

**WHERE THERE IS LIMITED MENTAL HEALTH ACCESS: THE  
RELATIONSHIP BETWEEN SOCIAL CAPITAL AND MENTAL HEALTH**

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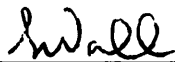
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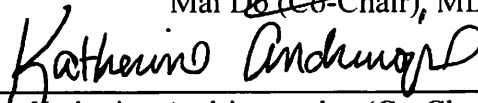
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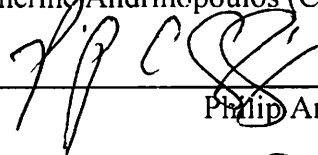
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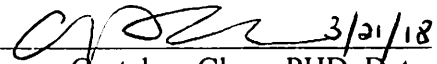
3/21/18

Katherine Andrinopoulos (Co-Chair), PhD Date



3/21/18

Philip Anglewicz, PhD Date



3/21/18

Gretchen Clum, PHD Date

## **ABSTRACT**

### **BACKGROUND**

Malawi is one of the least developed countries in the world, where the government's investment in the health care system, including mental health services is very low. As a result, there is limited access to mental health services and general health workers lack training to address mental health issues. Low detection rates of common mental disorders (CMDs) in Malawi suggest that a large percentage of people with CMDs are going unrecognized and untreated. Social capital is important in this context because it may improve mental health for men and women in rural, sub-Saharan settings, such as rural Malawi, where there is little or no mental health care. This dissertation presents three papers related to the relationship between social capital and mental health in rural Malawi. The first paper explores the social determinants of social capital, the second paper examines the relationship between social capital and mental health, and the final paper looks at the role of gender as a moderator in this relationship.

### **METHODS**

The analyses in this dissertation use a subset of data from the 2008 and 2010 Malawi Longitudinal Study of Families and Health" (MLSFH). The study sample included 1523 females and 994 males who had both 2008 and 2010 SF-12 mental health scores. The seven social capital measures were financial and non-financial transfers given and received, financial and non-financial reciprocity, and social participation. The six mental health measures were the 2010 SF-12 mental health composite score (MCS-12); the 4 components/scales of the 2010 MCS-12 which includes role/emotional functioning,

social functioning, vitality, and mental health functioning; and overall satisfaction as perceived by the respondent. Paper #1 used seven ordinary least squared multiple regression and ordered logistic regression models to determine the determinants of social capital in 2008. Paper #2 used six ordinary least squared multiple regression and logistic regression models to determine the association between 2008 social capital measures and mental health outcomes in 2010 from 2008 and 2010 longitudinal data. Paper #3 used six ordinary least squared multiple regression and logistic regression models stratified by sex to determine the association between 2008 social capital measures, 2008 gender attitudes and gender power, and mental health outcomes in 2010 for males and females.

## **RESULTS**

Paper #1 found that none of the predictor variables were statistically significant for all seven social capital measures, although being from the Central region of Malawi and attending Church in the last week were associated with five out of seven measures. Paper #2 found only one measure of social capital had a positive association with a measure of mental health, while three other measures of social capital had a negative association with a mental health measure. Paper #3 found clear differences between men and women when examining the role of gender on the relationship between social capital and mental health.

## **CONCLUSION**

These results will inform future studies seeking to measure social capital in rural, sub-Saharan African settings and will provide insights when planning interventions to increase social capital in order to improve mental health for men and women in resource-

poor settings. The measures of social capital used in this study should be further explored further and validated in other rural, sub-Saharan African settings.

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## INTRODUCTION

Mental health is a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively, and is able to contribute to his or her community (WHO, 2016). Poor mental health hinders one's ability to learn and participate productively in the economy. Mental health is a critical issue in sub-Saharan Africa where there is little access to services, especially in rural areas. Malawi has very few mental health workers while general health workers lack training to address mental health issues. Since previous research demonstrates a positive association between social capital and mental health (Hamano et. al., 2010; Rose, 2000; Niemenan et. al, 2010; Kawachi and Berkman, 2001; Wind and Komproe, 2012; Almedom, 2005; McKenzie, 2008; Elgar et. al., 2011; Hassanzadeh et. al., 2016; de Silva et. al., 2007) in more developed countries, it is important to understand whether social capital can improve mental health within communities in Malawi, and other low resource, low income communities in sub-Saharan Africa, where people are interdependent on one another and there is insufficient access to trained mental health providers (Udedi, 2016). This dissertation will examine mental well-being, not specific mental disorders.

Despite much attention on social capital in disciplines as diverse as public health, sociology, economics, political science, and management sciences, there is little agreement on its definition. This dissertation will utilize Woolcock's (2001) definition of social capital: having "one's family, friends, and associates constitute an important asset, one that can be called upon in times of crisis, enjoyed for its own sake, and/or leveraged

for material gain.” Additionally, there is large gap between the theoretical understanding of social capital and the measurement of social capital in empirical studies (Stone, 2001). Overall, there is no well-established method of measuring social capital across populations (Harpham, Grant, & Thomas, 2002; Macinko & Starfield, 2001). To understand the relationship between social capital and mental health, it is important to explore how to measure social capital in non-Western collectivist cultures, and resource-limited settings. Since social capital has not been well-studied in sub-Saharan Africa and there is no standard measurement of social capital in the literature, this dissertation offers a measurement tailored to the sub-Saharan African context.

Beyond the direct relationship between social capital and mental health, this dissertation also identifies the determinants of social capital in sub-Saharan settings in order to help us understand how to increase social capital to improve mental health in rural settings where mental health services are not always accessible. Also, understanding how men and women approach and access social capital differently is useful for tailoring mental health interventions to assist individuals with unique social challenges.

## **THEORETICAL FRAMEWORK**

This dissertation follows the three-paper format. The three papers use the following theoretical framework which was developed based on existing literature (figure 1).

**Figure 1. Conceptual Framework: Social Capital and Mental Health and the Influence of Gender**

<b>DETERMINANTS OF SOCIAL CAPITAL</b>				
<u>Socio-economic/ Demographic</u>	<u>Health Status</u>	<u>Religiosity</u>	<u>External</u>	<u>Self-Determination</u>
-Marital Status -Age -Household Size -Education -Region -Tribe -Wealth -Has Savings	-2008 SF-12 Mental Health Score -2008 SF-12 Physical Health Score -HIV Status -Likelihood of AIDS in the future	-Church attendance	-Financial Shock -Non-financial Shock	-Power to Travel -Power to Make Decisions



<b>COGNITIVE SOCIAL CAPITAL</b>	<b>STRUCTURAL SOCIAL CAPITAL</b>
Reciprocity    Transfers Given & Received (Financial & Non-financial)	Social Participation

**GENDER ATTITUDES  
GENDER POWER**



**MENTAL HEALTH FUNCTIONING (0-100)**  
As measured by the SF-12 MCS

SF-12 MCS Components:  
Role Functioning  
Vitality  
Mental Health Functioning  
Social Functioning

Subjective Measure:  
Overall Satisfaction

Social capital is measured in two main domains in this dissertation: cognitive social capital and structural social capital. Structural social capital is defined as what people do; it includes social participation since it encompasses activities in the community and in society. Cognitive social capital is defined as what people feel. This includes reciprocity between individuals and can also include transfers (Hamano, 2010). Financial and non-financial transfers given and received, and financial and non-financial reciprocity are important measures of social capital because they focus on aspects of Malawian communities in which people identify with their communities, where obligations to help kin and other community members exist, and people are interdependent on one another (Swidler & Watkins, 2007; Potter & Handcock, 2010. Social participation (Lindstrom, 2004; Putnam, 1993, 1995; Guillen, Coromina, & Saris, 2011; Abbott, 2010; Healy, 2002; Wollebaek & Per Selle, 2003; Zukewich & Norris, 2005; Hyyppa, 2008) is often used as measures of capital, while reciprocity is rarely measured even though it is an important component of social capital (Abbott and Freeth, 2008). Transfers are not commonly used as a direct measure of social capital. No other known study has used these measures of social capital together. These measures of social capital are tailored to capture the uniqueness of the sub-Saharan context where giving and receiving and participating in the community are part of the fabric of society and provide social insurance in times of need.

Central to this conceptual framework is the relationship between social capital and mental health. It is hypothesized that social capital affects mental health based on whether one has a negative or positive response to social participation, giving financial non-financial transfers to another, receiving non-financial or financial transfers, and/or having a

reciprocal financial or non-financial relationship with another. A negative response diminishes mental health and a positive response improves mental health. This dissertation will examine mental well-being, not specific mental disorders. There are four areas that comprise mental health as measured by the SF-12 mental composite score (MCS-12): role functioning, vitality, mental health functioning, and social functioning. In addition, social capital can also negatively or positively affect one's self-perceived overall satisfaction with their lives/general well-being. Even though all social capital measures are important, one measure of social capital can influence overall mental health, an area of mental health (role functioning, vitality, mental health functioning, and social functioning), or overall satisfaction, more than another.

At the top of the conceptual framework are the determinants of social capital.

Recognizing the determinants of social capital in sub-Saharan Africa can create a better understanding on what influence social capital. The determinants shown to be related to social capital in other settings (Knack & Keefer, 1997; Helliwell & Putnam, 1999; Paldam, 2000; Huang, Maassen van den Brink, & Groot, 2009; van Oorschot and Arts, 2005; Bolin, Lingren, Lindstrom, & Nystedt, 2003; Christoforu, 2005; Berggren and Bjornskov, 2011; Stromsnes, 2008; van Oorschot 2006; Kassa, 2012; Alexander, 2007; Kassa and Parts, 2008) or hypothesized to influence social capital in rural Africa are included in this framework. They can be grouped into socio-economic/demographic, health status, religiosity, self-determination, and external determinants. The socio-economic/demographic determinants include: marital status, tribe, education level, region of residence, wealth, age, household size, and having savings. The health status determinants include: 2008 SF12 mental health and physical health scores, HIV status,

and likelihood of HIV in the future. The religiosity determinant is church attendance. The external determinants are financial or non-financial shock in the last two years, while the self-determination determinants are power to travel and power to make decisions. These determinants negatively or positively influence social capital in rural settings such as Malawi.

Looking at the conceptual framework, it is hypothesized that gender influences the relationship between social capital and mental health (Kawachi & Berkman, 2001). Specifically, gender, beyond the biological designation of sex, can be measured by gender attitudes and gender power. Men and women may utilize social capital differently and gender may influence the relationship between social capital and mental health outcomes. It is important to understand the influence of gender on social capital to tailor interventions specific to men and women's approach and utilization of social capital to assist individuals with unique mental health needs.

A major strength of this dissertation is the longitudinal data that will be used to better determine the direction of the relationship between social capital and mental health. This dissertation will look at the measures of social capital, which includes social participation, transfers, and reciprocity, tailored towards a developing country context, measured in 2008 and examine their associations with mental health outcomes in 2010 among the same individuals. It will examine whether these measures produce a positive or negative mental health and how gender influences this relationship.

## **OVERVIEW**

This dissertation consists of three papers on social capital and mental health in rural Malawi. The papers in this dissertation are unified by the overall objective of advancing knowledge about what influences social capital and what social capital means for the mental health of men and women in developing countries in sub-Saharan Africa. The overall goal is to create understanding of how to increase social capital to improve mental health for men and women in rural, sub-Saharan settings, such as rural Malawi, where there is little or no mental health care.

