someone available to hug you?" Considering *a priori* knowledge of Vietnamese cultural norms that discourage outward displays of affection through hugs, I chose to omit this item from this subscale due to its lack of cultural appropriateness and low-performing reliability. Once this item was removed from the subscale, the reliability coefficient for affection support increased from 0.42 to 0.74. Thus, I proceeded to use this modified subscale in the analysis. Omission of this item also slightly increased the reliability coefficient of the overall social support scale from 0.91 to 0.92.

Estimation of differences in mean social support subscale scores between two groups were compared by t-tests, with tests of significance evaluated at the $p < .05$ level. Multivariate logistic regression using a Generalized Estimating Equation (GEE) approach was used to provide estimates for the effects of social networks on screening. Because lay health workers were used to recruit participants and sampling was therefore not random or independent, GEE was used to account for potential clustering by lay health worker since participants recruited by one lay health worker may be similar to each other than participants recruited by a different lay health worker. One important advantage of the GEE approach is that it provides consistent estimates of the beta coefficients and robust standard errors regardless of whether the working correlation is correct (37). However, a limitation to this approach is that the number of LHWs needs to be large enough to ensure more accurate standard error estimates. Odds ratios (ORs) and 95% confidence intervals (CIs) are presented to three decimal places so that rounding would not obscure findings. Sociodemographic characteristics, such as age, educational attainment, language proficiency, employment status, family history of breast cancer, and number of years lived in the U.S. were treated as potential confounders based on the previous literature regarding barriers to cancer screening in Vietnamese women. In addition, I adjusted for intervention group assignment and recruitment agency, which were treated as potential confounding variables related to the study design. Each social support subscale was examined separately in association with breast cancer screening outcomes, adjusted for other social support subscales, then adjusted for sociodemographic characteristics, and finally adjusted for study design factors. All analyses were performed using SAS v.9.1.3 (38).

Results

Sample characteristics

The final study sample consisted of 418 Vietnamese American women aged 40 years or older who resided in Santa Clara County, California. Characteristics of survey respondents are shown in Table 1. The mean age of respondents was 56.9 years (range 40 – 91). All respondents were born outside of the U.S. with a mean duration of residence in the U.S. of 13.8 years (range 0 – 31). Nearly all (97.8%) respondents reported speaking English poorly or not at all. Almost 60% of respondents had less than a high school education. The majority of respondents were married (76.3%) and unemployed (65.6%). Almost one-fifth (18.9%) of the sample had no health insurance. A small proportion (6.1%) of respondents had a family history of breast cancer. These characteristics indicate that this sample comprised older, low socioeconomic status, foreign-born Vietnamese American women. Although the majority (83.4%) of respondents had ever had a clinical breast examination (CBE), only two-thirds (67.5%) reported receipt of a CBE in the last two years. Likewise, 92.5% of respondents had ever had a mammogram, but only 80.9% had had one in the last two years.

Internal consistency reliability (Cronbach's alpha) coefficients for the social support subscales were similar to those reported for the larger 19-item MOS social support scale originally proposed by Sherbourne and Stewart (10). Distributions of the social support subscale scores were largely skewed in the direction of greater support, as evident by the high mean scores shown in Table 1. Instrumental support showed the highest mean score of 95.0, followed by affection support (mean score=93.7), informational support (mean score=74.2), emotional support (mean score=71.0), and positive social interaction (mean score=55.0).

Bivariate associations

Table 2 shows the bivariate association between mean social support subscale scores and sociodemographic characteristics of Vietnamese American women. Mean scores for support subscales did not appear to differ markedly by study arm. However, women aged 40-64 had significantly higher scores for emotional support (74.6 vs. 60.4, $p < .001$), informational support (78.0 vs. 62.7, $p < .001$), affection support (95.1 vs. 89.5, $p < .01$), and positive social interaction (58.2 vs. 45.4, $p < .001$) than women aged 65 and older. Compared with women who spoke little or no English, women who spoke English proficiently, well, or fluently had a significantly higher instrumental support score (99.3 vs. 94.8, $p < .001$), higher affection support score (100.0 vs. 93.6, $p < .001$), and higher positive social interaction score (79.9 vs. 54.3, $p < .01$). Women with at least a high school education also had higher scores in emotional support (76.2 vs. 67.2, $p < .001$), informational support (78.6 vs. 71.9, $p < .001$), affection support (95.6 vs. 92.7, $p < .01$), and positive social interaction (59.2 vs. 52.8, $p < .001$) compared to women with less than a high school education. Employed women also reported significantly higher scores in emotional support (74.3 vs. 69.3, $p < .05$), informational support (78.6 vs. 71.9, $p < .01$), affection support (95.6 vs. 92.7, $p < .05$), and positive social interaction scores (59.2 vs. 52.8, $p < .05$) than unemployed women. There were no significant differences between any type of social support and length of residence in the U.S. or health insurance status.

In the bivariate associations between receipt of breast cancer screening examinations and social support subscales (Table 3), I found that perceived social support varied according to each type of screening examination. Women who had ever received a mammogram reported no significant differences for all social support subscale scores compared to women who had never

received a mammogram. However, women who had a mammogram in the last two years had a higher instrumental support score than women who did not receive a mammogram in the last two years (95.6 vs. 91.6, $p < .05$). Differences in social support scores were observed to be more marked for CBE outcomes. Women who had ever received a CBE had higher scores in emotional support (72.1 vs. 65.1, $p < .05$), informational support (75.3 vs. 68.6, $p < .05$), and positive social interaction (56.1 vs. 48.6, $p < .01$) than women who had never received a CBE. This pattern was observed consistently across even more social support subscales in women who received a CBE in the last two years. Women who had received a CBE in the last two years had higher scores in instrumental support (95.9 vs. 92.8, $p < .05$), emotional support (73.2 vs. 66.2, $p < .05$), informational support (76.5 vs. 69.2, $p < .01$), and positive social interaction (57.5 vs. 49.2, $p < .01$).

In the multivariable analysis of recent mammography screening and social support subscales, instrumental support was the only type of social support associated with a higher odds of receiving a mammogram in the last two years (Table 4). In the unadjusted model (Model 1, Table 4), the odds ratio for instrumental support was 1.020 (95% CI: 1.004-1.037). When adjusted for other social support subscales (Model 2, Table 4), the odds ratio for instrumental support increased slightly to 1.023 (95% CI: 1.002-1.044). Further adjustment for sociodemographic characteristics, including age, health insurance status, education level, language proficiency, employment status, years in the U.S., and family history of breast cancer (Model 3, Table 4) increased the OR for instrumental support to 1.032 (95% CI: 1.006-1.059). Final adjustment for study design factors including intervention group assignment and recruitment agency (Model 4, Table 4) increased the OR for instrumental support further to 1.048 (95% CI: 1.017-1.079). Thus, instrumental support appears to be a significant predictor of receiving a mammogram in the last two years in the final multivariable model in Vietnamese American women. None of the other social support subscales were associated with receiving a mammogram in the last two years in any of the multivariable models.

