

AN AFRICAN-AMERICAN AND LATINO
MALE LAY HEALTH ADVISOR (LHA) PROGRAM:
HOW CONFIDANT-LHA RELATIONSHIP INTERDEPENDENCE AND LHA
PREVENTIVE HEALTH BEHAVIORS IMPACT
CONFIDANT PREVENTIVE HEALTH BEHAVIORS

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ABSTRACT

ANH NHAT TRAN - An African-American and Latino Male Lay Health Advisor (LHA) Program: How Confidant-LHA Relationship Interdependence and LHA Preventive Health Behaviors Impact Confidant Preventive Health Behaviors
(Under the direction of Eugenia Eng)

INTRODUCTION: In the United States, many men of color experience poor health outcomes and confront serious healthcare obstacles. Yet, little research and few interventions have addressed men's relationships and their influence on healthcare behaviors.

METHODS: This study analyzed a male lay health advisor (LHA) intervention dataset with 227 North Carolina African-American and Latino LHAs and their "Confidants" (men they reached). This study aimed to: (1) examine racial/ethnic differences in Confidant-LHA relationship interdependence properties, (2) assess the concordance of data obtained from three one-item closeness measures, and (3) test Confidant-LHA relationship interdependence and LHA preventive health behavior effects on Confidant preventive health behaviors. These behaviors included healthcare visits, fruit and vegetable consumption, and condom use frequency. Relationship properties were diversity, length, interaction, and closeness. Closeness measures included the Inclusion of Others in Self (IOS) pictorial scale, an adapted, and a verbal equivalent IOS scale. Kendall's tau test evaluated correspondence among three closeness measures. Hierarchical generalized linear regression analyses tested association between covariates and Confidant preventive health behaviors.

RESULTS: No racial/ethnic differences were found for any relationship property mean values, other than interaction frequency. Latinos interacted with one another more

frequently than African American counterparts. Strong correspondence existed among responses of three closeness measures: original IOS versus an adapted IOS scale [$r=0.636$ ($p<.001$)], and adapted IOS versus verbal equivalent IOS scale [$r=0.602$ ($p<.001$)]. Confidant-LHA closeness was correlated with longer familiarity, more frequent interactions, and more diverse interpersonal connections. LHA closeness to Confidant had a significant positive association ($p<.05$) with Confidant closeness to LHA. A significant interaction effect existed between LHA healthcare visits and Confidant-LHA closeness ($p<.05$): increased Confidant closeness to LHA strengthened the positive relationship between LHA and Confidant healthcare visits.

CONCLUSIONS: Comparable relationship interdependence findings between African-American and Latino participants suggest similar receptiveness to social support and influence interventions like LHA programs. Strong correlation between adapted and original IOS closeness measure supports exploring the validity of this adapted IOS measure with similar populations. Finally, links between LHA and Confidant preventive healthcare visits supports future male LHA interventions to examine the most efficacious Confidant-LHA relationship for improving men's health outcomes.

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LIST OF ABBREVIATIONS

| ABBREVIATION | DEFINITION |
|---------------------|--|
| CSW | Commercial sex worker |
| HGLM | Hierarchical generalized linear modeling |
| HLM | Hierarchical linear modeling |
| ICC | Intra-class correlation |
| LHA | Lay health advisor |
| NC | North Carolina |
| OR | Odds ratio |
| STD | Sexually transmitted disease |
| US | United States |

CHAPTER ONE

INTRODUCTION

1.1 Problem Statement

Compared to their female counterparts, males in the United States have lower average life expectancies and suffer higher death rates from nearly all leading causes of death (Porche & Willis, 2004). Of the various racial groupings by which American men can be categorized, men who belong to racial and ethnic minorities experience higher rates of morbidity, disability, and disease than their White counterparts (Williams, 2003). Disparities in health care and outcomes among African-American and Latino men have resulted in calls for heightened attention from policy makers and funding agencies in both the private and public health sectors (Treadwell & Ro, 2003).

One public health strategy used to address ethnic and racial health disparity is loosely referred to as lay health advisor (LHA) interventions. LHAs are indigenous members of a population, who are recruited and trained to provide health promotion activities for other members in their community, who typically have been marginalized from the mainstream health care system (Bird et al., 1998; Earp et al., 2002; Earp & Flax, 1999; Elder et al., 2005; Eng, 1993; Navarro et al., 1998; Swider, 2002; Watkins, Harlan, Eng, Gansky, & et al., 1994). Today's growing proportion of underserved minority populations and ever-increasing health care costs in the United States have encouraged public health professionals to explore the use of LHAs for outreach, education, and advocacy (Lewin et al., 2005a; Warrick, Wood, Meister, & de Zapien, 1992). Despite the growing number of LHA interventions reported in

the health promotion literature (Earp & Flax, 1999; Eng & Parker, 2002), relatively few published evaluations of LHA interventions exist (Altpeter, Earp, Bishop, & Eng, 1999). Among these evaluations, statistically significant changes had been found in target health-related outcomes (in comparison to pre-intervention baseline measures or to control group outcomes) (Baker et al., 1997; Bird et al., 1998; Birkel et al., 1993; Earp et al., 2002; Elder et al., 2005; Kidane & Morrow, 2000; Navarro et al., 1998; Rauscher, Earp, & O'Malley, 2004; Warrick et al., 1992). Other evaluations, however, found no significant change (Andersen et al., 2000; Campbell et al., 2004; Corkery et al., 1997; Dennis, 2002; Duan, Fox, Derose, & Carson, 2000; Lacey, Tukes, Manfredi, & Warnecke, 1991; Sung et al., 1992; Watkins et al., 1994). It has been observed that these inconclusive results from the few evaluations conducted may be due to the varied rigor of LHA intervention study designs (Swider, 2002). Furthermore, others have noticed uncertainty concerning the necessary qualities that characterize an effective LHA. A vague typology of LHA interventions currently guides research and practice; poor conceptualization of the LHA field exists with many gaps in (a) procedures for recruiting and training LHAs, (b) criteria to assess LHA roles and functions in the community, and (c) LHA training and support activities used (Love, Gardner, & Legion, 1997; Rhodes, Foley, Zometa, & Bloom, 2007).

Most LHA intervention studies have focused on the unidirectional pathway of influence between LHA activities and change in the persons they are intended to reach, such as health knowledge, self-efficacy, and behavioral outcomes (Campbell et al., 2004; Corkery et al., 1997; Earp et al., 2002; Elder et al., 2005; Flax & Earp, 1999; Love et al., 2004; Nemeck & Sabatier, 2003; Rauscher et al., 2004; Thomas, Earp, & Eng, 2000; Watkins et al., 1994). Rarely, if at all, have any published studies explored the bidirectional influence

(relationship interdependence) between LHAs and their Confidants, who are the persons they assist. Such bidirectional influence could include whether the effects of (1) *Confidant-LHA relationship structural properties* (e.g., diversity, duration, interaction frequency, closeness) or (2) *LHA characteristics* (e.g., LHAs' own health behaviors) might also impact Confidant health behaviors (Booker, Robinson, Kay, Najera, & Stewart, 1997; Chavis, 2004; Taylor, Serrano, Anderson, & Kendall, 2000). Furthermore, LHA programs involving men as advisors or natural helpers in promoting other men's preventive health behaviors are almost non-existent (Eng & Parker, 2002). One reason for the paucity of male LHA programs may be the lack of research and understanding about the functional aspects of friendships between men, as well as how they relate to one another and influence each other in behavioral change (McCoy, 1998; Staples, 1995). In short, the examination of Confidant-LHA relationship interdependence has been virtually non-existent in LHA intervention research, yet it may play a key role in impacting desired Confidant health outcomes. In addition, because relationship interdependence is also rarely addressed with friendships between men of color, there is also a potential lack of culturally acceptable and appropriate measures of interconnectedness/closeness for Confidant-LHA dyads comprising men of color, such as African-American or Latino men.

1.2 Study Aims

Using data from an African-American and Latino male LHA health promotion program, this dissertation study explored the construct of structural properties of Confidant-LHA relationship interdependence. For the first component of this study, I conducted: (a) an exploratory examination of the structural properties of male Confidant-LHA relationships

and whether they vary by race, (b) an analysis of whether Confidant closeness to LHA is predicted by any other relationship properties, and (c) a concordance assessment of data obtained from three one-item measures of closeness administered to African-American and Latino males. For the second component of this study, I examined to what extent: (a) structural properties of Confidant-LHA relationship interdependence and (b) LHA preventive health behaviors impact Confidant preventive health behaviors (healthcare utilization for routine or screening exams; fruits and vegetable consumption; and condom use frequency). Using a two-manuscript format, I have reported the findings and discussed the results and implications for future research and intervention studies. The first manuscript focuses on the results of research aim #1, while the second manuscript covers research aims #2-3 below:

Aim 1: Examine and describe patterns among structural properties of Confidant-LHA relationship interdependence (*diversity; length; interaction frequency; closeness*) among African-American and Latino men who participated in a LHA intervention program, and test the concordance of our adapted IOS (Inclusion of Others in Self) closeness scale with the original IOS scale.

Aim 2: Examine and describe the association between structural properties of Confidant-LHA relationship interdependence (*diversity; length; interaction frequency; closeness*) and Confidant preventive health behaviors among African-American and Latino men who participated in a LHA intervention program.

Aim 3: Examine and describe the association between LHA preventive health behaviors and Confidant preventive health behaviors among African-American and Latino men who participated in a LHA intervention program.

Data used to achieve these research aims came from the *Men as Navigators (MAN) for Health Study*, which was a quasi-experimental study (one group pre-post test design) that evaluated a male natural helper LHA intervention. The parent study was geared, in part, to modify the effects of male gender socialization on the preventive health behaviors of African-American and Latino men in North Carolina.

1.3 Rationale

1.3.1 Aim 1: Examining Confidant-LHA relationship properties and measures of closeness

Confidant-LHA relationship properties

Interdependence Theory examines how a pattern of behavioral outcomes is influenced by the experiences of partners in a dyad (e.g., LHAs and Confidants) and posits that structural properties of their relationship can bring partners either closer to each other or push them apart (Lewis, 2002). When these structural properties draw partners closer to each other, the theory contends that communication and social influence between the partners will be more effective in changing each partner's behavior (Kelley et al., 1983; Lewis, Devellis, & Sleath, 2002; Lewis et al., 2003). There is little published research regarding the dynamics of platonic adult male friendships, especially between men of color (Gaines, 1995; McCoy, 1998; Staples, 1995), and how these relationships can influence health attitude and behavior change. There is a lack of research to help clarify the specific structural and contextual properties of the Confidant-LHA relationships (relationships which possibly could influence the extent to which LHA interventions produce desired outcomes). To our knowledge, no LHA intervention studies have examined structural properties of Confidant-LHA relationships to determine any predictive value they may have upon Confidant health

outcomes. Furthermore, to our knowledge, no studies have examined this inquiry in the context of a male LHA intervention program.

Measures of closeness for men of color

By using direct self-report measures intended to capture a person's proclivity towards an interdependent or independent identity, inconsistent results have been reported in various studies that examined how cultural differences influence people's sense of interconnectedness or closeness with one another (Levine et al., 2003; Li, 2002). In other words, many measures have probed about how close or interconnected a person feels towards others, but results have been conflicting within the same cultures. One factor that creates inconsistent results may be that all the measures usually used involve multiple items, and the interpretation of these items might not be uniform nor easily translated across different cultures and languages (Li, 2002). Multiple researchers (Li, 2002; Mashek, Cannaday, & Tangney, 2007; Tropp & Wright, 2001; Uleman, Rhee, Bardoliwalla, Semin, & Toyama, 2000) have used an alternative one-item pictorial scale, Inclusion of Self (IOS) Scale, for their study. The IOS scale has been used primarily to describe dyadic relationships such as romantic relationships and self-best friend relationships. In applying the IOS scale to various samples, researchers have found it robust and reliable. In recent years, the IOS scale has been modified for diverse purposes with diverse groups (Li, 2002; Mashek et al., 2007). An interactive computerized version of the IOS scale has also been created for public use (Le, Moss, & Mashek, 2007). Rarely, however, has the IOS scale been administered for male-to-male friendship dyads between men of color in the United States (Aron, Aron, & Smollan, 1992), so there is speculation as to how culturally or socially appropriate the IOS scale measure is for capturing closeness/interconnectedness in this population.

1.3.2 Aim 2: Examining effect of Confidant-LHA relationship properties on Confidant health outcome

Even though more is known about the dynamics and benefits of female friendships and social networks (Swider, 2002) as compared to that of males, female LHA intervention programs have also rarely examined relationship properties in terms of how they affect health outcomes of interest. A well-studied area of health behavior change research involving dyadic relationships has been intimate couples-focused interventions, but they also have yielded mixed results (Lewis et al., 2002; Lewis, McBride et al., 2006; Lewis et al., 2003). It has been posited that previous research focused on improving social support in couples has sometimes been overly simplistic in conceptualizing how couple members influence each other (Lewis, Rook, & Schwarzer, 1994). Researchers have pointed to both poor conceptualization and operationalization of support measures as factors for this oversimplification. Also, mixed findings might be due to lack of attention to structural or contextual aspects of relationships, which, can potentially influence desired health outcomes (Lewis et al., 1994; Reis & Collins, 2000). The same might be true for Confidant-LHA relationships, so it is important to account for structural properties of Confidant-LHA relationship interdependence in the process of exploring potential predictors of desired Confidant health outcomes.

1.3.3 Aim 3: Examining the impact of LHA characteristic on Confidant health outcome

The relationship between a LHA and his Confidant, by design, can be conceptualized as one that involves social influence, interpersonal communication, and provision of concrete access to health services. The pair resides and interacts in the same community; they belong to a mutual social network (Eng & Parker, 2002). Hence, it is highly likely that Confidants are aware of their LHAs' health behaviors (or behavioral intentions). When a LHA conveys

his own health behaviors in some way (either through conversation or through practice), he might, in turn, influence his Confidant's health behavior. This is similar to how one might conceptualize the interpersonal, influencing process that occurs in other dyadic relationships, such as husband and wife, parent and child, teacher and student, or peer and peer (Lewis et al., 2002). To our knowledge, only a few published LHA intervention studies have ever monitored any type of LHA health-related beliefs or behaviors throughout the program (Chavis, 2004; Flax & Earp, 1999; Wynn, 2005); no studies, however, have explored the association of these LHA behaviors with the health outcomes of the Confidants to whom LHAs are intended to reach.

1.4 Significance of Study

The working mechanisms behind the process of LHA interventions have not been delineated well. Thus, this study drew from social relationship research and theory to examine factors that have never been studied before (LHA characteristics and Confidant-LHA relationship properties) and to explore their possible link to Confidant health outcomes. The findings can help refine a theory of how LHA interventions function, and ultimately, how they can be effective. For example, how crucial is it toward achieving program outcomes that LHAs model the same health behaviors they are encouraging in their Confidants? Are Confidant-LHA relationships more effective when both parties have a long and established relationship with each other, or is the diversity of their relationship (knowing each other in multiple contexts, such as co-worker and neighbor) more important? How important is it for LHAs and Confidants to perceive a sense of closeness in their relationship in terms of fostering positive health outcomes, and are there ways to strengthen those relationship properties within the intervention?

With a clearer understanding of LHA characteristics and dyadic relationship properties, we hope to better understand the “active ingredients” for successful LHA interventions that focus on improving men’s preventive health behaviors. The findings can provide program planners with added insight on how to structure and refine their LHA recruitment, training, relationship-building, and retention activities. For example, the findings can inform the following: refining the ‘profile’ of LHAs to be recruited, developing LHA training program topics, and creating Confidant-LHA activities to strengthen key relationship interdependence properties.

1.5 Organization of Dissertation

This dissertation has seven chapters. Chapter Two reviews the literature on: (a) health status of African-American and Latino men in the United States, (b) lack of health promotion programs geared specifically for men, (c) purpose and main features of LHA intervention and evaluation programs, and (d) emerging research directives for LHA intervention studies: male LHAs to promote men’s health, significance of LHA characteristics, and significance of Confidant-LHA relationship properties. Chapter Three describes the study’s theoretical basis and conceptual models, presents the research questions, and sets forth the hypotheses to be tested. Chapter Four details the study’s methodology, including study design, sample construction, and general overview of the analysis. Chapters Five and Six, in the format of two manuscripts, present the study results. Chapter Seven synthesizes conclusions and presents implications for future research and practice.

CHAPTER TWO

LITERATURE REVIEW

Overview

To understand the context and significance of the study, this chapter presents a review of the relevant literature on: (a) health status of African-American and Latino men in the United States, (b) lack of health promotion programs geared specifically for men, (c) purpose and main features of LHA intervention and evaluation programs, and (d) emerging research directives for LHA intervention studies. I present a case for the potential value in exploring the efficacy of a natural helper LHA model to address men's health disparities. I also point out, however, how little is known about the functional characteristics of friendships between men of color, and how the public health field needs a clearer understanding about how the structural properties of LHA-Confidant relationships impact desired health outcome change. The research is informed by the concept of relationship interdependence from Interdependence Theory, and by other social psychology research on how structural properties of relationships (e.g., diversity, duration, frequency, closeness) can influence emotions and behavior.

2.1 Health status of African American and Latino men in the U.S.

Men in the United States, on average, live approximately seven years less than women and have higher death rates for the top 15 leading causes of death, except for Alzheimer's disease, even with age-adjusted mortality rates (Courtenay & Keeling, 2000; Porche & Willis, 2004). When examining the causes of death, one finds that most are

lifestyle, not biologically, related. Overall, men are less attentive to health matters than females, are less knowledgeable, and are not as diligent about self-care practices (Smith, Bonhomme, Semiao, & Fox, 2003). Some gender-based differences in mortality/morbidity and health-related practices include the following: (a) motor vehicle accident deaths take the lives of three times more men than women, (b) men represent 85% of all AIDS cases in the US, (c) cirrhosis of the liver and alcoholism are four times more prevalent in men than women, (d) men are four times more likely to commit suicide than women, (e) nearly 80% of all homicide victims are men, (f) men ages 45-64 suffer heart attacks nearly three times more often than their female counterparts, and (g) women visit physicians almost four times more often than men, even after controlling for reproductive related visits (Smith et al., 2003).

Men of color, one of the most disregarded populations by the field of public health, experience the most deprived health outcomes and face the greatest barriers to healthcare (Gornick, 2003). African-American men have the shortest life expectancy of any group and live about seven years, on average, less than White men (Meyer, 2003). African-American men also suffer disproportionately from many of the leading causes of death and disability in our society, and these differences can be striking. For example, 40% of African-American men with CVD die prematurely, which is about twice the rate of White men (21%) (Meyer, 2003). Prostate cancer is the leading cancer diagnosed among men, and African-American men have the highest rates of prostate cancer in the world (Gornick, 2003). African-American males ages 15-24 have a homicide fatality rate that is reported to be 17 times that of their White counterparts.

The 2006 NC Behavioral Risk Factor Surveillance System data revealed that African-American men in North Carolina are at higher risk than White male residents for the

following: diabetes, stroke, kidney diseases, prostate cancer, AIDS, homicide, and asthma (Centers for Disease Control and Prevention, 2006). North Carolina's African-American men bear a disproportionately higher burden of prostate cancer than their counterparts in surrounding states, and their prostate cancer mortality rate is more than three times that of North Carolina's White men (Vines & Godley, 2004). African-American men are more likely to report health risk behaviors that contribute to cardiovascular disease and type-2 diabetes. During 2006, 24% of African-American men, compared to 18% of White men, had participated in no physical activity for the month prior to questioning. Seventy two percent (72%) of African-American men surveyed were overweight and obese, while 70% percent of all White men were overweight and obese (Centers for Disease Control and Prevention, 2006). National data revealed that less than one-third of men meet dietary guidelines for fruit consumption, and less than a quarter meet dietary guidelines for vegetable consumption (Centers for Disease Control and Prevention, 2006).

Latino men's lifespan is about 5 years shorter than White men (Meyer, 2003). In 2001, HIV/AIDS was the third leading cause of death among Hispanic men aged 35 to 44 (Anderson & Smith, 2003). In 2002, Latinos had the second highest rate of AIDS diagnoses for all racial and ethnic groups. The highest rate was that for African Americans (Centers for Disease Control and Prevention, 2002). In 2002, although Hispanics comprised only about 14% of the population of the United States and Puerto Rico, they accounted for 18% of the total AIDS cases diagnosed. Latinos also accounted for 20% of the total number of new AIDS cases reported (8,000 of over 42,000 cases) - almost four times greater than that for Whites. The Latino male's AIDS case rate in 2001 was 43.3/100,000, which was triple that for the White male (Centers for Disease Control and Prevention, 2002).

From 1990 to 2000, North Carolina experienced the fastest growing Latino population of any state in the country (Martinez & Manson, 2004). Many southern states, including NC, consistently lead the nation in reported cases of AIDS, gonorrhea, chlamydia, and syphilis (Centers for Disease Control and Prevention, 2003). From 1997 to 1999, primary and secondary syphilis rates remained stable among Whites, but dramatically increased by 20% among US Latinos. In North Carolina, gonorrhea rates increased to 257.4/100,000 in 2003, whereas gonorrhea rates among Latinos mirrored national trends, which grew by nearly 12% among Latinos in NC (Centers for Disease Control and Prevention, 2003). In 2004, 16% of all cases of primary and secondary syphilis reported to CDC occurred among Latinos (Centers for Disease Control and Prevention, 2005). From 2001-2005, the North Carolina HIV rate for Hispanics was nearly three times the rate for Whites. Similarly, the sexually transmitted disease rates were greater for Hispanics than Whites (North Carolina Department of Health and Human Services, 2006). NC's geographic position places Latino immigrants at higher risk for sexually transmitted diseases than counterparts in their country of origin (Salvatore, 2001). In a statewide sample of recent immigrant male Latino farm workers ages 16-56, 93% reported having easy access to female commercial sex workers (CSW). Female CSWs were described as being readily available, even in remote towns in NC. Nearly one-half (45%) of participants reported having sexual intercourse with a female CSW since moving to NC. Of those who reported sexual intercourse with a female CSW, only 32% reported ever using condoms and 16% reported ever having had an STD, usually gonorrhea (Salvatore, 2001).

2.1.1 Factors contributing to men's health disparities

A variety of factors have been associated with men's health and life expectancy, some

of which include socioeconomic status, race/ethnicity, and health care access (Courtenay, 2000). Although socioeconomic status is one of the strongest known factors contributing to men's poor health status in the United States, men still demonstrate poorer health than women at all SES levels (Porche & Willis, 2004). Women with the same level of social disadvantage as men still tend to have better health outcomes in terms of mortality, disability, chronic disease, and injury rates (Schofield, Connell, Walker, Wood, & Butland, 2000). Thus, socioeconomic status solely cannot explain the gender differences in health and longevity. Some other determinants of men's disparate health status, especially for men of color, include the following: poor work conditions, personal health/self care practices, stress, impaired coping and emotional processing abilities, cultural beliefs, biological and environmental factors, differential access to healthcare services, and potential bias among treating providers (Satcher, 2003; Vines & Godley, 2004; Williams, 2003).

Of all the factors mentioned above, differences in health behaviors between men and women can help explain many gender differences in health status (Courtenay & Keeling, 2000). The U.S. Preventive Services Health Task Force reviewed thousands of health-related research studies and estimated that half of all deaths in the United States could be prevented through changes in health practices (Courtenay, 2000). This finding, which has been corroborated by other researchers, provides evidence for health risk reduction through preventive practice (Courtenay, 2000). Women tended to engage in more health promoting behaviors and have healthier lifestyle patterns than men (Schofield et al., 2000; Williams, 2003). Data from one government health care surveillance system reported that most health risk behaviors among adults (e.g., drinking and driving, smoking, not using auto seat belts, not obtaining health screenings) are more common in men than women (Courtenay, 2000).

Little is known, however, about *why* men engage in less healthy lifestyles and adopt fewer health promoting attitudes and behaviors. In his book, *Man Enough*, the author stated, “Unlike women, most men have not questioned traditional male gender arrangements (Pittman, 1993).” Most men do not directly question the social construction of masculinity or how it impacts their lives, other than to speculate whether or not their own masculinity is sufficient.

Whether or not they are aware of it, men’s socialization into manhood or masculinity does impact how they approach their health practices (Porche & Willis, 2004). Similar to race, gender is a socially constructed identity, acquired through what a person does in social interactions with other people and in their social context (Hearn et al., 1992; Moynihan, 1998). What it means to be male is influenced by historical, social, and cultural factors. Male gender is signified by beliefs and behaviors that are practiced in social interactions and, therefore, varies between cultures and individuals (Moynihan, 1998).

A high prevalence of unhealthy behaviors among men is explained partially by male gender socialization, which is the attitudes, beliefs, and resulting behaviors of masculinity (Courtenay, 2000; Hong, 2000; Moynihan, 1998). These beliefs have a role in shaping the behavioral patterns of men in ways that have health consequences (Hearn et al., 1992; Moynihan, 1998; Williams, 2003). The dominant form of masculinity in Western society includes socialization to display strength, power, independence and stoicism; to avoid emitting any emotion or vulnerability that could be construed as weakness; and to adopt health risk behaviors (Courtenay, 2000; Hong, 2000). These differences in gender-specific, learned behavior are the major contributors to many of the health disparities between men and women (Courtenay, 2000). Men are less likely than women to seek needed medical care

in a timely manner or to follow medical advice (Helgelson, 1995; Kim, Dennison, Hill, Bone, & Levine, 2000; Staples, 1995). Research suggests that male gender socialization teaches men that they are invulnerable to illness or that asking for help, such as for medical problems, is a sign of weakness (Nicholas, 2000). Men show great reluctance in seeking help for physical or psychological problems or for participating in screening programs (Smith et al., 2003). Avoidance of seeking health care providers has been offered as a partial explanation for increased mortality rates from cancer and heart disease among men (Helgelson, 1995; Nicholas, 2000). Abuse of alcohol and illegal drugs is more common among men than women and research has demonstrated that alcohol use among various populations is associated with the presence of masculine attitudes (Lemle & Mishkind, 1989). Low-income men may be at increased risk for substance abuse because of the daily stresses they face and the socially sanctioned nature of substance use as a coping strategy for men. Men with limited educational and employment opportunities may turn to alcohol and other drugs as an escape from their inability to live up to one of the major tenets of male gender socialization in our society (Bartholomew, Hiller, Knight, Nucatola, & Simpson, 2000).

The behaviors influenced by male gender socialization are further magnified among men from minority ethnic populations. It has been argued that African American men, who are economically and socially marginalized in society, are more likely to exhibit forms of masculine power that are detrimental to their health, such as authority-defying behaviors to outwit others, toughness and violence, and sexual prowess, because they do not have access to professional and economic achievements of the White male dominant power structure (Courtenay, 2000; Hong, 2000; Whitehead, 1992). Men of color continue to struggle in a

race conscious society against discrimination that results in lesser opportunities with regards to stable housing, quality employment, higher education, and viable health access and affordable health services (Satcher, 2003; Staples, 1995; Williams, 2003). In the US, African-American and Latino men have the poorest health care utilization rates. According to the National Health Interview Survey, over 30% of Spanish-speaking Latinos had not seen a doctor or health professional within the past year. Compared with US-born Hispanic adults, immigrant Hispanic adults were almost twice as likely to have no usual place of health care (16% compared with 31%), and three times as likely never to have seen a doctor or health care professional in their life (6% compared with 2%) (Dey & Lucas, 2006). Almost three-quarters of Spanish-speaking Hispanics in NC reported not having a personal doctor (Thomas et al., 2000).

2.1.2 State of health promotion programs for men of color

African American men ages 18-64 years in all income brackets were found to be twice as likely to have had no physician contacts in the past year as compared to their female counterparts (Smith et al., 2003). In the face of such bleak healthcare status for men of color, minimal literature exists on effective male-specific health promotion and health services programs compared to projects focused on women's health. If the programs do exist, rarely do health educators or providers ever directly address with their male clients the effects that male gender socialization may have upon their health. Few, if any, healthcare organizations that assist disenfranchised communities provide well-funded and well-coordinated services to address preventive health needs of men, especially men of color (Smith, 2003; Weinrich et al., 1998). One of the reasons for this limited service availability is that priority is usually assigned to children, mothers, and women in general. Men of minority communities have not

necessarily been viewed as integral members of the family and, thus, have not been a part of the nation's health care priority (Smith, 2003). Men rarely use services offered by public health departments and family planning clinics except in emergency situations. Most of the services are set up as an adjunct to services focused on women and are thought of targeting men only in regard to dire health circumstances (Smith, 2003). A common view does not exist that such services should focus on men's health needs in a broader, holistic sense.

Nevertheless, there exist a number of publications highlighting health promotion programs, which have targeted men as their primary audience (although not always men of color). Many of the health promotion programs focusing on men's health have used peer educator or public opinion leader frameworks to design and implement their interventions, which address topics such as dietary change, physical activity, and HIV/AIDS risk behaviors (Buller, Burgoon et al., 2000; Buller et al., 1999; Elford, Bolding, & Sherr, 2001; Elford, Sherr, Bolding, Serle, & Maguire, 2002; Fridinger & Vincent, 1989; Hart, 1998; Larkey et al., 1999; Lynde, 1992; Morisky, Nguyen, Ang, & Tiglao, 2005; Shuguang & Van de Ven, 2003; Weinrich et al., 1998; Williamson, Hart, Flowers, Frankis, & Der, 2001; Ziersch, Gaffney, & Tomlinson, 2000). Although not identical to natural helper LHA intervention models, some of the peer educator or public opinion leader-based health promotion programs do share some common aspects with LHA models (Kelly, 2004; Larkey et al., 1999). Most LHA programs, however, have worked primarily with women (Larkey et al., 1999).

2.2 Overview of LHA interventions

This section highlights various topics regarding LHA interventions: (a) background information on the association between social relationships and health that help guide

development of LHA interventions, (b) purpose and features of LHA interventions, (c) and evaluations of LHA interventions.

2.2.1 Background on social relationships and health

When investigators write about the impact of social relationships upon health, many terms are used loosely and interchangeably, such as social networks, social support, or social influence (Berkman & Glass, 2000). To improve clarity, I have distinguished among these commonly referenced terms. First, *social networks* can be defined as a web of social relationships that surround an individual, as well as the characteristics of those ties (Berkman & Glass, 2000; Heaney & Israel, 2002). Secondly, social networks may sway health via several pathways, one of which is *social influence*. Social influence often manifests within relationships in a social network through the form of interpersonal communication (Lewis et al., 2002). The interpersonal influence may occur through the simple observation of one another or from a receiver-initiated social comparison process (Heaney & Israel, 2002); social influence is a key attribute of many types of relationships and a vital process used to change health behavior (Reis & Collins, 2000). Thirdly, *social support* (Berkman & Glass, 2000) has also been explored as a mediating mechanism by which social networks influence health behavior. One common definition of social support is that it is assistance exchanged through interpersonal interactions within relationships (Heaney & Israel, 2002). Examples of the types of assistance exchanged usually fall into the categories of emotional, instrumental, appraisal, and informational support - such as caring emotion, aid for tangible needs, feedback for decision making, or advice/information (Eng & Parker, 2002). Unlike emotional support, instrumental, appraisal, and informational support have more potential to influence health because these types of support improve access to resources and material

goods, which can help facilitate opportunity and access to healthcare and other health-related liaisons (Berkman & Glass, 2000). A distinction between social support and social influence is that the former is consciously provided by the sender (Heaney & Israel, 2002), whereas the latter does not require deliberate or conscious attempts to modify behavior. Sometimes, people obtain guidance by simply comparing their attitudes and behaviors to a reference group of people similar to them (Berkman & Glass, 2000).

From a public health perspective, the associations found between social relationships and health should not be ignored when contemplating behavior change interventions (Vaananen, Buunk, Kivimaki, Pentti, & Vahtera, 2005). The seminal work of social epidemiologists in the 1970's, such as John Cassel and Sidney Cobb, has motivated research for future decades. Findings have revealed over the years that the degree to which people are interconnected with others in a community influences their health and well-being (Berkman & Glass, 2000). In 1976, Cassel published a seminal review of epidemiological research with humans and studies with animals that suggested the effects of social relationship factors are not specific to any one disease process (Heaney & Israel, 2002). Soon after, Berkman and colleagues authored findings that revealed compelling evidence of the connection between membership in social networks and mortality (Berkman & Syme, 1979). Over the years, findings from other prospective epidemiological studies have also suggested that people who have limited social ties with others are at increased risk for mortality and morbidity (Berkman & Glass, 2000). Other important factors, such as baseline health status, health services use, or socioeconomic status, cannot account for all the increased mortality risk (Lewis et al., 1994). The findings have suggested that one of the ways social relationships help produce health benefits is by encouraging beneficial health

behaviors and discouraging harmful ones. Today, it is generally accepted that people involved in close social networks tend to have a mortality advantage from almost every cause of death over those who have more sparse and loosely connected social ties (Berkman & Glass, 2000; Lewis, 2002).

2.2.2 Purpose and Features

Capitalizing on research that reveals people who belong to close social networks may have added health status benefit, the natural helper LHA intervention model engages “natural helpers” to promote the health of community members (Eng & Parker, 2002). The main tenet posited in the LHA intervention approach is the exchange of health promoting social support and social influence from LHAs to their Confidants in the community to enhance members’ health status. The assumption within the overall LHA intervention model is that the social support and/or influence provided by LHAs will improve adoption of healthy lifestyle behaviors among the members in LHAs’ social networks (Heaney & Israel, 2002). Natural helpers can provide a community-based system of care and support that complements, but does not substitute for, the more specialized medical services of healthcare providers (Eng & Parker, 2002). The natural helper LHA concept stems from the observation that every community has respected and caring members to whom others turn naturally for advice and assistance. Typically, the social support and influence that occurs between natural helper LHAs and their community members is done so in a spontaneous and informal manner, occurring within the daily routines of social interactions (Altpeter et al., 1999; Earp et al., 1997; Eng & Parker, 2002). The natural helper LHA model seems to be especially applicable to certain communities of color, for they tend to turn first to their own community members for information and guidance (Jackson & Parks, 1997).

LHA interventions have emerged in the United States as an important approach in health promotion for a variety of health issues, especially for communities historically marginalized from the health care system (Bird et al., 1998; Earp et al., 2002; Earp & Flax, 1999; Elder et al., 2005; Eng, 1993; Navarro et al., 1998; Swider, 2002; Walker & Jan, 2005; Watkins et al., 1994). Today's growing proportion of underserved minority populations and cost-containment reforms in the U.S. health care system have pressed public health providers to explore more efficient and effective use of community resources, such as calling upon LHAs for outreach, education, and advocacy (Warrick et al., 1992). Activating interpersonal social networks to effect behavior change may be especially important with individuals of lower SES because they seem to rely more on the influence from peers than from more formal, unfamiliar, inaccessible professional change agents (Larkey et al., 1999).