Using data from the 2008 “The Malawi Longitudinal Study of Families and Health” (MLSFH), paper 1 of this dissertation examines the determinants of social capital in rural Malawi and offers a measurement of social capital tailored for sub-Saharan African settings. The 17 determinants of social capital shown to be related to social capital in other settings or hypothesized to influence social capital in rural Africa were analyzed using ordinary least squared multiple regressions and ordered logistic multiple regression in seven separate models, with the seven proposed measures of social capital as dependent variables. The social determinants of social capital, limited to those characteristics with a statistically significant relationship with social capital measures, were then interacted with sex.

Paper 2 then explores the direct relationship between social capital and mental health in rural Malawi using 2008 MLSFH data for the social capital variables and the control variables and MLSFH 2010 data for the mental health outcome variables. The use of

longitudinal data protects against the biasing effect of reverse causality, presenting a clearer picture of the direction of association and reducing the possibility that people with better mental health are more likely to engage in social capital building activities. Unlike other studies, this paper utilizes five measures of mental health as the dependent variables, which include overall satisfaction as perceived by the respondent, the 2010 SF-12 mental health composite score (MCS-12), and the 4 components/scales of the 2010 SF-12 mental health composite score (role/emotional functioning, social functioning, vitality, and mental health functioning), with the seven, context tailored measures of social capital as the independent variables. Ordinary least squared multiple regressions were utilized for the continuous variables and logistic multiple regression was utilized for the one binary variable.

Finally, paper 3 explores whether gender acts as a moderator in the relationship between social capital and mental health using the same 2008 and 2010 MLSFH data as paper 2. Women's power for decision-making, as well as attitudes towards women's self-determination may create differences in the ways men and women utilize or react to social capital, resulting in differences in mental health outcomes. This paper tests the hypothesis that women are more likely to engage in non-financial relationships and these relationships improve their mental health; and men are more likely to engage in financial relationships and participate in the community and these relationships improve their mental health. Gender, beyond the biological designation of sex, is measured by gender attitudes and gender power. Ordinary least squared multiple regressions stratified by sex were utilized for the continuous variables and logistic multiple regression stratified by sex was utilized for the one binary variable. The social capital variables with a



statistically significant relationship with a 2010 mental health outcome variable in paper 2 were stratified by sex then interacted separately with gender attitudes and gender power to determine if gender attitudes and gender power were related to social capital in 2008 for men and women separately.

# **PAPER 1: THE DETERMINANTS OF SOCIAL CAPITAL IN RURAL MALAWI**

## **INTRODUCTION**

Previous studies find a positive relationship between social capital and mental health (Hamano et al., 2010; Rose, 2000; Niemenan et al, 2010; Kawachi & Berkman, 2001; Wind & Komproe, 2012; Almedom, 2005; McKenzie, 2008; Elgar et al., 2011; Hassanzadeh et al., 2016; De Silva, Huttly, Harpham, & Kenward, 2007). However, social capital is difficult to define and there is little agreement on how to measure social capital (Szreter & Woolcock, 2004; Nieminen et al., 2008; Harpham, Grant, & Thomas, 2002; Macinko & Starfield, 2001; De Silva, 2006). In addition, there are few studies which focus on the determinants of social capital, especially in low-resource settings. This paper examines the determinants of social capital in rural Malawi. It is important to recognize the determinants of social capital in sub-Saharan Africa to understand how to increase social capital to improve mental health in rural settings where mental health services are not always accessible.

In developing countries like Malawi, there is greater reliance on social ties as an insurance system for negative life events and socio-economic difficulties since formal insurance does not often exist (Swidler & Watkins, 2007). Social capital can buffer the effects of these social and economic stressors on mental health (Kawachi & Berkman, 2001). There is, however, limited empirical evidence on the relationship between social capital and mental health, especially in sub-Saharan Africa. To understand the relationship between social capital and mental health, it is important to explore how to

measure social capital in non-Western, resource-limited settings. Without a tailored measurement of social capital, it is impossible to understand how to increase social capital in rural sub-Saharan African communities. By exploring the determinants of social capital and how to measure it, interventions can be developed or tailored to increase social capital to improve mental health.

## **BACKGROUND**

Malawi is one of the least developed and most densely populated countries in the world. The current population is 19.2 million, with approximately 80 percent of the population living in rural areas (CIA, 2017). The country ranks 170 out of 188 on the Human Development Index (UNDP, 2016). The 2016 estimated GDP per capita income is 1,110 dollars, ranking the country number 223 in the world (CIA, 2017). Malawi performs poorly on health indicators such as maternal-child health and infectious disease, as well as morbidity and mortality rates. Life expectancy at birth is 59.2 years for men and 63.2 for women and the fertility rate is 5.49 children. Health expenditures account for 11.4 percent of the GDP (CIA, 2017). Presently, 1,000,000 (970,000 -1,100,000) people in Malawi are living with HIV/AIDS. The epidemic is generalized and feminized (UNAIDS, 2016).

Along with poor health indicators and lack of development, Malawi experiences a lack of government investment in the health care system, including mental health services. Malawi has only .01 psychiatrists and .02 psychologists per 100,000 people. There are 3 mental hospitals, with a total of 401 beds (WHO, 2011). Mental health spending is only 1

percent of the total health budget (WHO, 2011). In general, there are insufficient resources allocated to mental health care. In 2002, unipolar disorders/depression ranked number four behind HIV/AIDS, cataracts, and malaria for YLD (Years Lost Due to Disability) in Malawi (Bowie, 2006).

Communities are important in both the prevention and the etiology of mental health disorders (Myers, Stein, Grimsrud, Seedat, & Williams, 2008). Where there is insufficient access to trained providers, it is important to focus on the role of social capital and how it can benefit mental health within communities where individuals must rely on family, friends, and other community members. This is especially true in Malawi, where lack of health insurance, life insurance, and other structural support has resulted in a profound dependence on community, kin, and social obligations (Potter & Handcock, 2010).

## **LITERATURE REVIEW**

### Social Capital

Putnam and Coleman were influential in the development of modern social capital theory, although Durkheim's work is often cited as the origin of the concept of social capital. Durkheim's theory (1893) of social integration stresses the importance of structural social capital and the role of social networks within larger social and economic contexts. Social integration creates a sense of belonging and connection, as well as personal protection through interaction and participation. The resulting group cohesion creates solidarity and norms. In Durkheim's *Suicide* (1897, [1951]), he argues that social

integration is key to understanding suicide. As social integration decreases, people are likelier to commit suicide. This suggests a connection between social isolation and reduced psychological well-being (Kawachi & Berkman, 2001).

There is debate about who first used the term “social capital.” Many attribute the term to Hanifan in 1916, who was describing the importance of community participation for school performance (Woolcock & Narayan, 2000). Robert Putnam was one of the first to discuss the importance of social capital and its benefit for individuals. His theory of social capital is often cited in the health sciences (De Silva, McKenzie, Harpham, & Huttly, 2005). Putnam describes social capital as having the features of social life, including networks, norms, and trust. These features allow social participants to act together in an effective manner to pursue shared objectives and the public good. Furthermore, he states that measuring who benefits from social capital must be done empirically, rather than “definitionally” (Putnam, 1995).

Coleman is also very influential in the study of social capital. According to Coleman (1998), social capital is, “defined by its function” and is made up of different entities, which have two commonalities: social structure and the facilitation of actions of individuals within the structure. There are three forms of social capital: obligations and expectations, information channels, and norms. For obligations and expectations, when person A does something for person B, there is a sense of trust that person B will reciprocate in the future. This action creates expectation on the part of person A and a sense of obligation on the part of person B. For information channels, social capital is created by social relations who offer information that facilitates actions. Norms (actions

regarded by a group as proper or correct), when they exist and are effective, create a powerful sense of social capital. Coleman believes that a person cannot be only individualistic, nor can a person be totally shaped by his environment. Social capital is intangible, although it can facilitate productive activity. Social structure provides “actors” with resources to achieve their interests. Social structure also allows for the existence of norms and values among groups. Obligation and expectation create a social environment in which people are doing things for each other.

Woolcock (2001) describes social capital as having “one’s family, friends, and associates constitute an important asset, one that can be called upon in times of crisis, enjoyed for its own sake, and/or leveraged for material gain.” More precisely, social capital is the norms and networks that facilitate collective action (Woolcock, 1998). Social capital is typically divided into two components: structural and cognitive social capital. Structural social capital can be defined as what people do and measured by the extent and/or intensity of links or activities. Cognitive social capital can be defined as norms, values, beliefs, and attitudes and can be measured by looking at perceptions of support, reciprocity, sharing, and trust (Harpham, Grant, & Thomas, 2002; Whitely & McKenzie, 2005). The constructs of bonding and bridging social capital also exist, with bonding capital referring to social cohesion within homogeneous group structure and bridging capital referring to the social ties between diverse communities or groups (Harpham, Grant, & Thomas, 2002; Healy, 2002; Whitely & McKenzie, 2005). Social capital is different from social networks and support since it is a feature of social structure, as opposed to a focus on individuals (Lochner, Kawachi, & Kennedy, 1999).

Despite much attention on social capital in disciplines as diverse as public health, sociology, economics, political science, and management sciences, there is little agreement on its definition or measurement. Stone (2001) states that there is a large gap between the theoretical understanding of social capital and the measurement of social capital in empirical studies. Since social capital is a complex construct, simple proxies cannot be utilized (Harpham, Grant, & Thomas, 2002). According to Nieminen et al. (2008), definitions also differ according to frameworks and whether there is a focus on individuals or groups. The authors indicate that many investigators exclude a definition of social capital entirely and focus on measurement instead. Furthermore, there is a tendency to use surveys that were not intended to measure social capital (Nieminen et al., 2008; Szreter & Woolcock, 2004). Overall, there is no well-established method of measuring social capital across populations (Harpham, Grant, & Thomas, 2002; Macinko & Starfield, 2001).

#### Social Capital in sub-Saharan Africa

There is limited literature on social capital in sub-Saharan African settings and most is focused on HIV/AIDS. In *Ties of Dependence*, Swidler & Watkins (2007), show that a web of relationships exists in sub-Saharan Africa and these relationships, based on patron-client relationship of reciprocity and redistribution and the morality of sharing, mitigate the effects of both poverty and wealth. In these societies, one invests in others and there is a trust that they will reciprocate. Social interactions are important part of society in Malawi and social networks act as an important resource (Helleringer & Kohler, 2005).

Kohler, Kohler, Anglewicz, & Behrman (2012) examine intergenerational transfers in relation to HIV/AIDS in rural Malawi and find that these types of financial and non-financial transfers are common and widespread. Within these types of transfer patterns, they find that non-financial transfers tend to be based on mutual help rather than the reallocation of resources and financial transfers tend to be age-patterned, but neither is associated with the health status, including HIV status, of the respondents. Potter & Hancock (2010) find that within Malawian villages, transfers tend to be less based on social hierarchy and are likely to occur between married couples, from parents to children, and members of the same compound.

Social participation in groups has been shown to be beneficial in sub-Saharan settings, although the literature is scarce. Club membership is associated with lower risk of HIV in South Africa (Campbell, Williams, & Gillgen, 2002) and Zimbabwe (Gregson, Terceira, Mushati, & Nyamukapa, 2004), although the value of social capital may depend on the characteristics of the community, group, and individual. Myroniuk & Anglewicz (2015) suggest that social participation in Malawi may be protective for health, but detrimental for mental health because it may lead to additional obligations to support others. Pronyk et al. (2008) cautions that not all social capital is protective and can increase HIV risk in rural South Africa by exposing women participating in groups to more potential sexual partners; therefore, it is important to examine, then balance intervention efforts focused on social capital to strengthen its protective dimensions.