In the crude (unadjusted) model for CBE screening, nearly all social support subscales were significantly associated with increased receipt of CBE in the last two years (except for affection support). The ORs for instrumental, informational, emotional support, and positive social interaction were all approximately 1.01, indicating that for every 1-point increase in these subscale scores, there was a slightly increased odds of receiving a CBE in the last two years. However, additional adjustment for other types of social support, sociodemographic factors, and study design factors did not significantly change the odds between type of social support and receipt of CBE in the last two years (Models 2 through 4, Table 4). These results suggest that no perceived social support of any type is likely to influence receipt of CBE in the last two years among Vietnamese American women.

Discussion

The aim of this study was to examine the effects of perceived social support on use of breast cancer screening exams in a predominantly immigrant, monolingual, and low SES population of Vietnamese American women. These findings showed that women generally reported moderate to high levels of social support across all sub-domains; this was observed more specifically in women who were younger, employed, more educated, and more proficient English-speakers. These findings also support the independent association of instrumental social support as the single most important predictor for the receipt of mammography screening in the

last two years, but did not support the influence of any type of social support on receipt of CBE in the last two years in this sample of Vietnamese American women. The association between instrumental social support and mammography screening was not explained by differences in age, health insurance status, educational attainment, language proficiency, employment, years in the U.S, and family history of breast cancer, recruitment agency or intervention group assignment.

While numerous epidemiologic studies have assessed the effects of social support on various other health outcomes (2, 4, 6, 8, 39-43), few have focused on directly quantifying the relationship between perceived social support and breast cancer screening. This is the first study to examine the multidimensional aspects of social support and their relationship to breast cancer screening behavior in Vietnamese American women. Results from this study are not entirely consistent with findings from previous studies in other racial/ethnic populations. One study showed that, in addition to instrumental support, other types of support such as informational and emotional support and positive social interactions are important factors in use of mammography and CBE. Using the same measure of social support, Messina and colleagues found that emotional/informational support and positive social interaction, but not instrumental support or affection, were significantly associated with regular use of mammography screening, CBE, and breast self-examination, in a large population-based sample of a predominantly educated white population across various regions of the U.S. (44). However, a study of 670 African American women showed no association between emotional and instrumental support with use of mammography or CBE after adjusting for self-reported health status, source of primary care, health insurance, age, and education (16). In a multiethnic study in the San Francisco Bay Area, Katapodi and colleagues did not report any significant differences in social support in relation to mammography screening among non-Hispanic, African American, and Latina women using a 5-item scale of social support (14); they attributed this finding, in part, to the very small proportion (6%) of women who reported never receiving a mammogram. The authors also reported that women who adhered to CBE guidelines had significantly higher social support scores than those with lower scores, consistent with results observed in my analysis. However, they did not adjust for any confounding factors as I did in the multivariable models to enable any further consistent findings. Comparisons across these studies are further complicated by the fact that they did not use the same measure of social support. These findings of an association between instrumental support and mammography, but none for other types of support, suggest that certain types of social support are more important than others depending on the ethnic population being studied.

In this study, I found that social support was not associated with recent use of CBE. Although all forms of social support, except for affection support, were significantly associated with increased use of recent CBE in the crude model, these associations became null after adjustment for covariates. Therefore, the lack of a significant finding for an independent association of social support with recent use of CBE may be explained by the effects of other covariates in this population. In the step-wise regression, I found that the association became null when I controlled for other social support subscales in Model 2 of Table 4, suggesting that the additive effects of other types of social support may have explained away the crude association. The association between social support and use of CBE found in other studies may be in part due to differences in covariate adjustment (or lack thereof) (14, 44) and cultural differences in the way social support potentially influences use of CBE in Vietnamese American women. The differences in the associations for CBE and mammography in this study may be due to the way each screening test is conducted. Because a mammogram requires a referral to a different place,

it suggests that more support is needed to follow-through and obtain a mammogram than a CBE, whereas a CBE can be performed during a routine physical examination in the physician's office.

Our study has the following limitations. First, this analysis was based on cross-sectional data, which limits a causal interpretation between social support and breast cancer screening behavior. Indeed, in some cases, breast cancer screening might change a woman's level of social support when a woman is diagnosed with breast cancer as a result of screening. Women may seek more social support from their social networks in order to cope with diagnosis and treatment. Second, I only assessed perceived availability of support provided and not the desired type of social support from the respondent. The majority of studies in social support and cancer screening have focused predominantly on perceived availability of social support. However, to assess a more comprehensive picture of the relationship between social support and breast cancer screening, it is useful to measure both the desired type of social support and perceived availability of support. Social support is not always considered beneficial, especially if the type of available or provided support does not match the type of desired support for the respondent. Thus, the lack of any or stronger associations between social support and breast cancer screening may be due to the lack of capturing the desired social support from the respondent. Third, this study relied on self-report of receipt of breast cancer screening. There are no published studies validating Vietnamese American women's self-report of breast screening; the only published validation rate for self-report of mammography for an Asian subgroup was only 66.7% among Chinese American women compared to 89.3% among non-Hispanic white women (45). Fourth, because women in this study were recruited through lay health workers from the community, it is presumable that these women had some social connection to the lay health worker and the community and therefore some existing level of social support, thereby skewing the sample towards higher levels of social support, as evident in the mean social support scores from Table 1. Thus, the high levels of social support in this sample may have required a larger sample size to detect a significant effect size for the association between social support and breast cancer screening in Vietnamese American women. Finally, I did not assess the source of social support, as support from family members may have a different impact on screening behavior than support provided by friends and/or lay health workers.

In spite of these limitations, this study has notable strengths. First, this study had a relatively large sample of Vietnamese American women with minimal attrition during follow-up. Second, this study fills an important gap in the literature by providing empirical evidence for the effects of multiple dimensions of social support on breast cancer screening in an understudied population. The extent to which social support is perceived and desired in the context of breast cancer screening is likely to vary across different ethnic cultures and is poorly understood; this study adds to the literature in this area as the first study to examine social support and breast cancer screening behavior in Vietnamese American women.

Although most dimensions of social support were not consistently found to support increased mammography or CBE screening, this study provides evidence that perceived instrumental social support increases mammography screening in Vietnamese American women. These findings may have important implications for the delivery of health interventions and programs aimed at increasing breast cancer screening in underserved ethnic minority populations. For example, public health programs that use social support as a means to improve breast cancer screening in Vietnamese American women or other ethnic minority groups may be more effective in ensuring that women continue to receive timely mammography screening by focusing on effective ways to provide instrumental support to women. The forms of instrumental

support might, for example, include the provision of transportation and childcare and the need for such interventions should be explored further in this population. Because breast cancer screening is most effective for early detection if women adhere to screening guidelines, future research should explore screening adherence in this population and the various factors that determine whether Vietnamese American women intend to continue receiving mammography or CBE screening according to published guidelines. The next chapter of this dissertation will proceed to examine the social factors such as subjective norms and social influence that may be associated with intention to continue receiving breast cancer screening in this immigrant population.