LHAs have also been labeled as a variety of other terms, some of which include, but are not limited to the following: community health worker, community health representative, indigenous lay worker, lay health worker, promotora, public health aid, and volunteer health educator (Earp & Flax, 1999; Love et al., 1997). Eng and colleagues have characterized differences between these roles by arraying the different types of LHA intervention strategies on a continuum of informal to formal assistance. At the informal end of the continuum is the *natural helping* LHA strategy (Eng & Smith, 1995; Israel, 1985), as referred to earlier. These natural helpers are not employed by a formal agency and do not need to meet the qualifications set by an agency. Instead, the community sets their qualifications (Eng, Parker, & Harlan, 1997; Eng & Smith, 1995; Israel, 1985).

Regardless of the term used, there is broad consensus in the public health arena that LHAs' knowledge and understanding of the language, cultural values, and norms of

underserved communities are crucial elements in bridging the gap between these communities and the public health system. LHAs have been used to address a wide range of health issues across various community settings (Bird, Otero-Sabogal, Ha, & McPhee, 1996; Centers for Disease Control and Prevention, 1994; Jackson & Parks, 1997). For the purposes of this dissertation research, I limit discussion to LHAs who are natural helpers intended to reach members of their community on a volunteer basis instead of LHAs who serve as paraprofessionals or employees of a health care agency (e.g., county health department, public health clinic) (Eng & Parker, 2002; Love et al., 1997; Watkins et al., 1994).

2.2.3 Evaluation of LHA interventions

More experimental studies are needed to test and evaluate the effects of specific health promotion strategies and techniques implemented by LHAs across diverse communities. The results of published LHA intervention evaluations are rare and have mixed results. Some programs achieve desired health-related outcomes among community members (Baker et al., 1997; Bird et al., 1998; Birkel et al., 1993; Earp et al., 2002; Elder et al., 2005; Navarro et al., 1998; Rauscher et al., 2004; Warrick et al., 1992), but others do not (Campbell et al., 2004; Corkery et al., 1997; Lacey et al., 1991; Sung et al., 1992; Watkins et al., 1994).

Part of the reason for mixed findings may be the varying experimental rigor of LHA study designs used to assess the impact of LHAs intervention in changing health-related outcomes (Swider, 2002). Published evaluations on LHA interventions have in common study design characteristics, which could potentially be problematic in drawing conclusions about the findings. These design issues include lack of standardized measures, high attrition rates, poorly defined interventions, non-experimental designs, reliance purely on self-

reported data, not controlling for possible confounders, and inevitable time lags that exist in detecting health gains attributable to the programs (Lewin et al., 2005a; Lewin et al., 2005b; Swider, 2002; Walker & Jan, 2005). Furthermore, for the enhancement of program development and effectiveness, there must be a better understanding about the key LHA behavioral and psychosocial characteristics needed to implement program activities effectively. For example, how crucial is it to the success of the LHA intervention program that LHAs should model the same health behaviors that they encourage their Confidants to adopt or sustain? There is a need for more exploratory studies to assess the processes in selecting, recruiting, and training LHAs to develop more definitive criteria to assess their various functions and successes in the community (Nguyen, Tanjasiri, Kagawa-Singer, Tran, & Foo, 2006; Rhodes et al., 2007).

2.3 Emerging research directives for LHA interventions

As mentioned earlier, although LHA programs have been used extensively in the U.S. and internationally for community health promotion initiatives, they have mainly been targeted for women's health promotion. Furthermore, there is definitely room for improvement in the area of evaluation research of LHA intervention programs. This next section discusses some emerging directives in the area of LHA intervention research: (a) incorporating men as LHAs, (b) studying implications of Confidant-LHA relationship structural properties on effectiveness of LHA programs, and (c) examining significance of LHA characteristics on effectiveness of LHA programs. Concepts from Interdependence Theory will also be introduced as they relate to the discussion of emerging research directives.

2.3.1 LHA interventions that incorporate men of color as LHAs

Although health disparities are abundant among men of color, very few published intervention studies exist that formally declare the use of natural helper LHAs to promote the health behaviors of men of color (or men, in general) (Eng & Parker, 2002; Wynn, 2005). Part of the reason for lack of natural helper male LHA interventions to promote minority men's health may be the lack of research and understanding about the functional aspects of friendships between men of color, how they relate to one another and influence each other (McCoy, 1998; Staples, 1995), and how those factors impact the design of a male LHA program. Another reason for little visibility of male LHA interventions is because, as mentioned earlier, LHAs can be referred to by many other different terms. Therefore, some programs promoting men's health might be incorporating change agents who go by titles other than LHA but who have roles very similar to LHAs. What is found in the literature are a number of "peer educator" or "public opinion leader"-based health promotion programs with men as their target audiences. They address diverse public health topics such as dietary change, physical activity, and HIV/AIDS risk behaviors; and have revealed positive health behavior changes in their target populations (Buller, Buller et al., 2000; Buller, Burgoon et al., 2000; Buller et al., 1999; Elford et al., 2001; Elford, Bolding, & Sherr, 2004; Elford et al., 2002; Ergene, Cok, Tumer, & Unal, 2005; Fridinger & Vincent, 1989; Hart, 1998; Kelly, 2004; Kelly et al., 1992; Larkey et al., 1999; Lynde, 1992; Morisky et al., 2005; Shuguang & Van de Ven, 2003; Weinrich et al., 1998; Williamson et al., 2001; Ziersch et al., 2000).

Both peer educator and public opinion leader programs are derived from a theoretical foundation that is somewhat similar to key principles of natural helper LHA programs. The peer health education approach is theoretically founded upon the notion that an individual

group member can be an effective advocate for health change due to several psychological and social processes (Larkey et al., 1999). Theories predicting success of peer educator programs have focused on communication within social groups, much like LHA programs. Some of the theories that inform both peer educator programs and those using public opinion leaders are those of Diffusion of Innovations theory and Social Comparison Theory (SCT) (Kelly, 2004; Larkey et al., 1999). SCT further explicates the social, psychological, and interpersonal processes in social networks, which is very relevant and similar to LHA-Confidant interactions as well.

Not all peer educator or opinion leader programs, however, focus on men of color. Furthermore, some differences sometimes exist between peer educator or opinion leader models as compared to the typical natural helper LHA model. For example, the study setting is not always based in the community (e.g., worksites), the network contacts are not always defined by neighborhood relationships or proximity but rather by where the Confidants are more of a “captive audience” (e.g., employees, students), and peer educators may or may not necessarily be deemed as natural leaders by Confidants (Buller, Buller et al., 2000).

Natural helper LHA examples

More recently, researchers and interventionists have begun to consider the natural helper LHA model typically used to promote minority women’s health issues (Baker et al., 1997; Bird et al., 1998; Earp et al., 1997; Elder et al., 2005; Eng, 1993; Ergene et al., 2005; Jackson & Parks, 1997; Meister, Warrick, de Zapien, & Wood, 1992; Sung et al., 1992; Warrick et al., 1992) and to see how they can adapt it to address minority men’s health disparities. For example, the Charlotte, NC REACH (Racial and Ethnic Approaches to Community Health) 2010 program incorporated a LHA intervention to provide outreach,

peer education, referral, and advocacy to their neighbors to decrease the incidence of heart disease and diabetes among African-American residents in northwest Charlotte neighborhoods. Although all the first wave of LHAs were women, the program did recruit and train a few male LHAs to reach males in the community (Chavis, 2004). As mentioned earlier in Section 2.3.1, a current health promotion project in Alabama focuses exclusively on men's health promotion (prostate cancer awareness) and uses exclusively male volunteers to conduct outreach and surveying of men in the community (Wynn, 2005).

A recent body of literature has also indicated that barbershops can be effective sites for community-based health education programs for African-American men, and that barbers might be good LHA candidates (Bowen, 2004; Hart & Bowen, 2004; Holmes, 2004; Staten, 2001). Barbershops patronized by African-American men have been emotional safe havens where conversations are as varied as the men who frequent them. In this male-dominated environment, African-American men discuss a wide range of topics, from local current events to sports to personal subjects such as religion and family matters. A feasibility study was conducted in Seattle-King County, WA, where researchers interviewed 24 proprietors and 88 clients of barbershops that served mainly African-American clientele (Hart & Bowen, 2004). Nearly 80% of the barbers spoke to their clients about health-related topics. Ninety-six percent of the proprietors reported that they would be willing to help their clients learn about prostate cancer. Seventy-five percent reported that they would consider allowing computers to be installed to provide information about prostate cancer. Moreover, virtually all clients reported that they would be willing to receive information about prostate cancer while at the barbershop.

2.3.2 Significance of Confidant-LHA relationship properties

Although the idea of using male LHAs to promote men's health is gaining momentum, what has not been examined is whether Confidant-LHA relationship properties (whether it be male and female LHAs) impact the effectiveness of LHA intervention programs. The type of relationships most routinely studied by social scientists has been focused mainly on friendship, courtship, and marriage among White, heterosexual, educated, middle-class people (Wood & Duck, 1995). Many studies have recruited college students as participants; as a result, much insight on relationships usually is limited to the realm of friendships and romantic relationships among undergraduates. Hence, little is known about the mechanisms of relational identity between working class, minority individuals, and even less about non-romantic friendships between men of color (Wood & Duck, 1995). Friendships between men is still one of the most important, least examined relationships in America, and little research exists on the development and attributes of men's same-gender friendships (McCoy, 1998). Men's studies, especially within psychology, have theorized extensively about male development, yet they usually describe only the period through early childhood or adolescence. Thus, ongoing non-romantic friendships between adult men have been virtually overlooked.

Interdependence theory

The *MAN for Health* study protocol is based on an implicit social network influence conceptual model. Social networks are the sets of social relationships to which people like LHAs and Confidants belong. Social support is a type of behavioral act that LHAs are hypothesized to provide to their Confidants within their social relationships (Heaney & Israel, 2002). LHAs may also exert social influence on their Confidants as well. Both social

support and influence could be important elements of the social relationship between and LHA and Confidant that may influence Confidant health-related behavior and perceptions (Heaney & Israel, 2002; Lewis et al., 1994). Although no single theory adequately elucidates the complex relationship between social relationships and health (Heaney & Israel, 2002), one broader theory that can serve as a theoretical framework to organize other social influence and interpersonal communication theories/frameworks is Interdependence Theory. Interdependence Theory is a dyad-level, social psychology theory that examines the patterns of outcomes that interacting partners, such as LHAs and Confidants, may experience, and how these patterns are influenced by the partners' relationship (Refer to Appendix 1 for conceptual model) (Lewis et al., 2002). Interdependence is the process by which people influence each other's experiences (Rusbult & Van Lange, 1996). It is important for understanding social psychological phenomena because important factors of human experience cannot be understood fully through theories that focus only on individual-level processes only (Rusbult & Van Lange, 1996). Interdependence Theory assumes that the motives shaping human preferences are, to some degree, situation, relationship, and partner specific (Rusbult & Van Lange, 1996). The concept of interdependence can help inform how LHAs and Confidants influence each other's health motives, preferences, or behaviors. Thus, this theory was used to inform the implicit theoretical framework of this dissertation study.

A key concept useful to this study's research questions is *relationship interdependence*. This concept refers to the structural properties of a relationship (e.g., closeness, diversity, length) and is hypothesized to either bring people closer or push them apart (Lewis et al., 2002). These relationship structural properties, when they draw people

closer to each other, are thought to make communication between the partners more effective in changing behavior (Lewis et al., 2002; Lewis et al., 2003). Why should one pay due diligence to the concept of interdependence? First, interdependence shapes everyday interactions and can explain the opportunities and constraints that characterize Confidant-LHA interactions (Rusbult & Arriaga, 2000). Second, interdependence can shape the mental events of LHAs and Confidants (Rusbult, Arriaga, & Agnew, 2001). The cognitions and affect between the two parties impact interventionists' attempts towards identifying the most efficacious dynamics and actions between the two to produce desired health outcomes. Third, interdependence shapes LHA-Confidant relationships (Rusbult et al., 2001). It helps to describe the options and limitations that characterize this unique type of relationship and possibly to delineate the ways to strengthen and maximize the relationship potential.

Confidant-LHA relationship structural properties

Thus, when trying to better understand the potential of social influence or support within male LHA-Confidant relationships, we must realize that many different interpersonal processes and constructs fall under the realm of social influence or support; each of which has its own unique association with health (Lakey & Cohen, 2000). Trying to capture the level of social influence or social support a LHA exerts upon or provides to his Confidant is not as simple as measuring a distinct variable, per se. Instead, the social influence or support process between LHAs and Confidants should not be conceptualized as a product that is delivered or separated from its relationship context (Cohen, Gottlieb, & Underwood, 2000). It is naïve to assume that any 'good' or 'close' Confidant-LHA relationship would automatically enhance all types of social influence or support (Reis & Collins, 2000). For

example, the level of social influence or support a LHA has upon his Confidant is more likely to exist based on how certain characteristics, such as responsiveness, interdependence, and positive affect (Reis & Collins, 2000) operate. Thus, one can view provision of LHA social influence towards his Confidant within an interpersonal context, and it will be shaped within the context of the strengths and weaknesses of the LHA-Confidant relationship. As noted earlier, Interdependence Theory explains behavior by reference to properties that reside between partners- the features of interactions (Rusbult et al., 2001). Reis and Collins (2000) believe that effective interventions should target the particular relationship processes (e.g., closeness, longevity, satisfaction) thought to underlie the desired type of social influence or support successful in producing desired outcomes.

One dimension of relationship properties significant to social influence and social support can be referred to as “nature or extent of interdependence.” These concepts consider the nature or strength of relationships from a structural point of view (Reis & Collins, 2000), mainly the degree and type of influence each partner has on the other (Kelley et al., 1983). Examples of such concepts under this domain include, but are not limited to, closeness, interdependence orientation, and commitment. As compared to closeness, the latter two concepts (interdependence orientation and commitment) are more established and predictable within the context of typical LHA-Confidant relationships. *Interdependence orientation* refers to the norms that govern the exchange of benefits (including help and support) between the two partners (Reis & Collins, 2000). To a large extent, the norms regarding benefit exchange expected within the Confidant-LHA relationship are already fairly well established in that LHAs are expected to provide benefit to the Confidant. LHAs are present, in a sense, to help ‘serve’ their Confidants. This is not to say that LHAs cannot reap certain benefits

from their relationships with Confidants. Some LHAs do report a sense of personal enrichment and satisfaction from their involvement with LHA activities and the relationships they build with their Confidants (Altpeter et al., 1999). A concept like interdependence orientation is less unpredictable and more clearly established within a dyadic relationship like LHA-Confidant than within other dyad relationships, such as two people in a marriage, in which the benefit exchange might be expected to be more bi-directional. As for the concept of *commitment*, it embodies the relationship bond with a future orientation (Reis & Collins, 2000). LHAs and Confidants who have volunteered to be involved in a natural helper LHA program already have a tendency to be more highly motivated and devoted to the goals of the program and to working with each other than would a random pairing of two parties. Most LHAs and Confidants already know each other, to some extent, from their existing social networks. Both parties made a very conscious decision to spend time and interact with one another, despite their busy daily schedules and obligations. Therefore, it would not be surprising that a stable commitment level exists for Confidant-LHA relationship, at least for some extended period in the future.

The concept of closeness, on the other hand, appears to be of great importance to define, measure, and address because it is not as stable, within the context of Confidant-LHA relationships, as are the other two structural relationship properties. Although defined differently by researchers, closeness is a prototypical construct representing common sense notions that relationships differ to the extent that partners are involved with each other and that the closer a relationship is, *the more each partner's behaviors affect the other* (Reis & Collins, 2000). In the 1980's, close-relationship research expanded rapidly, and, in the past decade, social scientists have witnessed a fast growth of interest in close relationships (Aron

& Fraley, 1999). Close relationships are central to human experience and behavior. For instance, having close relationships is a major factor in determining quality of life and the lack of them is a key factor in depression and suicide (Aron et al., 2004). Ironically, much of the research in this area does not explicitly define or agree upon the nature of closeness. One behavioral and systemic definition, however, offered by Kelley and colleagues is often referenced (Kelley et al., 1983). They state that close relationships focus on mutual influence, interdependence, and degree of interconnectedness of activities. This view has served as the basis for development of measures of interpersonal closeness behavior, which normally focus on one or more of the following factors: (a) time spent together, (b) diversity of shared activity, and (c) perceived influence over one's own decisions. Many of the productive consequences of interpersonal relations (e.g., increased social influence) surface from close relationships. To the best of my knowledge, however, no published LHA intervention study, male or female-specific, has ever addressed this structural relationship characteristic directly.

Perspectives on close relationships

Aron and colleagues applied Kelley's definition of closeness mentioned above and delineated a systematic approach to understanding the cognitive foundation of closeness, which is based on the principle that, in a close relationship, each person "includes the other in the self"-- whereby, when two people are close, each person includes aspects of the other as part of himself (Aron et al., 1992). The idea that, in a relationship, other is included in the self is consistent with a wide range of modern social psychological ideas on relationships (Aron & Fraley, 1999). Each self can be conceptualized as a product of multiple relationships throughout its lifespan (Aron et al., 2004). The inclusion-of-other-in-self model has been explicitly linked with interdependence, where it has been described as

“cognitive interdependence – a mental state characterized by a pluralistic, collective representation of self-in-relationship” (Agnew, Van Lange, Rusbult, & Langston, 1998).

Aron has summarized the research trends on close relationships, over the years, to propose a self-expansion principle in that a central human motivation is the desire to expand the self – to acquire resources, perspectives, and identities that enhance one’s ability to accomplish goals. It is a motivation to enhance one’s potential efficacy in life endeavors (Aron et al., 2004), but this is not necessarily a conscious process. The general motivation to expand the self often leads to a desire to enter and maintain a particular type of close relationship because such relationships can be a useful and satisfying means to self actualization. Below are three trends observed in research on closeness in relationships:

(1) Closeness as a changed resource allocation strategy – members of close relationships are motivated to act for outcomes in which they can reap resources (i.e. material, knowledge, social assets) for not only one self but for one’s partner as well because they view that benefiting others is like benefiting themselves (Aron et al., 1992; Aron et al., 2004). Researchers have described close relationships as having a communal quality, in which a partner is motivated by the needs of the other, regardless of the expected reciprocal outcome for the self (Aron et al., 1992). This approach is similar to an empathy model, which helps to explain pro-social behavior and findings showing greater helping for those with whom the person is in a close relationship (Aron et al., 1992). For example, in allocation game experiments where participants make a series of decisions allocating money to self, best friend, and another person(s), allocations to best friend were similar to self (Aron et al., 1992). These results persisted whether or not the other person(s) would know who was responsible for the allocation. Other studies have supported the prediction

that people react to a close other person's outcomes as if they were one's own outcomes (Aron et al., 2004).

(2) *Closeness as a changed actor/observer perspective* –members of close relationships tend to categorize their own view of experiencing the world (either consciously or unconsciously) as more alike with each other than those who are not so close (Aron et al., 2004; Hogg & Turner, 1987). Other studies have shown that the most effective type of power dynamic to encourage behavior change tends to be that of “referent power,” when the person being assisted (i.e., Confidant) feels as if the person in authority (i.e., LHA) shares his values, preferences (van Ryn & Heaney, 1997), and ways of dealing with life events. In other words, if one feels close to another person, then one will evaluate the world as if he is viewing it from the other's perspective. When another is included in the self, people may begin to identify their own traits with those of a close other (Aron et al., 2004). For example, one might hypothesize that there is positive correlation between Confidants' level of closeness with their LHA and how much their own health behaviors are similar to that of their LHAs.

(3) *Closeness as vicariously sharing the other's identities*- members of close relationships act as if some or all aspects of the partner are partially the their own, such as the other person's characteristics or memories (Aron et al., 1992). As a result, the processing and memory related to self and close others may become so overlapping that one may inaccurately recall whether something happened with regard to one's self or one's close other. In studies evaluating this phenomenon, closeness affects memory processes in the sense that, the closer one feels to a person, the more traits one will be able to assign and recall about that individual (Sande, 1988). Furthermore, in a meta-analysis of studies

testing the memory and response time for memory recall and processes, data revealed consistently better memory for words studied in relation to self than for words studied in relation to others, *but* the degree of difference in memory was moderated by the closeness of the other person (Symons & Johnson, 1997).

The literature on relationship interdependence also has shown consistent gender differences, such as men being less likely than women to attempt to change another's health-related behavior (Lewis, McBride et al., 2006). It has been observed that men use fewer relational terms to describe themselves, score lower on measures of relational self-construal, report fewer emotional experiences linked to relationships, are less attuned to information about others' relationships, and are less motivated to behave in ways that maintain close relationships (Cross & Madson, 1997). Explanations for such observed gender differences in relationship interdependence have been put forward, but are, as of yet, untested.

One explanation is that men are relatively more independent and women are relatively more interdependent, differing in the extent to which they view themselves as being separate from, as opposed to being connected to, others (Cross & Madson, 1997; Markus & Kitayama, 1991). Cross and Madsen (Cross & Madson, 1997) assert that, in Western societies, males are more individualistic, while females are more collectivistic. Males are encouraged to be independent and autonomous, whereas females are expected to be interdependent. The argument is that men's view of self as being independent arises from their belief in the inherent separateness of individuals, with others being important as sources of verification and appraisal of men's self. Women's view of self as being interdependent arises from their belief in every individual being embedded in a larger social whole, with

others becoming directly linked to women's self-concept. These gender differences are encouraged by American culture (Cross & Madson, 1997).

A counter explanation views the need to belong and interact with others as being fundamental for all human beings, regardless of gender. That is, both men and women move toward becoming socially connected and fill their respective needs for relationship interdependence in a number of interchangeable ways (Baumeister & Leary, 1995). The argument is that observed differences in men and women's views of self as independent are based in culture rather than gender. For example, men and women, who share the same culture, do not differ on individualistic dimensions of self, but do differ on relational dimensions, such as relationship interdependence (Kashima et al., 1995). Observed gender differences in relationship interdependence are attributed to women's orientation to focus on smaller, more close-knit relationships whereas men's orientation is focused on the collective, such as groups to which they belong. For example, men are more likely than women to help "strangers" who are of the same group, such as of the same town, college, gender, race or ethnicity, and age cohort (Baumeister & Leary, 1995; Gabriel & Gardner, 1999). Furthermore, relationship interdependence for men occurs within a broader sphere than for women because both culture and nature require men to compete for an advantageous place within a social hierarchy of power and status (Gabriel & Gardner, 1999). This evidence suggests that men may be highly successful as LHAs for their social network confidants.

In summary, close relationships are important, because, in part, people are social beings. Social life provides safety, emotional support, and relationship status and bonds that facilitate survival and life goals (Berscheid & Reis, 1998). Therefore, people to whom we feel close can impact us in ways that are more substantial than those to whom we feel less

interconnected. The inclusion-of-other-in self model helps to facilitate some of the discussion that ensues from the observed trends in closeness mentioned above.

Other significant properties of social network ties

When identifying other critical relationship properties that impact social influence between people, many researchers also study the properties of the relationship, such as frequency of contact (number of face-to face contacts and/or by phone or written correspondence), duration (the length of time individuals know each other), or multiplexity (the number of types or diversity of connections or support flowing through each relationship) (Berkman & Glass, 2000). None of the published LHA intervention studies reviewed reported any of these relationship properties in relation to how they were associated with Confidant health outcomes of interests. Therefore, again, a gap in knowledge exists about how these structural properties (including the closeness concept mentioned above) of a Confidant-LHA relationship affect desired health outcomes.

Closeness measures for men of color

Many researchers have tested whether there are cultural differences in people's proclivity towards an interdependent or independent identity – namely how interconnected they feel with others. This body of research stems out of Markus and Kitayama's Self- Construal Theory (Markus & Kitayama, 1991), which posits that some cultures (e.g., North America, Western Europe) have a more independent cultural norm, where people tend to be more independent in relation to other members in society, while other cultures (e.g., Asia, Latin America) have a more collective cultural norm, where members exhibit a more interdependent mode of existence. Study findings have been inconsistent, and results appear to depend on the nature of the measurement indices (Levine et al., 2003). Cross-cultural

studies using behavioral/cognitive measures of closeness or interconnectedness have generally supported the cultural self-construal hypothesis (Heine, Lehman, Peng, & Greenholtz, 2002; Kitayama & Ishii, 2002; Takemura, Yuki, Kashima, & Halloran, 2007), whereas those that adopted more direct self-report, Likert-type scales have yielded inconsistent support (Gudykunst et al., 1996; Kim & Storm, 2000; Kim, Hunter, & Yoon, 1996; Leung & Kim, 1997; Singelis, 1994). One reason for inconsistent results may be that all the applied measures usually involve different number of items; furthermore, the interpretation of these items might not be uniform by subjects nor easily translated across different cultures or languages. To improve the situation, some researchers have opted to use a pictorial measure (vs. verbal descriptions) instead, which might reduce probability of cross-cultural misconstrual. Li and colleagues (Li, 2002) considered the one-item pictorial scale, the IOS scale, for their study. Based on the inclusion-of-other-in-self model by Aron and colleagues (Aron et al., 1992) already mentioned above, the IOS scale has been used primarily to describe dyadic relationships, such as romantic relationships and self-best friend relationships. In applying the IOS scale to various samples, researchers have found it robust and reliable. In recent years, the IOS scale has been modified for use with diverse groups (Aron, Aron, Tudor, & Nelson, 1991; Aron et al., 2004) and for diverse purposes (Tropp & Wright, 2001). An interactive computerized version of the IOS scale has also been created for public use (Le et al., 2007). Rarely, if at all, has the IOS scale been administered to male-to-male friendship dyads between men of color in the United States, so it is questionable whether or not the IOS measure is culturally and socially valid for capturing closeness/interconnectedness in this population.

2.3.3 Significance of LHA characteristics

Another under examined factor in LHA intervention research is the characteristics that LHAs embody. When considering the advancement and refinement of natural helper LHA interventions, it is not unreasonable to ponder whether individual LHA characteristics might influence the main health outcome of interest, usually those of the Confidant. The relationship between a LHA and his Confidant, by intervention design, can be conceptualized as one that involves social influence and interpersonal communication. The pair resides and interacts in the same community, and they belong to a mutual social network (Eng & Parker, 2002). Hence, it is highly likely that Confidants may become aware of their LHAs' health-related attitudes and behaviors (individual LHA characteristics) during the course of their communications and interactions with each other. To hypothesize that when a LHA conveys his own health attitudes and behaviors, he might, in turn, influence his Confidant's health behavior is similar to how one might conceptualize the interpersonal influencing process that takes place in other dyadic relationships, such as husband and wife, parent and child, teacher and student, or peer and peer (Lewis et al., 2002). It is not uncommon in other areas involving dyad-interaction research to take into account the potential effects of the higher group level unit characteristics (i.e. LHA characteristics) on lower level unit outcomes (i.e. Confidant health outcomes). Other areas of dyadic relationship research that have considered the effect of nested levels of interaction include education research with students nested within teacher groups, family/social work research where children are nested within parent groups, and medical interaction research where patients are nested within physician groups (Ashton et al., 2003; Bauman et al., 2002; Ennett et al., 2003; Foshee et al., 2004; Guo, 2005; Street, Gordon, Ward, Krupat, & Kravitz, 2005).

Interestingly, very few LHA intervention studies examine LHA characteristics' influence on Confidant health outcomes. The social influence can occur through LHA and Confidant direct interpersonal communication, which is in line with the tenets of Interdependence Theory discussed above. The concept of interdependence can help explain the effects of LHA characteristics (e.g., attitudes they voice and behaviors they exhibit) on Confidants' health motives, preferences, or behaviors. In other cases, the Confidant might even observe the LHA's behaviors (e.g., eating, physical activity) from a distance throughout different activities and venues and, thus, be influenced by indirect communication with the LHA. This phenomenon, in part, is informed by the observational learning concept of Social Cognitive Theory, whereby behavioral adoption occurs by watching the action and outcomes of others' behaviors (Baranowshi, Perry, & Parcel, 2002). Most scholars who have undertaken the task of providing a conceptual analysis of relationships agree that the essence of an interpersonal relationship lies in the interactions that take place between the relationship partners. The defining hallmark of interaction is influence; each partner's behavior can influence the other partner's subsequent behavior in some way (Reis & Collins, 2000).

Nevertheless, very few publications on LHA intervention studies have reported examining individual LHA characteristics (e.g., health behaviors, empowerment levels) throughout the program (Booker et al., 1997; Chavis, 2004; Flax & Earp, 1999). Of these publications, I highlight three recent ones. These quasi-experimental studies, at best, only provide descriptive statistics of LHA characteristics, and findings were not statistically significant. The first LHA intervention program, aimed at decreasing the incidence of heart disease and diabetes of North Carolinian African-American adults, asked new LHAs to

complete a profile that covered their own health risks and protective behavior in order to answer whether or not their health behavior changed over the course of the intervention program (Chavis, 2004). The LHAs repeated the health survey annually, and the results came from a pool of 12 LHAs who compared health behavior change over the course of the two years. The descriptive study, while certainly susceptible to response bias, revealed that LHAs became more health conscious over the course of the intervention. Overall, the number of LHAs who consumed recommended daily servings of fruit and vegetables and participated in recommended levels of daily physical activity increased. In terms of chronic disease screening, the number of LHAs who obtained cholesterol screening and blood pressure checks increased as well.

A second LHA intervention program which examined LHA characteristics focused on increasing use and knowledge of health care services among migrant farm workers and, as a side inquiry, also explored the status of personal empowerment (self-efficacy) among LHAs as a result of participation in the program (Booker et al., 1997). Nearly all the 27 LHAs surveyed experienced some level of increase in personal empowerment during the intervention period. The third LHA intervention study that captured LHA characteristics aimed to increase initial and repeat breast cancer screening rates among NC low-income, rural African Americans. As part of a detailed process evaluation, staff captured information about the extent of LHA activity in relation to participation in intervention components and developed definitions for the varying activity levels (Altpeter et al., 1999).

Of all the known studies that provide any descriptive statistics of LHA characteristics, none explored their association with health outcomes of the Confidants they reached. The only study found that came close to such an inquiry was one that explored whether a LHA's

health behavior (breast cancer screening) might affect a Confidant's own intention to seek screening (Flax, 1996). Responses from the majority of the 29 respondents suggested that a LHA's own mammography-screening behavior would not influence whether the Confidant listened to the LHA's advice or decided to seek screening. The findings, however, were not tested in any type of experimental design, and results were not statistically significant.

In summary, although LHA characteristics (e.g., health behaviors) have rarely been examined in LHA intervention studies, a theoretical basis exists to warrant such an inquiry, especially how LHA characteristics might impact the Confidant outcomes. Moreover, past LHA intervention studies have either not measured and/or accounted for LHA characteristics with proper statistical analysis methods.

2.4 Conclusion

Minimal documentation exists on effective health promotion programs specifically for men of color, who, as a group, consistently exhibit poorer health status than their White counterparts. The LHA intervention model seems to be especially applicable to communities of color for enhancing health status because these populations seem to turn first to others in their community for information and guidance. Research has revealed that people may have added health status benefits when belonging to close social networks, so LHA intervention strategies are increasingly applied as a viable health promotion approach for a variety of health issues. Although, historically, LHA intervention programs have not focused on men's health disparities, the trend is slowly changing. The methodological shortcomings of many previous LHA studies make it difficult to discern the true effectiveness of LHA intervention programs. Much still needs to be learned, therefore, about the specific pathways that lead to successful LHA interventions. Furthermore, the relative lack of information about how LHA

characteristics and the structural aspects of Confidant-LHA relationships impact the target population's health outcomes suggests that further study may be warranted. Therefore, the first aim of this study was primarily to explore basic descriptive data existing for structural properties of Confidant-LHA relationship interdependence and to examine the concordance of data from different versions of the IOS scale implemented for men of color. The second aim of this study was to investigate the relationship between *structural properties of Confidant-LHA relationships* (diversity, length, interaction frequency, and closeness) and Confidant health outcomes. The third aim of the study was to explore the relationship between *LHA health behavior* and Confidant health outcomes.

CHAPTER THREE:

CONCEPTUAL MODELS, RESEARCH QUESTIONS & HYPOTHESES

Overview

Theoretical perspectives and empirical findings on men's health disparities, natural helper LHA interventions, social influence and social support impact on health, and relationship processes informed the development of the theoretical framework and conceptual models for this study. Specifically, this study applied theoretical constructs from relationship interdependence theory to: (a) inform development of its research questions, (b) inform how LHA interventions might work, and (c) better understand the validity of these theoretical constructs within varied research populations, such as men of color or those who reside in different regions (urban vs. rural). The following sections present the theoretically informed conceptual models, define each construct, and state the research questions and expected results or hypotheses of the study.

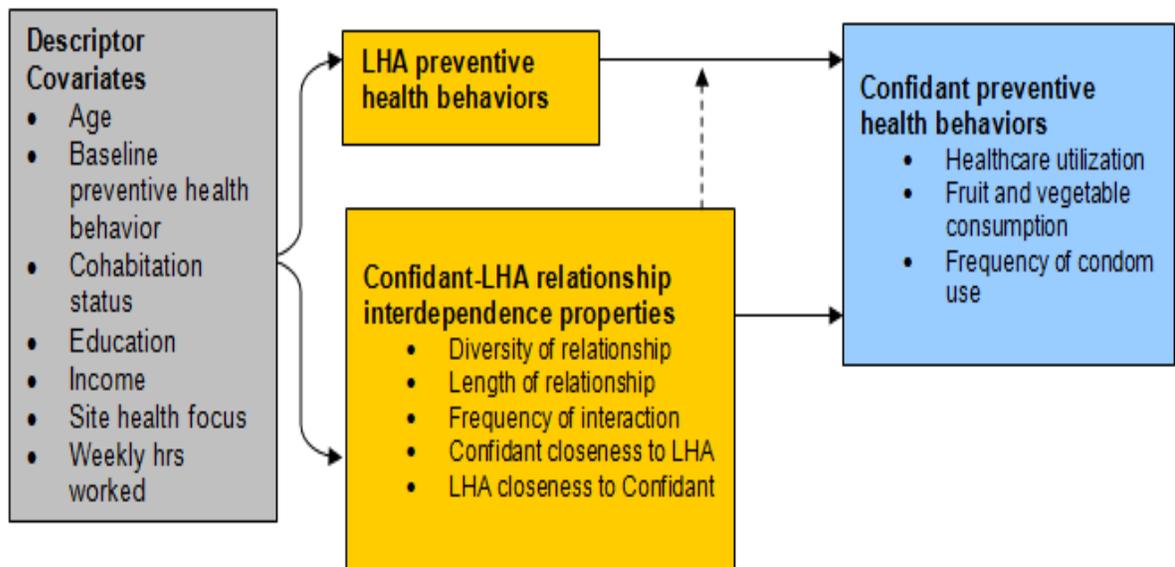
3.1 Conceptual Model

3.1.1 Model Description

Drawing on both the theoretical and empirical literature regarding dyadic relationship interdependence, the conceptual model below (Figure 1) represents the study's hypothesized pathways of how LHA preventive health behaviors and Confidant-LHA relationship properties can impact Confidant health outcomes. Three distinct Confidant preventive health behaviors were examined as outcomes: healthcare utilization visits, fruit and vegetable daily consumption, and frequency of condom use during sexual encounters. I hypothesized that

the outcomes would be affected by two factors with their own separate and direct pathways: structural properties of Confidant–LHA relationship interdependence (Research Question 2.1) and LHA preventive health behaviors (Research Question 3.1). Furthermore, the model highlights the hypothesis that the structural properties of Confidant-LHA relationship interdependence would each moderate the relationship between LHA preventive health behaviors and Confidant LHA preventive health behaviors (Research Question 3.2). Because so little is known about how Confidant-LHA relationship structural properties operate, I wanted to test multiple pathways by which this domain could influence health outcomes. LHA relationship properties were also hypothesized to moderate the effect that LHA characteristics have on Confidant preventive health behavior.