In Malawi, community members interact with each other daily and participate in group activities that bring people together (Myroniuk & Anglewicz, 2015). Transfers and



reciprocity are also an important and very present part of daily life in rural Malawi and community members and kin invest in each other (Swidler & Watkins, 2007). Given the frequency of occurrence, daily interactions that occur through social participation, giving and receiving transfers, and reciprocity that creates interdependence, are the most important features of social capital exchange in rural Malawi.

### Measurement of Social Capital

This paper will utilize Woolcock (2001)'s definition of social capital and provide a measurement tailored to the rural, sub-Saharan African context.

This paper will concentrate on three specific areas of social capital, which are useful when focusing on resource poor countries in sub-Saharan Africa, such as Malawi: social participation, transfers (financial and non-financial), and reciprocity (financial and non-financial). These are important measures of social capital because community, kin, and social obligations are central to life in rural Malawi. These three measures focus on important aspects of Malawian culture in which people identify with their communities, where obligations to help kin and other community members exist, and people are interdependent on one another.

Social participation is how actively a person takes part in the activities of formal or informal groups in society (Lindstrom, 2004; Hyppa, Maki, Alanen, & Impivaara, 2008). Transfers can be described as the flow of resources (wealth or time) from one individual, household, or a group to another (Hayhoe & Stevenson, 2007). Reciprocity is the practice of exchange within a social relationship in which any type of exchange given by one

party is repaid to that party by the one who received the original exchanged goods or services (Stone, 2001) or the act of giving benefits to another in return for benefits received (Molm, Schaeffer, & Collett, 2007).

It must be noted that many studies use trust as a measurement of social capital. However, in sub-Saharan Africa, trust is a feature of transfers and reciprocity. If trust did not exist, then transfers and reciprocity would not occur. Community members and kin partake in these relationships with the expectation that this investment in each other is a type of social insurance (Swidler & Watkins, 2007).

### Social Participation

According to Guillen, Coromina, & Saris (2011), the importance of social participation is referred to by almost all scholars and is fundamental in the literature on social capital. Social participation is widely used as a measure of social capital. Social participation is an empirically, directly observable aspect of social capital (Lindstrom, 2004). Robert Putnam (1993, 1995) is an original proponent of using social participation as a measure of social capital. Putnam refers to social participation as civic engagement, which is a person's connection to their community. Putnam describes this concept as being highly correlated with social trust (Putnam, 1995), a type of trust that exists within established relationships among those who are well known and social networks (Stone, 2001).

Social participation is distinct from casual social contact with friends, family, neighbors, etc. (Abbott, 2010). Social participation can encompass involvement in church or religious activities (Healy, 2002). Social participation is also inclusive of civic

participation (Lindstrom, 2004; Wollebaek & Per Selle, 2003). Civic participation is an activity that contributes to the provision of public benefit. This can include individual activities like voting and contacting an elected representative; organizing activities that produce local collective benefits such as parent teacher associations and resident associations; and activities which produce non-collective benefit like national political parties and pressure groups (Abbott, 2010).

Social participation can be measured by frequency, type, time spent, and size of network/of how many groups (Zukewich & Norris, 2005). Hyyppa (2008) and Lindstrom (2004) measure social participation as how often a person partakes in formal and informal groups in an active manner. In this research, social participation includes participation in formal and informal groups, as well as civic participation. In Malawi, this includes going to a funeral, the market, a wedding, a political meeting, as well as speaking to the village headman and the traditional authority.

### Transfers

A transfer is the receipt of financial or non-financial help. Transfers occur without compensation, are unidirectional, and are not barter (Lune, Winter, Morris, Gutkowska, & Jezewska-Zychowicz, 1999). Transfers occur for a variety of reasons, including altruism (Foster & Rosenzweig, 2001; MacDonald & Koh, 2003); risk-sharing among households and communities (Foster & Rosenzweig, 2001; Azam & Gubert, 2006; Davies, 2007; Rosenwig, 1988); and self-interest (De la Brière, Sadoulet, de Janvry, & Lambert, 2002). Other reasons include parental repayment (Lillard & Willard, 1997); old age security (Lillard & Willard, 1997; Park, 2003); exchange motive in which there is a

financial transfer made for time between an offspring and parent (Lillard & Willard, 1997); and bargaining power in the household in which control of resources is linked with household power (Lillard & Willard, 1997). Schervish and Havens (2003) suggest that caring behaviors are driven by an interest and identification with others. For these reasons, transfers are important in creating social capital and emphasizing the importance of social networks.

Transfers often encompass both financial and non-financial help within the family and outside the family. According to Cao (2006), transfers do not need to be limited solely to family or to altruism. Time and financial transfers within and beyond the family are interrelated. Furthermore, transfers of time, money, and support begin with family and friends closest to them and extend outward (Schervish & Havens, 2003). Park (2003) states that inter-household transfers are common in developing countries, with 20-90 percent of households receiving private transfers compared to 15 percent in the United States. In addition, received transfers comprise 2 to 20 percent of household income.

In Malawi, intergenerational financial and non-financial transfers are common and are a fundamental characteristic of family relationships (Kohler, Kohler, Anglewicz, & Behrman, 2012). Financial transfer describes giving another person money or financial assistance. Non-financial transfer describes giving another person non-financial help, such as collecting firewood, cooking, taking care of people, or helping with farming. Family and community members help each other during economic crises, in the context of life and death, as well as in daily life. Individuals, families, and households use

transfers by family or community members to cope with income and health shocks (Chao & Kohler, 2007). Therefore, family and local communities act as social safety nets.

### Reciprocity

Reciprocity occurs when a person gives a transfer of financial or non-financial help in return for an earlier financial or non-financial transfer received. Putnam (1993) states that reciprocity involves “mutual expectation” of repayment in the future so it acts as an investment system. For this reason, ties are created as “insurance against future needs.” According to Swidler & Watkins (2007), a gift can be seen as a credit, which can lead to reciprocity during a time of critical need. Parks-Yancy, DiTomaso, & Post (2008) note that reciprocal relationships produced by weak ties, in which members may not have knowledge or access to the same people, may help individuals “move up” in the social structure, while individuals in high social positions benefit more from generalized reciprocal obligations of their strong ties, which denote a higher emotional bond.

Reciprocity is governed by norms, in which parties understand the social contract they have entered (Stone, 2001). Molm, Schaeffer, & Collett (2007) see reciprocity as an important social exchange that reinforces trust and solidarity in partners. Reciprocity consists of trust, positive feelings towards the exchange partner, and perceived shared interests. Furthermore, reciprocity is a product that affirms a relationship’s value and partner’s trustworthiness and willingness to invest in a relationship. Therefore, reciprocity builds trust and commitment in socially embedded relationships that are not seen in market exchanges (Molm, Schaeffer, & Collett, 2007). This relationship is supported by Coleman’s description of social capital in which obligation and expectation

create a social environment in which people are doing things for each other (Coleman, 1998).

Abbott and Freeth (2008) state that reciprocity is rarely measured even though it is an important component of social capital. Often, the concept of reciprocity is confused with other behaviors such as altruism. For example, using volunteerism as an expression of reciprocity even though there is not always a payback. Although Putnam feels that reciprocity is a core component of social capital, the authors concede that he did not include it in his composite index of social capital. In addition, Abbott & Freeth (2008) state it is difficult to create a simple question to measure reciprocity because of its complexity.

When reciprocity is measured, one of the following three approaches is often used (Stone, 2001). The first approach examines the culture of reciprocity within given network or locality, providing information on the norm of reciprocity. The second approach is investigating reciprocal behavior, while the third approach is looking at the benefits of network participation. These last two approaches are investigating the behavior outcome of the norm, rather than the norm of reciprocity itself.

#### Determinants of Social Capital

There is a limited amount of literature about the determinants of social capital, especially in sub-Saharan African countries. Overall, there are a large range of factors, which include socio-economic and contextual factors which influence social capital. Hunter, Neiger, & West (2011) suggest that social determinants of health may precede social

capital and may in fact be a mediator between social determinants and improved health outcomes. Examining the United States context, the authors theorize from a review of the social capital literature and the social determinants of health literature that the social determinants of health such as lack of income, unemployment, lack of education, and poor housing may impede one's ability to receive support from others or participate in society. In turn, this lack of social capital causes internal stressors that result in poor health outcomes. The authors suggest that increasing social capital may buffer the negative effects of social determinants of health and improve health outcomes. The authors concede that an explanation of this pathway is unclear.

Outside of the African context, many studies find that income and education have the strongest influence on social capital (Knack & Keefer, 1997; Helliwell & Putnam, 1999; Paldam, 2000; Huang, Maassen van den Brink, & Groot, 2009) when looking at institutional trust and social participation. However, among these studies, there is variation on the direction (positive or negative) of these factors on trust, which is a difficult concept to measure.

There are very few studies examining the socio-demographic factors, such as age, gender, and marital status on social capital and there are varying results based on how social capital is measured. Men are shown to have greater participation in formal networks, while women tend to participate in informal networks (Christoforu, 2005). Bolin, Lingren, Lindstrom, & Nystedt (2003) find married couples have less social capital due to the demands of family life which leaves little time for social relations. Regarding age,

van Oorschot and Arts (2005) argue the positive effect of age can be attributed to differences in generation, cohort, or life stage.

There are conflicting results overall about whether religiosity, meaning attending and/or belonging to a church, promote social capital as measured by trust. Berggren & Bjornskov (2011) find a negative effect of religiosity on trust, while Stromsnes (2008) & van Oorshot (2006) find a positive effect. Kassa (2012) finds that religious attendance has a positive effect on social capital in Europe, while Alexander (2007) finds a negative effect in the United States. Attending services creates a sense of belonging and solidarity but can also reduce the time for other activities or create distrust for those who do not share their beliefs.

In their study of the differences in the individual determinants of social capital in Europe, Kassa & Parts (2008) find differences in sources of social capital between transition (post-Soviet) and non-transition countries (never under Soviet control). It can be inferred that what determines social capital in a less developed country may be very different for a more developed country.

## **METHODS**

### Data

This first paper uses data from the 2008 “Malawi Longitudinal Study of Families and Health” (MLSFH). The sample is restricted to 2517 male and female respondents, aged 15 and above, with a SF-12 mental health score in both 2008 and 2010, although this



paper only uses variables from the 2008 survey. The sample is restricted those with SF-12 scores in both years since the 2010 SF-12 mental health score is an outcome of interest in paper two and three which examine the effect of social capital in 2008 on mental health in 2010. Since the social capital measures in 2008 are the independent variables of interest in papers two and three, this paper will use the same sample that is used in the other two papers that are a part of this dissertation. Using the entire 2008 sample of 4,036 could change the results since there may be a difference between those who did not answer the SF-12 in both years and those who did and there would not be comparability of results across papers, which are part of the same conceptual framework for this dissertation.