Table 1. Characteristics of Vietnamese American Women Respondents, Age \geq 40 Years, Santa Clara County, California, 2004-2007 (N = 418)

Characteristic	n	%
Mean age, yrs (\pm SD)	56.9 (10.2)	
Min-max	40-91	
Mean length of residence in the U.S., yrs (\pm SD)	13.8 (7.9)	
Min-max	0-31	
Study arm		
Intervention group	226	54.1
Comparison group	192	45.9
Self-rated English-speaking ability, poorly/not at all	409	97.8
Educational level < 12 years	244	58.4
Unemployed	274	65.6
Marital status		
Married	319	76.3
Widowed	27	6.5
Divorced or separated	49	11.7
Never married	23	5.5
Health insurance		
No health insurance	79	18.9
Has insurance	339	81.1
Family history of breast cancer	22	6.1
Ever had clinical breast examination (CBE)	346	83.4
CBE in last 2 years	282	67.5
Ever had mammogram	384	92.5
Mammogram in last 2 years	338	80.9
Social support score (mean score \pm SD)		
Instrumental support	95.0 (12.8)	
Informational support	74.2 (26.1)	
Emotional support	71.0 (25.8)	
Affection support	93.7 (14.1)	
Positive social interaction	55.0 (27.0)	

Table 2. Social Support Subscale Scores by Characteristics of Vietnamese American Female Respondents (N = 418)

Characteristics	Instrumental Support,		Emotional Support,		Informational Support,		Affection Support,		Positive Social Interaction,	
	Mean Score	<i>t</i>	Mean Score	<i>t</i>	Mean Score	<i>t</i>	Mean Score	<i>t</i>	Mean Score	<i>t</i>
Study arm										
Intervention group	94.4 (13.1)	0.95	72.3 (24.9)	-1.05	75.2 (25.4)	-0.88	93.4 (14.5)	0.51	55.2 (26.7)	-0.17
Comparison group	95.5 (12.6)		69.4 (26.7)		73.0 (26.8)		94.1 (13.7)		54.5 (27.0)	
Age group (yrs)										
40-64	95.3 (12.0)	0.85	74.6 (24.9)***	4.90	78.0 (24.3)***	4.97	95.1 (13.0)***	3.13	58.2 (26.0)***	4.15
65 and older	93.9 (14.9)		60.4 (25.5)		62.7 (27.9)		89.5 (16.3)		45.4 (27.5)	
English-speaking ability										
Poorly/not at all	94.8 (13.0)***	4.70	70.8 (25.8)	1.19	73.9 (26.2)	1.71	93.6 (14.3)***	9.14	54.3 (27.8)**	3.62
Proficient/well/fluent	99.3 (2.0)		79.9 (21.2)		84.7 (17.5)		100.0 (0)		79.9 (19.5)	
Highest level of education										
< High school	94.5 (13.5)	0.80	67.2 (26.3)***	3.56	70.4 (27.3)***	3.54	92.4 (15.2)**	2.36	51.5 (27.0)***	3.13
≥ High school	95.4 (11.9)		76.2 (24.1)		79.4 (23.3)		95.6 (12.2)		79.6 (16.3)	
Employment										
Unemployed	94.3 (13.9)	1.48	69.3 (26.1)*	1.95	71.9 (26.10)**	2.53	92.7 (15.3)*	2.16	52.8 (26.7)*	2.31
Employed	96.1 (10.5)		74.3 (24.9)		78.6 (25.5)		95.6 (11.5)		59.2 (27.0)	
Length of residence in U.S.										
≤ 10 years	94.2 (13.3)	0.61	73.2 (25.2)	-1.19	75.0 (26.4)	-0.33	93.1 (15.7)	0.60	55.1 (27.8)	0.02
> 10 years	95.2 (12.6)		69.9 (26.0)		73.8 (25.9)		94.0 (13.3)		54.8 (26.5)	
Health insurance										
No health insurance	94.5 (13.5)	-1.44	67.2 (26.3)	1.27	70.4 (27.3)	1.15	92.4 (15.2)	-0.63	51.5 (27.0)	1.48
Has health insurance	95.4 (11.9)		76.2 (24.1)		79.4 (23.3)		95.6 (12.2)		59.6 (26.0)	

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 3. Social Support Subscale Scores by Breast Cancer Screening Examination among Vietnamese American Female Respondents (N = 418)

Breast cancer screening examination	Instrumental Support,		Emotional Support,		Informational Support,		Affection Support,		Positive Social Interaction,		
	Mean Score	t	Mean Score	t	Mean Score	t	Mean Score	t	Mean Score	t	
Mammogram											
Ever had mammogram											
Yes	95.2 (12.5)	-1.71	70.5 (25.6)	1.02	74.3 (25.9)	-0.34	94.0 (13.7)	-	54.5 (26.6)	0.83	
No	91.2 (16.2)		76.6 (27.5)		73.2 (27.9)		90.6 (18.5)	1.04	59.3 (30.2)		
Mammogram within last 2 years											
Yes	95.6 (11.4)*	-2.47	71.0 (25.0)	-0.05	74.8 (25.3)	-0.77	94.1 (13.6)	-	55.1 (25.9)	-0.18	
No	91.6 (17.5)		70.6 (28.8)		71.7 (29.0)		92.2 (16.3)	0.94	53.9 (30.9)		
Clinical Breast Examination (CBE)											
Ever had CBE											
Yes	95.1 (12.7)	-0.70	72.1 (25.2)*	-2.04	75.3 (25.5)*	-1.91	94.0 (13.8)	-	56.1 (26.4)*	-2.15	
No	93.9 (13.7)		65.1 (27.9)		68.6 (28.2)		92.4 (15.7)	0.82	48.6 (28.4)		
CBE within last 2 years											
Yes	95.9 (10.9)*	-2.32	73.2 (24.4)*	-2.44	76.5 (24.5)**	-2.48	94.5 (12.8)	-	57.5 (25.4)**	-2.82	
No	92.8 (16.1)		66.2 (27.9)		69.2 (28.5)		92.2 (16.4)	1.51	49.2 (29.0)		

* $p < .05$

** $p < .01$

*** $p < .001$

Table 4. Generalized Estimating Equation Logistic Regression Models of Recent Breast Cancer Screening and Social Support Subscales among Vietnamese American Women, Age ≥ 40 Years, Santa Clara County, California, 2004-2007

	Model 1 ^a			Model 2 ^b			Model 3 ^c			Model 4 ^d		
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Mammogram within last 2 years												
Instrumental support ^e	1.020	1.004-1.037	1.023	1.002-1.044	1.032	1.006-1.059	1.048	1.017-1.079				
Informational support ^e	1.004	0.995-1.014	1.009	0.992-1.023	1.011	0.990-1.032	0.998	0.973-1.022				
Emotional support ^e	1.000	0.990-1.011	0.991	0.974-1.009	0.987	0.965-1.009	0.995	0.970-1.020				
Affection support ^e	1.009	0.993-1.025	0.999	0.978-1.020	0.985	0.958-1.013	0.978	0.945-1.013				
Positive social interaction ^e	1.001	0.991-1.011	0.998	0.985-1.011	0.995	0.980-1.010	0.994	0.976-1.012				
Clinical breast examination within last 2 years												
Instrumental support	1.018	1.003-1.033	1.012	0.994-1.030	1.020	0.998-1.042	1.018	0.996-1.042				
Informational support	1.010	1.002-1.018	1.002	0.988-1.017	1.004	0.988-1.020	1.002	0.986-1.019				
Emotional support	1.010	1.002-1.018	1.001	0.985-1.016	0.999	0.981-1.017	1.003	0.985-1.021				
Affection support	1.011	0.997-1.025	0.998	0.981-1.015	0.979	0.957-1.002	0.977	0.952-1.001				
Positive social interaction	1.012	1.004-1.020	1.009	0.997-1.020	1.006	0.993-1.019	1.006	0.993-1.020				

^aUnadjusted model.