Figure 1. Conceptual model of effect of confidant-LHA relationship interdependence on confidant health outcomes.



Confidant preventive health behaviors (outcome variable) serve as the main outcome variable for the conceptual model. This construct, on a global level, refers to activities that people undertake to prevent or detect illness or also to enhance health. Preventive health behavior generally follows from a belief that such behavior will benefit health. These behaviors include both primary prevention and early detection. Primary prevention behaviors aim to prevent the incidence of disease (Lowe & Clavarino, 2006), such as exercise to improve aerobic fitness and prevent cardiovascular disease. People who increase their levels of physical activity have been found to reduce levels of risk factors such as high blood pressure, high blood cholesterol, and excess body fat. Early detection (or secondary prevention) behaviors aim to prevent early forms of disease from progressing. This involves people who have already developed preclinical disease or risk factors for disease but in whom the disease has not yet become clinically apparent (Lowe & Clavarino, 2006). Within the context of this dissertation study, I was interested in three preventive health behaviors of Confidants: (a) healthcare utilization for routine or screening exams, (b) daily fruit and vegetable consumption, and (c) frequency of condom use during sexual encounters. One of the reasons for including multiple dependent variables is because each of the study's three community sites focused on a different health topic during the course of implementing its LHA intervention program. More details about these measures and the method to account for different community health topic focus are provided in Chapters 5 and 6, which report the results of the study.

Confidant-LHA relationship structural properties (predictor variables) consists of four aspects: closeness, diversity, frequency, and length of relationship.

Perceptions of closeness

Although conceptualizing the meaning of close relationships across disciplines may not be universal, one way in which a close relationship can be defined is one of strong, frequent, and diverse interdependence that lasts over an extended period of time (Kelley et al., 1983). Some examples of such relationships are friendships, intimate relationships, marriages, and parent-child relationships. Researchers who study close relationships have often characterized them by properties of strength, frequency, diversity, duration, and interdependence. These properties may shift in degrees over time, while the relationship is still able to be considered 'close' (Kelley et al., 1983). To some people, close may have a connotation of intimacy and positive emotions, which are not entirely appropriate to the full range of relationships that can actually be considered close. Relationships do not need to involve the exchange of intimate information or even produce regular intense positive feelings in order to be tightly interconnected in the ways closeness is defined by Kelley and colleagues (1983). For example, close co-workers may never share intimate details of their personal lives; spouses may feel great hostility for each other but continue to have strong effects on each another.

Other researchers in the field have also offered a wider repertoire of features for close relationships, which include, in addition to Kelley's main proposed features, shared norms (e.g., about communication, responsibilities), attitudes (e.g., liking, trusting), and beliefs about the relationship (its uniqueness, importance) (Huston & Burgess, 1979). The idea of closeness as overlapping selves, people's sense of interpersonal interconnectedness, also seems to be consistent with a wide variety of approaches to closeness in the social psychology literature (Aron et al., 1992; Aron et al., 2004; Baranowshi et al., 2002; Hogg &

Turner, 1987; Sande, 1988; Toms & Hobbs, 1997). Some researchers have posited that, in close relationships, the individual acts as if some aspects of the partner are partially the individual's own -- a vicarious sharing of each other's traits and abilities.

Diversity of relationship

The diversity of a relationship can be viewed as the pathway(s) by which the partners are connected to each other (e.g., co-worker, neighbor, friend, spouse, relative) and help to instigate the social support and influence that flows through the relationship (Berkman & Glass, 2000). Many researchers examining the level of social influence and support that exist within social networks are interested in capturing the diversity or multiplexicity of how people know/are connected to each other as an influential variable.

Length of relationship

The length of a relationship is the duration of time partners have known each other (Berkman & Glass, 2000). Like the concept of diversity of relationship, many researchers examining the level of social influence and support that exist within social networks are also interested in how long people have known each other as influential variable.

Frequency of relationship

One way to conceptualize frequency of interaction in a relationship is the number of face-to face or written contacts partners may have with one another over a certain period of time (Berkman & Glass, 2000). In the context of examining a behavior change intervention that involves both partners interacting within the context of program activities, it behooves one to examine frequency of interaction *outside* program activities, which possibly captures a more realistic and natural account of the interaction frequency between the two parties.

LHA characteristic (predictor variable) consists of LHA preventive health behaviors. The meaning of this construct is identical to that of the main outcome variable, “Confidant preventive health behaviors,” as discussed above under Section 3.1.3.1. For the purposes of this dissertation study, the conceptualization of LHA preventive health behaviors is the same as that for his corresponding Confidants: (a) healthcare utilization for routine or screening exams, (b) daily fruit and vegetable consumption, and (c) frequency of condom use during sexual encounters.

3.2 Research Questions and Hypotheses

3.2.1 Aim 1

Examine and describe patterns of correlation among structural properties of Confidant-LHA relationship interdependence (*diversity, length, interaction frequency, closeness*) among African-American and Latino men who participated in a LHA intervention program, and test the concordance of our adapted IOS (Inclusion of Others in Self) closeness measure with the original IOS scale.

RQ 1.1 What are the correlations between all the structural relationship properties: Confidant closeness to LHA, LHA closeness to Confidant, relationship diversity, interaction frequency, and length?

Expected result 1: All relationship properties will be positively correlated with one another.

RQ 1.2 Do the patterns of correlation between Confidant closeness to LHA, LHA closeness to Confidant, relationship diversity, interaction frequency, and length vary by race?

Expected results 2: The correlation patterns of structural relationship properties will not vary by race.

RQ 1.3 Do the structural relationship properties' mean scores (Confidant closeness to LHA, LHA closeness to Confidant, relationship diversity, interaction frequency, and length) differ by race?

Expected results 3: Structural relationship properties' mean scores will not significantly vary by race.

RQ 1.4 To what extent are relationship diversity, interaction frequency, length and LHA closeness to Confidant significantly associated with Confidant closeness to LHA?

H1.4.1 Increased relationship diversity will be significantly associated with increased Confidant closeness to LHA.

H1.4.2 Increased relationship interaction frequency will be significantly associated with increased Confidant closeness to LHA.

H1.4.3 Increased relationship length will be significantly associated with increased Confidant closeness to LHA.

H1.4.4 Increased LHA closeness to Confidant will be significantly associated with increased Confidant closeness to LHA.

RQ 1.5 If any main effects exist between any of the structural relationship properties (relationship diversity, interaction frequency, length LHA closeness to Confidant) and Confidant closeness to LHA, do they vary by race?

H1.5.1 The extent to which relationship diversity, interaction frequency, length and LHA closeness to Confidant predict Confidant closeness to LHA will not vary by race.

RQ 1.6 What is the level of concordance between the socio-culturally adapted IOS scale of closeness, the original IOS scale, and a verbal equivalent scale of closeness?

H1.6.1 Original IOS scale and adapted IOS scale will be significantly correlated.

H1.6.2 Verbal equivalent closeness scale and adapted IOS scale will be significantly correlated.

3.2.2 Aim 2

Examine and describe the association between Confidant-LHA relationship properties (*diversity, length, interaction frequency, closeness*) and Confidant preventive health behaviors.

RQ 2.1 To what extent are Confidant-LHA relationship (a) diversity, (b) length, (c) interaction frequency, and (d) closeness related to Confidant preventive health behaviors?

H.2.1.1 As the variety of ways in which Confidant-LHA pairs know each other (diversity) increases, Confidants will exhibit higher levels of preventive health behaviors.

H.2.1.2 As the period of time in which Confidant-LHA pairs have known each other (length) increases, Confidants will exhibit higher levels of preventive health behaviors.

H.2.1.3 As Confidant-LHA pairs increase their interaction frequency with one another outside project activities, Confidants will exhibit higher levels of preventive health behaviors.

H.2.1.4 As LHA closeness to Confidant increases, Confidants will exhibit higher levels of preventive health behaviors.

H.2.1.5 As Confidant closeness to LHA increases, Confidants will exhibit higher levels of preventive health behaviors.

3.2.3 Aim 3

Examine and describe the association between LHA preventive health behaviors and Confidant preventive health behaviors.

RQ 3.1 To what extent are LHA preventive health behaviors related to Confidant preventive health behaviors?

H 3.1.1 As LHAs demonstrate higher levels of preventive health behaviors, Confidants will demonstrate higher levels preventive health behaviors.

RQ 3.2 To what extent do Confidant-LHA relationship properties interact with the association between LHA preventive health behaviors and Confidant preventive health behaviors?

H.3.2.1 The effect of LHA preventive health behaviors on Confidant preventive behaviors will be strengthened as the number of ways in which LHAs and Confidants know each other increases.

H.3.2.2 The effect of LHA preventive health behaviors on Confidant preventive behaviors will be strengthened as the length of time in which LHAs and Confidants know each other increases.

H.3.2.3 The effect of LHA preventive health behaviors on Confidant preventive behaviors will be strengthened as the Confidant-LHA interaction frequency outside project activities increases.

H.3.2.4 The effect of LHA preventive health behaviors on Confidant preventive behaviors will be strengthened as Confidant closeness to LHA increases.

H.3.2.5 The effect of LHA preventive health behaviors on Confidant preventive behaviors will be strengthened as LHA closeness to Confidant increases.

CHAPTER FOUR: RESEARCH METHODS

Overview

The following topics will be discussed: (1) research design of the original data source, (2) eligibility criteria for the secondary data analysis, and (3) general overview of data analysis strategies.

4.1 Data Source

4.1.1 Description

The data for this dissertation study came from the *Men as Navigators (MAN) for Health Study*, which was conducted from 2004-2007. The study design and measures of *MAN for Health Study* suited this study's research aims well. Specifically, *MAN for Health's* multiple data collection waves, African American & Latino cohorts, extensive LHA predictor measures as well as Confidant outcome measures, and linked LHA and Confidant samples are necessary features to examine this proposal's aims. The goal of *MAN for Health Study* was to understand and improve, in three different communities, prostate health behaviors among rural African-American men; cardiovascular health behaviors among urban African-American men; and sexual health behaviors among rural Latino men in NC. It is important to note that although the health focus in each community was different, one common goal across all health/disease topics is to improve participants' knowledge about the benefits of preventive healthcare visits and to increase their access and utilization of available healthcare services.

The *MAN for Health Study* was a quasi-experimental pre-post no control group design study of a male natural helper LHA intervention model to modify the effects of male gender socialization and institutional racism on various health outcomes. LHAs were trained to conduct *MAN learning circles*, a facilitated group discussion technique developed by Toms in order to help promote preventive health behaviors and improve chronic disease and sexual health outcomes among Confidants (Toms & Hobbs, 1997). The learning circles used scenarios to encourage discussion and practice of healthy behaviors within social groups that help men understand and cope better with society's expectations of masculinity. Learning circles also can help men develop skills to become advocates for their communities. Examples of *learning circle* activities included exercise clubs, men's day activities that incorporate health information and activities (sporting events, fishing trips, father-son day, cookouts, block parties, food tasting/preparation), support groups, health screenings, and stress reduction (coping strategies, support groups, life skills training).

Baseline surveys began February 2005 and continued on a rolling basis as LHAs and Confidants were being recruited. Follow-up interviews were conducted six and twelve months after baseline surveys were completed. The study ended in March 2007. The interviews for both LHAs and Confidants assessed the behavioral and psychosocial measures used in this dissertation study: use of preventive and early detection services, diet activity, condom use, and Confidant-LHA relationship structural properties. The Public Health Institutional Review Board at The University of North Carolina at Chapel Hill approved the *MAN for Health* study protocol.

4.1.2 Sampling Strategy

Participants in the *MAN for Health* study included African-American and Latino men

ages 18 years and older who must volunteer to participate in the project. A non-probability purposive sampling strategy was used to recruit both LHAs and Confidants. Recruitment of LHAs occurred through Project Coordinators from each of the three communities, where the target health condition varied in each community. Community A comprised rural Latino men focusing on sexual health and prevention of sexually transmitted diseases. Community B comprised rural African-American men focusing on informed decision-making regarding prostate health and screening. Community C comprised African-American men focusing on improving cardiovascular health. Recruitment of Confidants occurred through the LHAs. Each LHA was encouraged to recruit at least 10-12 local men as Confidants with whom they have a relationship as a trusted coworker, neighbor, friend, family member, or associate. This relationship was necessary in order for men to entrust the LHA with information on their use of health services, risk behaviors and attitudes, and perceptions about institutions. Hence, it was necessary for each LHA to recruit his own Confidants directly. Also, within this evaluation design, the communities and individuals served as their own controls (Campbell & Stanley, 1966).

4.1.3 Study Sample

To be eligible as either a LHA or Confidant in this dissertation study, participants had to be either African-American males ages 18 and over residing in Orange and Chatham counties or Latino males ages 18 and over residing in Chatham County. They also were required to complete both a baseline and six month follow-up survey to be included in this dissertation study. In the end, a total of 203 Confidants and 24 LHAs comprised the sample of this dissertation study.

4.1.4 Data Collection

The primary data source for this study came from the *MAN for Health Study* questionnaires at two time points: baseline and 6-month follow-up interviews conducted with LHAs and Confidants. Trained Project Coordinators in Chatham, Orange, and Wake counties conducted the LHA interviews as a group, with a minimum of two LHAs each in order to conduct the group interview. LHAs filled in their own answers, placed their completed questionnaires in a sealed envelope and returned to Project Coordinators. In terms of Confidant data, each trained LHA surveyed his group of Confidants whom he recruited. The same data collection protocol used with LHA surveys was followed with Confidant survey administration. Similar methods were used for the six-month follow-up interviews of both LHAs and their Confidants. Participants were considered ‘lost’ if they were unable to be contacted for follow up.

4.2 Data Analysis Overview

After screening the data, data analysis was conducted in two stages. For the exploratory analysis phase (mainly research aim #1), initial descriptive, correlational, and bivariate analyses were performed. This initial stage was performed using statistical software package Statistical Package for the Social Sciences (SPSS) v.15.0 for Windows (SPSS Inc, 2007). The basic purpose of this stage was to detect outliers and unusual frequency distributions, detect inconsistencies, and inform the model building second phase. Another point of special interest in the descriptive analysis was to see whether the trends of the predictor variables (LHA and Confidant-LHA relationship properties) manifested differently based on race. This information can help to interpret findings and customize future interventions involving communities with the same socio-demographic factors.

In the second stage (mainly research aims #2-3), multilevel regression models were used to determine the independent associations between the various explanatory variables already discussed and the three Confidant preventive health behavior outcomes of interest: (a) healthcare utilization for routine or screening exams, (b) daily fruit and vegetable consumption, and (c) frequency of condom use during sexual encounters. Various versions of hierarchical generalized linear modeling (HGLM) were used to identify the direct and/or indirect effects of LHA and Confidant-LHA relationship properties on the three Confidant preventive health outcomes. HGLM was used when discrete or limited dependent variables are involved (Guo, 2005) and they employ either penalized quasi-likelihood (PQL) or marginal quasi-likelihood estimation (Guo & Zhao, 2000). HGLM analyses was handled by the statistical software package Hierarchical Linear and Nonlinear Modeling (HLM) 6.04 (Scientific Software International Inc, 2007).

4.2.1 General Analysis Strategy

HGLM was used instead of conventional regression models for two main reasons. First, conventional multivariate regression models are not appropriate for analysis of grouped data where Confidants are nested within different LHA groups (a specific LHA interacts with a specific group of Confidants). This type of data requires special treatment because most multivariate models assume that observations (i.e., Confidant preventive health outcomes) are independent from one another, but being grouped together in activities with the same LHA can invalidate this assumption (Guo, 2005). To account for possible correlation among Confidants belonging to the same LHA group, a multilevel regression strategy like HGLM was used for this dissertation study (Guo & Zhao, 2000). This analysis strategy assumed hierarchical structured data with outcome variable measure at the lowest analysis level

(Confidant) and predictor variables at all existing levels (Confidants and LHA level). This modeling technique corrected for potential intra-class correlation by adding random effects to the model (Guo, 2005). Analysis comparing LHA groups was conducted with 24 LHA clusters.

Second, HGLM was used instead of standard HLM techniques because the latter assumes that the dependent variable(s) of interest has a continuous distribution and that the residuals at all levels have a normal distribution (Snijders & Bosker, 1999). These assumptions of linearity and normality, however, did not hold true for this dissertation study, where the three dependent variables (for research aims #2-3) were either discrete count (health care utilization visits and fruit and vegetable consumption) or dichotomous in nature (condom use) after they were rescaled. Using HGLM, nonlinear transformation of the predicted value was able to satisfy this constraint (Raudenbush & Bryk, 2002). In short, HGLM offered a coherent modeling framework for this study design, which included multilevel data with nonlinear structured models and non-normally distributed errors.

For this study, only two time points were assessed, where baseline measure served as a control, so there was no need to have a level that models within-Confidant variance due to a time trajectory (which would usually requires a minimum of 3 time points anyhow). Thus, this dissertation's study design involved a two-level model where Confidants (level 1) were nested within LHAs (level 2), so data clustering existed at the LHA group level. Level 1 variables were the Confidant-LHA relationship properties, while level 2 variables were LHA characteristics.

Excluding the research questions that involved an exploratory analysis (and thus, only expected results were offered) and the hypotheses that involved testing the concordance of

the three IOS scale measures (which were tested using SPSS), all remaining study hypotheses were tested using HLM 6.04 (Scientific Software International Inc, 2007). This statistical program allowed for simultaneous evaluation of group level (LHA) and individual level (Confidant) variables on our individual level outcome. It can specify the odds of achieving an outcome as a function of variation occurring between and within two levels of effects. In this dissertation study, LHA groups and Confidants represented these two levels.

HLM 6.04 also accounted for clustering of Confidants within LHA groups by formally representing each of these levels in its own sub-model. Each model expressed the relationship among variables within a given level and, in turn, specified how each variable at one level influences, or fails to influence, the relationships of variables at the other levels. On the LHA group level, the model included a random error term, which allowed the intercept to vary between LHA groups. As a result, variation between LHA characteristics could be examined and explicitly accounted for as an independent determinant of Confidant preventive health behavior.

4.3. Human Subjects

Human subject approval from the UNC Institutional Review Board was received before conducting this study's secondary data analysis.

CHAPTER FIVE

Relationship Structural Properties of African-American and Latino Male Lay Health Advisors and Their Confidants: Closeness, Diversity, Length and Interaction Frequency

ABSTRACT

Introduction: In the United States, African-American and Latino males experience higher rates of morbidity, disability, and disease than their White counterparts. Lay health advisor (LHA) intervention programs are one strategy to address ethnic and racial health disparities, whereby transferring interpersonal interactions to health-enhancing effects. Most LHA studies, however, have not been geared towards men, and have given little focus to relationship structural properties. Existing validated closeness measures have rarely been administered to adult male-to-male friendship dyads between men of color. **Methods:** This study involves secondary data analysis from a LHA intervention study working with African-American and Latino males to improve preventive health behaviors. Guided by Interdependence Theory, this study primarily involved: (a) an exploratory examination of descriptive data of the structural properties of male Confidant-LHA relationships, (b) an analysis of whether Confidant closeness to LHA is associated with any other relationship structural properties, and (c) a concordance assessment of results from three one-item measures of closeness. Confidant-LHA relationship structural properties referred to diversity, length, interaction frequency, and closeness. Three measures of closeness included the original Inclusion of Others in Self (IOS) scale, an adapted IOS scale, and a verbal

equivalent IOS scale. The study sample included 227 African-American and Latino men residing in North Carolina. Data included baseline and six-month follow-up time points. We calculated descriptive frequencies and used multilevel regression modeling to examine the relationship structural properties data. To evaluate correlations between the three versions of IOS scale, we calculated the Kendall's tau test coefficient. **Results:** (a) No major differences appeared to exist between the African-American and Latino samples in regards to mean scores for relationship structural properties, with the exception of Interaction Frequency. Latino Confidant-LHA dyads, on average, interacted more frequently outside project activities than their African-American counterparts. (b) Most of the relationship property correlations were, at best, moderate and did not vary by race. Nine out of ten pairs had positive correlation values, ranging between .055 and .416. (c) Multilevel model results revealed that, regardless of race, LHA closeness to Confidant had a significant positive association with Confidant closeness to LHA. (d) For original IOS scale versus the adapted IOS scale [$r=0.636$ ($p<.001$)] and the adapted IOS scale versus the verbal equivalent IOS scale [$r=0.602$ ($p<.001$)], the Kendall coefficient indicated fairly strong correspondence between these measures' responses. **Conclusion:** First, closeness between LHA and Confidant, in general, is correlated with knowing each other longer, interacting with each other more frequently, and having more diverse connections to one another. One significant predictor of Confidant closeness to LHA is LHA closeness to Confidant. Second, in this sample, African-American and Latino men did not differ in their level of closeness with their male social peers, nor did relationship structural property correlation patterns differ by race. According to Interdependence Theory, because the profiles of their relationship structural properties are comparable, both African-American and Latino men may be similar in their

acceptance of social support and, thus, receptive to interventions like LHA programs. Finally, fairly strong correlation between our socio-culturally adapted IOS measure and the original IOS measure lends credence to using the adapted IOS measure for our sample of African-American and Latino males. Future research with similar populations can better determine the validity of this proposed modified measure of closeness.

INTRODUCTION

Health Disparities among Men of Color: In the United States, men who belong to racial and ethnic minority populations experience higher rates of morbidity, disability, and disease than their White counterparts (Williams, 2003). These health disparities are very apparent among African-American and Latino men, which calls for heightened attention from both health care providers and policy makers to the health promotion and disease prevention efforts for these populations (Rhodes et al., 2007; Treadwell & Ro, 2003). African-American men have the shortest life expectancy of any group and live about seven years, on average, less than White men (National Center for Health Statistics, 2007). African-American men in North Carolina are at higher risk than their White counterparts for the following: diabetes, stroke, kidney diseases, prostate cancer, AIDS, homicide, and asthma (Centers for Disease Control and Prevention, 2006). Latino men's lifespan is about five years shorter than White men (National Center for Health Statistics, 2007). From 2001-2005, the North Carolina HIV rate for Hispanics was nearly three times the rate for Whites. Similarly, the sexually transmitted disease rate was greater for Hispanics than Whites (North Carolina Department of Health and Human Services, 2006). A variety of factors are associated with men's health and life expectancy, some of which include socioeconomic status, race/ethnicity, and access to health care (Courtenay, 2000). Some other determinants of

men's disparate health status, especially for men of color, include the following: poor work conditions, personal health/self care practices, stress, impaired coping and emotional processing abilities, cultural beliefs, environmental factors, differential access to healthcare services, and potential bias among treating providers (Kreiger, 2005; Satcher, 2003; Vines & Godley, 2004; Williams, 2003). Unfortunately, health promotion programs and health care systems that embrace men's particular socio-cultural needs, especially men of color, are scarce when in relation to health services access and utilization (Porche & Willis, 2004; Rhodes et al., 2007).

Lay Health Advisor Programs: One strategy to address ethnic and racial health disparities has been to implement lay health advisor (LHA) intervention programs, by which indigenous members of a population (i.e., LHA) provide health promotion activities to individuals (i.e., Confidants) in their informal networks (Bird et al., 1998; Earp et al., 2002; Earp & Flax, 1999; Elder et al., 2005; Eng, 1993; Navarro et al., 1998; Sherrill et al., 2005; Swider, 2002; Teufel-Shone, Drummond, & Rawiel, 2005; Watkins et al., 1994). LHA interventions have become increasingly popular over the years for addressing numerous communities' health disparities. LHA programs are based on an implicit social network influence model where an integral part is the exchange of social support, such as information, advice, tangible aid, and referrals to external resources (House, Umberson, & Landis, 1981). LHAs are expected to hold a more insightful understanding of their community's strengths, weaknesses, and social networks (Rhodes et al., 2007) because the LHAs reflect socioeconomically, ethnically, and culturally the communities for which they advocate. Therefore, it is projected that LHAs can exert social influence on their Confidants through the social support process (Heaney & Israel, 2002).

From a public health perspective, the associations found between social support, social influence, and health (Broadhead et al., 1983; Cassel, 1976; Nuckolls & Cassel, 1971) hold substantial potential for translating these health-enhancing effects into interpersonal interactions through LHA interventions (Berkman & Glass, 2000; Berkman & Syme, 1979; Lewis et al., 2002; Lewis et al., 1994; Vaananen et al., 2005). That said, the association between social relationships and health is still complex, as evidenced by social support interventions that address health (e.g., LHA programs) having mixed results (Cohen et al., 2000; Lewin et al., 2005a; Lewin et al., 2005b; Swider, 2002). Interestingly, LHA programs involving men as advisors in promoting other men's preventive health behaviors are almost non-existent (Eng & Parker, 2002; Rhodes et al., 2007). Translation of social support research to health promotion programs which specifically target men are few; gaps in knowledge still exist about the functional aspects of friendships between men (DeVellis, Lewis, & Sterba, 2003), how they relate to one another and influence each other in behavior change (McCoy, 1998; Staples, 1995; Wood & Duck, 1995). Provision of social support by LHAs has been studied as a gender-neutral process, with scarce attention given to properties of the relationship itself between men, which may assist or impede men's expression and acceptance of social support and, ultimately, improve or undermine their health behaviors (Cross & Madson, 1997; Reis & Collins, 2000). With limited empirical research on men-to-men's platonic relationships, we have drawn on current theoretical work from social psychology and relationship science to inform our study.

Interdependence Theory and Relationship Structural Properties: When examining possible “active ingredients” of a successful LHA intervention, most studies have traditionally regarded and measured health-related relationships as unidirectional, from an

LHA to his Confidant, rather than as an interdependent process (DeVellis et al., 2003). In a relationship, one partner's behaviors cannot be freed from the influence of the other partner's behaviors. Most scholars in relationship science agree that the essence of an interpersonal relationship lies in the interactions that take place between the partners. The defining hallmark of interaction is influence; each partner's behavior can influence the other partner's subsequent behavior in some way (Reis & Collins, 2000; Rusbult & Van Lange, 2003). A common bias of health-related relationship studies, however, has been continually examining one side of two-sided interactions, which can result in limited understanding of relationship phenomena from the dual perspectives of both partners (Kenny, Kashy, & Cook, 2006). Explanations of behavior, in reference to relationship interdependence, are the focus of Interdependence Theory (Kelley et al., 1983; Rusbult et al., 2001). The theory defines interdependence as the process by which interacting partners influence each other's experiences. Thus, high level of interdependence in a dyad can be likened to high level of influence with one another. In relationship science, influence is often thought of as very intertwined with the concepts of closeness and interdependence (Berscheid & Peplau, 1983; Reis & Collins, 2000); for this study, closeness was conceptualized along this paradigm. Thus, the closer a relationship is, the more each partner's behaviors influence the other (Reis & Collins, 2000), and, thus, have high interdependence. Just as social networks have structural properties, such as reciprocity or density (Heaney & Israel, 2002), the theory refers to relationship interdependence as the structural properties of a relationship, e.g., diversity, interaction frequency, and length (Lewis et al., 2002). Interdependence Theory examines how a pattern of behavioral outcomes is influenced by the experiences of partners in a dyad (e.g., LHAs and Confidants) and posits that *structural properties of their relationship can*

bring partners either closer to each other or push them apart (Lewis, 2002). When these structural properties draw partners closer to each other, the theory contends that communication and social influence between the partners will be more effective in changing each partner's behavior (Kelley et al., 1983; Lewis et al., 2002; Lewis et al., 2003). Hence, for example, based on this theory, one could speculate that how close (interdependent) one feels towards another can, potentially, impact behavior change, and that the level of closeness may be based on how long people have known one another, how often they interact, and the diversity of the roles they play in each other's lives. To our knowledge, no published LHA intervention study, male or female, has ever directly examined the structural properties of Confidant-LHA relationships and their effects on Confidant health outcomes (Heaney & Israel, 2002; Lewin et al., 2005b; Nemeck & Sabatier, 2003; Rhodes et al., 2007).

Measuring Closeness in Confidant-LHA dyads: Over the past two decades, close-relationship research has risen rapidly (Aron & Fraley, 1999). Even though measuring relationship interdependence among Confidant-LHA dyads is not common in LHA intervention research, multiple scales do exist which tap into partners' levels of closeness or interconnectedness (Aron et al., 1992; Berscheid, Snyder, & Omoto, 1989; Levine et al., 2003; Li, 2002). One measure of closeness, which has been used by researchers from varying fields of social science, is the Inclusion of Self in Others (IOS) scale (Aron et al., 1992; Li, 2002; Mashek et al., 2007; Tropp & Wright, 2001; Uleman et al., 2000), which is intended to tap into people's sense of interpersonal connectedness. A one-item pictorial measure, the IOS scale has been the instrument of choice for many researchers because of its demonstrated test-retest reliability as well as discriminant, convergent, and predictive validity that match or exceed other measures of closeness – measures that are usually much more lengthy and

complex (Li, 2002). Furthermore, the scale has been used effectively in other studies of relationships that include both genders and varying types of relationships (e.g., spouses, friends, family members) (Aron et al., 1992; Aron et al., 2004). Rarely, however, has the IOS scale been administered to male-to-male friendship dyads between men of color in the United States. A recent international roundtable discussion of public health researchers and policy makers cited that one issue hindering success in research with low-income and seldom studied communities is the lack of culturally appropriate methodology, which includes using unsuitable measurement tools, which then obscure the true reality of a studied topic (Cardona & Joshi, 2007). Therefore, it is reasonable to question how culturally or socially appropriate the IOS measure would be for capturing closeness/interdependence in this population of men. If, indeed, a modified IOS scale is proposed for use, then it is worthy to examine its concordance with the original scale.

Study Questions and Hypotheses: Given the absence of prior research on the structural properties of male LHA-Confidant relationships, the following questions were explored:

- What are the correlations between all the structural relationship properties: Confidant closeness to LHA, LHA closeness to Confidant, relationship diversity, interaction frequency, and length?
- Do the patterns of correlation among all the structural relationship properties vary by race?
- Do the mean scores for all the structural relationship properties differ by race?

The following are the study hypotheses:

- Confidant closeness to LHA will be positively associated with

- Relationship diversity.
- Relationship interaction frequency.
- Relationship length.
- LHA closeness to Confidant.
- The extent to which relationship diversity, interaction frequency, length, and LHA closeness to Confidant are associated with Confidant closeness to LHA will not vary by race.
- Original IOS scale and adapted IOS scale will be significantly correlated.
- Verbal equivalent closeness scale and adapted IOS scale will be significantly correlated.

METHODS

Study Setting, Sample and Design

This study analyzed secondary data from the *Men As Navigators (MAN) for Health* study, a community-based participatory research study funded by the Centers for Disease Control and Prevention from September 2003-March 2007. MAN for Health examined the efficacy of a male LHA intervention model to improve prostate health behaviors among rural African-American men, cardiovascular health behaviors among urban African-American men, and sexual health behaviors among rural Latino men in North Carolina. The study took place in three counties in central North Carolina and collected data at three time points: baseline, six-month, and twelve-month follow-up. The present study used only the first two waves of data.

Project Coordinators from each of the three sites recruited the male LHAs through the advisement of members from their community advisory, group along with their own knowledge of the community's socio-cultural landscape. The Latino site recruitment strategy,

however, involved an additional unique component whereby the Latino LHAs were all recruited from local existing Latino soccer leagues. LHAs from all sites were then trained to recruit and provide health information to up to twelve men (Confidants) in their local social network (e.g., coworker, neighbor, friend, family member). Again, the Latino LHAs identified most all of their Confidants from their soccer team networks. The LHAs directly establishing a relationship with their Confidants was necessary in order for men to entrust the LHA with personal information, such as their use of health services or risk behaviors and attitudes. Hence, it was necessary for each LHA to recruit and enroll his own Confidants directly. Also, within this evaluation design, the communities and individuals served as their own controls (Lewis et al., 2002) in a pre-post test quasi-experimental design. All study participants met the following eligibility criteria: self-identified as African-American or Latino male, literate in Spanish or English, 18 years of age or older, resided in one of the three study counties, volunteered to participate as either a LHA or Confidant, and gave written informed consent.

Data Collection Procedures

Baseline data were collected from LHAs and Confidants before the *MAN for Health* twelve-month intervention began. Time 2 data were collected six months after the intervention started. All surveys with African Americans were conducted in English, while all surveys with Latino participants were conducted in Spanish. Project Coordinators facilitated data collection with LHAs in a small group setting. The questionnaires were self-administered by the LHA and took approximately 30-60 minutes to complete. The Project Coordinator was present and available for questions during this time. LHAs received a monthly stipend of \$100 for participating in the intervention and completing the surveys. In

turn, LHAs administered questionnaires with their Confidants in a group setting. Prior to data collection activities, like the Project Coordinators, LHAs were also trained in interviewing procedures and research ethics. To administer the questionnaire, LHAs read the questions aloud as Confidants marked their responses on their individual questionnaire. The Confidant questionnaires took approximately 30-60 minutes to complete. Confidants received \$5 for completing the Time 1 questionnaire and \$10 for completing the Time 2 questionnaire.

Measures

Research staff for the *MAN for Health* study developed a questionnaire based on prior research, and it was reviewed and modified for cultural appropriateness by the academic research study team and community research partners. The survey was also pilot tested for conciseness, clear communication, and acceptability with community advisory group members from each site prior to the start of data collection. After the English version was finalized, the survey was translated into Spanish. In addition, towards the end of the study, Project Coordinators met with their respective community advisory group members to administer a brief survey, which contained three measures of closeness. The three closeness scales were included in one brief questionnaire, which took approximately 3-5 minutes to answer. Instructions on the questionnaire guided participants to select one important male person in their lives (e.g., boss, friend, neighbor, relative, etc) and to complete the questions based on that person. The participants were told that the purpose of the questionnaire was to examine different ways to inquire about a similar topic with men similar to them demographically and culturally.

Closeness/Interconnectedness Measure: The IOS scale (Aron et al., 1992) is the instrument on which the *MAN* research team based the culturally adapted IOS scale – the

measure used to measure closeness between Confidant and LHA (see next variable below). The original IOS scale was administered to community advisory group members to explore the extent of concordance with the adapted IOS study measure. Aron's evidence (1992) supports the psychometric and substantive suitability of the IOS scale as a measure of closeness – of people's sense of interconnectedness with one another. Researchers demonstrated the measure's rapid completion, relative invulnerability to social desirability response set effects, appropriateness in a variety of populations and research circumstances, and consistency with diverse theoretical orientations to closeness. The IOS scale was chosen over other measures for a variety of reasons. First, research staff considered the measure's appropriateness and implementation feasibility. Although the Relationship Closeness Inventory (RCI) (Berscheid et al., 1989) has been used by other researchers to measure relationship closeness, the RCI response burden was deemed to be too heavy for this study's participants (RCI entails over 70 items). Still other measures, such as the Sternberg Intimacy Scale (Aron et al., 1992), focused more on romantic or intimate relationships, which is not applicable for this study population, either. Secondly, the IOS scale psychometric properties are well documented regarding test-retest reliability as well as discriminant, convergent, and predictive validity (Aron et al., 1992; Aron et al., 2004).