MLSFH examines the demographic, socioeconomic and health conditions in Malawi for more than a decade. MLSFH includes respondents from three districts in Malawi: Rumphi (North), Mchinji (Central), and Balaka (South) (Kohler et al., 2015). The three districts represented in the survey are comparable in epidemiological, socioeconomic, and subsistence-agriculture characteristics; however, they differ in marriage patterns, religious affiliations, schooling, patrilineal versus matrilineal inheritance and landownership, and HIV prevalence (Kohler et al., 2015).

MLSFH collects data every two to three years to examine topics such as HIV/AIDS, health and well-being, social and sexual networks, behaviors and attitudes, family planning, household structure, intergenerational transfers, and economic shocks (MLSFH, 2017). The first wave of data was collected in 1998 (MDICP-1) and subsequent waves of data were collected in 2001 (MDICP-2), 2004 (MDICP-3), 2006

(MDICP-4), 2008 (MDICP-5), 2010 (MDICP-6), and 2012 (MDICP-7). The original sample was chosen through cluster random sampling in Mchinji and Rumphu and using a subset of an earlier representative population survey in Balaka. This sample was similar to the rural population surveyed in the 1996 Malawi Demographic and Health Survey (Kohler et. al, 2015). The first wave of data included ever-married women age 15-49, and their husbands. Subsequent data includes the original sample and the new spouses of those who remarried. In 2004, a sample of 1,500 adolescents was added and in 2006, the spouses of 2004 adolescents were added. In 2008, a sample of 800 parents of MLSFH/MDICP respondents was also added to examine intergenerational relationships. The attrition rate of each wave is 648 people after 1998, 674 people after 2001, 715 people after 2004, 796 people after 2006, 1,016 people after 2008, and 136 people after 2010. The most common reason for attrition between waves of data collection was migration (MLSFH, 2017).

In 2008, the age range was 17-92 and the age range was 20-89 in 2010. The 2008 data has a sample size of 4,036 and the 2010 data has a sample size of 3,798. Biomarkers for HIV were collected in 2008, but not in 2010 (Kohler, 2012). A total of 3020 respondents from the 2008 survey participated in the 2010 survey (Kohler et al., 2015). The sample for this dissertation is 2,517 respondents who participated in both 2008 and 2010 surveys and have SF-12 mental health scores for both years. These two datasets are being used because the questionnaires are almost the same, compared to other years, and they contain appropriate variables for measuring mental health and social capital.

The pertinent topics covered in the 2008 and 2010 surveys include a self-reported SF-12 questionnaire module on physical and mental health; social capital questions which include intergenerational/interfamilial transfers and help relationships, transfer relationships with community members, and social participation; and biographical information (Kohler et al., 2015). This dissertation uses 2008 data for independent variables and control variables and the outcome variable SF-12 from the 2010 data to ascertain causality.

### Variables

#### *Social Capital:*

Variables for financial and non-financial transfers, and financial and nonfinancial reciprocity were created from variables in the “actual transfers” section of the questionnaire. Respondents were asked to list the NAME of people, by line, “who actually provided assistance for you and your family within the past two years.” Each line represents an additional transfer partner (line=partner). A person could list up to 10 partners, representing lines 1-10. First, two variables representing whether a respondent has given (NAME) any money in the last two years (at\_1) and whether a respondent has given (NAME) any nonfinancial help in the last two years (at\_3) were recoded into binary variables (0 “no” 1 “yes”) by line, up to 10 (1-10). Missing values, which increase by line number, were recoded as “no” since this may be indicative that there was no additional partner to list. This same process was duplicated for two variables representing whether a respondent had received any money from (NAME) in the last two years (at\_6) and whether a respondent had received any nonfinancial help from (NAME) in the last two years (at\_8). The recoded variables for at\_1, at\_3, at\_6, and at\_8 were each summed

by line to represent non-financial and financial transfers by direction (i.e. respondent to partner or vice versa).

From the recoded variables for at\_1 and at\_6, a new binary variable was created by line for whether there was financial reciprocity. From the recoded variables for at\_3 and at\_8, a new binary variable was created by line for whether there was non-financial reciprocity. For these two new variables by line, 1 represents that a respondent gave and received and 0 represents that a respondent gave and did not receive or vice versa. An overall variable for financial reciprocity and for non-financial reciprocity was created by summing the lines by the variable for whether there was financial reciprocity and for whether there was non-financial reciprocity, indicating the number of reciprocal relationships.

A variable was created to represent the number of transfer/reciprocal partners. This variable accounts for variation in the number of partners each respondent may have. This variable was created by calculating the maximum value across line variables for each observation. Using the partner variable, another variable was created to represent the percentage of financially reciprocal relationships. This variable was created by dividing the sum total number of financial reciprocal relationships by the number of transfer/reciprocal partners variable multiplied by 100. This process was duplicated to create a variable representing the percentage of non-financial relationships.

The following questions were used to create the social participation variable:

1. How many times in the last month have you been to:	a) A funeral? b) A drama performance? c) A beer place? d) A place where people dance? e) A market?
2. How many times in the last year have you been to:	a) A wedding? b) A drama about family planning? c) A political meeting?
3. How many times in the last year have you spoken to:	a) The Village Headman? b) The traditional authority? c) A member of the District Assembly?
4. Are you a member of any of the following village committee?	Development Committee Health Committee Funeral Group Market Committee Chief's council District Development committee Village AIDS committee

Notes:

1. Funeral and market are included in the social participation variable. Drama performance, beer place, and place where people dance are excluded as more than 75 percent answered “no” and these activities are less reflective of typical village activities.
2. Wedding and political meeting are included in the social participation variable. Drama about family planning is excluded as more than 75 percent answered “no” and this activity is less reflective of typical village activities.
3. Spoken to the Village Headman and the traditional authority are included in the social participation variable. Talking to a member of District Assembly was excluded as over 90 percent answered “no.”
4. All are included: Development Committee, Health Committee, Funeral Group, Market Committee, Chief's council, District Development committee, Village AIDS committee.

Variables for number of times at a funeral, market, wedding, and political meeting, as well as number of times speaking to the village headman and the traditional authority were coded none, low, and high. Low and high categories were based on the mean values. The variable for member of committee was summed across rows, then the

categories none, low, and high were created based on the mean (0=none, low=1-2 times, high=3 or more). A factor analysis was then used to assess whether the seven variables were measuring the same underlying concept. The alpha coefficient was .70. The final social participation variable was then created by summing the seven chosen variables. The final categories were low, medium, and high based on the Stata xtile function. In this case, “none” was combined with “low” values due the low number of “no” responses.

*Determinants Variables:*

Independent variables include characteristics (determinants) shown to be related to social capital in other settings or hypothesized to influence social capital in rural Africa.

Referring to the conceptual framework, the characteristics/determinants can be grouped into socio-economic/demographic, health status, religiosity, self-determination, and external. These variables include: the characteristics/determinants can be grouped into socio-economic/demographic, health status, religiosity, self-determination, and external. These variables include: marital status (married or not married), HIV status (negative or positive/refused), education level (no school, finished primary, or finished secondary or higher), region of residence (northern, central, or southern region of Malawi), age, wealth quintile, 2008 SF12 mental health and physical health scores, tribe (Tumbuka, Yao, Chewa, or other), whether respondent attended Church in the last week, whether the respondent experienced a financial shock in the last two years, whether the respondent experienced a non-financial shock in the last two years, household size (1-3 members, 4-6 members, 7 or more), whether the respondent has savings, how the respondents views his likelihood of AIDS in the future (no/low or medium/high), power to travel (none/a little, some or a lot), and power to make decisions (no/low or medium/high).

The variables of marital status, HIV status, and attended Church in the last week were recoded into binary variables. Power to travel and power to make decisions were both made into binary variable by the combining responses for a none/a little/some as 0 (no) and a lot as 1 (yes). The respondent's view of his/her likelihood to have AIDS in the future was made into a binary variable by combining no likelihood, don't know, and low and by combining medium and high. The variable tribe was collapsed from nine categories to four: Tumbuka, Yao, Chewa, and other. The six tribes (including identifying as "other") which had fewer respondents in the sample were grouped into the category "other." Note that Tumbuka, who are mainly in the northern region, are the reference group since north is the reference group for region. Also, correlation coefficient for tribe and region was .3 so both variables were included. Since only 4 respondents answered that they have higher education, higher education was grouped with secondary education for the level of education variable.

The variables experienced financial and experienced non-financial shock were created from questions related to whether a respondent's household had been severely affected by six types of shocks in the last two years. For this analysis, the shock variables were grouped together based on whether they were financial or non-financial/social shocks. Death or serious illness of an adult member or someone who provides support for yourself or your family, and breakup of household were classified as nonfinancial shocks. Poor crop yields, loss of crops, loss of livestock, or loss of coupons; loss of source of income; and damage to house due to fire, flood, or other unexpected event were classified as financial shocks. A question related to changes in crop yields was not included

because this can be a positive or negative event. The “yes” or “no” responses within each category were then summed to create a financial and a non-financial shock variable.

Household size was collapsed into three groups. Responses for household size ranged from 1-17, with 45 and 47 as outliers. Based on the distribution of responses, household size was categorized into 3 or less, 4-6, and 7 or more persons. Four was the mode.

There were no changes in coding for region, age, wealth quintile, 2008 SF-12 mental health and health scores, and has savings.

### Data Analysis

The data was analyzed using Stata 13. This study first assessed the sample’s characteristics, then measured the bivariate relationships between each social capital variable and each individual characteristic as described above using simple linear regression for continuous variables and simple logistic regression for binary variables. This study then ran ordinary least squared multiple regressions with financial transfer given, non-financial transfer received, financial transfer received, non-financial transfer given, financial reciprocity, and non-financial reciprocity as outcome variables and all the individuals characteristics described above as independent variables. An ordered logistic multiple regression was run with social participation as the outcome and all the individual characteristics as independent variables. These seven models were used to determine the predictors of social capitals. The social determinants of social capital, limited to those characteristics with a statistically significant relationship with social capital measures, were then interacted with sex. The interactions were analyzed to determine if being male



or female might be related to the social determinants and how this affects the relationship with social capital.

## **RESULTS**

### Descriptive Statistics

Table 1 provides the sample's characteristics. Most respondents were female (60.51%), married (82.96%), and had a primary level education (63.95%). The average age of respondents was 41 years old. The sample was mainly from the Chewa (31.87%), Tumbuka (31.35%), and Yao (23.89%) tribes and religion was divided between Muslim (23%), Catholic/CCAP/Anglican (37.27%), and other (39.73%). Respondents were almost evenly divided between the three regions (North, South, Central) and the greatest proportion (44.54%) had a household size of 4 to 6 persons. The majority of respondents did not have savings (71.76%). Most respondents were HIV negative (90.62%). The majority of respondents (64.96%) attended Church in the last week.

The social capital variables are summarized in Table 2. The social participation variable was constructed using tertiles, thus 37.62% had low, 36.71% had medium, and 25.67% had high levels of social participation. Overall, the average number of transfers did not vary greatly, although there were more financial transfers received (4.05), and fewer financial transfers given (3.13) compared to non-financial transfers given (3.66) and received (3.61) which were almost equal. There was more non-financial reciprocity (3.27) compared to financial reciprocity (2.72).

### Bivariate Analysis

Table 3 provides the results of the bivariate analysis. The bivariate analysis was conducted between all seven social capital measures and the 17 socio-demographic determinants of interest to examine their unadjusted association. Fifteen out of 17 variables were statistically significant at a level of  $p < .05$  or lower with at least one measure of social capital. Experiencing a financial shock in the last two years and HIV status were not significantly associated with any measure of social capital.