^bAdjusted for social support subscales.

^cAdjusted for Model 2 covariates + age, education, language proficiency, employment, years in the U.S., health insurance status, and family history of breast cancer.

^dAdjusted for Model 3 covariates + intervention group assignment and recruitment agency.

^eOdds ratio associated with a 1-unit change in subscale score.

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Chapter 5. Social influence, perceived norms, and intentions for future breast cancer screening among Vietnamese American women

Introduction

Early detection of breast cancer through mammography and clinical breast examination (CBE) for women aged 40 and older is critical for reducing breast cancer morbidity and mortality. Current screening guidelines from the American Cancer Society (1) recommend that women aged 40 and older receive an annual mammography and CBE for as long as they are in good health. In addition, the ACS recommends that CBE be a part of routine check-ups and that it should be conducted roughly every three years for women in their 20's and 30's and every year for women aged 40 years and older (2). Thus, breast cancer screening is optimally effective for early detection if women continue to receive screening per recommended annual screening guidelines. This chapter aims to examine social network influence factors that may impact Vietnamese American women's intentions to receive future mammography or CBE per ACS guidelines. Behavioral intention indicates an individual's readiness to engage in a particular behavior and has generally been considered to be the most important predictor of screening behavior (3-5).

Of the four main pathways through which social networks are posited to impact health and health behavior, social influence is considered to be the least examined compared to other pathways (6). Social influence is broadly defined as being influenced by an individual's social context. Within an individual's social network, shared values and norms around health and health behavior can be an important source of social influence. Subjective norms refer to perceptions of what others believe and do and how these perceptions pressure one another to take up the same belief or behavior. From a sociological perspective, norms have also been defined as the accepted standards of behavior for a group. These normative beliefs are strongly influenced by interactions within an individual's social network. Social norms are often learned from observing people's behaviors and/or hearing what other people tell them. Norms are also strongly influenced by the cultural context, as some members of one's network may be regarded as more influential than others (7). Thus, the role of perceived norms among Vietnamese American women is important to examine as one potential form of network influence on intention to receive future screening.

Studies of breast cancer screening behavior have often been guided by behavioral theories of individual health that include constructs such as intention, self-efficacy, perceived benefits, perceived susceptibility, normative beliefs, and motivation to comply. When using some variation of this conceptual framework, several studies have consistently found that subjective norms are strongly associated with intention to receive screening (4, 5, 8). However, social norms and behavioral intention are constructs that can differ across cultures (7) and researchers have suggested that these relationships be explored further across various ethnic cultures (9). A few studies have been conducted in Korean and Japanese women (4, 10) supporting the relationship between breast cancer screening norms and intention for future mammography screening. However, due to the heterogeneity of the Asian population encompassing a wide range of diverse cultures, norms and values, and health experiences, these results are not necessarily generalizable to the Vietnamese American population. To date, no quantitative studies have been conducted to examine the influence of social norms on breast cancer screening intention in this population. Therefore, I aim to expand the literature in this area

to better understand how social influence through breast cancer screening norms impact intention to receive future screening in this understudied and underserved ethnic minority community.

Despite the lack of studies in this population, the burden of breast cancer continues to be an important public health problem in Vietnamese American women. According to the most recent cancer incidence and mortality data from the nationwide Surveillance, Epidemiology, and End Results (SEER) Program, breast cancer is the most commonly diagnosed cancer and the third leading cause of cancer death among Vietnamese women in the U.S. (11). Vietnamese American women also tend to be diagnosed at more advanced stages of disease and experience greater risk of dying from breast cancer than non-Hispanic white women (12, 13). These disparities are in part attributable to lower rates of cancer screening among Vietnamese In California, 75% of Vietnamese women aged 40 and older reported having a mammogram in the past 2 years versus 80% of non-Hispanic whites in 2007 (14). As recent immigrants, Vietnamese American women are vulnerable to barriers to accessing cancer screening services, suggesting a potential role for social network-based programs and interventions to influence health behavior and outcomes. Previous studies have identified patient and health care system factors associated with low cancer screening utilization among Vietnamese, including having attained a low level of education, not having a regular physician, and lacking health insurance (15-20).

This chapter will examine social influence through perceived breast cancer screening norms and its association with intention to receive breast screening examinations. Using a community-based sample of Vietnamese American women in Santa Clara County, California, I aim to evaluate the extent and types of social influence (i.e., perceived approval of breast cancer screening from friends and family, perceived approval of breast cancer screening from their physician, and perceived use of breast cancer screening by their peers) on the intention to undergo breast cancer screening among Vietnamese American women.

Methods

Study population

The Racial and Ethnic Approaches to Community Health (REACH) 2010 Breast Cancer Screening Lay Health Worker Outreach (LHWO) Project was a randomized controlled community intervention trial to improve breast cancer screening among Vietnamese women in Santa Clara County, California. Funded by the Centers for Disease Control and Prevention, the LHWO study was conducted from 2004-2007 and included 1,100 Vietnamese women aged 40 and older. Details of the study design and protocol are described in Chapter 1 of this dissertation and were modeled after previously successful cancer screening interventions in the Vietnamese American community (21, 22). The study investigators collaborated with 5 community-based organizations that recruited 10 LHWs each. Each LHW, in turn, recruited 22 participants from their social networks. The participants were then randomized to either the LHWO plus media-based education group or to a media-based education only group. In 2008, 526 of these Vietnamese American women were administered a follow-up telephone questionnaire regarding characteristics of their social networks and their current receipt of breast cancer screening exams and intentions for future screening within the next 12 months. Telephone interviews were conducted in Vietnamese by bilingual and bicultural staff. The follow-up response rate was 99%, which was calculated by the number of people who agreed to participate in the follow-up telephone interview divided by the number of people who were contacted for follow-up. Respondents were offered a \$5 grocery gift card as compensation for their participation. The

study protocol was approved by the institutional review boards of the University of California, San Francisco and the University of California, Berkeley.

Measures

Sociodemographic characteristics including age, marital status, education level, employment status, number of years lived in the U.S., health care access, and family history of breast cancer were measured using questions from the baseline survey in the LHWO Study, which had been developed, pre-tested, and administered to measure breast cancer screening outcomes in older Vietnamese women.

Measured at the time of follow-up, the primary outcome variables for this analysis were intention to receive mammography within the next 12 months (yes/no) and intention to receive a clinical breast examination within the next 12 months (yes/no).