The IOS scale is one-item pictorial measure of closeness, and is intended to tap into people's sense of interpersonal connectedness. The IOS scale contains seven Venn diagrams of two same-size circles, one circle indicating the self and the other circle representing other (Refer to Appendix 2). IOS scale instruction reads, "*Please circle the picture below which best describes your relationship.*" In the first picture, the two circles are adjacent to each other. From the second to the seventh picture, the degree of overlap progresses linearly (Aron

et al., 1992). As the degree of overlap progresses linearly in each set, it creates a seven-step interval-level scale. The more the overlap, the closer one (the self) feels with the other. The circles within the set represent the two people in the relationship (e.g., Confidant and LHA).

Confidant Closeness to LHA: The measure used for this study is a socio-culturally adapted version of the original IOS scale by Aron and colleagues (1992), as mentioned above, captured at the six-month time point. After substantial consideration, the modification to the IOS scale was made based on feedback from pre-testing the IOS scale with community advisory group members involved in the project whose demographic characteristics were similar to participants. The main reactions voiced were that the meaning of the overlapping circles was either a bit too abstract or that respondents felt like the overlap represented some type of relationship with physical intimacy between the two parties. For those who had the latter reaction, they did not think the graphical representation was culturally and socially appropriate, nor did they feel comfortable in completing the measure. One person indicated that, if he had to respond, he would limit his response to the set of responses that had the least overlap. Pre-test respondents also took issue with the instruction including the word 'relationship' because, once again, to some, this word alluded to a romantic bond. Because it does not seem as if the IOS scale had been tested extensively with men of color nor administered often to male-male platonic relationships, research staff felt it was very important to take into consideration the social and cultural appropriateness of the measure - presenting it in a way that would most accurately measure the level of closeness/ interconnectedness between LHA and Confidant.

Based on this feedback, MAN for Health research staff adapted the closeness measure to be socially and culturally acceptable to the study population. Instead of seven sets of

overlapping circles, the adapted scale entails seven concentric circles that vary in distance from a center circle, which represents the person to whom one assesses how close one feels (refer to Appendix 3). The less the distance between the two circles, the closer one feels to the other. The instructions were also adjusted to match the modified pictorial and substituted ‘relationship’ with ‘friendship’. For this study, we analyzed the six-month follow-up measure, which was one item that asked about Confidants’ *current* perception of closeness of his LHA. The response values assigned to this measure are scored as follows: 1 (the letter that represents the circle furthest away from the center circle) to 7 (the letter that represents the circle closest to the center circle). Thus, the higher the score, the higher the level of closeness a Confidant feels towards his LHA.

LHA Closeness to Confidant: This construct is captured by the same adapted version of the IOS scale used to measure *Confidant Closeness to LHA*. Only some minor changes were made so as to ask LHAs to assess closeness level to his Confidant (instead of asking Confidant to assess closeness level with his LHAs). The response values assigned to this measure were scored in the same manner as that of the measure above for “Confidant Closeness to LHA.” A higher score indicated a higher level of closeness a LHA felt towards his Confidant. Both Confidant and LHA closeness measures were collapsed from the original seven-interval categories to four categories. For analysis purposes, a decision to transform any measurement scale as presented in the questionnaire (e.g., collapsing the number of existing categories) was based on the distribution of responses for that particular item in order to reflect more of the natural distribution of the reported frequencies.

Equivalent Verbal Scale of Closeness: This measure provided a verbal alternative to the socio-culturally adapted IOS pictorial scale of closeness. The question stated “How close

do you feel to this person?” The scale, too, is made up of seven interval categories and responses range from “Not close at all” to “Among the closest of all.” It was administered to community advisory group members to help garner whether or not responses of the socio-culturally adapted IOS pictorial measure was concordant with an equivalent verbal/word scale.

Relationship Diversity: This characteristic was assessed by one item, which queried the variety of the ways in which the Confidant is connected with his LHA. Nine nominal response options were offered (e.g., family member, co-worker, neighbor). For every response option checked, a value of ‘1’ is given. All the responses were added to form a composite score (range from 1-9). This score was then dichotomized to knowing one another in *one way* vs. *two ways or more*. A higher score indicated that the LHA and Confidant knew each other in a greater number of ways.

Relationship Interaction Frequency: The frequency in which LHA and Confidant interacted with each other outside intervention activities was assessed by one item. Six ordinal response options ranged from values of 1 (“Less than once a year”) to 6 (“Everyday”). This item is a modified version of one on the International Values Survey (Kanaiaupuni, Thompson-Colón, & Donato, 2000).

Relationship Length: This was assessed by one item that inquired how long the Confidant had been acquainted with the LHA at the time he was asked to join the study. Seven response options range from values of 1 (“Just met as part of MAN project”) to 7 (“More than 10 years”). These seven categories were then collapsed to four categories.

DATA ANALYSIS

Using Statistical Package for the Social Sciences (SPSS) version 15.0 for Windows (SPSS Inc, 2007), we first generated demographic descriptive statistics on the sample population. Next, data analyses were conducted to assess the distribution, means, and correlations of the study variables. To compare mean values of relationship properties by race, independent-samples t-test statistics were conducted. To determine the association between all the relationship properties, Pearson correlation coefficient matrices were generated. To evaluate the degree of concordance between different IOS scales measuring closeness, Kendall's tau test coefficient were calculated.

Hierarchical Linear and Nonlinear Modeling (HLM) 6.04 (Scientific Software International Inc, 2007) was used to examine whether Confidant closeness to LHA was significantly associated with any of the other relationship properties (LHA closeness to Confidant, relationship diversity, interaction frequency and length) and/or by race. Hierarchical generalized linear modeling (HGLM) was used to determine whether any independent associations existed (at $\alpha < .05$ level) between the explanatory variables and Confidant Closeness to LHA. Multilevel regression modeling also accounted for clustering of Confidants within LHA groups by formally representing each of these levels in its own sub-model. To analyze the outcome because it was coded as an ordinal variable, a cumulative logit model was used. We first ran bivariate analyses of the relationship between the explanatory variables and Confidant closeness to LHA. We added covariates to the original main effects model that met $\alpha < .10$ significance level. Finally, a multilevel regression model was used to determine the independent associations (at $\alpha < .05$ significance level) between the

explanatory variables shown to be significant in the bivariate analyses and the outcome of interest.

RESULTS

Attrition

At baseline, a total of 379 men completed questionnaires, of which 216 were African American and 162 were Latino. At the six-month follow up time point, 236 men turned in completed surveys. Those who did not participate in both waves of data collection were excluded from analysis. Therefore, of the participants who provided six-month data, 227 cases (131 African-American and 96 Latino men) were retained for this present study. In order to assess the affect of the 40% attrition rate on the study sample from baseline to six-month follow-up time point, we examined the relationship between Confidants' demographic characteristics (they were only study variables in which we could project baseline values by substituting their six-month responses) and whether they dropped out of the study at six-month follow-up. We used either t-test or chi-square test statistics, depending on the scaling of the variable. We ran a series of means comparisons on the demographic variables of age, cohabitation status, education, income, and weekly hours worked. Results revealed that Confidants who were lost to follow up statistically differed ($\alpha < .05$) from those who remained in the study in terms of age, cohabitation status, and income. Those who dropped out of the study by the six month time point were more likely to live with a partner, be younger, and report less income than their counterparts who remained in the study. To the best of our knowledge, however, no empirical evidence exists to indicate that these demographic characteristics had any bearing on our study variables of interest, relationship structural properties.

Missing Items

Missing items were defined as the cases with values missing on the study's explanatory variables (in regards to the study hypothesis involving predictive modeling of Confidant closeness to LHA). The extent of missing items was first assessed by conducting univariate analyses on the variables of interest. All but one of the relationship structural properties (length, frequency, diversity, and LHA closeness to Confidant) each had more than 10% missing items. We wanted to determine whether these missing values were randomly distributed across all observations. To determine whether cases were missing completely at random, the sample was divided into those with and without any missing items on the explanatory variables of interest. Both groups were then compared by the dependent variable, Confidant closeness to LHA at six-months, using a chi-square test. Failure to observe significant differences between the two groups at the 95% confidence level ensured that missing items were randomly distributed across observations.

Demographics

Table 1 summarizes the demographic characteristics of LHAs and Confidants by race/ethnicity. *Confidants*: Regarding age, Latinos, as a whole, were younger than their African-American counterparts, and this difference was statistically significant ($p < .05$). Nearly all (96%) of Latinos were between 18-40 years of age, while 72% of African Americans were 41 years or older. Both groups had a similar profile of cohabitation status, with about 2/3 living with a partner and 1/3 living without one ($p = .92$). The education profile for the group diverged whereby African Americans, in general, had received more formal education than their Latino counterparts ($p < .05$). Nearly all African Americans (95%) had at least a high school education, while 65% of the Latino men had received less than a

high school education. This trend was similar with income as well where, overall, African-American Confidants reported higher levels of total annual household income as compared to their Latino counterparts ($p < .05$). Over 2/3 of African Americans had an annual household income exceeding \$28,000, while only 9% of Latinos fell in the same category. Regarding number of hours worked per week, a greater proportion of African-American Confidants worked more than 40 hours per week in comparison with Latino Confidants (59% v. 33%) ($p < .05$). The majority of Latinos (61%) worked between 31-40 hours per week. *LHAs*: The demographic patterns of Confidants and LHAs were actually fairly similar in all categories. Latino LHAs also tended to be younger than their African-American counterparts ($p < .05$). About 2/3 of Latino LHAs (64%) were between 18-40 years of age, while 78% of African American LHAs were 41 years or older. Both racial/ethnic groups had a similar distribution regarding cohabitation status: the majority lived with a partner (2/3 or more) while the remaining did not ($p = .58$). In terms of education, a higher proportion of African Americans, as compared to Latinos, had received formal education beyond high school ($p < .05$). About half of African-American LHAs had received at least some college education while *all* Latino LHAs reported less than a high school education. Regarding annual household income, the majority (72%) of Latino LHAs had incomes between \$22,001-58,000, while nearly half of African-American LHAs reported incomes greater than \$58,000 ($p < .05$). Finally, when examining LHA number of hours worked weekly, the trend mirrored that of the Confidants, except that, proportionally, LHAs worked even more hours than their Confidants: 75% of African-American LHAs worked more than 40 hours per week as compared to 45% Latino LHAs. This difference, however, was not statistically significant ($p = .17$).

Table 1. Frequency distribution of demographic characteristics of LHAs and confidants by race/ethnicity.

| | | <i>LHA</i> | | <i>CONFIDANT</i> | |
|---------------------------------------|-------------------------------|------------------|----------------------|-------------------|----------------------|
| | | <i>AA (N=13)</i> | <i>Latino (N=11)</i> | <i>AA (N=118)</i> | <i>Latino (N=85)</i> |
| | | <i>N (%)</i> | <i>N (%)</i> | <i>N (%)</i> | <i>N (%)</i> |
| Age ^{LC} | 18-30 yrs | 1 (8%) | 3 (27%) | 10 (8%) | 59 (72%) |
| | 31-40 yrs | 5 (8%) | 4 (37%) | 23 (20%) | 20 (24%) |
| | 41-50 yrs | 9 (46%) | 3 (27%) | 41 (35%) | 2 (2%) |
| | > 50 yrs | 6 (32%) | 1 (9%) | 44 (37%) | 2 (2%) |
| Cohabit Status | Living with partner | 8 (62%) | 8 (73%) | 77 (65%) | 51 (61%) |
| | Not living with partner | 5 (38%) | 3 (27%) | 41 (35%) | 32 (39%) |
| Educ ^{LC} | Less than HS educ | 7 (54%) | 11 (100%) | 6 (5%) | 55 (65%) |
| | HS degree/ GED | 0 (0%) | 0 (0%) | 41 (35%) | 14 (16%) |
| | Some college or Assoc. degree | 6 (46%) | 0 (0%) | 36 (30%) | 10 (12%) |
| | B.S. degree & beyond | 0 (0%) | 0 (0%) | 35 (30%) | 6 (7%) |
| Income ^{LC} | <\$10,000 | 1 (8%) | 0 (0%) | 15 (13%) | 14 (17%) |
| | \$10,001-16,000 | 1 (8%) | 1 (9%) | 4 (3%) | 19 (24%) |
| | \$16,001 -22,000 | 0 (0%) | 2 (19%) | 8 (7%) | 17 (21%) |
| | \$22,001-28,000 | 1 (8%) | 4 (36%) | 11 (10%) | 22 (27%) |
| | \$28,001-58,000 | 4 (30%) | 4 (36%) | 35 (31%) | 9 (11%) |
| | >\$58,000 | 6 (46%) | 0 (0%) | 41 (36%) | 0 (0%) |
| Hrs worked per wk ^C | 30 hrs or less | 1 (8%) | 0 (0%) | 10 (8%) | 6 (7%) |
| | 31-40 hrs | 2 (11%) | 6 (55%) | 38 (33%) | 50 (60%) |
| | 41-50 hrs | 4 (33%) | 3 (27%) | 25 (22%) | 19 (23%) |
| | 41-50 hrs | 4 (33%) | 3 (27%) | 25 (22%) | 19 (23%) |
| | 51 hrs or more | 5 (42%) | 2 (18%) | 43 (37%) | 8 (10%) |

^L racial/ethnic group difference among LHAs (p<.05)

^C racial/ethnic group difference among Confidants (p<.05)

Relationship structural properties

Confidant-LHA relationship structural properties by race/ethnicity are summarized in

Table 2. *Length:* At the start of the intervention program, a large majority of Latino

Confidant-LHA dyads (72%) had already been acquainted with each other anywhere from 3 to 10 years as compared to 37% of African-American men in the same time frame. On the other hand, 40% of the African-American dyads had known each other for 10 years as compared to 17% of the Latino group. *Interaction Frequency:* In regards to how often Confidant-LHA pairs interacted with each other outside project-related activities, 5% of African-American Confidant-LHA pairs reported the lowest frequency of interaction, at only several times a year. No Latino dyads reported this lowest level of frequency interaction. Nearly half (40%) of African-American Confidant-LHA dyads reported interacting at least once a month as compared to 21% of Latino dyads. Nearly $\frac{3}{4}$ of Latino dyads and $\frac{1}{2}$ of African-American dyads interacted at least once a week or several times a week. *Diversity:* In terms of the number of ways which Confidant-LHA dyads were acquainted with each other, (e.g., being a family member, neighbor, or colleague), both racial/ethnic groups followed the same pattern: At least $\frac{2}{3}$ of Confidant-LHA pairs knew each other in one way while the remaining pairs knew each other in two or more diverse ways. *Confidant Closeness to LHA:* Similar patterns of closeness were reported for both racial/ethnic groups. Approximately $\frac{1}{2}$ of Confidants in both groups reported the highest two levels of closeness with their LHAs (*Fairly Close* or *Extremely Close*); similar proportions from both groups reported the remaining more distant levels of closeness (*Somewhat Close* or *Not Very Close*). *LHA Closeness to Confidant:* For both racial/ethnic groups, a slightly smaller proportion of LHAs, as compared to Confidants, reported the two highest levels of closeness with their dyad partner. That said, a higher percentage of Latino LHAs (versus the African-American LHAs) reported perceiving those two highest levels of closeness with their Confidants (42% versus 29%). For the *Somewhat Close* category, 44% of African-American LHAs identified

with this level of closeness towards their Confidant while 24% of Latino LHAs did the same. As for the LHAs who selected the lowest 4 levels of perceived closeness (collapsed into the single category of *Not Very Close*), the proportion was similar in both racial/ethnic groups – 27% for African Americans and 33% for Latinos.

Table 2. Frequency distribution of confidant-LHA relationship structural properties, by race.

| Relationship Characteristic | | Afric Amer N (%) | Latino N (%) | Total Missing |
|------------------------------------|--------------------------------|-----------------------------|-------------------------|--------------------------|
| Length | Just met to 2 yrs | 27 (23%) | 6 (11%) | 32 |
| | 3-5 yrs | 22 (19%) | 28 (52%) | |
| | 6-10 yrs | 21 (18%) | 11 (20%) | |
| | More than 10 yrs | 47 (40%) | 9 (17%) | |
| Interaction Frequency | Several times a year | 6 (5%) | 0 (0%) | 28 |
| | At least once a month | 46 (40%) | 12 (21%) | |
| | At least once a week | 19 (16%) | 16 (27%) | |
| | Several times a week | 40 (34%) | 26 (45%) | |
| | Everyday | 6 (5%) | 4 (7%) | |
| Diversity | Know each other 1 way | 88 (75%) | 36 (62%) | 28 |
| | Know each other 2 or more ways | 29 (25%) | 22 (38%) | |
| Confidant Closeness to LHA | Not very close (D-G) | 19 (16%) | 19 (22%) | 3 |
| | Somewhat close (C) | 40 (34%) | 21 (25%) | |
| | Fairly close (B) | 32 (28%) | 24 (29%) | |
| | Extremely close (A) | 25 (22%) | 20 (24%) | |
| LHA Closeness to Confidant | Not very close (D-G) | 25 (27%) | 19 (33%) | 53 |
| | Somewhat close (C) | 40 (44%) | 14 (24%) | |
| | Fairly close (B) | 14 (15%) | 11 (19%) | |
| | Extremely close (A) | 13 (14%) | 14 (24%) | |

Correlations between all the relationship structural properties

Pearson correlation coefficients were computed among the five structural relationship properties. Descriptive statistics are presented in Table 3 to indicate the strength of the correlations among the relationship structural properties. Most coefficients indicated small to medium correlations among the properties (Cohen, Cohen, West, & Aiken, 2003). All but

one of the relationship property pairs had positive correlation values that ranged between .055 and .416. Only Frequency-Length had an almost negligible negative correlation of -.002. The correlation between LHA closeness to his Confidant and the other variables, for the most part, exhibited some of the highest positive correlation values (.269 to .416). This research question was examined in a general exploratory manner, but had it been tested and hypothesized with a significance level set at $\alpha < .05$, then seven out of the ten correlations would have exhibited statistical significance.

Table 3. Pearson's correlations for relationship structural properties of entire sample.

| | Confidant Closeness | LHA Closeness | Length | Frequency | Diversity |
|----------------------------|----------------------------|----------------------|---------------|------------------|------------------|
| Confidant Closeness | 1.00 | | | | |
| LHA Closeness | .289** | 1.00 | | | |
| Length | .126 | .352** | 1.00 | | |
| Frequency | .055 | .269** | -.002 | 1.00 | |
| Diversity | .220** | .416** | .226** | .175* | 1.00 |

*p<.05 **p<.01

Racial differences in relationship structural properties

Tables 4 and 5 present the correlation matrices for the relationship structural properties by race, African-American and Latino samples, respectively. This research question was examined in a general exploratory manner, but had it been tested and hypothesized with a significance level set at $\alpha < .05$, then between four to six out of the ten correlations in each racial/ethnic group, respectively, would have exhibited statistical significance. No major racial/ethnic group differences were found between the African-American and Latino samples. The patterns of association among these variables, stratified

by race, were very similar to that of the combined sample. For both racial/ethnic samples, we noted, once again, small to medium positive correlations for almost all of the variables. Again, only one negative correlation was observed for each of the racial/ethnic samples (Frequency-Length for African-American group and Frequency-Confidant Closeness to LHA for Latino group). Similar to the combined sample, the correlation analysis stratified by race/ethnicity revealed that the correlation between LHA closeness to his Confidant and the other variables, for the most part, were some of the highest positive correlation values out of all the pairs.

Table 4. Pearson's correlations for relationship structural properties of African American sample.

| | Confidant Closeness | LHA Closeness | Length | Frequency | Diversity |
|----------------------------|----------------------------|----------------------|---------------|------------------|------------------|
| Confidant Closeness | 1.00 | | | | |
| LHA Closeness | .106 | 1.00 | | | |
| Length | .120 | .392** | 1.00 | | |
| Frequency | .101 | .348** | -.056 | 1.00 | |
| Diversity | .151 | .358** | .167 | .194* | 1.00 |

*p<.05 **p<.01

Table 5. Pearson's correlations for relationship structural properties of Latino sample.

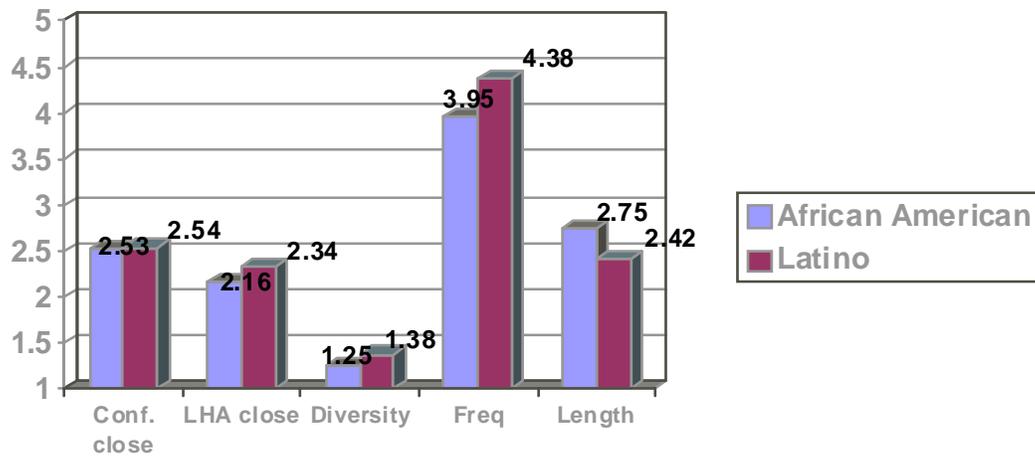
| | Confidant Closeness | LHA Closeness | Length | Frequency | Diversity |
|--------------------------------|--------------------------------|--------------------------|---------------|------------------|------------------|
| Confidant Closeness | 1.00 | | | | |
| LHA Closeness | .506** | 1.00 | | | |
| Length | .165 | .385* | 1.00 | | |
| Frequency | -.030 | .123 | .324* | 1.00 | |
| Diversity | .323* | .469** | .490** | .066 | 1.00 |

*p<.05 **p<.01

Racial differences in mean scores for structural relationship properties

In general, no major differences were found between the African-American and Latino samples in regards to structural relationship properties, with the exception of Interaction Frequency. As reflected in Figure 2, Latino Confidants and their LHAs, on average, appeared to interact more frequently with each other outside project activities (M= 4.38, SD=0.89) than their African-American counterparts (M=3.95, SD= 1.07). A higher proportion of the Latino LHAs reported interacting with their Confidants in the frequency categories of *everyday*, *several times a week*, and *at least once a week*. This research question was examined in a general exploratory manner, but had it been tested and hypothesized with a significance level set at $\alpha <.05$, then interaction frequency would have exhibited statistical significance in the difference between the two racial/ethnic groups.

Figure 2. Mean scores of relationship structural properties, by racial/ethnic group.



Model 1: Significant main effects of Confidant closeness to LHA

We used cumulative logit multilevel regression modeling procedures to test whether any Confidant-LHA relationship structural property had a significant effect on Confidant closeness to LHA. In the bivariate analyses (see Appendix 4, Table A), relationship diversity and LHA closeness to Confidant were significant at the α -level < .10 and, thus, entered into the final main effects model. As indicated in Table 6, results were contrary to the hypothesized associations in that no significant association was found between the outcome and diversity, length, or interaction frequency. The latter two variables were not included in the final model analyses because they were not significant in the bivariate analyses. Our findings did confirm, however, that higher LHA closeness to Confidant was significantly associated with higher Confidant closeness to LHA. Findings revealed that the odds of a Confidant feeling closer to his LHA are 1.47 times greater when the LHA felt at least “somewhat close” to his Confidant, versus feeling “not close at all.”

Table 6. Final model for Confidant closeness to LHA.

| Fixed Effects | Coefficient | Odds Ratio |
|----------------------------|--------------------|-------------------|
| Intercept | -1.3645 | |
| Relationship Diversity | 0.5736 | 1.77 |
| LHA Closeness to Confidant | 0.3915* | 1.47 |

Number of Confidants = 203
Number of LHAs =18

***p<.001 **p<.01, *p<.05 Each predictor is centered around its grand mean

Model 2: Impact of race on relationship between structural relationship properties and Confidant closeness to LHA

As presented in the section above, the only significant main effect on Confidant closeness to LHA was LHA closeness to Confidant. To examine whether race was an effect modifier of the relationship between LHA closeness to Confidant and Confidant closeness to LHA, we added an interaction term (race * LHA closeness to Confidant) to the full cumulative logit multilevel regression model. Findings did not support race as a significant moderator (p=0.11) of the relationship between the significant main effect, LHA closeness to Confidant and the outcome, Confidant closeness to LHA.

Concordance among three measures for closeness

Kendall correlation coefficient was calculated to measure the degree of correspondence between the different measures of closeness administered to the same group of individuals; we also tested our hypothesis that our socio-culturally adapted IOS scale measure would significantly correspond with both the original IOS scale and a verbal equivalent measure. Data confirmed that our hypothesis was true. Below, Table 7 highlights the results. For original IOS measure versus our adapted measure, r=0.636 (p<.001), the Kendall coefficient indicates fairly strong correspondence between responses to these

measures. We were able to reject the null hypothesis and conclude that individuals showed significant agreement between their responses of the original and modified IOS closeness measure. The correspondence between our adapted IOS measure versus the verbal equivalent measure was $r=0.602$ ($p<.001$). Like the former pair, these two closeness measures also demonstrated significant and fairly strong agreement between the responses given.

Table 7. Kendall’s tau correlations for results from closeness measures.

| | Kendall’s tau-b | Asymptotic SE^a |
|---|------------------------|----------------------------------|
| Original IOS scale versus Adapted IOS scale | 0.636*** | 0.128 |
| Adapted IOS scale versus Equivalent closeness verbal scale | 0.602*** | 0.134 |

* $p<.05$ ** $p<.01$ *** $p<.001$ ^a Not assuming the null hypothesis

DISCUSSION

This study is the first, within a male LHA intervention context, to examine the patterns of Confidant-LHA relationship structural properties in hopes of describing a possible significant working mechanism underlying LHA interventions - relationship interdependence. The study is also unique in its focus on African-American and Latino men. Knowledge of relationship interdependence among men of color is all the more shrouded in mystery. The extent of interdependence between partners is one dimension of relationship characteristics deemed significant to social influence and social support (Reis & Collins, 2000). Thus, the extent of interdependence within Confidant-LHA dyads is especially salient for LHA interventions, which are grounded in the framework of LHAs extending social support to and exerting social influence on their Confidants. We chose to examine more

thoroughly the closeness between LHA and Confidant because closeness is a prototypical phenomenon that embodies interdependence – *the closer a relationship is, the more each partner's behavior likely affects the other* (Canary, Cupach, & Messman, 1995; Reis & Collins, 2000). We also examined other relationship structural properties and tried to disentangle their role in promoting closeness/interdependence among Confidant-LHA dyads.

Positive Correlations among Relationship Structural Properties

Our descriptive data revealed that, in general, closeness between Confidants and LHAs was correlated with knowing each other longer, interacting with each other more frequently, and having more diverse connections to one another. These findings concur with research by others that indicated relationships of close friends and spouses were, in part, characterized by high frequency and diversity in contrast with relationships of business partners and personal enemies, which were associated with low frequency and diversity (Berscheid & Peplau, 1983).

Furthermore, multilevel regression modeling revealed that LHA closeness to his Confidant was had a significant positive association with Confidant closeness to his LHA. This finding supports the precept of Interdependence Theory which posits that emotions and behaviors of people are not free from that of the partners with whom they interact (Lewis, 2002; Lewis, Kalinowski, Sterba, Barrett, & DeVellis, 2006). We are not clear, however, about *how* Confidants may even be aware (if at all) of how close their LHAs feel towards them, but the relationship interdependence definitely manifests itself through this finding. Because no other proposed relationship structural properties (i.e., relationship diversity, length, and interaction) revealed a predictive role on Confidant closeness to LHA, additional research is still warranted about other relationship properties (e.g., strength of

interconnections, correspondence of outcomes) that may also play a role in fostering closeness/interdependence among Confidant-LHA pairs (Berscheid & Peplau, 1983; Lewis et al., 2002).

Cultural Similarities among Relationship Structural Properties

The data from this study also afforded us the opportunity to investigate whether relationship structural properties of Confidant-LHA dyads presented themselves differently according to one's race/ethnicity. The significance of this inquiry was to see whether any differences exist regarding relationship interdependence – differences that may cause the groups to vary in their acceptance and receptiveness of social support and social influence, which a LHA intervention typically involves. We discovered that African-American and Latino men in this study did not greatly differ in their level of reported closeness with their male social peers. On the contrary, the mean average score for Confidant closeness to LHA among African Americans and Latinos was almost identical: 2.543 versus 2.535. Only interaction frequency mean scores appeared to slightly differ (4.38 for Latinos versus 3.95 for African Americans). This observed difference, however, is likely attributable to the difference in the recruiting strategy used by the two groups; unlike the African-American cohort, Latino LHAs and Confidants were recruited exclusively from established soccer teams in the area. Hence, Latino dyads were more likely to interact with each another more frequently outside of LHA program activities due to their involvement in soccer league activities (e.g., practices, games, socials).

Furthermore, no racial differences were found in the correlation patterns between all the relationship structural properties or the regression modeling results. These comparable findings between the two racial/ethnic groups contradict a fundamental assumption of the

Theory of Independent-Interdependent Self-Construal (Markus & Kitayama, 1991), which posits that some cultures (e.g., North America, Western Europe) have a more independent cultural norm, whereas other cultures (e.g., Latin American, Asian) have a more interdependent and collective cultural norm and, hence, would be expected to report higher levels of closeness with their social peers. In light of these findings, according to Interdependence Theory, because the profiles of relationship structural properties are comparable, both African-American and Latino men may be similar in their acceptance of social support and, possibly, equally receptive to health promotion strategies, such as LHA interventions.

Validity of a Socio-Culturally Adapted IOS Scale for African American and Latino Men

Researchers for the MAN for Health LHA intervention project, which served as the parent study, had piloted their survey instruments with community advisory group members from the three sites to ensure cultural relevance and appropriateness. Community input on the IOS scale, in its original form, revealed that it was not only difficult to comprehend but had the potential to be misconstrued and deemed offensive. The measure was revised, therefore, to a format that was more culturally authentic for African-American and Latino men. Our findings reveal that a strong and statistically significant correlation existed between the culturally-adapted IOS measure and the original IOS measure, which indicates that the modified scale most probably also tapped into a very similar construct of closeness/interconnectedness for which the original IOS scale was meant to do. Additionally, the adapted IOS pictorial scale had similar significant correlation with an equivalent verbal word IOS measure; this finding supports that what researchers wished to convey in words was successfully communicated in pictorial form. Both results lend credence to using the adapted

IOS measure for our study sample of African-American and Latino males. Future research with similar populations using this modified measure can better determine its validity and appropriateness for more widespread dissemination within these communities. Moreover, engaging local communities to identify and resolve methodological problems is encouraged to improve acceptance of the subsequent interventions as well as the validity of the results garnered from research efforts (Ard, Carter-Edwards, & Svetkey, 2003; Cardona & Joshi, 2007).

LIMITATIONS AND FUTURE DIRECTIONS

Although the results from this study make a number of significant contributions to the research literature, there are also some limitations that affect their generalizability and warrant attention in future research. First, the initial study sample was not selected at random. The basis of a LHA intervention model is the identification and training of community members who are routinely sought out by others for advice and help. Therefore, from a resources and recruitment limitation standpoint, it was neither practicable nor relevant for the study to use probability sampling to recruit participants. The representativeness of the study's participants, instead, was established through comparison with county census data (North Carolina State Data Center, 2000), and generalizability of the results is limited to the men in this sample. Second, a high attrition rate and the difference between certain demographic characteristics of the group that dropped out, again, limit the results to the men in this sample. Third, although the missing item analysis we conducted suggested that missing items were randomly distributed across observations, we acknowledge that the proportion missing reduces our power to detect significant differences. Fourth, social desirability bias may have also occurred when Confidant-LHA dyads answered items

regarding closeness to one another. Participants may have rated their levels of perceived closeness to one another according to what they believed researchers or their LHAs might desire. The study took careful measures to maintain confidentiality, however, and to reassure respondents that their responses would have no bearing on their relationship with their dyad member or the research team. Fifth, when testing whether race was an effect modifier between the significant main effect of LHA closeness to Confidant and Confidant closeness to LHA, our final multilevel regression model revealed that the results did not vary by race. The results should be interpreted with caution, however, because we used multilevel regression modeling procedures to analyze our smaller sample ($n=203$, $j=24$), and we may have had an insufficient sample size to detect a significant interaction effect of race. Maximum likelihood estimation procedures commonly used in multilevel analysis are asymptotic, which translates to the sample size needing to be sufficiently large (Maas & Hox, 2005). Finally, although our study focused on four structural properties of relationships (closeness, diversity, length, and interaction frequency), there are also other important properties of interdependence mentioned in the literature, which were not measured (e.g., accommodation, degree of correspondence). The secondary dataset used in this study, however, did not capture those constructs so could not be included.

Despite the limitations, this study was intended as an initial stepping stone to encourage future research exploring factors that impact relationship interdependence among LHA-Confidant dyads. Because LHA perceived closeness to Confidant had an impact on Confidant perceived closeness to LHA, one logical inquiry is *how* does social influence happen? Does something change about LHAs' behaviors towards Confidants as a result of how close they feel to Confidants? Is this phenomenon something that Confidants can sense

and which, in turn, makes them feel closer to LHAs? Delving in-depth into this process of relationship interdependence is by no means simple, but, nevertheless, it still is worth exploring in order to clarify the successful mechanisms behind Confidant-LHA interactions.

Another related direction for future studies is to measure, as mentioned above, other relationship structural properties not captured in this study to see if they are significantly associated with dyad partners' sense of closeness or interconnectedness with one another. From there, a plausible next step of inquiry, in regards to LHA interventions, would be to examine whether these structural properties of relationship interdependence actually have an impact on the desired Confidant health outcomes, which is the end goal of most LHA interventions. The rationale for this pathway of change is that relationship structural properties are thought to draw partners closer to each other, and Interdependence Theory contends that communication and social influence between the partners will be more effective in changing each partner's behavior (Lewis et al., 2002). According to the theory, LHA characteristics and/or behaviors would also be worth examining in terms of their association with Confidant health outcomes – a pathway not yet examined in the literature (Lewin et al., 2005a). Finally, because many past and current LHA intervention programs engage individuals from other racial/ethnic populations (e.g., American Indian, Pacific Islander, Southeast Asian) as LHAs and the intended beneficiaries (Kagawa-Singer et al., 2006; Nguyen et al., 2006; Tanjasiri et al., 2007), the natural question arises as to possible racial/ethnic differences in relationship interdependence properties and their effect on social support mechanisms between members from other racial/ethnic communities to help explain outcomes from those LHA programs.