Region, tribe, and household size were associated with all measures of social capital. Being from the Central region and Chewa decreased all measures of social capital, while having a household greater than 7 was associated with greater social participation, but decreased all types of transfers and reciprocity. Being from the Southern region and being Yao or from other tribes were negatively associated with all measures but non-financial reciprocity and social participation.

Being unmarried was negatively associated with financial and non-financial transfers given, financial reciprocity, and a social participation. Increases in age were negatively associated financial transfers and non-financial transfers given, and financial reciprocity, while increases in SF-12 physical and mental health scores were positively associated with these same three social capital measures. Increases in SF-12 physical health score was also positively associated with non-financial reciprocity and social participation. Having savings was positively associated with financial transfers received, financial and non-financial transfers given, financial reciprocity, and social participation.

Having a lot of power to travel was positively associated with financial transfers given, financial reciprocity, and social participation. Interestingly, a lot of power to travel was negatively associated with non-financial transfers given and received and non-financial reciprocity. It is possible that traveling creates social isolation and provides fewer close relationships to rely on in times of need. Similarly, a lot of power to make decision was positively associated with financial transfers received and given, financial reciprocity, and social participation, but negatively associated with non-financial transfers given and non-financial reciprocity.

Having a primary level education was positively associated with all measures except non-financial transfers received and given and was negatively associated with non-financial reciprocity, while having a secondary education/higher was positively associated with all social capital measures except non-financial reciprocity. The effect of secondary/higher education was greater for the same statistically significant measures (financial transfer given and received, financial reciprocity, and social participation).

Wealth quintiles 2, 3, 4, and the wealthiest were positively associated with financial and non-financial transfers given, financial reciprocity, and social participation. Quintile 4 was also positively associated with financial transfers received and the wealthiest quintile was positively associated with all social capital measures except non-financial reciprocity. None of the wealth quintiles were associated with non-financial reciprocity.

Attending Church in the last week and experiencing a non-financial shock in the last two years were only associated (negatively) with social participation. Believing one has a

medium/high likelihood of AIDS in the future was only associated (positively) with non-financial transfers given.

### Multivariate Analysis

Table 4 presents the results of the multivariate analysis conducted on each of the seven social capital measures with all 17 socio-demographic independent variables. None of the predictor variables was statistically significant for all seven social capital measures, although being from the Central region and attending Church within the last week was significant for five out of seven measures. HIV status and one's perceived likelihood of HIV in the future was not statistically significant predictors of any measure of social capital.

Being from the Central region was associated with receiving less financial and non-financial transfers, giving less financial and non-financial transfers, and less social participation. Attending Church in the last week was associated with receiving more financial and non-financial transfers, giving more non-financial transfers, and engaging in more non-financial reciprocity, but less social participation.

Three variables demonstrate a statistically significant effect on four out of seven social capital measures. Increasing age was associated with less financial and non-financial transfers and having fewer financially reciprocal relationships; however, there is a positive association with social participation. A higher SF-12 physical health score was associated with giving more financial and non-financial transfers and having more non-financial reciprocal relationships, as well as increased social participation. Having a lot of

power to travel was associated with more financial transfers given and more financially reciprocal relationships, as well as increased social participation, although it is also associated with less non-financial transfers given.

Six predictors, which include marital status, education, wealth quintile, experiencing a non-financial shock in the last two years, household size, and having savings were associated with three out of the seven social capital measures. Being unmarried was associated with less financial transfers given and less financially reciprocal relationships, as well as having reduced social participation. Primary and secondary/higher education was associated with more financial transfers received and increased social participation. Primary level education was also associated with less non-financial reciprocal relationships. Experiencing a non-financial shock in the last two years was associated with more financial transfers received and more financial reciprocity, as well as increased social participation. Having a household size of 7 or more was associated with less financial transfers given and having fewer financial and non-financial reciprocal relationships. Wealth across quintiles was associated with an increase in financial transfers given, greater financial reciprocity, and greater social participation; however, the effect of quintile 3 on financial reciprocity was not statistically significant. Having savings was associated with more financial transfers given and received and greater social participation.

SF-12 mental health score, a lot of power to make decisions, and tribe affiliation were associated with two out of seven social capital measures, while experiencing a financial shock in the last two years was only associated with one social capital measure. A better

SF-12 mental health score was associated with more non-financial transfers given and non-financial reciprocity. A lot of power to make decisions was associated with more financial transfers given and greater social participation. Identifying as Chewa was associated with less non-financial transfers received, while identifying as Yao was associated with greater social participation. Finally, experiencing a financial shock in the last two years was only associated with more non-financial transfers given.

### Interactions

Based on the multivariate analysis, the social determinants of social capital with a statistically significant relationship with social capital measures were interacted with sex to determine the effect of being male or female on the relationship with social capital. Table 5 shows the results of the interaction analysis on the effect of sex on the non-socio-demographic determinants of social capital. Only one of these determinates of social capital demonstrated a statistically significant interaction with sex at a level of  $p < .05$  or lower on its relationship with social capital measures. Among males, a greater 2008 SF-12 physical health score was associated with higher social participation compared to females.

## **DISCUSSION**

Overall, there is great variation in the association of selected determinants with social capital. As in other studies on the determinants of social capital (Knack & Keefer, 1997; Helliwell & Putnam, 1999; Paldam, 2000; Huang, Maassen van den Brink, & Groot, 2009), education and wealth are important predictors of social capital in rural

communities, especially for the social participation measure. Understandably, wealth appears to effect financial relationships as seen by its positive association with financial transfers given and financial reciprocity. Curiously, more education is associated with more financial transfers received. More education is often associated with more wealth which decreases the need for financial transfers. It is possible that the costs of school attendance, such as fees, uniforms, and supplies, are a financial burden and require relying on others financially. Further exploration is needed to determine the dynamics behind this relationship.

Region appears to be an important determinate of social capital, although this can only be applied to the Malawian context. Compared to the North, the central region is associated with less financial and non-financial transfers received and given, as well as a lower level of high social participation compared to low and medium participation. The central region represented by the Mchinji district is primarily Chewa almost equally Protestant and Catholic. There is a less rigid matrilineal system in this area where residence can be either matrilineal or patrilineal. It must be noted that 75% of the respondents in the Mchinji district follow patrilineal traditions (Kohler et al. appendix, 2015). Further research may be warranted to understand the effect of being matrilineal or patrilineal on social capital.

Being unmarried is associated with less financial transfers given, less financial reciprocity, and less social participation compared to being married. This is contrary to Bolin, Lingren, Lindstrom, & Nystedt (2003) who find married couples to have less social capital due to marital commitments. However, looking at a resource poor setting such as Malawi, this could be related to the importance of social ties (Swidler & Watkins,

2007). Those who are unmarried may not be able to give financially and participating in activities may lead to financial obligations (Kawachi & Berkman, 2001).

Increasing age is associated with less financial and non-financial transfers given and less financial reciprocity. In Malawi, there is a large emphasis on intergenerational transfers (Weinreb, 2002; Kohler, Kohler, Anglewicz, & Behrman, 2012) and there is an age-patterned allocation of resources from prime-age, “middle generation” adults to their elderly parents (Kohler, Kohler, Anglewicz, & Behrman, 2012). This determinant may be specific to developing country context in which there is an emphasis on taking care of aging family members. These aging adults took care of their children and it is their turn to be taken care of.

Having a large household, specifically 7 or more, decreases financial and non-financial reciprocity and financial transfers given. Large households may not be in the financial position to give transfers given the number of people that must be supported. Reciprocity may be decreased because it is not expected in a household where everything is shared.

Having savings is associated with more financial transfers given and received. Most respondents (71.76%) in the study do not have savings. Having savings puts one in a better, and perhaps expected, position to give financial transfers to others as detailed in Swidler & Watkin’s (2007) study. However, one would not expect someone with money to receive financial transfers unless it is for investment purposes. Having savings is also associated with greater social participation. Having savings may raise one’s profile in the community. Those with a higher community profile may be more likely to participate in



political and civic positions and events to protect or increase their social and financial investment in the community.

Looking at external factors, there is a positive association between giving a non-financial transfer and experiencing a financial shock in the last two years. There is also a positive association between participating in more financially reciprocal relationships and receiving more financial transfers if one experienced a non-financial shock in the last two years. This fits into the picture of Malawian society in which ties of dependence serve as social insurance (Swidler & Watkins, 2007). For example, if one is unable to give financially because of an earlier financial shock, he/she may still contribute to the social safety net by providing non-financial transfers.

When examining health status, HIV status and the subjective view of one's likelihood of HIV in the future are not statistically significant predictors of social capital. 2008 SF-12 health and mental health scores predict increases in non-financial transfers given and non-financial reciprocity. Conceivably, feeling better mentally and physically puts one in a better position to participate in non-financial activities which may be more physical in nature. Increases in the 2008 SF-12 health score is also associated with increases in financial transfers given and a higher level of social participation. Having a higher physical score may be associated with the increased ability to work and earn money; therefore, being in the position to give financially to others. Also, being in better physical shape may make one feel better and increase mobility to leave one's house or compound and participate in social activities.

Religiosity is an important predictor of social capital. Attending church within the last week has a positive association with receiving financial and non-financial transfers, giving non-financial transfers, non-financial reciprocity, but negative association with social participation. The results of other studies on religiosity are mixed, but these results, with the exception of social participation, support the literature (Stromsnes, 2008; van Oorshot, Arts, & Gelissen, 2006; Kassa, 2013) which finds a positive effect on social capital. The literature points to the sense of belonging and solidarity created by religiosity. In Malawi, religion is important as evidenced by 65 percent Church attendance in the last week. Churches themselves may present a social safety net in times of need. Most mainstream religions put emphasis on helping others in need. Churches provide a place where attendees can rely on others to receive financial and non-financial transfers when they are in need, but they can also give back to others through non-financial transfers and non-financial reciprocity.

Power to travel and the power to make decisions is associated with more financial transfers given and with a higher level of social participation. Power to travel is also associated with increases in financial reciprocity. If one can travel and make household decisions, it may be easier to build social capital for one's self, especially when it comes to giving financially and reciprocating financially, as well as participating in the community. If one does not have power to travel, one may be restricted to one's compound, being unable to participate in social activities and having no control over money to help others in need. Unexpectedly, power to travel is also associated with less non-financial transfers given. Perhaps having unlimited movement reduces one's time to

take part in helping activities if one is participating more in social activities. This relationship warrants more investigation.

Looking at the interactions between sex and the non-socio-demographic determinants of sex (religiosity, health status, self-determination, and external), only one interaction is statistically significant. 2008 SF-12 physical health score, when interacted with sex, increases the effect of social participation among males. This may be attributed to the fact that males, when feeling healthier, are more likely to participate in community activities and are more likely to stay home when they are not as healthy.

When all the measures of social capital are analyzed together in one model as opposed to seven separate models, the coefficients are too small to interpret and are not statistically significant. Therefore, the measures of social capital should be analyzed in separate models. This conclusion is shared by Kassa and Parts (2008), who found not only that different dimensions of social capital should be analyzed separately, but that determinants have a different effect on each dimension of social capital they measure. This holds true for this paper, which demonstrates the effect of determinants varies in both direction (positive and negative) and effect size depending on the measure of social capital.