Three survey items were used to capture the concept of social influence. Two items included the extent to which network members approve of breast cancer screening (one item about perception of approval from friends and family members and one item about perception of approval from physician) using a 5-point Likert scale ranging from 5=strongly agree to 1=strongly disagree; and one item regarding the belief about the proportion of peers who have undergone a mammogram, ranging from 0=don't know to 3=most. These items were examined individually and collectively. When these items were summed into an index score, with possible scores ranging from 0 to 13, with 0 representing no social influence and 13 representing the most social influence, I analyzed this measure as a continuous variable for social influence and computed its internal consistency reliability using Cronbach's alpha coefficient for participants with no missing data. However, due to its low reliability coefficient of 0.57, I chose to examine the three single-indicator items of social influence separately as they were determined to capture slightly different aspects of social influence in this analysis. The follow-up questionnaire was translated into Vietnamese, back-translated, and pilot-tested to ensure lexical equivalency and culturally appropriate wording.

Because the primary outcome of intention to receive screening has been subject to methodological concerns of social desirability bias (7), I measured this type of bias using the abbreviated version of the Marlowe-Crowne 10-item scale (23) in which the number of affirmative replies to the following items are summed: "I never met a person that I didn't like," "I always win at games," "I have never been bored," "I never get annoyed when people cut ahead of me in line," "I never get lost, even in unfamiliar places," "I have always told the truth," "My table manners at home are as good as when I eat out," "I have never lost anything," "No matter how hot or cold it gets, I am always quite comfortable," and "It doesn't bother me if someone takes advantage of me." This measure was previously been used and validated in a large national study of discrimination and chronic health in Asian populations, including Vietnamese Americans (24). Possible scores ranged from 0 to 10, with 0 representing no social desirability bias and 10 representing strong social desirability bias. The internal consistency reliability of the social desirability bias measure was evaluated using Cronbach's alpha coefficient for participants with no missing data on any of the ten items ($n=312$). The Cronbach's alpha for social desirability in this sample was 0.67. Missing data were accounted for in the analyses with an additional response category denoted as "missing" to compare and contrast potential differences in effect estimates.

Analysis

The final sample used in these analyses consisted of 435 of the 526 respondents for whom no data were missing on measures of social influence and screening intention. There were no significant differences in sociodemographic characteristics between respondents included in the analysis and respondents with missing data on the measures of social influence. Descriptive analyses were performed using chi-square tests and Fisher's Exact Test, where appropriate, to assess differences in respondent characteristics and social influence factors. Bivariate associations were also examined between respondent characteristics and breast cancer screening intentions, with chi-square tests of significance evaluated at the $p < .05$ level. Multivariate logistic regression using a Generalized Estimating Equation (GEE) approach was used to provide estimates for the effects of social networks on screening. Because lay health workers were used to recruit participants and sampling was therefore not random or independent, GEE was used to account for potential clustering by lay health worker since participants recruited by one lay health worker may be similar to each other than participants recruited by a different lay health worker. One important advantage of the GEE approach is that it provides consistent estimates of the beta coefficients and robust standard errors regardless of whether the working correlation is correct (25). However, a limitation to this approach is that the number of LHWs needs to be large enough to ensure more accurate standard error estimates.

Sociodemographic characteristics, such as age, marital status, education level, language proficiency, employment status family history of breast cancer, and number of years lived in the U.S. were treated as potential confounders based on the previous literature of cancer screening barriers in Vietnamese women. In addition, I adjusted for intervention group assignment and recruitment agency, which were treated as potential confounding variables related to the study design. Each social influence factor was examined separately for its association with breast cancer screening intention, adjusted for sociodemographic characteristics, then adjusted for social desirability, and finally for study design factors in the final multivariable model. All analyses were performed using SAS v.9.1.3 (26).

Results

Sample characteristics

The final analytic sample consisted of 435 Vietnamese American women aged 40 years or older who resided in Santa Clara County, California. Characteristics of survey respondents are shown in Table 1. The mean age of respondents was 56.9 years (range 40 – 91). All respondents were born outside of the U.S. with a mean duration of residence in the U.S. of 14.2 years (range 0 – 31). The vast majority (97.0%) of respondents reported speaking English poorly or not at all. Almost 55% of respondents had less than a high school education. The majority of respondents were married (76.6%) and unemployed (65.1%). Approximately one-fifth (20.5%) of the sample respondents had no health insurance. Only a small percentage (6.1%) had a family history of breast cancer. Overall, the majority of the sample consisted of older, low socioeconomic status, foreign-born Vietnamese American women. Almost 84% of respondents stated that they intend to receive a clinical breast examination (CBE) within the next 12 months, while 90.1% intend to receive mammogram in the next 12 months. The mean social desirability score for this sample was 6.4 and ranged from 1 to 10, with 10 representing the highest possible score (highest level of social desirability).

Almost half (47.4%) of respondents “strongly agreed” and 31.3% “agreed” that their family and friends approve of undergoing regular breast cancer screening. Although less than 2% neither agreed nor disagreed, almost 20% disagreed that their family and friends approved, with less than 1% expressing strong disapproval. By contrast, respondents reported a much higher proportion of perceiving approval from their physicians with regard to getting regular breast cancer screening. Almost 60% “strongly agreed” that their physicians approve of breast cancer screening and an additional 32.3% of respondents “agreed” with this statement. Although less than 2% “neither agreed nor disagreed” with this statement, 6% of respondents “disagreed” that their physicians approve of breast cancer screening and 1.2% “strongly disagreed.” Overall, respondents perceived more approval from their physicians than from family and friends with regard to undergoing regular breast cancer screening.

Bivariate associations

Table 2 shows the bivariate associations between three social influence factors and sociodemographic characteristics of the Vietnamese American women respondents. Overall, I observed no significant associations between respondent’s perceptions of breast cancer screening approval from family, friends, or physicians and sociodemographic characteristics of respondents. However, social norms about mammography screening were significantly associated with age group and education level of respondents. Respondents with greater perception of social norms (those who reported that at least half of their peers who had undergone mammography screening) were younger ($p < .001$) and had less than a high school education ($p < .01$).

Table 3 shows the bivariate associations between social influence factors and respondents’ stated intention to receive a mammogram or CBE within the next 12 months. Overall, findings were similar for both screening intention outcomes. The study arm (LHWO + media intervention group vs. media-alone comparison group) and age group of respondents were the only two factors consistently associated with both intention to receive a future mammogram ($p < .0001$ and $p < .001$, respectively) and intention to receive a future CBE ($p < .0001$ and $p < .001$, respectively). Respondents who stated an intention to receive a mammogram or CBE within the next 12 months tended to be in the intervention group (LHWO + media) and be in the 40-64 year age group.

Multivariable analyses

In the multivariable analysis of social influence factors and intention to receive a mammogram within the next 12 months, perception of approval from physicians was the only social influence factor to be significantly associated with future mammography intention in the unadjusted model (Table 4, Model 1). The odds ratio for approval from physicians was 3.01 (95% CI: 1.21-7.48). When adjusted for other social influence factors and sociodemographic characteristics, including age, marital status, health insurance status, education level, language proficiency, employment status, years in the U.S., and family history of breast cancer (Model 2, Table 4), the odds ratio for physicians’ approval decreased slightly to 2.93 (95% CI: 0.94-9.12) and was no longer significant.