CHAPTER SIX

An African-American and Latino Male Lay Health Advisor (LHA) Program: Examining Impact of LHA Preventive Health Behaviors and Confidant-LHA Structural Relationship Properties on Preventive Health Behaviors

ABSTRACT

Introduction: Men of color are among the most neglected populations in the United States, experiencing the poorest health outcomes and confronting the largest barriers to health care. Lay Health Advisor (LHA) interventions have the potential to help reduce the health disparities of disenfranchised communities, yet few have engaged men of color. There is currently a lack of research and understanding about the functional aspects of helping relationships between men, as well as how they relate to one another and influence each other's behaviors. **Methods:** This study analyzed two waves of survey data from an African-American and Latino male LHA intervention study aimed at improving preventive health behaviors related to prostate, cardiovascular, and sexual health. Guided by constructs from Interdependence Theory, this study examined the effects of (a) structural properties of relationship interdependence between LHAs and the men they helped (Confidants), and (b) LHA preventive health behaviors on the patterns of Confidant preventive health behavior outcomes. Preventive health behaviors included healthcare utilization visits in the past six months, daily servings of fruit and vegetables consumed, and condom use frequency during sexual encounters in the past three months. Structural properties Confidant-LHA relationship interdependence referred to diversity, length, interaction frequency, and closeness of

relationship. The study sample included 227 African-American and Latino men in the Southeast United States: 24 LHAs and 203 Confidants. A series of generalized hierarchical linear regression analyses were conducted to test the association between the relationship interdependence variables and Confidant preventive health behaviors. The Impact of various Confidant and LHA demographic covariates was examined as well. **Results:** In the final models created, a significant interaction effect was found between LHA healthcare visits and Confidant perceived closeness with LHA ($p < .05$). The higher the closeness between Confidants and LHAs, the stronger the magnitude of the positive effect between LHA healthcare visits and Confidant healthcare visits. Three descriptor covariates, Confidant age, income and baseline level of healthcare visits ($p < .05$), had a significant positive association with Confidant healthcare visits at six-months. **Conclusion:** The results provide support for examining further the impact of LHA characteristics and structural relationship properties on Confidant health behaviors. This information can assist in determining what constitutes the most efficacious Confidant-LHA dyad profile for improving Confidant health outcomes.

INTRODUCTION

Burden of Disease Among African-American and Latino Men: Men of color, one of the most disregarded populations, experience the most deprived health outcomes and face the greatest barriers to healthcare (Gornick, 2003). African-American men have the shortest life expectancy of any group; White men, on average, live about seven years longer than African-American men (Meyer, 2003). African-American men also suffer disproportionately from many of the leading causes of death and disability in our society; these differences can be striking. For example, 40% of African-American men with cardiovascular disease die prematurely – at twice the rate for White men (21%) (Meyer, 2003). Prostate cancer is the

leading cancer diagnosed among men; African-American men have the highest rates of prostate cancer in the world (Gornick, 2003). The 2006 North Carolina Behavioral Risk Factor Surveillance System data revealed that African-American men were at higher risk than White male North Carolina residents for diabetes, stroke, kidney disease, prostate cancer, AIDS, homicide, and asthma.(Centers for Disease Control and Prevention, 2006).

From 1990 to 2000, North Carolina experienced the fastest growing Latino population of any state in the country (Martinez & Manson, 2004). In North Carolina, gonorrhea rates among Latinos mirrored national trends, growing by nearly 12% (Centers for Disease Control and Prevention, 2003). In 2004, 16% of all North Carolina cases of primary and secondary syphilis reported to CDC occurred among Latinos (Centers for Disease Control and Prevention, 2005). North Carolina's geographic position places Latino immigrants at higher risk for sexually transmitted diseases than counterparts in their country of origin (Salvatore, 2001). In a statewide sample of recent immigrant male Latino farm workers, ages 16-56, 93% reported having easy access to female commercial sex workers (CSW). Nearly one-half (45%) of participants reported having sexual intercourse with a female CSW since moving to North Carolina. Of those who reported sexual intercourse with a female CSW, 32% reported ever using condoms and 16% reported ever having had an STD, usually gonorrhea (Salvatore, 2001).

Low rates of health insurance and lack of access to health care contribute to low levels of health care utilization (American Cancer Society, 2006). Although socioeconomic status (SES) is one of the strongest known factors contributing to men's poor health status in the United States, men still demonstrate poorer health than women at all SES levels (Courtenay, 2000). Thus, SES solely cannot explain the gender differences in health and

longevity. High prevalence of unhealthy behaviors among men is partially explained by male gender socialization, which is the attitudes, beliefs, and norms resulting from men's socialization into manhood or masculinity (Courtenay, 2000; Hong, 2000; Moynihan, 1998). Other factors contributing to poor health status for men of color include: hazardous work conditions, personal health/self care practices, stress, impaired coping and emotional processing abilities, cultural beliefs, biological and environmental factors, differential access to healthcare services, and potential bias among treating providers (Kreiger, 2005; Satcher, 2003; Vines & Godley, 2004; Williams, 2003).

Lay Health Advisor (LHA) Interventions: Today's growing proportion of underserved minority populations and ever-increasing health care costs in the United States have encouraged public health providers to introduce a number of social network approaches, loosely referred to as LHA interventions, for outreach, education, and advocacy (Hearn et al., 1992; Moynihan, 1998; Williams, 2003). Implicit in LHA interventions is the exchange of social support, such as information, advice, tangible aid, and referrals to external resources (House et al., 1981). From a public health perspective, the associations found between social support and health (Broadhead et al., 1983; Cassel, 1976; Nuckolls & Cassel, 1971) hold substantial potential for translating these health-enhancing effects into interpersonal interactions through LHA interventions (Berkman & Glass, 2000; Berkman & Syme, 1979; Lewis et al., 2002; Lewis et al., 1994; Vaananen et al., 2005). Results of published LHA intervention evaluations, however, are a combination of mixed results. Some programs have achieved the desired health-related outcomes among community members, but others have not (Lewin et al., 2005b; Rhodes et al., 2007; Swider, 2002). Part of the reason for the

discrepancy may be the varying experimental rigor of LHA study designs used to assess the impact of LHAs intervention in changing health-related outcomes (Swider, 2002).

The one common feature of natural helper LHA interventions is to enlist indigenous members of a given population (i.e., the LHA) in channeling health-enhancing social support to individuals (i.e., Confidants) in their informal social networks (Eng & Young, 1992; Heaney & Israel, 2002; Warrick et al., 1992). It is important to note that, as an established area of public health intervention research, few LHA interventions have focused on men (Eng & Parker, 2002; Eng & Young, 1992; Heaney & Israel, 2002; Jackson & Parks, 1997). Provision of social support by LHAs to their Confidants has been studied as a gender-neutral process, with little attention given to properties of the relationship itself between men, which may facilitate or hinder men's expression and receipt of social support and, ultimately, improve or undermine their preventive health behaviors (Reis & Collins, 2000).

Men's Confidant-LHA Relationship Interdependence: Seldom has there been published research regarding the dynamics of platonic adult male friendships, especially between men of color (Gaines, 1995; McCoy, 1998; Staples, 1995) and how these relationships can influence health attitude and behavior change. Most LHA studies have traditionally regarded and measured health-related relationships as only unidirectional, from an LHA to his Confidant. In a Confidant-LHA relationship, like all other relationships, one partner's behaviors cannot truly be immune from the influence of the other partner's behaviors. The defining feature of social interaction is influence; each partner's behavior can influence the other partner's subsequent behavior in some way (Reis & Collins, 2000). Yet a common trend among health-related relationship studies has been to examine only one side

of a two-sided interaction, which has produced limited understanding of the relationship interdependence phenomena (Kenny et al., 2006).

Explanations of behavior, in reference to relationship interdependence, are the focus of Interdependence Theory (Kelley et al., 1983; Rusbult et al., 2001). The theory defines interdependence as the process by which interacting partners influence each other's experiences. Interdependence is made up of structural properties of a relationship (e.g., closeness, diversity, duration, interaction frequency, accommodation) (Lewis et al., 2002). The theory examines how a pattern of behavioral outcomes is influenced by the experiences of partners in a dyad, such as LHAs and Confidants, and posits that structural properties of their relationship can bring partners either closer to each other or push them apart (Lewis, 2002). When these structural properties draw partners closer to each other, they can have more influence on one another; the theory contends that stronger relationship interdependence can lead to communication and social influence between the partners that will be more effective in changing each other's behavior (Kelley et al., 1983; Lewis et al., 2002; Lewis et al., 2003). There is a lack of evidence-based research to help clarify the specific structural properties of the Confidant-LHA relationship, which possibly can influence the extent to which LHA interventions produce desired outcomes. To our knowledge, no LHA intervention study has ever accounted for relationship structural properties of Confidant-LHA dyads and determined the predictive value they may have upon Confidant health outcomes. Furthermore, none has examined this inquiry in the context of a male LHA intervention program.

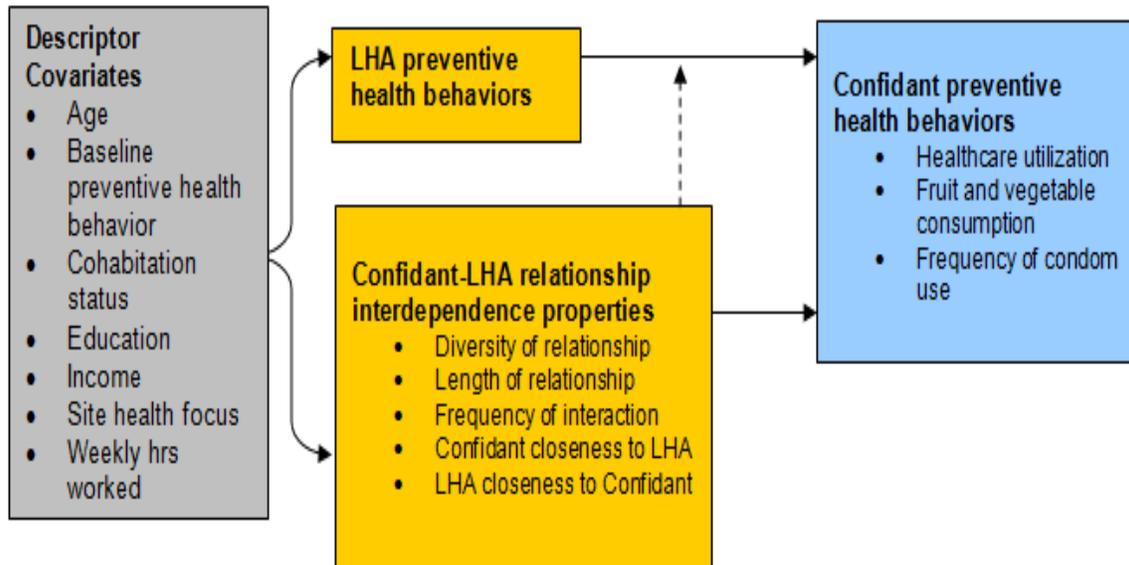
Influence of LHA Health Behavior on Confidant Health Behavior: Only a few published LHA interventions have monitored any type of LHA health behaviors throughout

the program (Bird et al., 1998; Earp et al., 2002; Earp & Flax, 1999; Elder et al., 2005; Eng, 1993; Navarro et al., 1998; Swider, 2002; Watkins et al., 1994); none have explored their association with health outcomes of the Confidants to whom LHAs are expected reach. The relationship between a LHA and his Confidant, by design, can be conceptualized as one that involves social influence, interpersonal communication, and provision of concrete access to health services. The dyad resides and interacts in the same community; they belong to a mutual social network (Chavis, 2004; Flax & Earp, 1999; Wynn, 2005). Hence, it is highly likely that Confidants are aware of their LHAs' health behaviors (or behavioral intentions). When a LHA conveys his own health behaviors in some way, either through conversation or through actual engagement, he might, in turn, influence his Confidant's health behavior similarly as to how one might conceptualize the interpersonal, influencing process that takes place in other dyadic relationships, such as husband and wife, parent and child, teacher and student, or peer and peer (Eng & Parker, 2002). Other times, social influence can occur through LHA and Confidant direct interpersonal communication. All these pathways of influence are in line with tenets of Interdependence Theory. Confidant-LHA relationship interdependence can help explain the effects of LHA characteristics (e.g., attitudes they voice and behaviors they exhibit) on Confidants' health motives, preferences, or behaviors. One of the important structural properties of interdependence which can be analyzed is the strength of shared interconnections (Berscheid & Peplau, 1983) or the related concept of degree of dependence (Kelley et al., 1983); the latter is defined in terms of the proportion of variance in a person's outcome (i.e., Confidant health outcome) that is attributed to the partner (i.e., LHA health behavior), and the proportion that is attributed to the two acting jointly (Berscheid & Peplau, 1983). Today's more advanced multi-level statistical modeling techniques (Guo,

2005; Raudenbush & Bryk, 2002) can help determine how much of a Confidant's health outcome is attributable to LHA-level characteristics – a pathway of influence never before examined in LHA intervention research.

Conceptual Model of the Study: Drawing on both the theoretical and empirical literature regarding dyadic relationship interdependence, the conceptual model below (Figure 3) represents the study's hypothesized pathways of how LHA preventive health behaviors and Confidant-LHA relationship properties can impact Confidant preventive health behaviors. Three distinct Confidant preventive health behaviors were examined: healthcare utilization visits, daily fruit and vegetable consumption, and frequency of condom use during sexual encounters. We hypothesized that Confidant behaviors would be affected by two factors with their own separate and direct pathways: (1) structural properties of Confidant-LHA relationship interdependence and (2) LHA preventive health behaviors. Furthermore, the model highlights the hypothesis that the structural properties of Confidant-LHA relationship interdependence would each moderate the relationship between LHA preventive health behaviors and Confidant LHA preventive health behaviors. Because so little is known about how Confidant-LHA relationship structural properties operate, we wanted to test multiple pathways by which this domain could influence health outcomes.

Figure 3. Conceptual model of effect of confidant-LHA relationship interdependence on confidant preventive health behaviors.



- As the period of time in which Confidant-LHA pairs have known each other (length) increases, Confidants will exhibit higher levels of preventive health behaviors.
- As Confidant-LHA pairs increase their interaction frequency with one another outside project activities, Confidants will exhibit higher levels of preventive health behaviors.
- As LHA closeness to Confidant increases, Confidants will exhibit higher levels of preventive health behaviors.
- As Confidant closeness to LHA increases, Confidants will exhibit higher levels of preventive health behaviors.
- As LHAs demonstrate higher levels of preventive health behaviors, Confidants will demonstrate higher levels of preventive health behaviors.
- Hypothesized moderating effect of relationship structural properties on association between LHA preventive health behaviors and Confidant preventive health behaviors

- The effect of LHA preventive health behaviors on Confidant preventive behaviors will be strengthened as the number of ways in which LHAs and Confidants know each other increases.
- The effect of LHA preventive health behaviors on Confidant preventive behaviors will be strengthened as the period of time in which LHAs and Confidants have known each other increases.
- The effect of LHA preventive health behaviors on Confidant preventive behaviors will be strengthened as the Confidant-LHA interaction frequency outside project activities increases.
- The effect of LHA preventive health behaviors on Confidant preventive behaviors will be strengthened as Confidant closeness to LHA increases.
- The effect of LHA preventive health behaviors on Confidant preventive behaviors will not be moderated by LHA closeness to Confidant.

METHODS

Study Sample and Design

This study used baseline and six-month data from the *Men as Navigators for Health* (MAN for Health) study, a community-based participatory research study funded by the Centers for Disease Control and Prevention. *MAN for Health* study examined the efficacy of a male LHA intervention model to impact preventive health behaviors related to improving chronic disease and sexual health outcomes. The study took place in three counties in central North Carolina and collected data at three time points: baseline, six-month, and twelve-month follow-up. The present study used only the first two waves of data. The goal of *MAN for Health* was to understand better and improve prostate health behaviors among rural

African-American men, cardiovascular health behaviors among urban African-American men, and sexual health behaviors among rural Latino men in North Carolina. It is important to note that although the health focus in each community was different, one common intervention goal existed across all health/disease topics: to improve participants' knowledge about the benefits of preventive healthcare visits and to increase their access and utilization of available healthcare services.

Project Coordinators from each of the three sites recruited the male LHAs through the advisement of members from their community advisory group along with their own knowledge of the community's existing social networks. The Latino site recruitment strategy also involved an additional component. These LHAs were all recruited from local existing Latino soccer leagues. LHAs from all sites were then trained to recruit and provide health information to up to twelve men (Confidants) in their local social network -- e.g., coworker, neighbor, friend, family member (the Latino LHAs also identified most of their Confidants from the soccer team networks). This established relationship was necessary in order for men to entrust the LHA with personal information, such as their use of health services or risk behaviors and attitudes. Hence, it was necessary for each LHA to recruit his own Confidants directly. Also, within this evaluation design, the communities and individuals serve as their own controls (Lewis et al., 2002). All study participants met the following eligibility criteria: self-identified as African-American or Latino male, literate in Spanish or English, 18 years of age or older, resided in one of the three study counties, volunteered to participate as either a LHA or Confidant, and gave written informed consent.

Data Collection Procedures

Baseline data was collected from LHAs and Confidants before the MAN for Health

12-month intervention began. Time 2 data were collected six months after the intervention started. All surveys with African Americans were conducted in English, while all surveys with Latino participants were conducted in Spanish. Project Coordinators facilitated data collection with LHAs in a small group setting. The questionnaires were self-administered by the LHA and took approximately 30-60 minutes to complete. The Project Coordinator was present and available for questions during this time. LHAs received a monthly stipend of \$100 for participating in the intervention and completing the surveys. In turn, LHAs administered questionnaires with their Confidants in a group setting. Prior to data collection activities, like the Project Coordinators, LHAs were also trained on interviewing procedures and research ethics. To administer the questionnaire, LHAs read the questions aloud as Confidants marked their responses on their individual questionnaire. The Confidant questionnaires took approximately 30-60 minutes to complete. Confidants received \$5 for completing the Time 1 questionnaire and \$10 for completing the Time 2 questionnaires.

Measures

A structured questionnaire was developed for the *MAN for Health* study based on prior research, reviewed and modified for cultural appropriateness by the academic research study team and community research partners, and finally pilot tested with community advisory group members from each site prior to the start of data collection. Many of the items on the survey questionnaires were based on established measures and were chosen for their conciseness, clear communication, and previous history of use with African-American and Latino populations (Centers for Disease Control and Prevention, 2004). The survey was translated into Spanish after the English version was finalized. The questionnaires captured the behavioral and psychosocial measures used in this study: use of preventive and early

detection health services, daily fruit and vegetable consumption, condom use frequency, and Confidant-LHA relationship properties. The questionnaire also recorded various descriptive variables of interest to this study, such as age, marital status, income, education, and number of hours worked per week. The measures examined in this study are described below.

Below, we list the details for the items used to measure the study variables. Table 8 highlights the actual wording of all the items measuring the study variables.

Descriptor Variables. Descriptive covariates included in the analyses included demographic variables of Confidant and LHA age, cohabitation status, education, hours worked per week, household income, and race/ethnicity. The LHA descriptive variables were classified as Level 2 LHA covariates when conducting analyses. In addition, a dummy variable (site) was included at the Confidant individual level to account for the site in which the participant was located; as mentioned earlier, the parent study intervention focused on impacting a unique health topic at each site so it is not necessarily expected that all Confidants would express change in all three preventive health behavior outcomes. Baseline measures of the Confidant preventive health behavior outcomes for each Confidant were also included as a descriptor covariate.

Outcome variables - Confidant preventive health behaviors. The main outcomes of interest consisted of three specific self-reported preventive behaviors collected from Confidants: (a) number of healthcare utilization visits in the past six months, (b) daily servings of fruit and vegetable consumed, and (c) frequency of condom use during sexual encounters in past three months. Except for the condom use outcome, all these measures were collected from Confidants both at baseline and six-month survey time points. Only the condom use measure from the six-month questionnaire was analyzed because the condom use item from the

baseline questionnaire was substantially revised at 6-month follow-up, rendering the two items non-comparable.

(a) Healthcare utilization visit (routine preventive or screening visit). This variable was comprised of two items. Scores from both items were combined to comprise a discrete count score for the composite variable “healthcare utilization visits”. Higher scores indicate higher number of healthcare visits attended; (b) Fruit and vegetable consumption Numeric scores from each item were added to form a composite score, and higher scores indicate higher daily number of fruit and vegetable servings consumed; (c) Sexual health outcome (condom use frequency). The responses were rescaled from ordinal to a dichotomous variable (‘Sometimes’ or ‘Always’ vs. ‘Never’ or ‘Rarely’). The manner in which we collapsed the response categories further delineates “common users” (‘Sometimes’ or ‘Always’ response) from “uncommon users” (‘Never’ or ‘Rarely’ response). Higher scores indicate a higher frequency of condom use.

Level 2 Explanatory Variable - LHA Preventive Health Behavior. This LHA-level measure hypothesized to influence *Confidant Preventive Health Behaviors* (outcome) consisted of the same three self-report Confidant preventive health behaviors (healthcare utilization visits, fruit and vegetable consumption and condom use frequency) discussed in the previous paragraph except here the information is asked of LHAs instead of Confidants.

Level 1 Explanatory Variables- Confidant-LHA Relationship Structural Properties.

(a) Confidant Closeness to LHA. This relationship structural property was captured by a modified version of Inclusion of Other in the Self (IOS) Scale (Aron et al., 1992), which was a one-item pictorial measure of closeness. Our adapted scale entailed seven concentric circles that varied in distance from a center circle, which represented the person to whom one

assessed how close one felt. The response values assigned to this measure were scored as follows: 1 (the letter that represents the circle furthest away from the center circle) to 7 (the letter that represents the circle closest to the center circle). LHA Closeness to Confidant. This variable was captured by the same modified version of the IOS scale used to measure Confidant Perception of Closeness with LHA mentioned directly above. It was also scored the same way and given minor wording changes so as to reflect who was assessing closeness to whom. Both Confidant and LHA closeness measures were collapsed from the original 7 ordinal categories to 4 categories; (b) Relationship diversity. This characteristic was assessed by one item, which queried about the context in which the LHA became acquainted with his Confidant. All the responses were added to form a composite score. This score was then dichotomized to knowing each other in *one way or less* vs. *two ways or more*. A higher score indicated that the LHA and Confidant knew each other in a greater number of ways; (c) Relationship length. This was assessed by one item that inquired how long the LHA had been acquainted with the Confidant at the time he asked the Confidant to join the study. These seven categories were then collapsed to 4 categories; (d) Frequency of Confidant –LHA interaction. The frequency in which LHA and Confidant interacted with each other outside intervention activities was assessed by one item. This item is a modified version of one in the International Values Survey (Aron et al., 1992).

Table 8. Study variables.

| BASELINE | | | |
|---|--|--------------|---|
| Construct Descriptor/Control Variables | Variable | #Item | Item |
| <i>Confidant Preventive Health Behavior</i> | <i>Health care utilization:</i> | | |
| | Routine medical check up | 1 | When did you last see a health care provider, such as a nurse or doctor, in the U.S. for a routine check-up, a routine physical exam, or something similar (NOT including ER visit)? Within past 6 months Within the past year 1-2 years ago Over 2 years ago Never |
| | Health screening test | 1 | During the past year, have you been to a clinic (or hospital, health department, doctor's office) for any of the following? YES/NO Prostate Specific Antigen (PSA) test for prostate screening diabetes screening STD counseling/testing HIV counseling/testing hypertension screening (screen for high blood pressure) cholesterol screening digital rectal exam other health screenings |
| <i>Sociodemographics</i> | Daily servings of fruits and vegetables | 2 | How many times in a typical day do you eat fruits, including fruit juice? # TIMES How many times in a typical day do you eat vegetables, including juice but not French fries? # TIMES |
| | Age | 1 | How old are you? |
| | Cohabitation status | 1 | What is your marital status? Married and living with family Married but not living with family Living as married Single, living with partner Single Divorced Widow/widower |

| | | | |
|--|-------------------------------|---|---|
| | Education level | 1 | What is the highest level of education you completed? No education or kindergarten Elementary school (1-6) Middle school High school diploma or equivalent (GED) Some college Associate's degree Bachelor's degree Master's degree Doctoral degree |
| | Hours worked weekly | 1 | How many hours do you work in a typical week? # HOURS |
| | Household income | 1 | Please tell me which category represents your total family income last year. [<i>Gross or before taxes income</i>] \$10,000 or less \$34,001-\$40,000 \$10,001-\$16,000 \$40,001-\$46,000 \$16,001-\$22,000 \$46,001-\$52,000 \$22,001-\$28,000 \$52,001-\$58,000 \$28,001-\$34,000 Greater than \$58,000 |
| | Race/Ethnicity | 2 | Are you Hispanic or Latino? YES/NO How would you describe your race? American Indian/Alaska Native Asian Black African American Native Hawaiian/Pacific Islander White Other |
| | Community health focus (site) | 1 | Sexual health Prostate health Cardiovascular health |

| SIX MONTH FOLLOW UP | | | |
|---|---------------------------------|--------------|--|
| Construct | Variable | #Item | Item |
| Confidant Preventive Health Behavior (Outcome variable) | <i>Health care utilization:</i> | | |
| | Routine medical check up | 1 | Same as baseline |
| | Health screening test | 1 | During the <i>past 6 months</i> , have you been to a clinic (or hospital, health department, doctor's office) for any of the following? YES/NO |
| | Fruit and vegetable consumption | 1 | Same as baseline |

| | | | |
|--|---|---|--|
| LHA Preventive Health Behavior (Explanatory variable) | Condom Use | 1 | Thinking about all of the times you have had sex during the past 3 months, how often did you use condoms? Always Sometimes Rarely Never No sex in the past 3 months |
| | <i>Health care utilization:</i> | | |
| | Routine medical check up | 1 | Same as Confidant preventive health behavior measure |
| | Health screening test | 1 | Same as Confidant preventive health behavior measure |
| | Daily servings of fruits and vegetables | 1 | Same as Confidant preventive health behavior measure |
| Confidant-LHA Relationship Interdependence Properties: (Explanatory variable) <i>Relationship Closeness</i> | Condom use | 1 | Same as Confidant preventive health behavior measure |
| | Confidant perception of LHA | 1 | Using the diagram on the right, select a letter inside one of the rings that best describes how close you feel currently to your LHA. [The closer the ring is to 'Me', the closer your friendship with your LHA]: A,B,C,D,E,F,G, |
| | LHA perception of Confidant | 1 | Using the diagram on the right, select a letter inside one of the rings that best describes how close you feel currently to your Confidant. [The closer the ring is to 'Me', the closer your friendship with your Confidant]: A,B,C,D,E,F,G, |
| | <i>Relationship Diversity</i> | | 1 |

| | | | | | | | | |
|---|-----------------------|---|----------|-----------------------|----------------------|----------------------|----------------------|-----------------------|
| <i>Relationship Length</i> | 1 | <p>When you asked your Confidant to be part of the MAN for Health/Hombres project, how long had you known him?</p> <p>Just met as part of the MAN Project Less than 6 months 6 months to 1 year 1 to 2 years 3 to 5 years 6 to 10 years More than 10 years</p> | | | | | | |
| <i>Relationship Interaction Frequency</i> | 1 | <p>On average, how often do you interact with your Confidant not counting the time you spent together in MAN for Health/ Hombres activities?</p> <table data-bbox="860 630 1364 714"> <tr> <td>Everyday</td> <td>At least once a month</td> </tr> <tr> <td>Several times a week</td> <td>Several times a year</td> </tr> <tr> <td>At least once a week</td> <td>Less than once a year</td> </tr> </table> | Everyday | At least once a month | Several times a week | Several times a year | At least once a week | Less than once a year |
| Everyday | At least once a month | | | | | | | |
| Several times a week | Several times a year | | | | | | | |
| At least once a week | Less than once a year | | | | | | | |

DATA ANALYSIS

Data analysis was conducted in two stages. In the first stage, initial descriptive analysis was performed, using Statistical Package for the Social Sciences (SPSS) version 15.0 for Windows (SPSS Inc, 2007) to describe the sample and to assess the distribution of variables in the sample population. If influential cases were found for any outcome variables, we compared the means, with and without the outliers, using a t-test or chi-square statistic. If the results for both groups were not statistically significant, all values for the variable in question were retained. In this study, no outlier values needed to be discarded. Next, we used Hierarchical Linear and Nonlinear Modeling (HLM) 6.04 (Scientific Software International Inc, 2007) to estimate all the models presented in this study. We ran bivariate analyses of the relationship between the explanatory variables and each of the three outcome variables, Confidant preventive health behaviors (results in Appendix 4, Tables B-D). Furthermore, the hypothesized moderator effects were tested by including the pairwise interactions between the LHA-level and Confidant-level relationship characteristic variables. We added covariates to the original main effects model that met $\alpha < .10$ significance level.

Finally, multilevel regression models were used to determine the independent associations ($\alpha < .05$ significance level) between the explanatory variables shown to be significant in the bivariate analyses and each of the three Confidant preventive health behavior outcomes of interest: (a) healthcare utilization visits in past six months, (b) daily number of fruit and vegetable servings consumption, and (c) frequency of condom use during sexual encounters in past 3 months. We used a Poisson sampling model and a log link function to analyze the healthcare utilization and fruit and vegetable consumption outcomes because they were coded as discrete count variables. As for the condom use frequency outcome, we used a Bernoulli sampling function and logit link-function to analyze the results because the outcome variable was rescaled to represent a dichotomous variable.

Hierarchical generalized linear modeling (HGLM) was used to identify the direct and/or indirect effects of LHA and Confidant-LHA relationship properties on these three Confidant preventive health behaviors. HGLM is used when discrete or limited dependent variables are involved (Raudenbush & Bryk, 2002; Scientific Software International Inc, 2007). This statistical program allows for simultaneous evaluation of group level (LHA) and individual level (Confidant) variables on our individual level outcome. Multilevel regression modeling also accounted for clustering of Confidants within LHA groups by formally representing each of these levels in its own sub-model. On the LHA group level, the models included a random error term, which allowed the intercept to vary between LHA groups. As a result, variation between LHA properties could be examined and explicitly accounted for as an independent determinant of Confidant preventive health behavior.

RESULTS

Attrition

A total of 379 men completed baseline questionnaires, of which 216 were African American and 162 were Latino. At the six-month follow up time point, 236 men turned in completed surveys. Those who did not participate in both waves of data collection were excluded from analysis. Therefore, of the participants who provided both baseline and six-month data, 227 cases (131 African-American and 96 Latino men) were retained for this present study.

In order to assess the effect of the 40% attrition rate on the study sample from baseline to 6-month follow-up time point, the relationship between Confidants' preventive health behavior outcomes and whether they dropped out of the study at six-month follow-up was examined. We ran a series of means comparisons on the three preventive health behavior outcome variables, using either t-test or chi-square test statistics, depending on the scaling of the variable. Results assessed whether Confidants who were lost to follow up differed from those who remained in the study in terms of their preventive health behavior outcomes. For all three outcomes, the p-values of the test statistics were all above $\alpha = .05$ significance level, which suggested that the participants lost to follow up did not differ statistically from those retained for this study in terms of their number of healthcare visits, fruit and vegetable consumption, and frequency of condom use at baseline measure.

Missing Items

Missing items were defined as the cases with values missing in the study's explanatory variables. The extent of missing items was first assessed by conducting univariate analyses on the variables of interest (explanatory and descriptor variables). Several

relationship characteristic variables (length, frequency, diversity, and LHA closeness) each had more than 10% missing data. We wanted to determine whether these missing items were randomly distributed across all observations. To determine whether cases were missing completely at random, the sample was divided into those with and without any missing items on the explanatory variables of interest. Both groups were then compared by their six-month dependent variable outcomes, using either a chi-square test or t-test. Failure to observe significant differences between the two groups at the 95% confidence level would have ensured that missing data were randomly distributed across observations. We observed, however, significant differences between the samples with and without missing values for mean average of healthcare utilization visits and fruit and vegetable daily consumption. This suggests that missing items might not be distributed randomly across observations and that selection bias might be involved. Therefore, we implemented a best-case/worst-case imputation scenario where we imputed the missing data with the “best case” value (the highest value on an ordinal/continuous scale) and ran a bivariate analysis of the independent variable and dependent outcome in question. Next, in comparison, we imputed the missing data with the “worst case” value (the lowest value on an ordinal/continuous scale) and reran the analysis. None of the results from either datasets was statistically significant; hence, we are comfortable that the missing data occurred randomly enough so that the study results were not affected by selection bias.

Descriptive Analyses

Table 9 summarizes the demographic characteristics of LHAs and Confidants. Of the 203 Confidants surveyed, the greatest proportion (34%) were between 18-30 years of age, while, for the 24 LHAs surveyed, the greatest proportion (37%) were between 41-50 years of

age. Confidants and LHAs had the opposite profile for cohabitation status: approximately 2/3 of Confidants (64%) were living with a partner, while, for LHAs, 2/3 (67%) were *not* living with a partner. Regarding education, a larger portion of Confidants received post-secondary education as compared to LHAs: Nearly ½ of Confidants (43%) had obtained at least some college education as compared to only ¼ of the LHA sample (25%). For total annual household income, a slightly higher percentage of LHAs reported earning at least more than \$28,000 per year than their Confidant counterparts (58% versus 46%). Finally, in terms of number of hours worked per week, the proportion of LHAs who reported working more than 40 hours per week was higher than that of the Confidants (60% versus 46%).