This research is important because it provides insight on the determinants of social capital in a resource-poor setting. Very little research on the determinants of social capital, if any, exists in this context. A strength of this study is providing meaningful measures of social capital that capture the uniqueness of the sub-Saharan context where giving and receiving and participating in the community are part of the fabric of society

and provide social insurance in times of need. The limitation to this part of the dissertation is the data is cross-sectional in nature. Therefore, causality cannot be determined. In addition, the determinants explored are limited to those variables measured in the questionnaire. Further research is needed to explore other possible determinants that may not be measured by the MLSFH questionnaire, such as cultural factors and social status, to complete the picture. Also, operational research is needed to explore how to increase social capital in sub-Saharan African communities based on what is known about the influence of determinants on social capital.

**Table 1: Sample characteristics, respondents with 2008 and 2010 SF-12 scores, MLSFH 2008**

<b>CHARACTERISTICS</b> ( <i>n=2517</i> )	
Variable	% (N)
<b>SOCIO-ECONOMIC/DEMOGRAPHIC</b>	
<b>Sex</b>	
Female	60.51 (1,523)
Male	39.49 (994)
<b>Marital Status</b>	
Married	82.96 (2,088)
Not Married	17.04 (429)
<b>Age mean (SD)</b>	
	41.36 (16.4)
<b>Education</b>	
No School	24.56 (618)
Primary Level	63.95 (1,609)
Secondary or Higher	11.49 (289)
<b>Religion</b>	
Muslim	23.00 (579)
Catholic/CCAP/Anglican	37.27 (938)
Other	39.73 (1,000)
<b>Tribe</b>	
Yao	23.89 (599)
Chewa	31.87 (799)
Tumbuka	31.35 (786)
Other	12.88 (323)
<b>Region</b>	
Central	34.37 (865)
South	32.26 (812)
North	33.37 (840)
<b>Wealth Quintile</b>	
Poorest	20.48 (515)
Second	20.12 (506)
Third	19.76 (497)
Fourth	19.24 (484)
Wealthiest	20.40 (513)
<b>Household Size</b>	
1-3	25.67 (646)
4-6	44.54 (1,121)

7 or more	29.80 (750)
<b>Has Savings</b>	
No	71.76 (1,662)
Yes	28.24 (654)
<b>HEALTH STATUS</b>	
<b>2008 SF-12 Mental Health Score (SD)</b>	54.16 (8.87)
<b>2008 SF-12 Physical Health Score (SD)</b>	1.67 (7.89)
<b>HIV Status (2008)</b>	
Negative	90.62 (2,281)
Positive/Refused	9.38 (236)
<b>Likelihood of AIDS in the Future</b>	
No/Low	69.56 (1,613)
Medium/High	30.44 (704)
<b>RELIGIOSITY</b>	
<b>Attended Church in the Last Week</b>	
No	64.96 (1,628)
Yes	35.04 (878)
<b>SELF-DETERMINATION</b>	
<b>Power to Travel</b>	
None/A little/Some	67.50 (1,566)
A lot	32.50 (754)
<b>Power to Make Decisions</b>	
None/A little/Some	45.7 (1,058)
A lot	54.24 (1,254)
<b>EXTERNAL</b>	
<b>Financial Shock in Last Two Years mean (SD) (0-3)</b>	1.19 (.78)
<b>Non-financial Shock in Last Two Years mean (SD) (0-2)</b>	.51 (.56)

**Table 2: Sample social capital characteristics, respondents with 2008 and 2010 SF-12 scores, MLSFH 2008**

<b>SOCIAL CAPITAL VARIABLES</b> ( <i>n</i> =2,517)	
<b>Variable</b>	<b>mean(SD) or %(n)</b>
<b>Financial Transfers Received</b> Respondent received money or financial assistance in the last two years from a transfer partner(s), but did not give money or financial assistance in return.	4.05 (2.76)
<b>Non-financial Transfers Received</b> Respondent received non-financial help in the last two years from a transfer partner(s), but did not give non-financial help in return.	3.66 (2.70)
<b>Financial Transfer Given</b> Respondent gave a transfer partner(s) respondent money or financial assistance in the last two years but did not receive money or financial assistance in return.	3.13 (2.63)
<b>Non-financial Transfer Given</b> Respondent gave a transfer partner(s) non-financial help in the last two years but did not receive non-financial help in return.	3.61 (2.67)
<b>Financial Reciprocity</b> Respondent gave a transfer partner(s) respondent money or financial assistance in the last two years and the partner(s) gave money or financial assistance in return.	2.72 (2.77)
<b>Non-Financial Reciprocity</b> Respondent gave a transfer partner(s) respondent non-financial help and the partner(s) gave non-financial help in return.	3.27 (3.00)
<b>Social Participation</b>	
Low	37.62% (947)
Medium	36.71% (924)
High	25.67% (646)

**Table 3: Bivariate analysis, associations between individual characteristics and social capital, respondents with 2008 and 2010 SF-12 scores, 2008 MLSFH**

	Financial Transfer Received	Non-financial Transfer Received	Financial Transfer Given	Non-financial Transfer Given	Financial Reciprocity	Non-Financial Reciprocity	Social Participation
	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Odds Ratio (s.e.)
<b>SOCIO-ECONOMIC/DEMOGRAPHIC</b>							
<b>Marital Status (ref=Married)</b>							
Not Married	.19 (.15)	-.08 (.14)	-.72 (.14)***	-.31 (.14)*	-.50 (.15)***	-.06 (.16)	.72 (.07)***
<b>Education Level (ref=No school)</b>							
Primary Level	.39 (.13)***	-.13 (.13)	.48 (.12)***	.11 (.13)	.26 (.13)*	-.33 (.14)*	1.36 (.12)***
Secondary or Higher	1.38 (.20)***	.45 (.19)***	1.33 (.19)***	.57 (.19)***	.95 (.20)***	-.06 (.21)	2.36 (.31)***
<b>Region (ref=North Region)</b>							
Central Region	-2.14 (.13)***	-1.57 (.13)***	-1.78 (.12)***	-1.50 (.13)***	-1.02 (.13)***	-.56 (.14)***	.78 (.07)**
South Region	-.82 (.13)***	-.39 (.13)***	-.46 (.12)***	-.30 (.13)*	-.36 (.13)**	-.12 (.15)	.89 (.08)
<b>Age</b>							
	-.01 (.00)	-.00 (.00)	-.03 (.00)***	-.02 (.00)***	-.02 (.00)***	-.01 (.00)	1.00 (.00)
<b>Wealth Quintile (ref=Poorest)</b>							
Quintile 2	.21 (.17)	.18 (.17)	.58 (.16)***	.41 (.17)**	.55 (.17)***	.26 (.19)	1.27 (.15)*
Quintile 3	.23 (.17)	.05 (.17)	.74 (.16)***	.42 (.17)**	.57 (.17)***	.09 (.19)	1.25 (.15)*
Quintile 4	.61 (.17)***	.29 (.17)	.98 (.16)***	.46 (.17)**	.84 (.17)***	.18 (.19)	1.50 (.18)***
Richest	.88 (.17)***	.46 (.17)**	1.40 (.16)***	.64 (.17)***	.93 (.17)***	.29 (.19)	1.64 (.19)***
<b>Tribe (ref=Tumbuka)</b>							
Yao	-.79 (.14)***	-.29 (.14)*	-.42 (.14)***	-.22 (.14)***	-.40 (.15)**	-.08 (.16)	.99 (.10)
Chewa	-1.95 (.13)***	-1.53 (.13)***	1.58 (.13)***	-1.42 (.13)***	-.89 (.14)***	-.60 (.15)***	.77 (.07)**
Other	-1.56 (.17)***	-.85 (.17)***	-1.05 (.17)***	-.59 (.17)***	-.52 (.18)**	-.00 (.20)	.91 (.11)
<b>Household Size (ref=1-3)</b>							
4-6	.01 (.13)	-.07 (.13)	.13 (.13)	.07 (.13)	-.08 (.14)	-.13 (.15)	1.11 (.10)
7 or more	-1.17 (.15)***	-1.12 (.14)***	-.78 (.14)***	-1.02 (.14)***	-.88 (.15)***	-1.13 (.16)***	2.68 (.27)***
<b>Has Savings (ref=No)</b>							
Yes	.49 (.12)***	.20 (.12)	.88 (.12)***	.24 (.19)*	.51 (.13)***	-.04 (.14)	2.16 (.19)***



<b>HEALTH STATUS</b>							
<b>2008 SF-12 Mental Health Score</b>							
	.00 (.01)	.00 (.01)	.02 (.01)***	.01 (.01)*	.02 (.01)***	.01 (.01)	1.00 (.00)
<b>2008 SF-12 Physical Health Score</b>							
	.01 (.01)	.01 (.01)	.04 (.01)***	.04 (.01)***	.03 (.01)***	.02 (.01)***	1.01 (.01)*
<b>HIV Status(ref=Negative)</b>							
Positive/Refused	-.03 (.19)	.01 (.18)	-.04 (.18)	.02 (.18)	-.07 (.19)	.05 (.20)	.87 (.11)
<b>Likelihood of AIDS in Future (ref= No/Low)</b>							
Medium/High	-.15 (.12)	.10 (.12)	.11 (.12)	.26 (.12)*	-.02 (.12)	.04 (.13)	1.05 (.09)
<b>RELIGIOSITY</b>							
<b>Attended Church in Last Week (ref=No)</b>							
Yes	.12 (.12)	.21 (.11)	-.17 (.11)	.07 (.11)	.03 (.16)	.17 (.13)	.71 (.06)***
<b>SELF-DETERMINATION</b>							
<b>Power to Travel (ref= No/A little/Some)</b>							
A lot	.20 (.12)	-.22 (.11)*	.41 (.11)***	-.27 (.11)*	.48 (.12)***	-.31 (.13)*	1.98 (.17)***
<b>Power to Make Decisions (ref= No/A little/Some)</b>							
A lot	.31 (.11)***	-.10 (.11)	.40 (.11)***	-.13 (.11)	.39 (.11)***	-.28 (.12)*	1.95 (.15)***
<b>EXTERNAL</b>							
<b>Financial Shock in Last Two Years (ref=No)</b>							
Yes	-.05 (.07)	-.01 (.07)	.03 (.07)	.09 (.07)	-.00 (.07)	.04 (.08)	1.05 (.05)
<b>Non-financial Shock in Last Two Years (ref=No)</b>							
Yes	.13 (.10)	.00 (.10)	-.13 (.10)	-.01 (.10)	.11 (.10)	-.02 (.11)	1.19 (.08)**

\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

**Table 4: Ordinary Least Square Regression and Ordered Logistic Regression (social participation) for the associations between individual characteristics and social capital, respondents with 2008 and 2010 SF-12 scores, 2008 MLSFH**