However, further adjustment for social desirability bias (Model 3, Table 4) increased the OR for physicians’ approval to 3.09 (95% CI: 1.04-9.19) and it again achieved statistical significance, suggesting a social desirability effect on the reporting of intention for mammography screening. Final adjustment for study design factors, including intervention group

assignment and recruitment agency (Model 4, Table 4), decreased the OR to 2.33 (95% CI: 0.59-9.29) and was no longer statistically significant. Thus in the fully adjusted model, perception of approval from physicians regarding breast cancer screening was not significantly associated with intention to receive a mammogram within 12 months. None of the other social influence variables were associated with intention to receive a mammogram within the next 12 months in any of the multivariable models. Although a quarter of respondents (25.5%) did not know or were not able to express their belief about the proportion of their peers who undergo mammography screening, I treated this as a separate categorical response and found effect estimates to be more similar to those who report about half of their peers undergoing screening compared to those who reported less than half of their peers.

In the crude (unadjusted) model, none of the social influence factors examined were significantly associated with intention to receive a CBE within the next 12 months. This null finding persisted even when I adjusted for additional factors in step-wise regression multivariable models (Table 4, Models 2-4). Thus, results from these analyses that no social influence factors in this analysis are likely to significantly influence intention to receive a CBE within the next 12 months among the Vietnamese American women respondents.

Discussion

Using data from a community-based sample of Vietnamese American women in California, I found that social influence, as measured through social screening norms, was not associated with intention to receive breast cancer screening. The null associations were consistently observed for the intention to receive either a mammogram or a CBE within the next 12 months, after adjustment for sociodemographic factors, social desirability bias, and study design factors. Overall, these findings indicated that women generally perceived high levels of breast cancer screening approval from network members, with greater perception of approval from their physicians than from their family and friends, which supports previous qualitative and quantitative research findings (4, 5, 10, 27, 28). Despite the high prevalence of perceived social norms in this sample, any impact of individual norms alone on breast cancer screening intention is not supported in this study. This finding suggests further consideration of other aspects of social influence that may be important to capture in terms of affecting behavioral intention.

Several studies in the breast cancer screening literature have investigated the relationship between social influence factors and breast cancer screening intention. This is the first study to date that has examined social influence through breast cancer screening norms and their relationship to intention to undergo breast cancer screening in Vietnamese American women. Results from this study are not surprising. They add empirical data to the mixed findings in this area of research, in which results have often varied depending on population under study (4, 10, 27, 29). In a study of Korean women residing in Korea, Ham and colleagues found that subjective norms were predictive of mammography screening intention (10). However, in a study of five racial/ethnic groups (African American, Chinese, Filipina, Latina, or non-Hispanic White women), Stewart and colleagues reported inconsistent associations between subjective norms and intention to receive a mammogram in the next 12 months (29), with positive associations found in some ethnic groups but not others. These inconsistencies across racial/ethnic groups have been attributed to measurement issues for both the constructs of subjective norms and behavioral intention. Pasick and colleagues have concluded that subjective norms are overall weak predictors of behavioral intention in cancer screening studies (7).

Since the overall conceptual framework for this dissertation was adapted from constructs proposed in Berkman's Social Network Conceptual Model (30), this study did not aim to measure or test the formal theoretical construct of subjective norms, which has been defined in behavioral theories as the combination of normative beliefs and the motivation to comply to these beliefs (31). However, the measure of social norms captures similar intent within the normative beliefs construct, which has also been found to be more important than motivation to comply in influencing behavioral intention (29). Nevertheless, these findings provide unique insights into the prevalence of social influence through screening norms and their potential effects on screening intentions as a first necessary step toward understanding how these concepts apply to Vietnamese American women.

Findings from this study should be interpreted with caution based on the following limitations. First, the measurement of social influence through norms was based on a few single-indicator items which may not have performed well in this population despite being validated in other populations. Although this study was useful in exploring the basic presence of screening norms, more qualitative work is needed to further characterize the conceptualization of other aspects of social influence and their importance in breast cancer screening behavior and intention among Vietnamese American women. Qualitative in-depth interviews and cognitive testing of survey items not yet validated in some populations will aid in further refining more appropriate, accurate, and comprehensive measures of social influence across diverse populations.

Despite the use of such validated and standardized survey items in other populations (32, 33), it is possible that the null associations found in this study are due to the poor performance of these measures in Vietnamese American women, evidenced by the 25% of respondents who did not know how to respond or how to express their beliefs regarding their peer's mammography screening behavior. Because screening behaviors are not often as visible a health behavior as smoking, exercising, or eating an unhealthy diet, it may have been difficult for respondents to give an accurate conjecture if they did not know their peers very well.

Second, the outcome of screening intention may be a problematic construct for measurement despite its pervasive use in the literature across cultures. A recent qualitative study by Pasick and colleagues raised concerns regarding the measurement of behavioral intention due to differences in the meaning of these constructs across cultures and found this construct to be highly problematic and vulnerable to social desirability bias for Filipina and Latina women (7). Since this problem could pose similar issues for Vietnamese American women as well, I attempted to mitigate some of the methodological concerns by adjusting for social desirability bias (23), which is the tendency for people to give responses that would be viewed favorably by others, such as the study interviewer.

Third, it is possible that the high proportions of women reporting strong social influences and intentions to receive screening in this sample may have required a larger sample size to detect a significant effect size given the prevalence of these exposures and outcomes. Although most ORs presented in the multivariable analyses were elevated above 1.0, almost all did not achieve statistical significance, in part due to power issues. Because the power calculations for the study was originally based on the sample size needed to detect screening differences between arms of the intervention study, I may not have had enough power to detect significant associations for this particular analysis. Finally, like many previous studies on this topic, this analysis was based on cross-sectional data, which limits a causal interpretation between social influences and breast cancer screening intentions.

This study has notable strengths. First, this study is a relatively large sample of Vietnamese American women with a very high response rate. Second, this study fills an important gap in the literature by examining social network influences on breast cancer screening intention in an understudied population. The extent to which social influences through norms is affected by culture is likely to vary across different racial/ethnic groups and is poorly understood. Thus, this study adds to the growing literature in this area and extends findings to another ethnic minority population.

Although social influence through screening norms was not found to be associated with intention to receive mammography or CBE screening, this study suggests that other aspects of social influence be explored, developed, and tested in future studies by integrating both qualitative and quantitative methods. These findings may have important implications for future research in this area, since social influence and behavioral intention are constructs that are vulnerable to measurement issues such as reliability and validity. They are also sensitive to the cultural context in which they are applied. Thus, future research is needed to more fully understand the meanings and interpretations of these constructs in specific ethnic groups. This will allow us to better understand how social influences shape intentions for future breast cancer screening toward the goal of reducing cancer health disparities among racial/ethnic populations.