Table 9. Demographic characteristics of LHAs and confidants.

| Characteristic | | LHA: # (%) N=24 | MISSING | CONFIDANT: # (%) N=203 | MISSING |
|----------------------------|-----------------------------|----------------------------------|----------------|---|----------------|
| Age | 18-30 yrs | 4 (17%) | 0 | 69 (34%) | 2 |
| | 31-40 yrs | 5 (21%) | | 43 (21%) | |
| | 41-50 yrs | 9 (37%) | | 43 (21%) | |
| | > 50 yrs | 6 (25%) | | 46 (23%) | |
| Cohabitation Status | Living with partner | 8 (33%) | 0 | 128 (64%) | 2 |
| | Not living with partner | 16 (67%) | | 73 (36%) | |
| Education | Less than HS educ | 18 (75%) | 0 | 61 (30%) | 2 |
| | HS degree/ GED | 0 (0%) | | 55 (27%) | |
| | Some college/ assoc. degree | 0 (0%) | | 46 (23%) | |
| | Bach. degree & beyond | 6 (25%) | | 41 (20%) | |
| Income | <\$10,000 | 1 (4%) | 0 | 29 (15%) | 8 |
| | \$10,001-16,000 | 2 (8%) | | 23 (12%) | |
| | \$16,001 -22,000 | 2 (8%) | | 25 (13%) | |
| | \$22,001-28,000 | 5 (21%) | | 33 (17%) | |
| | \$28,001-58,000 | 8 (33%) | | 44 (23%) | |
| | >\$58,000 | 6 (25%) | | 41 (21%) | |

| | | | | | |
|------------------------------|----------------|---------|---|----------|---|
| Hrs worked per wk | 30 hrs or less | 1 (4%) | 1 | 16 (8%) | 4 |
| | 31-40 hrs | 8 (35%) | | 88 (44%) | |
| | 41-50 hrs | 7 (30%) | | 44 (22%) | |
| | 51 hrs or more | 7 (30%) | | 51 (26%) | |

In regards to preventive health behaviors (refer to Table 10), the average number of healthcare visits attended increased, for both LHAs and Confidants, from baseline to 6-month follow-up. At baseline survey, LHAs and Confidants were similar in the average number of healthcare visits attended in the past six months (2.50 and 2.15, respectively), with the LHA value being slightly higher. After six months, LHAs reported a higher average number of healthcare visits attended in the past six months (3.50) versus the Confidants (2.37). In terms of baseline fruit and vegetable consumption, LHAs consumed approximately one additional average daily serving of fruit and vegetables (5.54) compared to the Confidants' average daily consumption (4.50). Six months later, LHA average daily number of fruit and vegetable servings stayed fairly stable (5.52), as did that of Confidants (4.55). Finally, in regards to condom use frequency during sex in the past three months, LHA and Confidant profile was reversed: About ½ of LHAs (48%) reported never or rarely using condoms and exactly ½ of Confidants reported sometimes or always using condoms. Both groups had similar proportions of men who reported not having sex in the past three months (13% for LHAs and 11% for Confidants). As mentioned already, this measure was administered at the six-month follow-up survey. No comparable baseline measure was available, so we cannot comment on any change that may have taken place from baseline to Time 2 survey.

Table 10. Preventive health behavior characteristics of LHAs and confidants. (N=227)

| Characteristic | LHA: N (%) N=24 | MISSING | CONFIDANT: N (%) N=203 | MISSING |
|---|----------------------------------|----------------|---|----------------|
| Mean healthcare visits in past 6 mo (baseline) (range: 0-9) | 2.50 | 0 | 2.15 | 5 |
| Mean healthcare visits in past 6 mo (6 mo f/u) (range: 0-7) | 3.50 | 0 | 2.37 | 4 |
| Mean daily servings of vegetables & fruits in past 6 mo (baseline) (range: 1-17) | 5.54 | 0 | 4.50 | 3 |
| Mean daily servings of vegetables & fruits in past 6 mo (6 mo f/u) (range: 1-20) | 5.42 | 0 | 4.55 | 1 |
| Frequency of condom use in past 90 days: | | | | |
| Never/Rarely | 11 (48%) | 1 | 78 (38%) | 1 |
| Sometimes/ Always | 9 (39%) | | 101 (50%) | |
| No sex in past 90 days | 3 (13%) | | 23 (11%) | |
| (range: 0-1) | | | | |

Confidant-LHA relationship properties are summarized in Table 11. When examining the relationship length, 19% of Confidant-LHA pairs had known each other 2 years or less, about 1/3 of Confidant-LHA pairs had known each other between 3-5 years, another 19% had known each other between 6-10 years, and the remaining 1/3 had known each other more than 10 years. In regards to how often Confidant-LHA pairs interacted with each other outside project-related activities, only 3% reported the least amount of interaction frequency, several times a year. About 1/3 of Confidant-LHA dyads interacted with each other at least once per month, 20% interacted at least once per week, 38% interacted several times a week, and 6% reported interacting everyday. In terms of the number of ways which had led Confidant-LHA dyads to become acquainted with each other (e.g., family member,

neighbor, colleague), about 1/3 (29%) had known each other in 2 or more ways while the remainder (71%) had either not been acquainted with each other before the start of the project or knew each other in only 1 way. Finally, in terms of perceptions of closeness with one another, 1/2 of Confidants reported the highest two levels of perceived closeness with their LHAs (*Fairly Close* or *Extremely Close*); on the other hand, a smaller proportion of LHAs (35%) reported the same two highest levels of closeness. As for the lowest 4 levels of perceived closeness (collapsed to the single category of *Not Very Close*), 19% of Confidants selected this category for their perceived closeness with their LHA while 29% of LHAs rated perceived closeness with their Confidants in the same category.

Table 11. Confidant-LHA relationship properties.

| Characteristic | | N (%) | Missing |
|--|--------------------------------|--------------|----------------|
| Length | Just met to 2 yrs | 33 (19%) | 32 |
| | 3-5 yrs | 50 (29%) | |
| | 6-10 yrs | 32 (19%) | |
| | More than 10 yrs | 56 (33%) | |
| Interaction Frequency | Several times per year | 6 (3%) | 28 |
| | At least once per month | 58 (33%) | |
| | At least once per week | 35 (20%) | |
| | Several times per week | 66 (38%) | |
| | Everyday | 10 (6%) | |
| Diversity | Know each other 1 way | 124(71%) | 28 |
| | Know each other 2 or more ways | 51 (29%) | |
| Confidant Perception of Closeness | Not very close (D-G) | 38 (19%) | 3 |
| | Somewhat close (C) | 61 (31%) | |
| | Fairly close (B) | 56 (28%) | |
| | Extremely close (A) | 45 (22%) | |
| LHA Perception of Closeness | Not very close (D-G) | 44 (29%) | 53 |
| | Somewhat close (C) | 54 (36%) | |
| | Fairly close (B) | 25 (17%) | |
| | Extremely close (A) | 27 (18%) | |

Below, the results of the final HGLM models are presented. The findings are organized by Confidant health outcome.

Factors Associated with Confidant Healthcare Utilization Visits

Intra-class correlation

The level of intra-class correlation (ICC) value of Confidant healthcare utilization visits in this dataset was 0.157, which means that approximately 16% of the variation in the number of Confidant healthcare visits existed because of differences *between* LHA groups (while about 84% of variation was due to variance *within* LHA groups). After adding the Level 2 variables (LHA number of healthcare utilization visits and LHA age) to the model, these LHA group level variables explained 42% of the variance in number of Confidant healthcare visit. A final model adjusted for factors found to be significant in the bivariate analyses of Confidant healthcare utilization visits is displayed in Table 12.

Descriptive covariates

Confidant baseline number of healthcare utilization visits was significantly associated with higher number of healthcare utilization visits at six months ($p < .05$). Translating log-rate ratio into event rate ratio, for every one-visit increase in baseline healthcare utilization, the expected number of healthcare utilization visits at six months increased by 7%. Confidant age also was associated positively with Confidant healthcare utilization visits ($p < .01$). For every one category increase in age, the expected number of healthcare utilization visits at six months increased by 33%. Finally, Confidant income was associated positively with Confidant healthcare utilization visits ($p < .05$). For every one income category increase, the expected number of healthcare utilization visits at six months increased by 11%.

LHA Characteristics

LHA number of healthcare utilization visits was associated with Confidant number of healthcare utilization visits at six months. However, this variable was part of a significant interaction effect described below so its model coefficient statistic was not interpreted individually.

Confidant-LHA Relationship Properties

Confidant perception of closeness with LHA is associated with number of healthcare utilization visits at six months. Because this variable is part of a significant interaction effect described below, however, its model coefficient statistic was not interpreted individually.

Interaction Effect

In alignment with the hypothesis that relationship properties would moderate the relationship between LHA preventive health behavior and the corresponding Confidant preventive health behavior outcome, the model showed a significant interaction effect of LHA healthcare visits and Confidant closeness level with LHAs on Confidant healthcare visits ($p < .05$). Figure 4 shows the interaction effect, based on estimates of HLM coefficients. In general, the average slope of LHA healthcare visits and Confidant healthcare visits was positive. As number of LHA healthcare visits increased (x-axis), the Confidant healthcare visit count increased as well (y-axis). In addition, the higher the Confidant closeness to LHA (mod=moderator), the stronger the magnitude of the effect of LHA healthcare visits on Confidant healthcare visits.

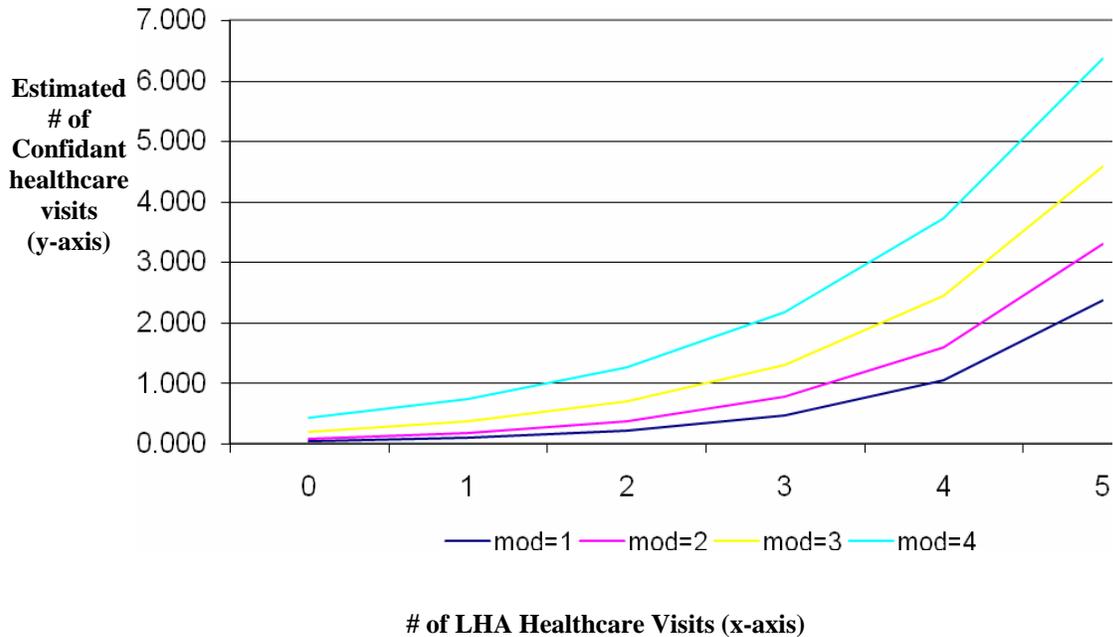
Table 12. Final model for confidant healthcare visits at six months.

| Fixed Effects | Coefficient | Event Rate Ratio |
|--|--------------------|-------------------------|
| <i>Confidant-level</i> | | |
| Intercept | 0.6559 * | |
| Baseline Measure of Healthcare Visits | 0.0659** | 1.07 |
| Closeness Level with LHA | 0.4577 * | 1.58 |
| LHA Closeness Level with Confidant | -0.0928 | 0.91 |
| Frequency of Interaction with LHA | 0.2271 | 1.26 |
| Age | 0.2870 ** | 1.33 |
| Cohabitation Status: Living with Partner (Not living with partner is reference) | 0.1821 | 1.20 |
| Income | 0.1111* | 1.11 |
| <i>LHA-level</i> | | |
| Healthcare Visits | 0.5850** | 1.80 |
| Education | 0.0690 | 1.07 |
| <i>Cross-level Interaction</i> | | |
| “LHA Healthcare Visits” by “Confidant Closeness” | -0.0922 | 0.92 |
| “LHA Healthcare Visits” by “Frequency of Interaction” | -0.0728 | 0.93 |
| Number of Confidants | 121 | |
| Number of LHAs | 16 | |

***p<.001 **p<.01, *p<.05

Each predictor is centered around its grand mean (except for Cohabitation, which is uncentered)

Figure 4. Model-predicted confidant health utilization visits in past six months: interactive effects of LHA healthcare utilization visits and confidant closeness to LHA.



Mod (Moderator) = Level of Confidant closeness to LHA

Note: Figure was created on the basis of the estimated HLM coefficients. It assumes a zero random coefficient.

Factors Associated with Confidant Fruit and Vegetable Consumption

Intra-class correlation

The ICC level of Confidant daily number of fruit and vegetable servings consumed was 0.025, which means that 2.5% of the variation in Confidant daily number of fruit and vegetable servings consumed was due to variance *between* LHA groups, while about 97.5% of variation was because of variance *within* LHA groups. After adding a Level 2 variable (LHA number of daily fruit and vegetable servings consumed) to the model, results indicated that the LHA group level variables hardly contributed anything to help explain the variance in Confidant daily fruit and vegetable intake. A final model adjusted for factors found to be

significant in the bivariate analyses of Confidant daily number of fruits and vegetable servings consumed is displayed in Table 13.

Descriptive covariates

Confidant baseline daily number of fruit and vegetable servings consumed was significantly associated with higher daily number of fruit and vegetable servings consumed at six months ($p < .001$). For every one-serving increase in fruit and vegetables at baseline, the expected number of fruit and vegetable servings consumed at six months increased 3%.

Confidant-LHA Relationship Properties

None in the model were found to be significant.

LHA Characteristics

None were included in the final model.

Interaction Effects

None were included in the final model.

Table 13. Final model for confidant fruit and vegetable consumption at six months.

| Fixed Effects | Coefficient | Event Rate Ratio |
|--|--------------------|-------------------------|
| <i>Confidant-level</i> | | |
| Intercept | 1.5696*** | |
| Baseline Measure of Fruit and Vegetable Consumption | 0.0294** | 1.03 |
| Race/Ethnicity: African American (Latino is reference) | -0.1528 | 0.86 |
| Closeness Level with LHA | 0.0342 | 1.03 |

Number of Confidants = 189

Number of LHAs = 22

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

Each predictor is centered around its grand mean (except for Race/Ethnicity, which is uncentered)

Factors Associated with Confidant Frequency of Condom Use

Intra-class correlation

The ICC value of Confidant condom use frequency during past 3 months was .043, which means that 4.3 % of the variation in Confidant condom use frequency during past 3 months was due to variance *between* LHA groups (while over 95% of variation in the outcome was due to variance *within* LHA groups). After adding a Level 2 variable (LHA condom use frequency during past 3 months) to the model, the results indicated that LHA group level variables contributed very little to explaining the variance in Confidant condom use frequency. A final model adjusted for factors found to be significant in the bivariate analyses of Confidant condom use frequency is displayed in Table 14. In summary, none of the explanatory variables or descriptor covariates in the model were significantly associated with the outcome.

Table 14. Final model for confidant condom use frequency at six months.

| Fixed Effects | Coefficient | Odds Ratio |
|--|--------------------|-------------------|
| <i>Confidant-level</i> | | |
| Intercept | 0.5519 | |
| Age | -0.6867 | 0.50 |
| Cohabitation Status: Living with Partner (Not living with partner is reference) | -0.5002 | 0.61 |
| Number of Hours Worked Per Week | -0.3541 | 0.70 |
| Income | -0.3777 | 0.68 |
| Race/Ethnicity: African American (Latino is reference group) | -0.1070 | 0.90 |
| <i>LHA-level</i> | | |
| Age | 0.0521 | 1.05 |
| Education | -0.2571 | 0.77 |
| Income | -0.1808 | 0.90 |

Number of Confidants = 189

Number of LHAs =22

***p<.001 **p<.01, *p<.05

Each predictor is centered around its grand mean (except for Race/Ethnicity and Cohabitation, which are uncentered)

DISCUSSION

The growing number of LHA intervention programs continues despite an absence of robust evidence of their effects (Bonfill, Marzo, Pladevall, Martí, & Emparanza, 2001; Britton, McCormick, Renfrew, Wade, & King, 2007; Hodnett, Gates, Hofmeyr, & Sakala, 2007; Kelley et al., 1983; Lewin et al., 2005b; Swider, 2002). One of the most comprehensive systematic reviews of LHA intervention studies (Lewin et al., 2005a), conducted by Cochrane Collaboration, examined the global evidence for the effectiveness of LHAs, as compared to other interventions, for all health conditions and types of interventions in primary and community health care. Forty-three randomized controlled LHA intervention trials were reviewed. Results from the systematic review revealed that, compared to usual care, LHA intervention programs focusing on improving outcomes for acute respiratory infection, malaria, and immunization uptake demonstrated benefits. For all other health issues, the evidence was insufficient to justify recommendation for practice. Not surprisingly, only one trial was designed exclusively for men, and it was a health education program targeted for gay men in Canada regarding high-risk sexual practices (Tudiver et al., 1992). Also, it was not clear how LHAs should best provide services or be trained.

Current theoretical application of *relationship interdependence* in LHA intervention research can possibly illuminate the public health field's understanding of factors, beyond changing individualized risk behaviors, to assist African-American and Latino men in reducing their disproportionate burden of disease. In public health, it is still unclear *how* social influence provides benefits for a variety of preventive health behaviors and how the influence component can be enhanced (DeVellis et al., 2003). Further overlooked in public

health research are the mechanisms of men's interpersonal relationships, which may underlie observed correlations between the concept of social influence and good health.

Consequently, the public health field has been stalled when interventions, guided by the assumption that involving LHAs in providing social support is sufficient to effect desired behavior change, are found to be unsuccessful with men (Lewin et al., 2005b; Lewis et al., 2002; Reis & Collins, 2000). For these reasons, this study directed attention to (a) the structural properties of the Confidant-LHA relationship interdependence, and (b) LHA preventive health behaviors as underlying mechanisms possibly influencing the helping process between African-American men and Latino men. We examined the explanatory value of structural relationship properties and LHA preventive health behaviors upon a LHA's relationship with his Confidants, so that more effective intervention models can be developed to improve and sustain African-American and Latino men's preventive health behaviors.

Confidant-LHA relationship structural properties

Baseline measure of Confidant daily intake of fruit and vegetable servings was significantly and positively associated with the six-month measure. The same trend was applicable for Confidant healthcare visits at six months – baseline level was also significant and positively associated with six-month outcome. These findings are not surprising (a person's baseline performance is usually an influential factor for subsequent outcomes), and are why we wanted to account for baseline level in our analysis process. Age and income were other descriptor covariates found to be significant for Confidant healthcare visits at six months. The older a Confidant was or the higher the income a Confidant reported, the more likely he was to access the healthcare system. These finding, too, are not surprising.

Increased age is usually a risk factor for many health conditions and diseases, which then require more interaction and follow-up with the healthcare system. As for income, financial constraints are often reported to be barrier to healthcare access so the higher the income of a Confidant, the less financial barriers he would have in regards to accessing healthcare services.

Moving away from descriptive covariates and back to relationship properties, our findings also revealed that Confidant closeness to LHA was significantly associated with Confidant healthcare utilization visits by way of being a positive moderating factor for the positive relationship between LHA behavior and that of his Confidant. This finding will be discussed more thoroughly below.

Possibility of alternative moderation model

As for the remaining non-significant relationship properties, relationship diversity and length never surfaced as a significant effect for any of the three Confidant health outcomes. Except for the condom use frequency outcome, the two other Confidant preventive health behavior outcomes (healthcare visits and fruit and vegetable consumption) were significantly associated with Confidant closeness to LHA in the initial bivariate analyses. Confidant healthcare visits were also significantly associated with LHA closeness to Confidant and interaction frequency, as well in the bivariate analyses. Yet in the final multilevel generalized linear regression models, only Confidant closeness with LHA remained a significant main effect ($p=.02$) on Confidant healthcare visit outcome. The coefficient of this main effect is not interpreted, however, because it is part of a significant interaction term in the final model, which is discussed in a section below. The failure of this study to reveal prominent effects of relationship structural properties on Confidant health outcomes may be

due to the misguided main effects pathway laid out in our conceptual model (see Figure 2). We had assumed that each structural property of the Confidant-LHA relationship would be equally capable of bringing the LHA dyad closer together (or moving them further apart). Prior research, however, has neither definitively delineated nor reached agreement as to *which* of the numerous relationship structural properties can actually influence partners' interdependence (Berscheid & Peplau, 1983; Lewis et al., 2002; Lewis, McBride et al., 2006; Reis & Collins, 2000), which can then influence behavior change. The literature has only suggested that various properties are important to consider (e.g., equality, conflict, diversity, duration, frequency, strength, closeness). Although closeness was, indeed, highlighted as an integral component of relationship interdependence (Berscheid & Peplau, 1983), we decided, with so little knowledge about Confidant-LHA dyads, to treat all the structural property variables in our study as independent constructs with equal credence in influencing Confidant-LHA relationship interdependence. In reality, it may have been more accurate to assign more weight to closeness as the most influential property of interdependence and to test whether the remaining properties acted as an effect modifier between closeness and Confidant health outcomes. This alternative conceptual model would have been supported by Berscheid and Peplau (Berscheid & Peplau, 1983), who wrote that a high degree of interdependence or closeness between two people can be operationalized as four structural properties of their interconnected activities: having *frequent* interaction with one another, the degree of impact per interaction being *strong*, the impact involving *diverse* activities for each person, and all these properties characterizing the interconnected activity series for a long *duration* of time. These authors and others (Aron et al., 2004; Kelley et al., 1983) hold the concept of closeness very central to the state of interdependence in a relationship.

Therefore, a possible reason for not finding direct main effects of diversity, length, and interaction frequency with Confidant health outcomes could be that these properties may instead play a more direct role in influencing closeness. In essence, this role would make them an effect modifier of our current hypothesized relationship between closeness and Confidant health outcome. We did not test this alternative pathway in our study.

LHA Health Behavior

Ability to detect intra-class correlation (ICC)

A significant contribution of this study to the LHA intervention research literature is that our data analysis involved hierarchical generalized modeling techniques to address the potential correlation biases stemming from the nature of the study's clustered data (Confidants nested within LHA groups). This multilevel clustered data design is common in many LHA studies, but is rarely addressed during data analysis (Raudenbush & Bryk, 2002; Snijders & Bosker, 1999). Multilevel regression modeling allowed us to study something previous LHA intervention studies have not- simultaneously examining the individual effects of Confidants (i.e. Level 1) *and* the group effects of LHAs (i.e. Level 2) on Confidant preventive health behaviors. Prior research has only examined individual effects of LHAs on Confidants, which can be short-sighted, considering the inherent dynamics of a dyadic relationship between each LHA and his group of Confidants. This is the first study, to our knowledge, that has captured the level of ICC among Confidants recruited by the same LHA, which we refer to as LHA groups.

The ICC correlation we calculated for each Confidant health behavior revealed that a proportion of variance in each behavior was due, to some extent, to variation *among* the LHA groups. That is, LHA groups were not only unequal, but the differences found in Confidant

behaviors appeared to be a function of which LHA group to which a Confidant belonged. Each LHA had recruited men from his own social networks to participate as Confidants. It is, therefore, not surprising to find that LHAs had selected and recruited men with whom they shared more similarities rather than incongruities. Thus, by virtue of this recruitment phenomenon, Confidants within the same LHA group shared more similarities with one another as well, and thereby, increasing the cluster effect (non-independence) among Confidants within the same LHA group.

With regards to Confidant healthcare visits, ICC indicated that approximately 16% of the variation in Confidants' behaviors was due to variance between LHA groups. To further emphasize the importance of not discounting LHA group level effects, when the significant LHA group variables (LHA number of healthcare utilization visits and age) were added to the main effects model of Confidant healthcare visits, these LHA group variables explained 42% of the variance in number of Confidant healthcare visits. When entered into the final regression model, LHA healthcare visits were a significant main effect ($\alpha = .01$) for Confidant healthcare visits outcome (The coefficient of this main effect is not interpreted, however, because it is part of significant interaction term in the model, which is discussed in the following section). This significant result partially supported our hypothesis that LHA preventive health behavior would be a significant main effect in predicting its corresponding Confidant preventive health behavior outcomes. Given the ICC calculations, however, it was not surprising that, in the final regression models, LHA preventive health behavior was not significantly associated with Confidant fruit and vegetable consumption and condom use frequency because ICC calculations had already revealed that adding the LHA group-level variables did not really explain any of the existing variances in these outcomes. These

regression model results suggest that LHA preventive health behavior was not of key significance in predicting the corresponding Confidant fruit and vegetable consumption and condom use frequency behaviors.

Importance of considering social context of health behaviors

Had there been a strong association among these three Confidant health behaviors, it might have been indicative of an overall Confidant health consciousness. Among the limited number of studies that have examined the clustering of major health behaviors, mixed results have been found (Newsom, McFarland, Kaplan, Huguet, & Zani, 2005). One of the largest studies to examine this issue analyzed data from 250,000 participants from four of the largest epidemiological health surveys in North America (Newsom et al., 2005). Findings revealed that some of the most important health behaviors related to chronic disease prevention (alcohol consumption, smoking, exercise, and diet) were largely unrelated to one another.

This study's results support the notion that health behaviors are, for the most part, independent and are not, as previously thought, necessarily linked by the presence of an individual's sense of health consciousness (Newsom et al., 2005). Therefore, one possible explanation for the divergent findings regarding impact of LHA health behavior on Confidant health behavior is that the influence of one person's behavior on a friend's behavior is likely to depend on the behavior itself (Jaccard, Blanton, & Dodge, 2005; Maxwell, 2002; Newsom et al., 2005). For example, Maxwell's investigation (Maxwell, 2002) into the influential role of same-sex friends across various risk behaviors (cigarette smoking, alcohol consumption, marijuana use, tobacco chewing) showed that the influence of peer behavior was highest for chewing tobacco (log odds= 2.14) and lowest for marijuana use (log odds=1.58). It has been suggested that peer influence may vary depending on the behavior's social context, with the

influence being stronger for behaviors that are more social or group-based, thereby providing an opportunity for the behaviors to be affected by group norms (Jaccard et al., 2005; Maxwell, 2002). Encouraging a Confidant to increase healthcare visits, fruit and vegetable consumption, and condom use frequency are attempts to impact three *very* different behaviors surrounded by very different environmental and psychosocial contexts. It may be argued that the condom use and dietary intake are less affected by group norms or less likely to be exhibited in a social setting. In short, these behaviors may require different types of social influence and support between LHAs and Confidants in order to trigger the desired change.

Interaction between Relationship Structural Properties and LHA Health Behavior

This is the first study to examine whether structural properties of Confidant-LHA relationship interdependence moderate, in any way, LHA health behavior on Confidant health behavior. We hypothesized and found that, as Confidant closeness to LHA increases, the stronger the effect of LHA healthcare visits is on Confidant healthcare visits. This significant interaction reinforces the notion that LHA-Confidant closeness is not to be ignored as a potentially pivotal component of how best to maximize LHA social influence on Confidant health behavior. The idea of strong Confidant-LHA closeness being equated with strong influence or interdependence is supported theoretically and empirically (Aron et al., 2004; Aron, Melinat, Aron, Vallone, & Bator, 1997; Berscheid & Peplau, 1983; Kelley et al., 1983; Lewis, 2002; Rusbult et al., 2001; Rusbult & Van Lange, 1996). In theory, this state of interdependence should then affect how well the Confidant receives communication and/or social influence from his LHA (e.g., influence of LHA health behavior) which, in turn, would influence Confidant health behavior.

At the same time, the other structural properties of diversity, interaction frequency, and length were not found to moderate LHA health behavior on Confidant health behavior. As discussed above, we put forward the idea that the more prominent role of these particular properties of the Confidant-LHA relationship may actually be as effect modifiers between a Confidant's perceived closeness to his LHA and the Confidant's preventive health behavior. As reported in a previous paper (Chapter 5) examining this same data set, Confidant closeness to LHA was positively correlated with all other structural properties; furthermore, multilevel regression modeling showed that LHA closeness to Confidant significantly impacted Confidant closeness to LHA. Therefore, in congruence with theory, closeness, as reported by our sample, definitely rose to prominence in affecting Confidant-LHA relationship interdependence (Aron et al., 2004; Aron et al., 1997; Lewis et al., 2002; Reis & Collins, 2000; Rusbult & Arriaga, 2000; Rusbult et al., 2001; Rusbult & Van Lange, 1996). The other structural properties were found to be intertwined in a way that could not be easily extricated with the measures and data available in this current study.

LIMITATIONS

This study provides new contributions to the LHA research literature, but there are also limitations worth discussing. First, study participants were neither randomly selected from the greater population nor randomly assigned to receive the LHA intervention (there was no separate control group). Thus, the findings of this study are vulnerable to external validity threats and, and generalizability is limited to the men in this sample. Secondly, even though our missing item analysis suggested that the missing items occurred randomly enough so that the study results were not affected by selection bias, we recognize that not having a complete dataset lessens our power to detect significant effects. Next, because we used

multilevel regression modeling procedures to analyze our smaller sample ($n=203$, $j=24$), there may be concern of insufficient sample size to detect significant effects. Maximum likelihood estimation procedures commonly used in multilevel analysis are asymptotic, which translates to the sample size needing to be sufficiently large. A smaller sample can be subject to inaccurate estimates and standard errors (Maas & Hox, 2005); in multilevel modeling, the concern is usually the sample size of the group level (i.e., LHA level), for which our study was 24 LHA groups. Maas and Hox (Maas & Hox, 2005) conducted a simulation study to determine the influences of different sample sizes at the group level. Results showed that a sample size of 50 groups or less led to biased estimates of the level two (i.e., LHA level) standard errors. Of note, however, the simulation study also revealed that the estimates of regression coefficients, variance components, and standard errors of level 1 variables remained unbiased and accurate with smaller numbers of groups. Fourth, social desirability bias may have also occurred when Confidant-LHA dyads answered items regarding closeness to each other. Confidants may have rated their level of perceived closeness to their LHA according to what they believed researchers or LHAs might desire. The study took careful measures to maintain confidentiality, however, and to reassure both the Confidants and LHAs that their responses would have no bearing on their relationship with their dyad member or the research team. Finally, as mentioned in the Methods section, we were not able to account for Confidant baseline level of condom use frequency. Albeit not ideal, we found no significant main effects or interactions in the model for Confidant condom use frequency; thus, even if we had a significant baseline condom use measure effect, it is highly doubtful that it would have augmented the overall results and caused any of the non-significant main effects to become significant.

FUTURE DIRECTIONS

This study was one of the first to examine how certain structural properties of the Confidant-LHA relationship interdependence might influence Confidant preventive health behavior, and how a LHA's own health behavior might impact his Confidant's health behavior. Although we found closeness to be an effect modifier between LHA health behavior influence on Confidant health behavior, what we did not have an opportunity to measure with the existing dataset was some aspect of communication or social influence between Confidants and LHAs. These constructs are the very aspects of relationship interdependence that are assumed to have an ultimate impact on behavior change. If future LHA intervention studies of relationship interdependence could capture some aspect of communication and/or social influence, the results could delineate more clearly *how* closeness affects LHA health behavior and has an impact on Confidant health behavior. For example, when Confidants feel closer to their LHAs, is their communication experience transformed or do LHAs' social influence attempts become more salient? Such information can help complete the full conceptual model proposed by Interdependence Theory (Lewis et al., 2002). Furthermore, as revealed in initial exploratory analyses reported in a previous paper (Chapter 5), given the positive correlation between Confidant closeness to LHA and all the other relationship structural properties (diversity, interaction frequency, length, LHA closeness to Confidant), all the relationship properties do appear to have some type of relationship with each other. Furthermore, LHA closeness to Confidant was also a significant main effect of Confidant closeness to LHA. Yet, given the fact that, in our study, none of the remaining relationship structural properties served as either main effects of Confidant health behaviors *or* as effect modifiers between LHA health behavior and Confidant health

behaviors, another possible pathway to examine is whether those particular relationship properties (diversity, interaction frequency, length, LHA closeness to Confidant) actually *moderate* the association between Confidant closeness to LHA and Confidant health behaviors. Perhaps these structural properties are not as central as we thought in directly influencing Confidant health behaviors but, instead, are more intertwined with influencing closeness. Therefore, future LHA intervention studies incorporating measures of relationship interdependence should consider testing a possible interaction between Confidant closeness to LHA and other structural properties in the Confidant health outcomes. Finally, because many past and current LHA intervention programs involve women as LHAs and Confidants, the natural question arises as to gender differences in the structural properties of relationship interdependence and their impact on health outcomes. All these future studies, in turn, have the potential to develop a more refined theory of how LHA interventions work and to explicate the mechanisms underlying their effectiveness in eliminating health disparities among men of color.

CHAPTER SEVEN

DISCUSSION

Using data from an African-American and Latino male LHA intervention study in North Carolina, the goal of this dissertation study was to identify structural properties of Confidant-LHA relationship interdependence and LHA group level characteristics associated with Confidant preventive health behaviors. In this chapter, I synthesize the findings reported earlier on the two components of the study, address methodological limitations, and conclude with implications for future research and practice to develop more appropriate and effective interventions to reduce health disparities of men of color.

The findings from this study contribute to a nascent but growing body of research regarding community-based intervention studies aimed at improving preventive health behaviors of men of color. Within the body of LHA intervention studies, the parent study is among the few for which both the LHAs and their Confidants were men of color and the intended beneficiaries. To our knowledge, no LHA intervention study has ever collected the same extent of data on its LHAs as it does for its Confidants, who are normally the main focus of LHA interventions.

Furthermore, most LHA intervention studies are not designed in a way that allows each LHA to interact with and survey a steady cohort of Confidants over time. Therefore, LHA and Confidant data are not usually linked, as they were in this dataset. This multilevel clustered data design is common in many LHA studies but rarely is addressed during data analysis. This dissertation study was able, however, to examine and account for potential

correlation biases stemming from Confidants being nested within LHA groups by using hierarchical generalized modeling. Unlike past LHA intervention studies, this one is the first to account for and document LHA group level intra-class correlation for Confidant healthcare visits, fruit and vegetable consumption, and condom use. It is valuable to the LHA intervention field to calculate and publish ICCs for Confidant health outcomes, so that the population of available estimates can grow. The group-level ICC has a strong inverse relationship to power and a good estimate of ICCs is needed to determine sample size. It would be of interest to see whether researchers would replicate the ICC patterns observed in this study and associated with the sample analyzed. Once a sufficient number of ICC estimates are available, it may be possible to take advantage of expected ICC magnitudes to help in the planning of new LHA intervention studies.

Secondly, this dissertation study is one of the first to examine the question of whether certain structural properties of the Confidant-LHA relationship (i.e., closeness, diversity, length, interaction frequency) influence Confidant preventive health behaviors. Although studies informed by Interdependence Theory have found that the social influence and communication patterns within dyads, such as married couples managing one partner's chronic illness, can affect each partner's behavior change, little has been documented on Confidant-LHA relationship interdependence. In sum, all the information garnered from this study can provide a platform for future research and practice to identify the most salient factors that contribute to improving preventive health behaviors for both male LHAs and their Confidants.

STUDY AIMS

Aim 1: *Examine and describe patterns among structural properties of Confidant-LHA relationship interdependence (diversity, length, interaction frequency, closeness) among African-American and Latino men who participated in a LHA intervention program, and test the concordance of our adapted IOS (Inclusion of Others in Self) closeness measure with the original IOS scale.*

The first aim of this study was achieved through the exploratory component of our study, which revealed, for the most part, that all the relationship structural properties were positively correlated with one another and that these correlation patterns were very similar by race. Additionally, via multilevel regression modeling, LHA closeness to Confidant surfaced as a significant effect on Confidant closeness to LHA, and this finding did not vary by race. Consequently, the concept of closeness is examined in the study. In addition, the mean scores for all structural properties were consistently very similar by racial/ethnic group. Only interaction frequency scores had, on average, a slightly larger differential among Latino Confidant-LHA pairs, interacting with one another more frequently. We attribute this finding to the unique nature of how the Latino participants were recruited through local soccer leagues; hence, many of the men, by nature of their shared sports activity, interacted with each other on a very regular basis.