	Financial Transfer Received (n=2289)	Non-financial Transfer Received (n=2289)	Financial Transfer Given (n=2289)	Non-financial Transfer Given (n=2289)	Financial Reciprocity (n=2289)	Non-Financial Reciprocity (n=2289)	Social Participation (n=2289)
	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Odds Ratio (s.e)
<b>SOCIO-ECONOMIC/DEMOGRAPHIC</b>							
<b>Marital Status (ref=Married)</b>							
Not Married	.05 (.15)	-.17 (.15)	-.69 (.14)***	-.22 (.15)	-.57 (.16)***	.02 (.18)	.63 (.07)***
<b>Education Level (ref=No school)</b>							
Primary Level	.34 (.14)*	-.11 (.15)	.05 (.14)	-.11 (.14)	-.09 (.16)	-.43 (.17)**	1.43 (.16)***
Secondary or Higher	.88 (.23)***	.19 (.23)	.26 (.21)	-.09 (.22)	.21 (.24)	-.36 (.27)	2.61 (.45)***
<b>Region (ref=North Region)</b>							
Central Region	-1.45 (.31)***	-.70 (.32)*	-1.20(.30)***	-.88 (.31)**	-.58 (.34)	.02 (.37)	.42 (.10)***
South Region	-.24 (.33)	-.10 (.33)	.33 (.31)	-.23 (.32)	.31 (.35)	-.21 (.39)	.66 (.16)
<b>Age</b>							
	.00 (.00)	.00 (.00)	-.03 (.00)***	-.02 (.00)***	-.02 (.00)***	.00 (.01)	1.01 (.00)***
<b>Wealth Quintile (ref=Poorest)</b>							
Quintile 2	.13 (.17)	.04 (.17)	.45 (.16)**	.26 (.17)	.52 (.18)***	.22 (.20)	1.49 (.20)***
Quintile 3	.03 (.17)	-.13 (.17)	.34 (.16)*	.14 (.17)	.35 (.19)	-.02 (.20)	1.44 (.19)**
Quintile 4	.16 (.18)	.01 (.18)	.48 (.17)**	.09 (.18)	.55 (.19)**	.07 (.21)	1.53 (.21)***
Richest	.12 (.19)	-.03 (.19)	.74 (.18)***	.15 (.19)	.58 (.20)***	.15 (.22)	1.45 (.21)**
<b>Tribe (ref=Tumbuka)</b>							
Yao	-.13 (.34)	-.09 (.34)	-.23 (.32)	.11 (.33)	-.41 (.36)	.01 (.40)	2.28 (.59)***
Chewa	-.23 (.32)	-.70 (.32)*	-.21 (.30)	-.49 (.31)	-.10 (.34)	-.44 (.38)	1.41 (.37)
Other	-.27 (.30)	-.43 (.30)	-.47 (.28)	-.02 (.30)	-.25 (.32)	.19 (.36)	1.43 (.33)
<b>Household Size (ref=1-3)</b>							
4-6	-.07 (.13)	-.18 (.13)	-.13 (.12)	-.13 (.13)	-.25 (.14)	-.24 (.15)	1.04 (.10)
7 or more	-.23 (.15)	-.29 (.15)	-.26 (.14)**	-.28 (.15)	-.36 (.16)*	-.43 (.19)*	1.22 (.14)
<b>Has Savings (ref=No)</b>							
Yes	.37 (.12)***	.19 (.12)	.52 (.12)***	.11 (.12)	.25 (.13)	-.07 (.15)	1.89 (.18)***
<b>HEALTH STATUS</b>							

<b>2008 SF-12 Mental Health Score</b>							
	.00 (.01)	.01 (.01)	.01 (.01)	.01 (.01)*	.01 (.01)	.01 (.01)*	1.00 (.00)
<b>2008 SF-12 Physical Health Score</b>							
	.00 (.01)	.00 (.01)	.01 (.01)*	.02 (.01)***	.01 (.01)	.02 (.01)**	1.02 (.01)**
<b>HIV Status (ref=Negative)</b>							
Positive/Refused	-.31 (.18)	-.24 (.18)	-.13 (.17)	-.10 (.18)	.08 (.19)	-.01 (.21)	.80 (.11)
<b>Likelihood of AIDS in Future (ref= No/Low)</b>							
Medium/High	-.04 (.12)	.18 (.12)	.02 (.11)	.17 (.12)	-.06 (.13)	.03 (.14)	1.11(.10)
<b>RELIGIOSITY</b>							
<b>Attended Church in Last Week (ref=No)</b>							
Yes	.28 (.11)**	.34 (.11)***	.07 (.10)	.23 (.11)*	.23 (.12)	.28 (.13)*	.74 (.06)***
<b>SELF-DETERMINATION</b>							
<b>Power to Travel (ref= No/A little/Some)</b>							
A lot	.04 (.13)	-.22 (.13)	.39 (.12)***	-.26 (.13)*	.47 (.14)***	-.25 (.15)	1.63 (.16)***
<b>Power to Make Decisions (ref= No/A little/Some)</b>							
A lot	.19 (.12)	-.06 (.12)	.26 (.11)*	.00(.12)	.29 (.13)	-.18 (.14)	1.42 (.13)***
<b>EXTERNAL</b>							
<b>Financial Shock in Last Two Years (ref=No)</b>							
Yes	.10 (.07)	.10 (.07)	.09 (.07)	.17 (.07)**	.01 (.08)	.10 (.08)	1.07 (.06)
<b>Non-financial Shock in Last Two Years (ref=No)</b>							
Yes	.25 (.10)**	.10 (.10)	.09 (.09)	.10 (.09)	.26 (.10)**	.01 (.11)	1.30 (.10)***

\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

**Table 5: Interaction of sex and statistically significant social determinants of social capital for respondents with 2008 and 2010 SF-12 scores, 2008 MLSFH**

	Financial Transfer Received	Non-financial Transfer Received	Financial Transfer Given	Non-financial Transfer Given	Financial Reciprocity	Non-Financial Reciprocity	Social Participation
	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Odds Ratio (s.e.)
2008 SF12 Mental Health Score*male				-.01 (.01)			
2008 SF12 Physical Health Score*male			.01 (.01)	.01 (.02)		.03 (.02)	1.03 (.01)*
Attended Church in Last Week*male ( <i>ref=No</i> )	.19 (.23)	-.06 (.23)		-.19 (.22)		-.15 (.27)	1.13 (.20)
Financial Shock in Last Two Years*male ( <i>ref=No</i> )				.21 (.14)			
Non-financial Shock in Last Two Year*male ( <i>ref=No</i> )	-.16 (.19)				.19 (.21)		.95 (.14)
Power to Travel*male ( <i>ref= No/A little/Some</i> )			.18 (.26)	.12 (.25)	.01 (.28)		.83 (.18)
Power to Make Decisions*male ( <i>ref= No/A little/Some</i> )			-.06 (.26)				1.46 (.31)

\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

## **PAPER 2: THE RELATIONSHIP BETWEEN SOCIAL CAPITAL AND MENTAL HEALTH**

### **INTRODUCTION**

Communities are vital in the prevention or the etiology of mental health disorders, as well as for better self-rated mental health (Myers, Stein, Grimsrud, Seedat, & Williams, 2008). In Malawi, lack of health insurance, life insurance, and other structural support has resulted in a profound dependence on communities (Potter & Handcock, 2010) with social ties serving as an insurance system against negative life events and socio-economic difficulties (Swidler & Watkins, 2007). Given the positive relationship between social capital and mental health (Hamano et al., 2010; Rose, 2000; Niemenan et al, 2010; Kawachi & Berkman, 2001; Wind & Komproe, 2012; Almedom, 2005; McKenzie, 2008; Elgar et al., 2011; Hassanzadeh et al., 2016; De Silva, Huttly, Harpham, & Kenward, 2007) in more developed countries, it is important to understand whether social capital can improve mental health within communities in Malawi, and other low resource, low income communities in sub-Saharan Africa, where people are interdependent on one another and there is there is insufficient access to trained mental health providers (Udedi, 2016).

This study examines the relationship between social capital and mental health in rural Malawi. Little research on social capital and mental health focuses on low-income, low resource countries, especially in sub-Saharan Africa, and Malawi in particular.

Compared to cross-sectional studies, in which it is difficult to predict the direction of the relationship, this study uses longitudinal data to predict the direction of the relationship

between social capital, as measured by financial and non-financial transfers, financial and non-financial reciprocity, and social participation, and mental health outcomes.

This study uses the SF-12 mental health composite score (MCS-12) to assess how social capital affects mental health. An advantage of the MCS-12 is that it is not influenced by daily mood fluctuations, but rather measures the level of pain, depression, anxiety, and energy over the previous four weeks (Chao & Kohler, 2007). Previous studies rely mainly on mental health measures such as the 12-item General Household Questionnaire (GHQ12), which measures psychological health with questions on happiness, depression, anxiety, self-confidence, and stress (Nieminen et al., 2010; Giordano & Lindstrom, 2011; Lindstrom, 2004) or the SF-36 (Hamano et al., 2010). Studies that also use MCS-12 (Hassanzadeh et al., 2016; Myroniuk & Anglewicz, 2015; Kohler & Kohler, 2012) have not examined the 4 components/scales of the MCS-12, which include role/emotional functioning, social functioning, vitality, and mental health functioning as independent domains. In comparison to these other studies, this study looks at both the MCS-12 score and the 4 components of the MCS-12 to get a better picture on whether social capital affects the individual realms of mental health differently. This information can be used when researching and planning social capital interventions to improve mental health since interventions may need to be tailored toward the different realms of mental health.

## **BACKGROUND**

According to McKenzie (2006), mental health can be defined as an “unimpeded sense of psychological and functional well-being.” WHO (2016) describes mental health more

broadly as a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively, and is able to contribute to his or her community. Mental illness can refer to specific mental disorders and mental health problems can refer to symptoms of psychological difficulties (McKenzie, 2006).

Overall poor mental health and depressive disorders have a negative effect on quality of life and interfere with social and family roles (Cuijpers, Beekman, & Reynolds, 2012). Poor mental health hinders one's ability to learn and participate productively in the economy. Mental disorders are associated with poverty and lack of economic growth, which hinders the development of societies and countries (WHO, 2008).

As mentioned in paper one, the government of Malawi invests very little in mental health care services. People with mental illness lack access to services because mental health services are centralized into three psychiatric units in the country, concentrated in urban areas, and are not integrated into primary health care. There are very few mental health workers and general health workers lack training to address mental health issues. In addition, there is a high level of social stigma towards people with mental illness and a general lack of understanding about mental health problems (Udedi, 2016).

In Udedi, Swartz, Stewart, & Kauye (2014), the authors examine the rate of common mental disorders (CMDs), which include depressive and anxiety disorders, in Malawi. They report a prevalence rate of 20.1 percent (20.7 percent in women and 18.6 percent in men) of CMDs, with a very low detection rate among primary health care clinicians. The

low detection rate suggests that a large percentage of people with CMDs in Malawi are going unrecognized and untreated.

## **LITERATURE REVIEW**

### Mental Health in Sub-Saharan Africa

The same categories of mental health disorders that are recognized in Europe and the Americas are also recognized in Africa, with anxiety and depression being the most common (Ngoma, Prince, & Mann, 2003). Ngoma, Prince, & Mann (2003), in their Tanzania study, find that the prevalence of CMDs is 48% in traditional healer patients and 28% in primary health care patients. This is important to note since many people in sub-Saharan Africa use the services of traditional healers who are often more accessible than formal medical settings (Ngoma, Prince, & Mann, 2003). Havenaar, Geerlings, Vivian, & Robertson (2008) also find a high prevalence of mental health problems among primary health care attendees in South Africa and an even higher prevalence among traditional healer patients. The authors note that preliminary qualitative data indicates that patients do not explicitly consult traditional healers about specific mental health problems, but rather for more vague symptoms related to mental health issues indicating the integral role of traditional healers in the mental health care system.