Table 1. Characteristics of Vietnamese American Women Respondents, Age \geq 40 years old, Santa Clara County, California, 2004-2007 (N = 435)

Characteristic	n	%
Mean age, yrs (\pm SD)	56.1 (9.8)	
Min-max	40-91	
Mean length of residence in the U.S., yrs (\pm SD)	14.2 (7.8)	
Min-max	0-31	
Study arm		
Intervention group	243	55.9
Comparison group	192	44.1
Self-rated English-speaking ability		
Poorly/not at all	422	97.0
Proficient/well/fluent	13	3.0
Education		
Less than high school	239	54.9
High school or more	196	45.1
Employment status		
Unemployed	283	65.1
Employed	152	34.9
Marital status		
Married	333	76.6
Widowed	29	6.7
Divorced or separated	42	9.7
Never married	31	7.1
Health insurance		
No health insurance	89	20.5
Has insurance	346	79.5
Family history of breast cancer		
Yes	25	6.5
No	361	93.5
Intention to receive clinical breast examination in 12 months		
Yes	365	83.9
No	70	16.1
Intention to receive a mammogram in 12 months		
Yes	392	90.1
No	43	9.9
Social influence factors		
Perception of breast cancer screening approval from family and friends		
Strongly agree	206	47.4
Agree	136	31.3
Neither agree or disagree	8	1.8
Disagree	82	18.9
Strongly disagree	3	0.7
Perception of breast cancer screening approval from physicians		
Strongly agree	256	58.9
Agree	140	32.3
Neither agree or disagree	8	1.8
Disagree	26	6.0
Strongly disagree	5	1.2
Belief in proportion of your peers who received a mammogram		
Less than half	15	3.5
About half	309	71.0
More than half	0	0.0
Don't know	111	25.5
Social desirability score ¹ (\pm SD)	6.4 (2.1)	
Min-max	1-10	

¹Composite scores computed for respondents with no missing data on any of the ten items (n=312)

Table 2. Social Influence Factors by Characteristics of Vietnamese American Female Respondent, Age \geq 40 years old, Santa Clara County, California, 2004-2007 (N = 435)

Characteristics	Approval from family/friends ¹		Approval from physicians ¹		Belief about mammography screening norms ²	
	Agree (n=342)	Disagree (n=85)	Agree (n=396)	Disagree (n=31)	Less than half (n=15)	About half (n=309)
Study arm						
Intervention group	42.7	52.9	56.6	48.4	60.0	55.7
Comparison group	57.3	47.1	43.4	51.6	40.0	44.3
Age group (yrs)						
40-64	78.7	81.2	80.1	67.7	53.5	81.2**
65 and older	21.4	18.8	19.9	32.3	46.7	18.8
Marital status						
Single/widowed/divorced	23.4	16.5	23.7	16.1	40.0	22.3
Married	76.3	83.5	72.3	83.9	60.0	77.7
English-speaking ability						
Poorly/not at all	97.4	97.7	97.0	100.0	100.0	96.8
Proficient/well/fluent	2.6	2.4	3.0	0.0	0.0	3.2
Highest level of education						
Less than high school	56.7	48.2	55.8	45.2	80.0	54.7*
High school or more	43.3	51.8	44.2	54.8	20.0	45.3
Employment						
Unemployed	66.1	62.4	64.4	71.0	80.0	62.1
Employed	33.9	37.7	35.6	29.0	20.0	37.9
Length of residence in U.S.						
\leq 10 years	68.4	72.9	70.7	58.1	66.7	68.9
$>$ 10 years	31.6	27.1	29.3	41.9	33.3	31.1
Health insurance						
No health insurance	19.6	23.5	19.4	32.3	33.3	22.0
Has health insurance	80.4	76.5	80.6	67.7	66.7	78.0

¹ Excludes responses for “neither agree nor disagree” (n=8 for both factors)

² Excludes responses for “don’t know” (n=111) and “more than half” (n=0)

* $p < .05$

** $p < .01$

*** $p < .001$

Table 3. Characteristics by Intention to Receive Breast Cancer Screening Exams in Vietnamese American Female Respondents, Age ≥ 40 years old, Santa Clara County, California, 2004-2007 (N = 435)

Characteristic	Intention to receive mammogram within 12 months		Intention to receive CBE within 12 months	
	Yes (n=392)	No (n=43)	Yes (n=365)	No (n=70)
Study arm				
Intervention group	61.0	9.3***	60.8	30.0***
Comparison group	39.0	90.7	39.2	70.0
Age group (yrs)				
40-64	80.9	62.8**	81.4	67.1**
65 and older	19.1	37.2	18.6	32.9
Marital status				
Single/widowed/divorced	22.7	30.2	22.5	28.6
Married	77.3	69.8	77.5	71.4
English-speaking ability				
Poorly/not at all	97.2	95.4	97.3	95.7
Proficient/well/fluent	2.8	4.7	2.7	4.3
Highest level of education				
Less than high school	54.6	58.1	54.3	58.6
High school or more	45.4	41.2	45.8	41.4
Employment				
Unemployed	64.8	67.4	64.4	68.6
Employed	35.2	32.6	35.6	31.4
Length of residence in U.S.				
≤ 10 years	70.2	65.1	70.1	67.1
> 10 years	29.9	34.9	29.9	32.9
Health insurance				
No health insurance	20.7	18.6	21.6	14.3
Has health insurance	79.3	81.4	78.4	85.7

* $p < .05$

** $p < .01$

*** $p < .001$

Table 4. Generalized Estimating Equation Logistic Regression Models of Intention to Receive Breast Cancer Screening within 12 Months among Vietnamese American Women, Age \geq 40 years old, Santa Clara County, California, 2004-2007

	Model 1 ^a			Model 2 ^b			Model 3 ^c			Model 4 ^d		
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Intention to receive mammogram within 12 months												
Perception of approval from family/friends												
Disagree	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Agree	1.65	0.81-3.37	1.52	0.57-4.07	1.45	0.48-4.36	1.15	0.38-3.47	1.15	0.38-3.47	1.15	0.38-3.47
Perception of approval from physicians												
Disagree	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Agree	3.01	1.21-7.48	2.93	0.94-9.12	3.09	1.04-9.19	2.33	0.59-9.29	2.33	0.59-9.29	2.33	0.59-9.29
Social norms regarding mammography screening												
Less than half of peers	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Half or more of peers	1.80	0.95-3.39	1.58	0.18-13.40	2.00	0.21-18.75	1.63	0.10-27.01	1.63	0.10-27.01	1.63	0.10-27.01
Don't know	1.80	0.95-3.39	1.16	0.11-11.97	1.44	0.14-15.10	0.93	0.05-16.98	0.93	0.05-16.98	0.93	0.05-16.98
Intention to receive CBE within 12 months												
Perception of approval from family/friends												
Disagree	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Agree	1.26	0.68-2.35	1.39	0.67-2.87	1.46	0.70-3.05	1.82	0.71-4.69	1.82	0.71-4.69	1.82	0.71-4.69
Perception of approval from physicians												
Disagree	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Agree	1.57	0.65-3.81	1.06	0.37-3.05	1.04	0.35-3.11	1.17	0.33-4.18	1.17	0.33-4.18	1.17	0.33-4.18
Social norms regarding mammography screening												
Less than half of peers	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-	1.00	-
Half or more of peers	0.90	0.54-1.50	1.67	0.25-11.06	1.90	0.25-14.82	1.74	0.28-22.16	1.74	0.28-22.16	1.74	0.28-22.16
Don't know	0.90	0.54-1.50	1.53	0.22-10.87	1.59	0.19-13.16	0.98	0.14-12.29	0.98	0.14-12.29	0.98	0.14-12.29

^aUnadjusted model.