This finding on lack of difference by race for the relationship structural properties (specifically, closeness) does not match the core tenet of self-construal theory (Markus & Kitayama, 1991). This theory posits that people from different cultures can differ in their level of interconnectedness or interdependence with one another (i.e., closeness) based on whether they reside in a country that has a more independent cultural norm (e.g., North

America, Western Europe) or whether they are members of a society which holds a more interdependent and collective cultural norm (e.g., Latin America, Asia). Thus, based on self-construal theory, the Latino group would have reported closer levels of closeness than their African-American counterparts. Given scarceness of data in the discipline of relationship science regarding male friendships of men of color, and because data from other studies have also refuted self-construal theory (Levine et al., 2003; Takemura et al., 2007), we have no reason to believe that our results are unique. Instead, they lead us to believe that perhaps both African-American and Latino men may be equally receptive to LHA interventions, which involve social influence and social support. Finally, a fairly strong correlation between our socio-culturally adapted IOS measure and the original IOS measure lends credence to using the adapted IOS measure for our sample of African-American and Latino males.

Aim 2: *Examine and describe the association between Confidant-LHA relationship properties (diversity, length, interaction frequency, closeness) and Confidant preventive health behaviors among African-American and Latino men who participated in a LHA intervention program.*

Contrary to our main effects hypotheses, no significant main effects were found between the structural properties of Confidant-LHA relationship interdependence and Confidant preventive health behaviors. The study did reveal, however, that Confidant closeness to LHA was significantly associated with Confidant healthcare utilization visits by way of being a positive moderating factor between LHA and Confidant behavior. This finding suggests that how close a Confidant feels towards his LHA definitely plays a significant role, one not addressed in prior LHA research, in terms of the level of

interdependence with each other. The idea of strong closeness being equated with strong influence or interdependence is supported theoretically and empirically (Kelley et al., 1983; Lewis, 2002; Lewis et al., 2002; Lewis, Kalinowski et al., 2006; Lewis, McBride et al., 2006; Reis & Collins, 2000; Rusbult & Arriaga, 2000; Rusbult et al., 2001; Rusbult & Van Lange, 1996). That is, Confidant-LHA interdependence can affect how well the Confidant receives communication and/or social influence from his LHA about a particular health behavior, which, in turn, can influence the Confidant's own health behavior. For our study sample, this conceptual pathway certainly appears to be appropriate.

Aim 3: *Examine and describe the association between LHA preventive health behaviors and Confidant preventive health behaviors among African-American and Latino men who participated in a LHA intervention program.*

Our hypothesis that posited a positive main effect between LHA preventive health behaviors and Confidant preventive health behaviors was not confirmed. What occurred instead was that, as Confidant closeness to LHA increased, the positive effect between LHA healthcare visits and Confidant healthcare visits grew stronger. Therefore, our hypothesis related to Confidant closeness to LHA serving as a positive moderator of the relationship between LHA health behavior and Confidant health behavior was confirmed for healthcare utilization visit behavior. Another component of this aim involved hypotheses that other relationship structural properties (i.e., diversity, frequency, length) would be positive effect modifiers on the relationship between LHA preventive health behaviors and Confidant preventive health behaviors. This set of hypotheses, however, was not confirmed.

The notion that LHA characteristics and health behaviors might affect Confidant health behavior is supported theoretically and empirically (Lewis, Kalinowski et al., 2006;

Lewis, McBride et al., 2006; Reis & Collins, 2000; Rusbult et al., 2001; Rusbult & Van Lange, 1996). Researchers from other areas of dyad relationship research (e.g., parent-child, physician-patient, student-teacher) have recognized the importance of the interdependence dynamics between the partners and have incorporated this notion into their research and intervention endeavors (Ashton et al., 2003; Ennett et al., 2003; Foshee et al., 2004; Street et al., 2005). As a matter of fact, in these other fields that involve dyad interaction research, the thought of not taking into account the characteristics of the “influencer” (e.g., LHA demographics, psychosocial, behavioral) and how they can influence the target population (e.g., Confidant) would probably be considered a crucial oversight.

STUDY LIMITATIONS

While this study contributes significant new information about structural properties of Confidant-LHA relationship interdependence and how they interact with LHA influence on Confidant preventive health behaviors, it also has its share of limitations. Given the parent study’s quasi-experimental one-group pre-post test design, whereby participants served as their own controls and were not randomly selected into the study, threats to internal and external validity may exist. A possible internal validity threat related to this study may be testing. Testing refers to the observed effect being due the number of times a participant’s responses are measured, where by virtue of experience with taking the survey once already, one is more likely to improve the score upon a retake. For this study, however, the period of time between survey points was six months and the questionnaire was fairly long (over 100 questions). Hence, it was unlikely that many participants were able to readily recall either the finer nuances of the questions or their baseline answers.

The external validity of the study is also put into question due to lack of random selection of participants. From a resources and recruitment limitation standpoint, it was neither practicable nor relevant for the parent study to use probability sampling to recruit participants. Similar to many other LHA intervention studies, the basis of a LHA model is the identification and training of community members who are routinely sought out by others for advice and help. Thus, the parent study was very purposeful and discerning in selecting the type of man to be recruited as LHAs. These men were expected to become knowledgeable in health promotion and the tenets of the study aims by participating in an extensive training program and, ideally, would stay engaged with their Confidant cohort over the course of the entire study. To combat this non-random sampling method and, instead, try to bolster the generalizability of the study results, the representativeness of the study's LHAs and Confidants was established through comparison with county census data. That said, given this common sampling method in many LHA programs, we must acknowledge that a very narrow selection process is taking place. Confidants who are recruited by LHAs and who agree to participate, as mentioned before, will probably have thoughts and behaviors that are similar to their LHA because of belonging to the same social network. Thus, the participating Confidants will tend to share common traits not only with their LHA but other Confidants in the same LHA group as well. Hence, it is difficult and unwise to generalize the outcomes of Confidants who self-select into the intervention with that of the more general population – a dilemma that strikes at the heart of a study's external validity.

Social desirability bias may have also occurred when Confidant-LHA dyads answered items regarding closeness to one another. Participants may have rated their levels of closeness to each other according to what they believed researchers or their program peers

might desire. The study took careful measures to maintain confidentiality of responses, however, and to reassure respondents that their responses would have no bearing on their relationship with either their dyad member or the research team. Another potential limitation, already mentioned previously, was that we were not able to account for the baseline level of Confidant condom use frequency in our modeling procedure. Although certainly not ideal to not be able to capture the potential impact of the baseline measure on the final model's results, we found no significant main effects or interactions in the model for Confidant condom use frequency. Therefore, even if we had a significant baseline condom use measure effect, it is highly doubtful that it would have augmented the overall results and caused any of the non-significant main effects to become significant. Finally, high attrition rate, like non-probability sampling, can affect the generalizability of our results, and the high proportion of missing items (between 2 – 35% missing, depending on the variable) decreased our power to detect significant effects.

IMPLICATIONS

Research

One direction for future studies is to measure other structural properties of relationship interdependence not captured in this study (e.g., conflict, correspondence of outcomes) to see if they are significantly associated with partners' sense of closeness or interconnectedness with one another. Also, regarding our adapted IOS scale that measured closeness, it would be worthwhile to further test its validity and reliability in future LHA intervention studies that involve African-American and Latino males.

In addition, although closeness was found to be an effect modifier between the positive effect of LHA health behavior on Confidant health behavior, the existing dataset did

not include measures of some aspect of communication or social influence between Confidant and LHA. These constructs are the very aspects of relationship interdependence that are assumed to have an impact on behavior change. Hence, a valuable line of future inquiry would be to capture some aspect of communication and/or social influence in order to delineate even more clearly *how* closeness can affect the impact of LHA health behavior on Confidant health behavior. For example, was it because when Confidants felt closer to their LHAs that their communication experience was enhanced in some way, or was it because Confidants were more amenable to LHAs' social influence attempts?

Furthermore, although the findings indicate that structural properties of Confidant-LHA relationship interdependence do seem to be related to one another, none served as main effects of Confidant health behaviors, and only closeness served as an effect modifier between LHA health behavior and Confidant health behavior. Hence, another reasonable pathway to examine is whether particular structural properties (diversity, interaction frequency, length) actually *moderate* the association between Confidant closeness to LHA and Confidant health behaviors. Future LHA intervention studies incorporating relationship interdependence property measures should consider testing a possible interaction between Confidant closeness to LHA and other relationship structural properties in Confidant health outcomes.

Finally, because most past and current LHA intervention programs focus on women, a future line of inquiry would be to examine (1) gender differences in the structural properties of relationship interdependence, and (2) if their influence on health behaviors outcomes for female-based LHA programs differ from those for male-based LHA programs. In sum, to understand the working mechanism underlying the social support functions of

LHA interventions, findings from this study have identified relationship interdependence as an important piece of this vast puzzle. How they fit together, however, warrants further investigation. Documenting the pathway of Confidant-LHA relationship interdependence toward desired preventive health behavior changes can move public health practice closer to eliminating racial and gender disparities health outcomes.

Practice

The goal of this dissertation study was to identify structural properties of Confidant-LHA relationship interdependence and LHA group level characteristics associated with Confidant preventive health behaviors in order to ultimately develop more appropriate and effective interventions to reduce health disparities of men of color. Undeniably, more research needs to be conducted regarding the composition and role of relationship interdependence as it relates to impacting Confidant health outcomes. Nevertheless, the study findings point us towards a more informed awareness and perhaps slight reconsideration in terms of both our LHA recruitment strategy and our approach towards helping LHAs select Confidants who will benefit most from LHA interaction activities.

First, findings from this study suggest that the health behaviors of LHAs being recruited - the same behavior which one aims to influence in their Confidants – cannot be ignored. The implication for practice, therefore, would recommend recruiting LHAs who already exhibit or are in the process of incorporating the desired behavior, such as regular healthcare/screening. The assumption is that, along with specialized LHA program training on becoming knowledgeable about the target health issues, the LHA's familiarity with navigating his own healthcare system, experience with making the best use of his own patient-provider interaction time, and overall respect and advocacy for his own health status

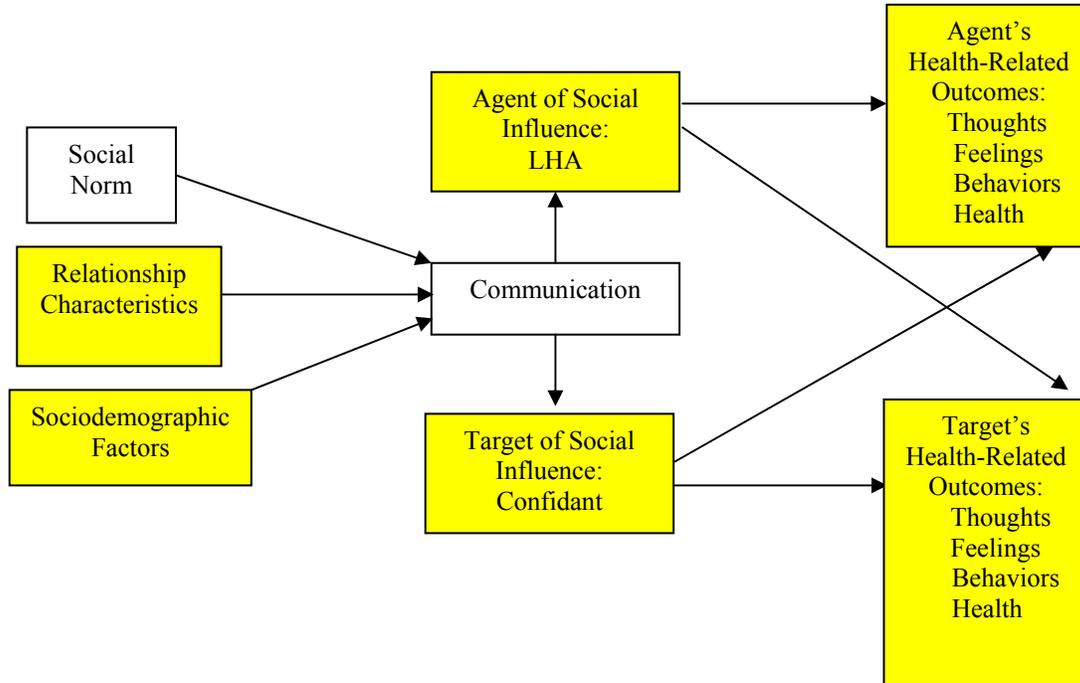
will translate into more effective influence with his Confidant's healthcare utilization outcome. For most LHA programs, LHAs, regardless of their health status profiles, have been selected because of their natural helper status in the community – for their proven ability to lead and/or influence their social network peers (Eng & Parker, 2002). It is assumed that those who volunteer to be LHAs also are committed to the health mission of the program and that this dedicated mindset, along with connections with and understanding of their community, are some of the most valuable tools they can bring to the project (Rhodes et al., 2007). Findings from this study suggest, however, that a valuable tool for stronger influence and more effective communication would be to recruit LHAs with a demonstrated ability to follow through with the health-related behavior which they are trying to promote. Since not all LHA preventive health behaviors were significantly associated with Confidant preventive health behaviors, one implication for practice would be to screen potential LHA candidates more carefully regarding their own health behavior profile and at least make an effort to include a proportion who already exhibits the desired health behavior. Such a recruitment strategy would at least allow for an opportunity to examine if a pre-existing LHA health behavior was an influential factor in Confidant behavior.

Furthermore, program coordinators may discover from such a recruitment strategy that, for those LHA candidates struggling to adopt the program's desired behavior, they would actually benefit more from being a Confidant. Regardless, for practitioners to be knowledgeable about the health behaviors of potential LHAs can certainly help refine the LHA recruitment and training process, which has constantly been documented as not being consistent across LHA programs (Lewin et al., 2005b; Rhodes et al., 2007).

The study results regarding closeness are not surprising, but without further research, their significance to LHA practice still remains to be seen. If future research confirms that Confidant-LHA closeness is indeed a positive factor in influencing Confidant health behaviors, the practice arena can be affected in several ways. First, if future research also provides a clearer picture of which relationship structural properties actually predict closeness, practitioners can strategize how they can enhance these structural properties during the course of the LHA intervention to encourage stronger closeness between Confidant-LHA so that desired health behaviors might be more likely. Conversely, if future research determines that closeness (or any other relationship structural property, for that matter) is no longer a significant factor in helping to predict Confidant health behaviors, then this will be one less factor for researchers to consider when designing, implementing, and evaluating their programs. Until that point, it is worth clarifying the influence of Confidant-LHA relationship interdependence on Confidant health behaviors. In conclusion, we agree with Reis and Collin (Reis & Collins, 2000), who stated that effective interventions should target *whatever* particular relationship properties there may be which underlie the desired type of social influence or support success in producing the desired outcomes.

APPENDIX 1

Interdependent Model of Social Influence and Interpersonal Communication*



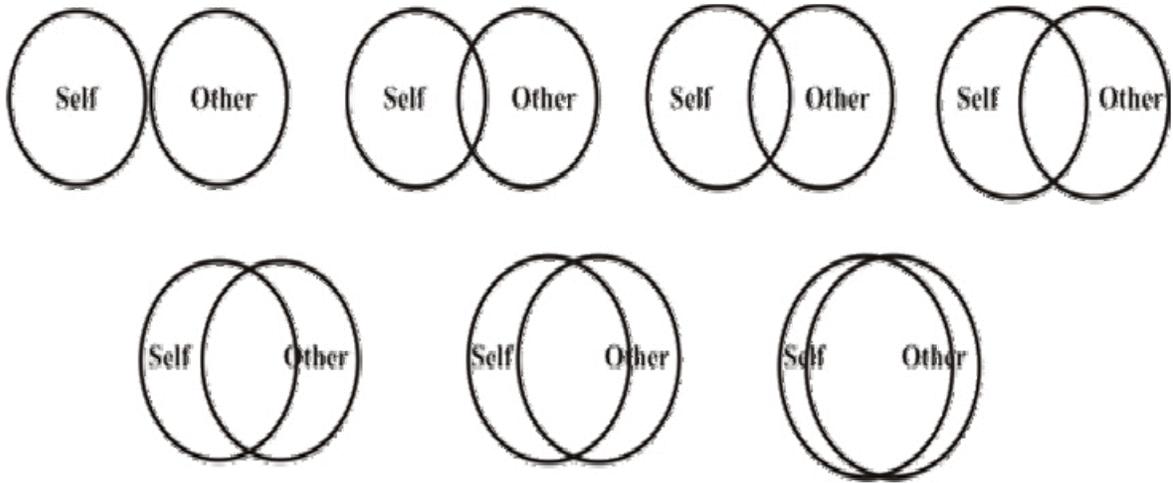
Note: Highlighted boxes contain research constructs included in our study reported in Chapter 6.

*Reprinted with permission from Lewis, M.A., Devellis, B., and B. Sleath (2002). Social influence and interpersonal communication in health behavior. Health Behavior and Health Education: Theory, Research, and Practice, K. Glanz, B.K. Rimer, and F.M. Lewis, (Eds). San Francisco, © by Jossey-Bass, San Francisco, CA.

APPENDIX 2

Inclusion of Others in Self (IOS) Scale*

Instructions: Please circle the picture that best describes your current relationship with your romantic partner.



* Aron, A., Aron E. N., & Smollan, D. (1992). Inclusion of other in the self scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, 63, 596-612.

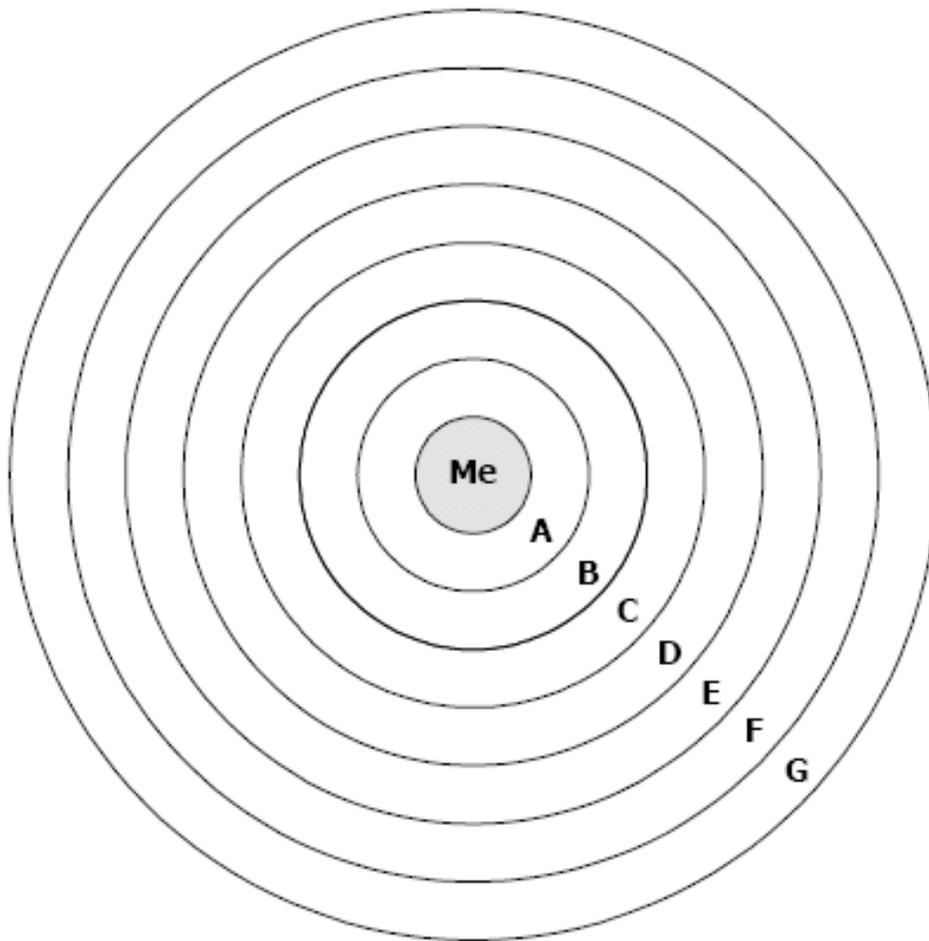
APPENDIX 3

Socio-Culturally Adapted IOS scale

Note: When scale was administered with LHA, instructions included the word *Confidant*. When scale administered with Confidant, instructions included the word *Navigator*.

Instructions: Using the diagram, select a letter inside one of the rings that best describes how close you feel **currently** to your Confidant (or Navigator). [*The closer the ring is to 'Me', the closer your friendship with your Confidant (or Navigator).*]

A B C D E F G



APPENDIX 4

Bivariate Analyses Results

Table A. Bivariate Analyses of Association between Relationship Structural Properties and Confidant Closeness to LHA.

| Fixed Effect of Confidant Healthcare Visit | Coefficient | Odds Ratio |
|---|--------------------|-------------------|
| Relationship Frequency | .1251 | 1.13 |
| Intercept | -1.3698* | |
| Relationship Length | .2325 | 1.26 |
| Intercept | -1.3603* | |
| LHA Closeness to Confidant | .4560* | 1.58 |
| Intercept | -1.3588* | |
| Number of Confidants = 203 | | |
| Number of LHAs = 21 | | |

^op<.10 *p<.05 **p<.01

Each predictor is centered around its grand mean

Table B. Bivariate Analyses of Association between Explanatory Variables and Confidant Healthcare Visits at Six Months.

| Fixed Effect of Confidant Healthcare Visit | Coefficient | Event Rate Ratio |
|---|--------------------|-------------------------|
| Relationship Structural Properties: | | |
| Relationship Diversity | -.2023 | .81 |
| Intercept | .7314** | |
| Relationship Frequency | -.1850* | .83 |
| Intercept | .7564** | |
| Relationship Length | -.0586 | .94 |
| Intercept | .7257** | |
| LHA Closeness to Confidant | -.1726* | .84 |
| Intercept | .7452** | |
| Confidant Closeness to LHA | .0393 | 1.04 |
| Intercept | .6147** | |
| LHA Healthcare Visit | | |
| | .1848** | 1.20 |
| Intercept | .6313** | |
| Relationship Structural Properties x LHA Healthcare Visit: | | |
| | .0053 | 1.00 |
| Diversity x LHA healthcare visit | .6876** | |
| Intercept | | |
| Frequency x LHA healthcare visit | -.0847* | .91 |
| Intercept | .5342** | |
| Length x LHA healthcare visit | -.0139 | .98 |
| Intercept | .6721** | |
| Confidant Closeness to LHA x LHA healthcare visit | -.1041** | .90 |
| Intercept | .5009** | |
| Descriptor Controls: | | |
| Confidant Baseline Healthcare Visit | .1311** | 1.14 |
| Intercept | .6567 | |
| Race/Ethnicity: African American | -.0102 | .99 |
| Intercept | .9426** | |
| Confidant Age | .3464** | 1.41 |
| Intercept | .6549** | |
| Confidant Cohabitation Status: Living with partner | .3045* | 1.36 |
| Intercept | .4387* | |
| Confidant Education | .0653 | 1.06 |
| Intercept | .6426** | |
| Confidant Income | .1211* | 1.13 |
| Intercept | .6237** | |
| Confidant Number of Hours Worked Per Week | .0178 | 1.02 |
| Intercept | .6442** | |
| LHA Age | .1088 | 1.11 |
| Intercept | .6269** | |
| LHA Cohabitation Status: Living with partner | -.0895 | 0.91 |
| Intercept | .6847* | |

| | | |
|-------------------------------------|---------|------|
| LHA Education | .3471* | 1.41 |
| Intercept | .6229** | |
| LHA Income | .1343 | 1.14 |
| Intercept | .6104** | |
| LHA Number of Hours Worked Per Week | .2136 | 1.24 |
| Intercept | .6354** | |

Number of Confidants = 189

Number of LHAs = 22

°p<.10 *p<.05 **p<.01

Each predictor is centered around its grand mean (except for Race/Ethnicity and Cohabitation, which are uncentered)

Table C. Bivariate Analyses of Association between Explanatory Variables and Confidant Fruit and Vegetable Consumption at Six Months.

| Fixed Effect of Confidant Fruit and Vegetable Consumption | Coefficient | Event Rate Ratio |
|--|--------------------|-------------------------|
| Relationship Structural Properties: | | |
| Relationship Diversity | .0521 | 1.05 |
| Intercept | 1.4739** | |
| Relationship Frequency | .0395 | 1.04 |
| Intercept | 1.4698** | |
| Relationship Length | .0519 | 1.05 |
| Intercept | 1.4791** | |
| LHA Closeness to Confidant | -.0046 | 1.00 |
| Intercept | 1.5014** | |
| Confidant Closeness to LHA | .0665° | 1.07 |
| Intercept | 1.5167** | |
| LHA Fruit and Vegetable Consumption | | |
| Intercept | .0083 | 1.01 |
| | 1.5181** | |
| Relationship Structural Properties x LHA F&V Consumption: | | |
| Diversity x LHA F&V Consumption | -.0390 | .96 |
| Intercept | 1.4428** | |
| Frequency x LHA F&V Consumption | -.0101 | |
| Intercept | 1.4410** | .99 |
| Length x LHA F&V Consumption | -.0121 | |
| Intercept | 1.4559** | .98 |
| Confidant Closeness to LHA x LHA F&V Consumption | | |
| Intercept | -.0113 | .99 |
| | 1.5135** | |
| Descriptor Controls: | | |
| Confidant Baseline F&V Consumption | .0417** | 1.04 |
| Intercept | 1.4902** | |
| Site | -.0878 | .92 |
| Intercept | 1.5485 | |
| Race/Ethnicity | -.2113° | .81 |
| Intercept | 1.6256** | |
| Confidant Age | -.0471 | .95 |
| Intercept | 1.5149** | |
| Confidant Cohabitation Status | -.0386 | .96 |
| Intercept | 1.5448** | |
| Confidant Education | .0267 | 1.03 |
| Intercept | 1.5183** | |
| Confidant Income | -.0039 | 1.00 |
| Intercept | 1.5346** | |
| Confidant Number of Hours Worked Per Week | -.0412 | .96 |
| Intercept | 1.5132** | |

| | | |
|-------------------------------------|----------|------|
| LHA Age | -.0525 | .95 |
| Intercept | 1.5110** | |
| LHA Cohabitation Status | .1460 | 1.16 |
| Intercept | 1.4135** | |
| LHA Education | -.0341 | 1.37 |
| Intercept | 1.5094** | |
| LHA Income | .0380 | 1.38 |
| Intercept | 1.5086** | |
| LHA Number of Hours Worked Per Week | -.1059 | .89 |
| Intercept | 1.5085** | |

Number of Confidants = 189

Number of LHAs = 22

°p<.10 *p<.05 **p<.01

Each predictor is centered around its grand mean (except for Race/Ethnicity, Site and Cohabitation, which are uncentered)

Table D. Bivariate Analyses of Association between Explanatory Variables and Confidant Condom Use Frequency at Six Months.

| Fixed Effect of Confidant Condom Use Frequency | Coefficient | Odds Ratio |
|--|--------------------|-------------------|
| Relationship Structural Properties: | | |
| Relationship Diversity | .0120 | 1.01 |
| Intercept | .0021 | |
| Relationship Frequency | .0468 | 1.05 |
| Intercept | -.0019 | |
| Relationship Length | -.0776 | .93 |
| Intercept | -.0761 | |
| LHA Closeness to Confidant | -.3089 | .73 |
| Intercept | .2445 | |
| Confidant Closeness to LHA | -.1695 | .84 |
| Intercept | .3009 | |
| LHA Condom Use Frequency | .1014 | 1.10 |
| Intercept | .2646 | |
| Relationship Structural Properties x LHA Condom Use Freq: | | |
| Diversity x LHA Condom Use Frequency | -0.3286 | .71 |
| Intercept | 2.5983 | |
| Frequency x LHA Condom Use Frequency | -.7067 | .49 |
| Intercept | 5.2387 | |
| Length x LHA Condom Use Frequency | -.1100 | .89 |
| Intercept | 1.8894 | |
| Confidant Closeness to LHA x LHA Condom Use Frequency | .6094 | 1.84 |
| Intercept | .8106 | |
| Descriptor Controls: | | |
| Site | 1.8385 | 1.28 |
| Intercept | -.0482 | |
| Race/Ethnicity | -1.9395** | 3.88 |
| Intercept | 1.3569 | |
| Confidant Age | -.7636** | .46 |
| Intercept | .1930 | |
| Confidant Cohabitation Status | -.9601* | .38 |
| Intercept | .8745* | |
| Confidant Education | .0505 | 1.28 |
| Intercept | .2484 | |
| Confidant Income | -.3282** | .72 |
| Intercept | .2603 | |
| Confidant Number of Hours Worked Per Week | -.5128* | .60 |
| Intercept | .2357 | |
| LHA Age | .1088° | |
| Intercept | .6269** | 1.11 |
| LHA Cohabitation Status | -.0895 | .91 |
| Intercept | .5873** | |
| LHA Education | .3471* | 1.46 |
| Intercept | .6227 | |

| | | |
|-------------------------------------|--------------------|------|
| LHA Income | .1343 [°] | 1.14 |
| Intercept | .6104** | |
| LHA Number of Hours Worked Per Week | .2137 | 1.24 |
| Intercept | | |

Number of Confidants = 189

Number of LHAs = 22

[°]p < .10 *p < .05 **p < .01

Each predictor is centered around its grand mean (except for Race/Ethnicity, Site and Cohabitation, which are uncentered)

REFERENCES

- Agnew, C. R., Van Lange, P. A. M., Rusbult, C. E., & Langston, C. A. (1998). Cognitive interdependence: Commitment and the mental representation of close relationships. *Journal of Personality and Social Psychology*, 74, 939-954.
- Altpeter, M., Earp, J. A., Bishop, C., & Eng, E. (1999). Lay health advisor activity levels: definitions from the field. *Health Educ Behav*, 26(4), 495-512.
- American Cancer Society. (2006). Cancer Facts and Figures for Hispanics/Latinos 2006-2008. American Cancer Society.
- Andersen, M. R., Yasui, Y., Meischke, H., Kuniyuki, A., Etzioni, R., & Urban, N. (2000). The effectiveness of mammography promotion by volunteers in rural communities. *Am J Prev Med*, 18(3), 199-207.
- Anderson, R., & Smith, B. (2003). Deaths: leading causes for 2001. National Vital Statistics Report pp. 52(59):51-53).
- Ard, J., Carter-Edwards, L., & Svetkey, L. (2003). A new model for developing and executing culturally appropriate behavior modification clinical trials for African Americans. *Ethn Dis*, 13(2), 279-285.
- Aron, A., Aron, E. N., & Smollan, D. (1992). Inclusion of other in the Self Scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, 63, 596-612.
- Aron, A., Aron, E. N., Tudor, M., & Nelson, G. (1991). Inclusion of Other in the Self Scale and the structure of interpersonal closeness. *Journal of Personality and Social Psychology*, 60, 241-253.
- Aron, A., & Fraley, B. (1999). Relationship closeness as including others in the self: Cognitive underpinnings and measures. *Social Cognition*, 17, 140-160.
- Aron, A., McLaughlin-Volpe, T., Mashek, D., Lewandowski, G., Wright, S. C., & Aron, E. N. (2004). Including close others in the self. *European Review of Social Psychology*, 15, 101-132.
- Aron, A., Melinat, E., Aron, E. N., Vallone, R., & Bator, R. (1997). The experimental generation of interpersonal closeness: A procedure and some preliminary findings. *Personality and Social Psychology Bulletin*, 23, 363-377.
- Ashton, C. M., Haidet, P., Paterniti, D. A., Collins, T. C., Gordon, H. S., O'Malley, K., et al. (2003). Racial and ethnic disparities in the use of health services: bias, preferences, or poor communication? *J Gen Intern Med*, 18(2), 146-152.

- Baker, E. A., Bouldin, N., Durham, M., Lowell, M. E., Gonzalez, M., Jodaitis, N., et al. (1997). The Latino Health Advocacy Program: a collaborative lay health advisor approach. *Health Educ Behav*, 24(4), 495-509.
- Baranowshi, T., Perry, C. L., & Parcel, G. S. (2002). How individuals environment, and health behavior interact: social cognitive theory. In K. Glanz, B. K. Rimer & F. M. Lewis (Eds.), *Health Behavior and Health Education: Theory, Research, and Practice* pp. 165-184. San Francisco: Jossey-Bass.
- Bartholomew, N. G., Hiller, M. L., Knight, K., Nucatola, D. C., & Simpson, D. D. (2000). Effectiveness of communication and relationship skills training for men in substance abuse treatment. *Journal of Substance Abuse Treatment*, 18(3), 217-225.
- Bauman, K. E., Ennett, S. T., Foshee, V. A., Pemberton, M., King, T. S., & Koch, G. G. (2002). Influence of a family program on adolescent smoking and drinking prevalence. *Prev Sci*, 3(1), 35-42.
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: desire for interpersonal attachments as a fundamental human motivation. *Psychol Bull*, 117(3), 497-529.
- Berkman, L. F., & Glass, T. (2000). Social integration, social networks, social support, and health. In L. F. Berkman & I. Kawachi (Eds.), *Social Epidemiology*. New York: Oxford University Press.
- Berkman, L. F., & Syme, S. L. (1979). Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. *American Journal of Epidemiology*, 109, 186-204.
- Berscheid, E., & Peplau, A. (1983). The emerging science of relationships. In H. Kelley, E. Berscheid, A. Christensen, J. Harvey, T. Huston, G. Levinger, E. McClintock, A. Peplau & D. Peterson (Eds.), *Close Relationships*. New York: W.H. Freeman and Company.
- Berscheid, E., & Reis, H. T. (1998). Attraction and close relationships. In D. Gilbert, S. Fiske & G. Lindzey (Eds.), *Handbook of Social Psychology* pp. 193-281). New York: Oxford University Press.
- Berscheid, E., Snyder, M., & Omoto, A. M. (1989). The Relationship Closeness Inventory: Assessing the closeness of interpersonal relationships. *Journal of Personality and Social Psychology*, 57, 792-807.
- Bird, J. A., McPhee, S. J., Ha, N. T., Le, B., Davis, T., & Jenkins, C. N. (1998). Opening pathways to cancer screening for Vietnamese-American women: lay health workers hold a key. *Prev Med*, 27(6), 821-829.