^bAdjusted for Model 1 covariates + age, marital status, education, language proficiency, employment, years in the U.S., health insurance status, and family history of breast cancer.

^cAdjusted for Model 2 covariates + social desirability score.

^dAdjusted for Model 3 covariates + intervention group assignment and recruitment agency.

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Chapter 6. Conclusion

Summary of Key Findings and Recommendations

This dissertation examined social network characteristics of Vietnamese American women and their roles on breast cancer screening behavior in Santa Clara County, California. The study population was based on a community-based intervention trial aimed at promoting breast cancer screening using lay health workers to recruit and educate eligible friends and family from their social circles on breast cancer prevention and its screening. The first analysis examined the association between overall social network structure and integration and breast cancer screening awareness, ever use of a mammogram and clinical breast examination (CBE), and recent use of these breast cancer screening exams. It found a positive association between social network integration and recent receipt of a CBE but not for mammography, with more socially-integrated women more likely to receive a CBE than less socially-integrated women. Given the lack of consistent associations between social network integration and breast cancer screening behavior in this study, our findings suggest that other properties of social networks, including the quality and characteristics of social ties as well as norms around breast cancer screening that may be important in influencing these health behaviors.

Because social networks can impact health through several pathways, a further analysis examined the different types of perceived availability of social support (emotional, informational, affection, instrumental, and positive social interaction) and the relative contribution of each type of support to most recent use of mammography and CBE. It found that Vietnamese American women generally perceived moderate to high levels of available social support of all types, with instrumental (i.e., tangible) support as the single most important social support predictor for recent use of mammography, but not for recent use of CBE. This finding suggest that more support is needed for obtaining and following-through with mammography screening rather than for CBE, which is typically performed as part of a routine health examination in a physician's office.

Finally, analyses examined the influence of social norms regarding breast cancer screening as one potential mechanism through which social networks may impact screening behavior. It focused on women's intention for future screening as the main outcome of the final analysis because breast cancer screening is only optimally effective for early detection if women in the appropriate age groups adhere to annual screening guidelines as recommended by the American Cancer Society. This analysis did not support social influence through screening norms on the impact of intention to receive a mammogram or CBE within the next 12 months. However, this analysis may have been limited by the high prevalence of both social influence factors and intentions for future screening which would have required a much larger sample size to detect significant effect estimates between these exposures and outcomes. Findings from this analysis also revealed the need to explore more culturally appropriate, accurate, and more comprehensive measures of social influence across diverse populations through mixed-methods research for a more sophisticated and more refined assessment of the relationship between social influence and breast screening intention and behavior.

Future directions in research

This dissertation is the necessary first step to begin the exploration of social network concepts and characteristics in one understudied and underserved population and their potential impacts on breast cancer screening behavior. Social network research is a promising and rapidly growing area of research as advances in technology have made it easier for people to connect with each other and to access a vast amount of information and resources. However, little is known about how the relationship between social networks and health varies across racial/ethnic groups. Social networks can facilitate the spread of health information to influence health behavior, suggesting implications for designing interventions toward improving these outcomes in underserved groups. Because the term *social networks* is so ubiquitous in the current vernacular language, an important point to emphasize is that studies of social networks have often been conducted at the individual level, with related constructs operationalized from the individual-level perspective. While early work in social network research has used this approach and contributed insightful knowledge to this topic, future research is needed to extend beyond the individual level and explore social network structures and characteristics from a bird's-eye or societal-level view and investigate how these structures differ within and across diverse communities. Qualitative research methods provide the appropriate tools to conduct the necessary groundwork and should be integrated with quantitative methods in future studies to delve into the complexities of social network concepts and explore cultural differences as they relate to preventive health behavior and outcomes.

Furthermore, methodological advances are needed to optimally study social networks and health by focusing specific pathways that are hypothesized to impact health behavior and outcomes. More developmental work is needed using a mixed-methods approach to more accurately and comprehensively assess the multiple dimensions of social networks and their pathways to impacting health. Because the vast majority of studies on social networks and health have relied on cross-sectional analyses, the majority of evidence in the literature is limited regarding the interpretation of a causal relationship between social network characteristics and health behavior and outcomes. Towards this aim, future research using intervention-based studies to study social networks would greatly benefit from collecting social network data longitudinally, if time and resources permit, to better understand the mechanisms through which social networks contribute to the potential effectiveness (or lack thereof) of community-based intervention studies in public health.

Concluding Remarks

This dissertation has contributed original empirical evidence that expand understanding of social network characteristics and breast cancer screening behavior among Vietnamese American women in one county in California and has pointed toward promising directions for future research on this topic. By doing so, this dissertation fills an important gap in knowledge in terms of the cultural, racial/ethnic, and socioeconomic-related variations in the structure and function of networks and their potential impacts on breast cancer screening behavior. These preliminary findings may have implications for

extending this work to other preventive health behaviors beyond cancer screening with the goal of reducing disparities in cancer control and prevention. The knowledge and insights gained from this dissertation will provide a basis for future research to test additional pathways underlying the effects of social networks and health in diverse communities using additional levels of network data.

Because social networks are naturally embedded in friends, families, acquaintances, and communities, future research is warranted in exploring the meaning, formation, and use of social networks in diverse communities, which may have important implications for more refined survey measures and for the delivery of health interventions and programs aimed at reducing cancer disparities in underserved and hard-to-reach racial/ethnic minority populations. However, one major methodological limitation to consider is that the creation of social networks is not random. As a result, selection bias may be an issue because people have a tendency to join social networks in which they share similar attributes with those of other network members. This is also referred to as the homophily effect commonly described in social network studies as “birds of a feather flock together.” For example, smokers are more likely to associate with other smokers. Although the homophily effect is inherent in social network studies, additional research is needed to develop this issue methodologically so that we can more clearly distinguish between how social networks affect health and how homophily effects muddle interpretations from these studies as a result of selection bias. Furthermore, the concept of social networks is fluid and subject to change throughout the individual life course. Little research has explored these life course social network dynamics to understand how they influence the spectrum of cancer control and prevention outcomes in various racial/ethnic populations. For example, little is known about how social networks change following breast cancer diagnosis and their role on quality of life among breast cancer survivors.

Finally, the availability of data from a large breast cancer screening intervention trial embedded in the framework of interpersonal relationships has provided an important opportunity and optimal approach for exploring how social networks influence breast screening behavior in an underserved population. Overall, findings from this dissertation have laid the necessary groundwork for identifying new opportunities for future research on social networks and health. Such research will help us to gain a better understanding of ways in which social networks can inform more effective interventions and programs to close the gap in cancer health disparities.