- Bird, J. A., Otero-Sabogal, R., Ha, N. T., & McPhee, S. J. (1996). Tailoring lay health worker interventions for diverse cultures: lessons learned from Vietnamese and Latina communities. *Health Education Quarterly*, 23(Supplement), S105-S122.
- Birkel, R. C., Golaszewski, T., Koman, J. J., 3rd, Singh, B. K., Catan, V., & Souply, K. (1993). Findings from the Horizontes Acquired Immune Deficiency Syndrome Education project: the impact of indigenous outreach workers as change agents for injection drug users. *Health Educ Q*, 20(4), 523-538.
- Bonfill, X., Marzo, M., Pladevall, M., Martí, J., & Emparanza, J. (2001). Strategies for increasing the participation of women in community breast cancer screening. *Cochrane Database of Systematic Reviews*(1), CD002943.
- Booker, V. K., Robinson, J. G., Kay, B. J., Najera, L. G., & Stewart, G. (1997). Changes in empowerment: effects of participation in a lay health promotion program. *Health Educ Behav*, 24(4), 452-464.
- Bowen, D. J. (2004). Electronic screening decision making tool for prostate cancer in communities. American Society of Preventive Oncology. San Francisco.
- Britton, C., McCormick, F., Renfrew, M., Wade, A., & King, S. (2007). Support for breastfeeding mothers. *Cochrane Database of Systematic Reviews*(1), CD001141.
- Broadhead, W. E., Kaplan, B. H., James, S. A., Wagner, E. H., Schoenbach, V. J., Grimson, R., et al. (1983). The epidemiologic evidence for a relationship between social support and health. *American Journal of Epidemiology*, 117, 521-537.
- Buller, D., Buller, M. K., Larkey, L., Sennott-Miller, L., Taren, D., Aickin, M., et al. (2000a). Implementing a 5-a-day peer health educator program for public sector labor and trades employees. *Health Educ Behav*, 27(2), 232-240.
- Buller, D. B., Burgoon, M., Hall, J. R., Levine, N., Taylor, A. M., Beach, B., et al. (2000b). Long-term effects of language intensity in preventive messages on planned family solar protection. *Health Commun*, 12(3), 261-275.
- Buller, D. B., Morrill, C., Taren, D., Aickin, M., Sennott-Miller, L., Buller, M. K., et al. (1999). Randomized trial testing the effect of peer education at increasing fruit and vegetable intake. *J Natl Cancer Inst*, 91(17), 1491-1500.
- Campbell, D. T., & Stanley, J. C. (1966). Experimental and quasi-experimental designs for research. Boston: Houghton Mifflin Company.
- Campbell, M. K., James, A., Hudson, M. A., Carr, C., Jackson, E., Oakes, V., et al. (2004). Improving multiple behaviors for colorectal cancer prevention among African American church members. *Health Psychol*, 23(5), 492-502.

- Canary, D., Cupach, W., & Messman, S. (1995). *Relationship conflict: Conflict in parent-child, friendship, and work relationships*. Thousand Oaks: Sage.
- Cardona, M., & Joshi, R. (2007). The challenge of balancing methodological research rigour and practical needs in low-income settings: What we are doing and what we need to do better. *Critical Public Health*, 17, 81-89.
- Cassel, J. C. (1976). The contribution of the social environment to host resistance. *American Journal of Epidemiology*, 104, 107-123.
- Centers for Disease Control and Prevention. (1994). *Community health advisors: models, research, and practice (Vols. I and II)*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
- Centers for Disease Control and Prevention. (2002). HIV/AIDS Surveillance Report 2002. pp. 14: 11-40). Atlanta: Centers for Disease Control and Prevention.
- Centers for Disease Control and Prevention. (2003). *Morbidity and Mortality Weekly Report (MMWR)*. pp. November 30: 52(46);1117-1120. Atlanta: Centers for Disease Control and Prevention.
- Centers for Disease Control and Prevention. (2004). 2004 North Carolina Behavioral Risk Factor Surveillance System Survey Results. North Carolina Center for Health Statistics: [On line] Available: <http://www.schs.state.nc.us/SCHS/brfss/2004/> (Accessed January 30, 2006).
- Centers for Disease Control and Prevention. (2005). Sexually transmitted disease surveillance 2004. pp. 1-20). Atlanta: Centers for Disease Control and Prevention, Division of STD Prevention.
- Centers for Disease Control and Prevention. (2006). Behavioral Risk Factor Surveillance System (BRFSS) calendar year 2006 results. North Carolina Center for Health Statistics: [On-line] Available: <http://www.schs.state.nc.us/SCHS/brfss/2006/index.html> (Accessed: February 19, 2008).
- Chavis, L. (2004). Evaluating lay health advisor programs: a multifaceted approach. 132nd Annual Meeting of the American Public Health Association. Washington DC.
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multivariate regression/correlation analyses for the behavioral sciences*. Hillsdale: Lawrence Erlbaum Associates.
- Cohen, S., Gottleib, B. H., & Underwood, L. G. (2000). Social relationships and health. In S. Cohen, L. G. Underwood & B. H. Gottleib (Eds.), *Social Support Measurement and Intervention: A Guide for Health and Social Scientists* pp. 3-25. New York: Oxford University Press.

- Corkery, E., Palmer, C., Foley, M. E., Schechter, C. B., Frisher, L., & Roman, S. H. (1997). Effect of a bicultural community health worker on completion of diabetes education in a Hispanic population. *Diabetes Care*, 20(3), 254-257.
- Courtenay, W. H. (2000). Constructions of masculinity and their influence on men's well-being: a theory of gender and health. *Soc Sci Med*, 50(10), 1385-1401.
- Courtenay, W. H., & Keeling, R. P. (2000). Men, gender, and health: toward an interdisciplinary approach. *J Am Coll Health*, 48(6), 243-246.
- Cross, S. E., & Madson, L. (1997). Models of the self: self-construals and gender. *Psychol Bull*, 122(1), 5-37.
- Dennis, C. L. (2002). Breastfeeding peer support: maternal and volunteer perceptions from a randomized controlled trial. *Birth*, 29(3), 169-176.
- DeVellis, R., Lewis, M. A., & Sterba, K. R. (2003). Interpersonal Emotional Processes in Adjustment to Chronic Illness. In J. Suls & K. Wallston (Eds.), *Social Psychological Foundations of Health*. Malden: Blackwell Publishing.
- Dey, A., & Lucas, J. (2006). Physical and Mental Health Characteristics of U.S. - and Foreign-Born Adults: United States, 1998-2003. In U.S. Department of Health and Human Services (Ed.). Centers for Disease and Health Prevention, National Center for Health Statistics: March 1, 2006. No. 369.
- Duan, N., Fox, S. A., Derose, K. P., & Carson, S. (2000). Maintaining mammography adherence through telephone counseling in a church-based trial. *Am J Public Health*, 90(9), 1468-1471.
- Earp, J. A., Eng, E., O'Malley, M. S., Altpeter, M., Rauscher, G., Mayne, L., et al. (2002). Increasing use of mammography among older, rural African American women: results from a community trial. *Am J Public Health*, 92(4), 646-654.
- Earp, J. A., & Flax, V. L. (1999). What lay health advisors do: An evaluation of advisors' activities. *Cancer Pract*, 7(1), 16-21.
- Earp, J. A., Viadro, C. I., Vincus, A. A., Altpeter, M., Flax, V., Mayne, L., et al. (1997). Lay health advisors: a strategy for getting the word out about breast cancer. *Health Educ Behav*, 24(4), 432-451.
- Elder, J. P., Ayala, G. X., Campbell, N. R., Slymen, D., Lopez-Madurga, E. T., Engelberg, M., et al. (2005). Interpersonal and print nutrition communication for a Spanish-dominant Latino population: Secretos de la Buena Vida. *Health Psychol*, 24(1), 49-57.

- Elford, J., Bolding, G., & Sherr, L. (2001). Peer education has no significant impact on HIV risk behaviours among gay men in London. *Aids*, 15(4), 535-538.
- Elford, J., Bolding, G., & Sherr, L. (2004). Popular opinion leaders in London: a response to Kelly. *AIDS Care*, 16(2), 151-158.
- Elford, J., Sherr, L., Bolding, G., Serle, F., & Maguire, M. (2002). Peer-led HIV prevention among gay men in London: process evaluation. *AIDS Care*, 14(3), 351-360.
- Eng, E. (1993). The Save our Sisters Project. A social network strategy for reaching rural black women. *Cancer*, 72(3 Suppl), 1071-1077.
- Eng, E., & Parker, E. (2002). Natural helper models to enhance community's health and competence. In R. DiClemente, R. Crosby & M. Kegler (Eds.), *Emerging theories in health promotion practice and research*. San Francisco: Jossey-Bass Wiley.
- Eng, E., Parker, E., & Harlan, C. (1997). Lay health advisor intervention strategies: a continuum from natural helping to paraprofessional helping. *Health Educ Behav*, 24(4), 413-417.
- Eng, E., & Smith, J. (1995). Natural helping functions of lay health advisors in breast cancer education. *Breast Cancer Res Treat*, 35(1), 23-29.
- Eng, E., & Young, R. (1992). Lay health advisors as community change agents. *Family Community Health*, 15, 24-40.
- Ennett, S. T., Ringwalt, C. L., Thorne, J., Rohrbach, L. A., Vincus, A., Simons-Rudolph, A., et al. (2003). A comparison of current practice in school-based substance use prevention programs with meta-analysis findings. *Prev Sci*, 4(1), 1-14.
- Ergene, T., Cok, F., Tumer, A., & Unal, S. (2005). A controlled-study of preventive effects of peer education and single-session lectures on HIV/AIDS knowledge and attitudes among university students in Turkey. *AIDS Educ Prev*, 17(3), 268-278.
- Flax, V. L. (1996). *The impact of lay health advisors on the women they counsel: an evaluation of the North Carolina Breast Cancer Screening Program's outreach component*. Health Behavior and Health Education. Chapel Hill: University of North Carolina-Chapel Hill.
- Flax, V. L., & Earp, J. L. (1999). Counseled women's perspectives on their interactions with lay health advisors: a feasibility study. *Health Educ Res*, 14(1), 15-24.
- Foshee, V. A., Bauman, K. E., Ennett, S. T., Linder, G. F., Benefield, T., & Suchindran, C. (2004). Assessing the long-term effects of the Safe Dates program and a booster in preventing and reducing adolescent dating violence victimization and perpetration. *Am J Public Health*, 94(4), 619-624.

- Fridinger, F. W., & Vincent, M. L. (1989). A comparison of peer educator, media and screening only approaches in reducing cardiovascular risk among corrections personnel. *Health Educ*, 20(1), 30-35.
- Gabriel, S., & Gardner, W. L. (1999). Are there "his" and "hers" types of interdependence? The implications of gender differences in collective versus relational interdependence for affect, behavior, and cognition. *J Pers Soc Psychol*, 77(3), 642-655.
- Gaines, S. O. (1995). Relationships between members of cultural minorities. In J. T. Wood & S. Duck (Eds.), *Off the beaten track: New shores for relationship research*. Thousand Oaks: Sage Publications.
- Gornick, M. E. (2003). A decade of research on disparities in Medicare utilization: lessons for the health and health care of vulnerable men. *Am J Public Health*, 93(5), 753-759.
- Gudykunst, W. B., Matsumoto, Y., Ting-Toomey, S., Nishida, T., Kim, K., & Heyman, S. A. M. (1996). The Influence of Cultural Individualism-Collectivism, Self Construals, and Individual Values on Communication Styles Across Cultures. *Human Communication Research*, 22(4), 510-543.
- Guo, G. (2005). Analyzing grouped data with hierarchical linear modeling. *Children and Youth Services Review*, 7(6), 637-652.
- Guo, G., & Zhao, H. (2000). Multilevel modeling for binary data. *Annual Review of Sociology*, 26, 441-462.
- Hart, A., Jr., & Bowen, D. J. (2004). The feasibility of partnering with African-American barbershops to provide prostate cancer education. *Ethn Dis*, 14(2), 269-273.
- Hart, G. J. (1998). Peer education and community based HIV prevention for homosexual men: peer led, evidence based, or fashion driven? *Sex Transm Infect*, 74(2), 87-89.
- Heaney, C. A., & Israel, B. A. (2002). Social networks and social support. In K. Glanz, B. Rimer & F. M. Lewis (Eds.), *Health behavior and health education: Theory, research, and practice* pp. 185-209). San Francisco: Jossey-Bass.
- Hearn, M., Bigelow, C., Nader, P., Stone, E., Johnson, C., Parcel, G., et al. (1992). Involving families in cardiovascular health promotion: The CATCH feasibility study. *Journal of Health Education*, 23, 22-31.
- Heine, S. J., Lehman, D. R., Peng, K., & Greenholtz, J. (2002). What's wrong with cross-cultural comparisons of subjective Likert scales?: The reference-group effect. *Journal of Personality and Social Psychology*, 82(6), 903-918.

- Helgeson, V. (1995). Masculinity, men's roles, and coronary heart disease. In D. Sabo & D. F. Gordon (Eds.), *Men's health and illness: Gender, power and the body* pp. 68-104. Thousand Oaks: Sage Publications, Inc.
- Hodnett, E., Gates, C., Hofmeyr, G., & Sakala, C. (2007). Continuous support for women during childbirth. *Cochrane Database of Systematic Reviews*(3), CD003766.
- Hogg, M. A., & Turner, J. C. (1987). Intergroup behavior, self-stereotyping and the salience of social categories. *British Journal of Social Psychology*, 26, 325-340.
- Holmes, W. (2004). Armed with flavored condoms, health workers take aim at AIDS. *News & Observer*. Siler City.
- Hong, L. (2000). Toward a transformed approach to prevention: breaking the link between masculinity and violence. *J Am Coll Health*, 48(6), 269-279.
- House, J. D., Umberson, D., & Landis, K. R. (1981). Structures and processes of social support. *Annual Review of Sociology*, 14, 293-318.
- Huston, T. L., & Burgess, R. L. (1979). Social exchange in developing relationships: An overview. In T. L. Huston & R. L. Burgess (Eds.), *Social exchange in developing relationships* pp. 3-28. Academic Press: New York.
- Israel, B. A. (1985). Social networks and social support: implications for natural helper and community level interventions. *Health Educ Q*, 12(1), 65-80.
- Jaccard, J., Blanton, H., & Dodge, T. (2005). Peer influences on risk behavior: An analysis of the effects of a close friend. *Developmental Psychology*, 41(4), 135-147.
- Jackson, E. J., & Parks, C. P. (1997). Recruitment and training issues from selected lay health advisor programs among African Americans: a 20-year perspective. *Health Educ Behav*, 24(4), 418-431.
- Kagawa-Singer, M., Park Tanjasiri, S., Lee, S. W., Foo, M. A., Ngoc Nguyen, T. U., Tran, J. H., et al. (2006). Breast and cervical cancer control among Pacific Islander and Southeast Asian Women: participatory action research strategies for baseline data collection in California. *J Cancer Educ*, 21(1 Suppl), S53-60.
- Kanaiaupuni, S., Thompson-Colón, T., & Donato, K. (2000). Counting on kin: Social networks, social support and child health status. CDE Working Paper No. 2000-10. Madison: The University of Wisconsin-Madison.
- Kashima, Y., Yamaguchi, S., Kim, U., Choi, S. C., Gelfand, M. J., & Yuki, M. (1995). Culture, gender, and self: a perspective from individualism-collectivism research. *J Pers Soc Psychol*, 69(5), 925-937.

- Kelley, H., Berscheid, E., Christensen, A., Harvey, J., Huston, T., Levinger, G., et al. (1983). Analyzing close relationships. In H. Kelley, E. Berscheid, A. Christensen, J. Harvey, T. Huston, G. Levinger, E. McClintock, A. Peplau & D. Peterson (Eds.), *Close relationships* pp. 20-67. New York: W.H. Freeman and Company.
- Kelly, J. A. (2004). Popular opinion leaders and HIV prevention peer education: resolving discrepant findings, and implications for the development of effective community programmes. *AIDS Care*, 16(2), 139-150.
- Kelly, J. A., St Lawrence, J. S., Stevenson, L. Y., Hauth, A. C., Kalichman, S. C., Diaz, Y. E., et al. (1992). Community AIDS/HIV risk reduction: the effects of endorsements by popular people in three cities. *Am J Public Health*, 82(11), 1483-1489.
- Kenny, D., Kashy, D., & Cook, W. (2006). Basic definitions and overview. *Dyadic Data Analysis* pp. 1-24). New York: Guilford Press.
- Kidane, G., & Morrow, R. H. (2000). Teaching mothers to provide home treatment of malaria in Tigray, Ethiopia: a randomised trial. *The Lancet*, 356(9229), 550-555.
- Kim, M.-S., & Storm, R. (2000). A Test of A Cultural Model of Patients' Motivation for Verbal Communication in Patient-Doctor Interactions. *Communication Monographs*, 67(3), 262.
- Kim, M. S., Hunter, J. E., & Yoon, H. (1996). Individual vs. cultural-level dimensions of individualism and collectivism: Effects on preferred conversational styles. *Communication Monographs*, 63(29-49).
- Kim, M. T., Dennison, C. R., Hill, M. N., Bone, L. R., & Levine, D. M. (2000). Relationship of alcohol and illicit drug use with high blood pressure care and control among urban hypertensive Black men. *Ethn Dis*, 10(2), 175-183.
- Kitayama, S., & Ishii, K. (2002). Word and voice: Spontaneous attention to emotional utterances in two languages. *Cognition & Emotion*, 16(1), 29 - 59.
- Kreiger, N. (2005). Defining and investigating social disparities in cancer: critical issues? *Cancer Causes and Control*, 16, 5-14.
- Lacey, L., Tukes, S., Manfredi, C., & Warnecke, R. B. (1991). Use of lay health educators for smoking cessation in a hard-to-reach urban community. *J Community Health*, 16(5), 269-282.
- Lahey, B., & Cohen, S. (2000). Social support theory and measurement. In S. Cohen, L. G. Underwood & B. H. Gottlieb (Eds.), *Social Support Measurement and Intervention: A Guide for Health and Social Scientists* pp. 29-52. New York: Oxford University Press.

- Larkey, L. K., Alatorre, C., Buller, D. B., Morrill, C., Klein Buller, M., Taren, D., et al. (1999). Communication strategies for dietary change in a worksite peer educator intervention. *Health Educ Res*, 14(6), 777-790.
- Le, B., Moss, W. B., & Mashek, D. (2007). Assessing Relationship Closeness Online: Moving From an Interval-Scaled to Continuous Measure of Including Others in the Self. *Social Science Computer Review*, 25(3), 405-409.
- Lemle, R., & Mishkind, M. E. (1989). Alcohol and masculinity. *J Subst Abuse Treat*, 6(4), 213-222.
- Leung, T., & Kim, M. S. (1997). A modified version of self-construal scale. Manoa: University of Hawaii.
- Levine, T. R., Bresnahan, M. J., Park, H. S., Lapinski, M. K., Wittenbaum, G. M., Shearman, S. M., et al. (2003). Self-Construal Scales Lack Validity. *Human Communication Research*, 29(2), 210-252.
- Lewin, S., Dick, J., Pond, P., Zwarenstein, M., Aja, G., van Wyk, B., et al. (2005a). Lay health workers in primary and community health care. *Cochrane Database of Systematic Reviews*(1), CD004015.
- Lewin, S. A., Dick, J., Pond, P., Zwarenstein, M., Aja, G., van Wyk, B., et al. (2005b). Lay health workers in primary and community health care. *Cochrane Database Syst Rev*(1), CD004015.
- Lewis, F. M. (2002). Perspectives on models of interpersonal behaviors. In K. Glanz, B. K. Rimer & F. M. Lewis (Eds.), *Health Behavior and Health Education: Theory, Research, and Practice* pp. 265-273. San Francisco: Jossey-Bass.
- Lewis, M. A., Devellis, B., & Sleath, B. (2002). Social influence and interpersonal communication in health behavior. In K. Glanz, B. K. Rimer & F. M. Lewis (Eds.), *Health Behavior and Health Education: Theory, Research, and Practice* pp. 240-264. San Francisco: Jossey-Bass.
- Lewis, M. A., Kalinowski, C. T., Sterba, K. R., Barrett, T. M., & DeVellis, R. F. (2006a). Interpersonal processes and vasculitis management. *Arthritis Rheum*, 55(4), 670-675.
- Lewis, M. A., McBride, C. M., Pollak, K. I., Puleo, E., Butterfield, R. M., & Emmons, K. M. (2006b). Understanding health behavior change among couples: An interdependence and communal coping approach. *Social Science and Medicine*, 62, 1369-1380.
- Lewis, M. A., McBride, C. M., Pollak, K. I., Puleo, E., Fish, L., & Butterfield, R. M. (2003). Couples' preferences for behavior change following polypectomy. *American Society of Preventive Oncology*.

- Lewis, M. A., Rook, K. S., & Schwarzer, R. (1994). Social support, social control, and health among the elderly. In G. N. Penny, P. Bennett & M. Herbert (Eds.), *Health Psychology: A Life Span Perspective* pp. 191-211). London: Harwood Academic Publishers.
- Li, H. Z. (2002). Culture, gender and self-close-other(s) connectedness in Canadian and Chinese samples. *European Journal of Social Psychology*, 32(1), 93-104.
- Love, M. B., Gardner, K., & Legion, V. (1997). Community health workers: who they are and what they do. *Health Educ Behav*, 24(4), 510-522.
- Love, M. B., Legion, V., Shim, J. K., Tsai, C., Quijano, V., & Davis, C. (2004). CHWs get credit: a 10-year history of the first college-credit certificate for community health workers in the United States. *Health Promot Pract*, 5(4), 418-428.
- Lowe, J. B., & Clavarino, A. (2006). Preventive Health Behavior. [On line] Available: <http://health.families.com/preventive-health-behavior-974-976-eph> (Accessed: January 30, 2006).
- Lynde, B. D. (1992). Nutrition promotion for mature adults: a case study in peer education. *J Nutr Elder*, 11(3), 19-31.
- Maas, C. J. M., & Hox, J. J. (2005). Sufficient sample sizes for multilevel modeling. *Methodology*, 1(3), 86-92.
- Markus, H., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, 98, 224-253.
- Martinez, H. N., & Manson, A. B. (2004). Health disparities among North Carolina's Latinos: our point of view. *N C Med J*, 65(6), 356-358.
- Mashek, D., Cannaday, L. W., & Tangney, J. P. (2007). Inclusion of community in self scale: A single-item pictorial measure of community connectedness. *Journal of Community Psychology*, 35(2), 257-275.
- Maxwell, K. (2002). Friends: the role of peer influence across adolescent risk behaviors. *Journal of Youth and Adolescence*, 31(4), 267-277.
- McCoy, L. (1998). Man-to-man: A psychodynamic/developmental understanding of adult male same sex relationships. Clinical Psychology. Newberg: George Fox University.
- Meister, J. S., Warrick, L. H., de Zapien, J. G., & Wood, A. H. (1992). Using lay health workers: case study of a community-based prenatal intervention. *J Community Health*, 17(1), 37-51.

- Meyer, J. A. (2003). Improving men's health: developing a long-term strategy. *Am J Public Health*, 93(5), 709-711.
- Morisky, D. E., Nguyen, C., Ang, A., & Tiglao, T. V. (2005). HIV/AIDS prevention among the male population: results of a peer education program for taxicab and tricycle drivers in the Philippines. *Health Educ Behav*, 32(1), 57-68.
- Moynihan, C. (1998). Theories in health care and research: theories of masculinity. *Bmj*, 317(7165), 1072-1075.
- National Center for Health Statistics. (2007). Health, United States, 2007 with Chartbook on Trends in the Health of Americans. Hyattsville, MD.
- Navarro, A. M., Senn, K. L., McNicholas, L. J., Kaplan, R. M., Roppe, B., & Campo, M. C. (1998). Por La Vida model intervention enhances use of cancer screening tests among Latinas. *American Journal of Preventive Medicine*, 15(1), 32-41.
- Nemeck, M. A., & Sabatier, R. (2003). State of evaluation: Community health workers. *Public Health Nursing*, 20(4), 260-270.
- Newsom, J. T., McFarland, B. H., Kaplan, M. S., Huguet, N., & Zani, B. (2005). The health consciousness myth: implications of the near independence of major health behaviors in the North American population. *Social Science & Medicine*, 60(2), 433-437.
- Nguyen, T. N., Tanjasiri, S. P., Kagawa-Singer, M., Tran, J. H., & Foo, M. A. (2006). Community Health Navigators for Breast- and Cervical-Cancer Screening Among Cambodian and Laotian Women: Intervention Strategies and Relationship-Building Processes. *Health Promot Pract*. 1524839906290251
- Nicholas, D. R. (2000). Men, masculinity, and cancer: risk-factor behaviors, early detection, and psychosocial adaptation. *J Am Coll Health*, 49(1), 27-33.
- North Carolina Department of Health and Human Services. (2006). North Carolina Minority Health Facts: Hispanics/Latinos. State Center for Health Statistics: December 2006.
- North Carolina State Data Center. (2000). North Carolina Census Data 2000. [On-line] Available:<http://census.osbm.state.nc.us/lookup/> (Accessed: February 19, 2008).
- Nuckolls, K. B., & Cassel, J. C. (1971). Social disorganization and stroke mortality in the Black population of North Carolina. *American Journal of Epidemiology*, 93, 166-175.
- Pittman, F. (1993). Man enough: Fathers, sons, and the search for Masculinity. New York: Berkeley Publishing Group.
- Porche, D. J., & Willis, D. G. (2004). Nursing and men's health movement: considerations for the 21st century. *Nurs Clin North Am*, 39(2), 251-258.

- Raudenbush, S. W., & Bryk, A. S. (2002). Hierarchical linear models: application and data analysis methods. Thousand Oaks: Sage Publications.
- Rauscher, G. H., Earp, J. A., & O'Malley, M. (2004). Relation between intervention exposures, changes in attitudes, and mammography use in the North Carolina Breast Cancer Screening Program. *Cancer Epidemiol Biomarkers Prev*, 13(5), 741-747.
- Reis, H. T., & Collins, N. (2000). Measuring relationship properties and interactions relevant to social support. In S. Cohen, L. G. Underwood & B. H. Gottlieb (Eds.), *Social Support Measurement and Intervention: A Guide for Health and Social Scientists* pp. 137-191. New York: Oxford University Press.
- Rhodes, S. D., Foley, K. L., Zometa, C. S., & Bloom, F. R. (2007). Lay health advisor interventions among Hispanics/Latinos: a qualitative systematic review. *Am J Prev Med*, 33(5), 418-427.
- Rusbult, C. E., & Arriaga, X. B. (2000). Interdependence in personal relationships. In W. Ickes & S. Duck (Eds.), *The social psychology of personal relationships* pp. 79-108. Chichester, UK: Wiley.
- Rusbult, C. E., Arriaga, X. B., & Agnew, C. R. (2001). Interdependence in close relationships. In G. J. O. Fletcher & M. S. Clark (Eds.), *Blackwell handbook of social psychology*, vol.2: Interpersonal processes pp. 359-387. Oxford: Blackwell.
- Rusbult, C. E., & Van Lange, P. A. (2003). Interdependence, interaction, and relationships. *Annu Rev Psychol*, 54, 351-375.
- Rusbult, C. E., & Van Lange, P. A. M. (1996). Interdependence processes. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social Psychology: Handbook of Basic Principles* pp. 564-596. New York: Guilford Press.
- Salvatore, A. (2001). Sexually Transmitted Infections and the Use of Prostitutes among Latino Farmworkers: 2000 Agricultural Season. In *North Carolina Farm Workers Health Program* (Ed.): North Carolina Department of Health and Human Services.
- Sande, G. N. (1988). Perceiving one's own traits and others': The multifaceted self. *Journal of Personality and Social Psychology*, 54(1), 13-20.
- Satcher, D. (2003). Overlooked and underserved: improving the health of men of color. *Am J Public Health*, 93(5), 707-709.
- Schofield, T., Connell, R. W., Walker, L., Wood, J. F., & Butland, D. L. (2000). Understanding men's health and illness: a gender-relations approach to policy, research, and practice. *J Am Coll Health*, 48(6), 247-256.

- Scientific Software International Inc. (2007). HLM 6.04. Hierarchical Linear and Nonlinear Modeling Lincolnwood, IL.
- Sherrill, W. W., Crew, L., Mayo, R. M., Mayo, W. F., Rogers, B. L., & Haynes, D. F. (2005). Educational and health services innovation to improve care for rural Hispanic communities in the US. *Educ Health (Abingdon)*, 18(3), 356-367.
- Shuguang, W., & Van de Ven, P. (2003). Peer HIV/AIDS education with volunteer trishaw drivers in Yaan, People's Republic of China: process evaluation. *AIDS Educ Prev*, 15(4), 334-345.
- Singelis, T. (1994). The measure of independent and interdependent self-construals. *Personality and Social Psychology Bulletin*, 20, 580-591.
- Smith, A. L. (2003). Health policy and the coloring of an American male crisis: a perspective on community-based health services. *Am J Public Health*, 93(5), 749-752.
- Smith, M., Bonhomme, J., Semiao, F., & Fox, S. (2003). Addressing the crisis in men's health through educational and policy initiatives. National Institutes of Health. Washington DC: Men's Health Network.
- Snijders, T., & Bosker, R. (1999). Multilevel analysis: an introduction to basic and advanced multilevel modeling. Thousand Oaks: Sage Publications.
- SPSS Inc. (2007). SPSS v.15.0. Chicago, IL: SPSS, Inc.
- Staples, R. (1995). Health among African American males. In D. Sabo & D. F. Gordon (Eds.), *Men's health and illness: gender, power, and the body* pp. 121-138. Thousand Oaks: Sage Publications, Inc.
- Staten, V. (2001). *Do bald men get half-price haircuts? : in search of American's great barbershops*. New York: Simon & Schuster.
- Street, R. L., Jr., Gordon, H. S., Ward, M. M., Krupat, E., & Kravitz, R. L. (2005). Patient participation in medical consultations: why some patients are more involved than others. *Med Care*, 43(10), 960-969.
- Sung, J. F., Coates, R. J., Williams, J. E., Liff, J. M., Greenberg, R. S., McGrady, G. A., et al. (1992). Cancer screening intervention among black women in inner-city Atlanta--design of a study. *Public Health Rep*, 107(4), 381-388.
- Swider, S. M. (2002). Outcome effectiveness of community health workers: An integrative literature review. *Public Health Nursing*, 19(1), 11-20.
- Symons, C. S., & Johnson, B. T. (1997). The self-reference effect in memory: A meta-analysis. *Psychology Bulletin*, 121, 371-394.

- Takemura, K., Yuki, M., Kashima, E. S., & Halloran, M. (2007). A cross-cultural comparison of behaviors and independent/interdependent self-views. In A. Bernado, M. Gastado-Conacot & M. Liwag (Eds.), *The Self, Relationships, Subjective Well-Being in Asia: Psychological, Social & Cultural Perspectives*. Seoul, Korea: Kyoyook-Kwahak-Sa.
- Tanjasiri, S. P., Kagawa-Singer, M., Foo, M. A., Chao, M., Linayao-Putman, I., Nguyen, J., et al. (2007). Designing culturally and linguistically appropriate health interventions: the "Life Is Precious" Hmong breast cancer study. *Health Educ Behav*, 34(1), 140-153.
- Taylor, T., Serrano, E., Anderson, J., & Kendall, P. (2000). Knowledge, skills, and behavior improvements on peer educators and low-income Hispanic participants after a stage of change-based bilingual nutrition education program. *Journal of Community Health*, 25(3), 241-262.
- Teufel-Shone, N. I., Drummond, R., & Rawiel, U. (2005). Developing and adapting a family-based diabetes program at the U.S.-Mexico border. *Prev Chronic Dis*, 2(1), A20.
- Thomas, J. C., Earp, J. A., & Eng, E. (2000). Evaluation and lessons learned from a lay health advisor programme to prevent sexually transmitted diseases. *Int J STD AIDS*, 11(12), 812-818.
- Toms, F. D., & Hobbs, A. D. (1997). *Who are we? Building a knowledge base about the different ethnic, racial and cultural groups in American: A self-study and workshop facilitator's guide*. Forestville: Diverse Books Publishing.
- Treadwell, H. M., & Ro, M. (2003). Poverty, race, and the invisible men. *Am J Public Health*, 93(5), 705-707.
- Tropp, L. R., & Wright, S. C. (2001). Ingroup Identification as the Inclusion of Ingroup in the Self. *Pers Soc Psychol Bull*, 27(5), 585-600.
- Tudiver, F. G., Myers, T., Kurtz, R. G., Orr, K. W., Rowe, C. J., Jackson, E. A., et al. (1992). The talking sex project. *Evaluation and the Health Professional*, 15(4), 26-42.
- Uleman, J. S., Rhee, E., Bardoliwalla, N., Semin, G., & Toyama, M. (2000). The relational self: Closeness to ingroups depends on who they are, culture, and the type of closeness. *Asian Journal Of Social Psychology*, 3(1), 1-17.
- Vaananen, A., Buunk, B. P., Kivimaki, M., Pentti, J., & Vahtera, J. (2005). When it is better to give than to receive: long-term health effects of perceived reciprocity in support exchange. *J Pers Soc Psychol*, 89(2), 176-193.
- van Ryn, M., & Heaney, C. A. (1997). Developing effective helping relationships in health education practice. *Health Educ Behav*, 24(6), 683-702.

- Vines, A. I., & Godley, P. A. (2004). The challenges of eliminating racial and ethnic health disparities: inescapable realities? Perplexing science? Ineffective policy? *NC Med J*, 65(6), 341-349.
- Walker, D. G., & Jan, S. (2005). How do we determine whether community health workers are cost-effective? Some core methodological issues. *J Community Health*, 30(3), 221-229.
- Warrick, L. H., Wood, A. H., Meister, J. S., & de Zapien, J. G. (1992). Evaluation of a peer health worker prenatal outreach and education program for Hispanic farmworker families. *Journal of Community Health*, 17(1), 13-26.
- Watkins, E. L., Harlan, C., Eng, E., Gansky, S. A., & et al. (1994). Assessing the effectiveness of lay health advisors with migrant farmworkers. *Family and Community Health*, 16(4), 72-87.
- Weinrich, S. P., Boyd, M. D., Weinrich, M., Greene, F., Reynolds, W. A., Jr., & Metlin, C. (1998). Increasing prostate cancer screening in African American men with peer-educator and client-navigator interventions. *J Cancer Educ*, 13(4), 213-219.
- Whitehead, T. L. (1992). Expression of masculinity in a Jamaican sugartown: Implications for family planning programs. In T. L. Whitehead & B. Reid (Eds.), *Gender Constructs and Social Issues*. Chicago: University of Illinois Press.
- Williams, D. R. (2003). The health of men: structured inequalities and opportunities. *Am J Public Health*, 93(5), 724-731.
- Williamson, L. M., Hart, G. J., Flowers, P., Frankis, J. S., & Der, G. J. (2001). The Gay Men's Task Force: the impact of peer education on the sexual health behaviour of homosexual men in Glasgow. *Sex Transm Infect*, 77(6), 427-432.
- Wood, J. T., & Duck, S. (1995). Off the beaten track: New shores for relationship research. In J. T. Wood & S. Duck (Eds.), *Understudied relationships: Off the beaten track* pp. 1-21. Thousand Oaks: Sage Publications.
- Wynn, T. A. (2005). A community-based project to promote prostate cancer awareness and informed decision making in AL. 132nd Annual Meeting of the American Public Health Association. Philadelphia, PA.
- Ziersch, A., Gaffney, J., & Tomlinson, D. R. (2000). STI prevention and the male sex industry in London: evaluating a pilot peer education programme. *Sex Transm Infect*, 76(6), 447-453.