Stigma towards people with mental illness in Malawi is strong and is a barrier to treatment. Patients and caretakers attribute most mental health disorders to alcohol/illicit drug use (95%), brain disease (92.8%), spirit possession (82.8%), and psychological trauma (76.1%). Very few believe that mental illness can be treated outside a hospital



setting. These views contrast with beliefs in high-income countries which favor psychosocial explanations (Crabb et al., 2012).

Socio-demographic factors may also influence mental health in Malawi. Another MLSFH study of adults older than 45 years old in rural Malawi finds that mental health has declined since 2006 and there are significant differences across groups, including men and women. Women over 40 have lower SF-12 scores than men, married men and women have better mental health compared to the non-married, and the elderly over 50 years of age have worse mental health compared to those aged 40-50 (Kohler & Kohler, 2012). In contrast to high-income countries, adults older than age 45 in Malawi are more likely to experience anxiety and/or depression as they age, which may be associated with the general decline of physical health. In addition, this population often suffers from poor nutrition intake and reduced work efforts and earnings as a result of these two common mental disorders (Kohler, Payne, Bandawe, & Kohler, 2017).

In sub-Saharan countries with a high prevalence of HIV, HIV infection and perceived risk may negatively impact mental health. In Zambia, Chipimo & Fylkesnes (2009), find a strong direct and indirect effect of HIV infection on mental distress. Indirect effects include HIV health perceptions, self-perceived risk, and worry about being HIV infected. Hsieh (2013) also find that perceived risk of HIV in Malawi is negatively associated with mental health outcomes, as measured by the MCS-12. A review of twelve studies of mental health problems affecting people who have HIV and AIDS in Malawi finds that this population is also affected by mental health problems such as depression and substance abuse, although many do not receive appropriate mental health care (Chorwe-

Sungani, Sefasi, & Pindani, 2015). Another review of 23 studies on the mental health of HIV-infected adults in Africa also find that people living with HIV or AIDS suffer from more mental health problems than non-affected individuals and half suffer from psychiatric disorders, with depression being the most common (Brandt, 2009).

In low-resource settings, shocks are characterized by their unpredictability and their transitory nature and include such events as crop or livestock loss, loss of support, job loss, household break-up, deaths of loved ones, and damage to property (Stroud & Anglewicz, 2015; Hyder, Behrman, & Kohler, 2012). In Malawi, shocks, are associated with poor mental health outcomes such as depression and anxiety (Baird, de Hoop, & Ozler, 2011). Both men and women experience a decrease in mental health due to shocks, though women experience a greater effect (Stroud & Anglewicz, 2015). Given this important association, this study will control for shocks.

### Social Capital and Mental Health

Previous studies find a positive relationship between social capital and mental health (Hamano et al., 2010; Rose, 2000; Niemenan et al, 2010; Kawachi & Berkman, 2001; Wind & Komproe, 2012; Almedom, 2005; McKenzie, 2008; Elgar et al., 2011; Hassanzadeh et al., 2016; De Silva, Huttly, Harpham, & Kenward, 2007). Low social capital may lead to poorer mental health by lowering an individual's satisfaction with others, increasing loneliness, and reducing future expectations (Hassanzadeh et al., 2016, Drukker, Gunther, Feron, & van Os, 2003; Riumallo-Herl, Kawachi, & Avendano, 2014; Giordano & Lindstrom, 2011).

Examining the individual domains of social capital, which include financial and non-financial transfers, financial and non-financial reciprocity, and social participation, used in this dissertation, giving transfers may increase a sense of self-control and personal satisfaction, which improves mental health (Roll & Litwin, 2010; Lee, Lyu, Lee, & Burr, 2014). Transfers may be based less on altruism, but more on the expectation that the transfer partner will reciprocate (Chao & Kohler, 2007). Reciprocal exchange is also associated with better mental health (Chao & Kohler, 2007; Davey & Eggebeen, 1998; Lee, Lyu, Lee, & Burr, 2014). In addition, transfers, including reciprocated transfers, enhance social fabric and social cohesion (Chao & Kohler, 2007). Structural social capital, in the form of social participation, is also associated with a better mental health status (Hamano et al., 2010; Yu, Sessions, Fu, & Wall, 2015; Kawachi & Berkman, 2001). Social participation creates access to social support and to social relationships that create positive attachments, give access to resources, and provide emotional fulfillment, which, in turn, improve mental health (Yu, Sessions, Fu, & Wall, 2015).

There are very few studies focused on social capital and mental health in sub-Saharan Africa. Myers, Stein, Grimsrud, Seedat, & Williams (2008) find that high levels of psychological distress is more common in those individuals with lower socioeconomic status in South Africa. Thomas (2006) finds that in Durban, South Africa and Lusaka, Zambia, women's participation in church groups and other community groups provide a form of social capital which results in better self-rated mental health. On the other hand, Myroniuk & Anglewicz (2015), using longitudinal MLSFH data, find that social participation in Malawi may be protective for health, but detrimental for mental health, as

measured by MCS-12, since participation may lead to additional financial and non-financial obligations.

Only conceptual links, rather than empirical evidence, show a connection between social capital and mental health (Harpham, Grant, & Thomas, 2002; Whitely & McKenzie, 2005). In general, social capital studies do not measure mental health. Rather, they tend to measure mental health problems, which refer to symptoms of psychological distress (McKenzie, 2006). This is an important distinction because this study will measure mental health through the SF-12 survey, which measures mental health rather than defined mental disorders. The SF-12 is described in the variables section below. Social capital will be measured as described in paper one: financial and non-financial transfers, financial and non-financial reciprocity, and social participation. Unlike the previous studies mentioned above, the measures of social capital used in this dissertation are tailored to rural sub-Saharan African communities and provide a better, more encompassing measurement of social capital's effect on mental health in low-income, low resource countries. In addition, since there is mixed evidence on whether social capital is negatively associated (Myroniuk & Anglewicz, 2015) or positively associated (Thomas, 2006) with mental health in sub-Saharan Africa, this study will contribute to the body of evidence on the effect of social capital on mental health in this context.

## **METHODS**

### Data

This second paper uses data from the 2008 and 2010 “Malawi Longitudinal Study of Families and Health” (MLSFH). The MLSFH is described in paper 1. The sample is

restricted to 2517 male and female respondents with a MCS-12 in both 2008 and 2010. This paper uses 2008 data for social capital variables and for control variables. The mental health outcome variables are from the 2010 data. The use of longitudinal data protects against the biasing effect of reverse causality, presenting a clearer picture of the direction of association and reducing the possibility that people with better mental health are more likely to engage in social capital building activities.

### Variables

#### *Mental Health:*

The outcome variables for this study is the 2010 SF-12 mental health composite score (MCS-12); the 4 components/scales of the 2010 MCS-12 which includes role/emotional functioning, social functioning, vitality, and mental health functioning; and overall satisfaction as perceived by the respondent.

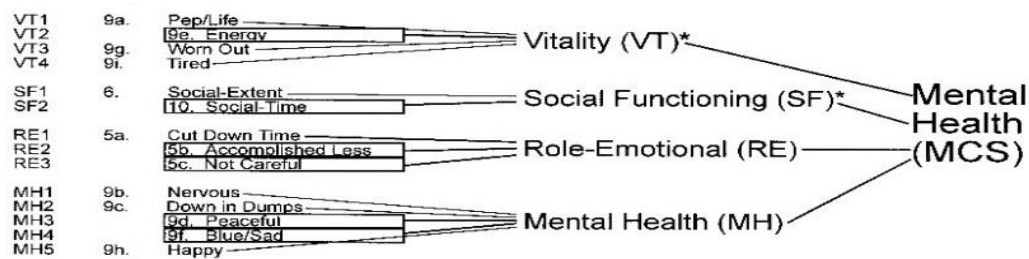
Mental health in this study was measured by the SF-12 questionnaire. The SF-12 is a standardized instrument extensively utilized to measure social/emotional functioning, subjective well-being, and overall health-related quality of life in a variety of contexts and settings (Kohler & Kohler, 2012; Ware, Kosinski, & Keller, 1996). The SF-12 is a generic measure, which is not limited to a certain age group or disease. The SF-12 is weighted and summed to give interpretive scales for both physical and mental health (Utah DOH, 2001). The most common scoring method of the SF-12 is complex and the algorithms consist of composites of weighted item responses (Ware, Kosinski, & Keller, 1996). SF-12 is good for large sample sizes (>500) and for measuring overall physical and mental health over the eight-scale profile (Gandek et al., 1998). According to Chao &

Kohler (2007), the SF-12 is known to be less subjective to daily mood and short-term health fluctuations.

The MCS-12, which measures mental health as opposed to physical health, is computed using the scores of twelve questions and ranges from 0 to 100, where a zero score indicates the lowest level of mental health and a 100 score indicates the highest level of mental health. It must be noted that there is a range of possible scores and these scores tend to vary among different age groups (Utah DOH, 2001). One limitation of the MCS-12 is it does not give an assessment of clinically defined mental disorders (Kohler, Payne, Bandawe, & Kohler, 2017). Burdine et al. (1999) state that mental health, as assessed by the MCS-12, is more closely related to social capital than physical health.

Figure 1 demonstrates that the MCS-12 contains a subset of 12 items. Information from all twelve items which represent vitality, social functioning, role-emotional, mental health was used to create the MCS-12 (Gandek et al., 1998).

**Figure 1: SF-12**



\* Significant correlation with other summary measure.  
 † Items in boxes were selected for SF-12.

Adapted from [7]

Gandek, B., Ware, J. E., Aaronson, N. K., et al. (1998). Cross-validation of item selection and scoring for the SF-12 health survey in nine countries: results from the IQOLA project. *J Clin Epidemiol*, 51 (11), 1171–1178.

In the 2010 MLSFH questionnaire, the standardized questions to measure the four components of MCS-12 are as follows:

<p><u>ROLE-EMOTIONAL FUNCTIONING:</u> During the past 4 weeks, have you accomplished less than you would like, as a result of any emotional problems (such as feeling depressed or anxious)?</p> <p>During the past 4 weeks, did you do your work or other activities less carefully than usual, as a result of any emotional problems (such as feeling depressed or anxious)?</p>	<p>1=Yes 0=No</p>
<p><u>VITALITY:</u> How much of the time during the past 4 weeks did you have a lot of energy?</p>	<p>1=All of the time 2=Most of the time 3=Some of the time 4=A little of the time 5=None of the time</p>
<p><u>MENTAL HEALTH:</u> How much of the time during the past 4 weeks have you felt downhearted and depressed?</p> <p>How much of the time during the past 4 weeks have you felt calm and peaceful?</p>	<p>1=All of the time 2=Most of the time 3=Some of the time 4=A little of the time 5=None of the time</p>
<p><u>SOCIAL FUNCTIONING:</u> During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?</p>	<p>1=All of the time 2=Most of the time 3=Some of the time 4=A little of the time 5=None of the time</p>

On the role-emotional scale, a low score represents someone who experiences many problems with work or daily activities, while a high score represents someone with none of these problems (Busija et. al., 2011). For the purposes of this dissertation, role-emotional functioning, which is measured by two questions, was recoded into one binary measure. 0 represents answering “yes” to one or both questions and 1 represents answering “no” to both questions.

On the mental health scale, a low score represents someone with high levels of nervousness and/or depression and a high score represents someone who is calm and peaceful (Busija et al., 2011). Mental health functioning was measured by two questions

on a 1-5 scale. The question “how much of the time during the past 4 weeks have you felt clam and peaceful?” was reverse coded so both questions would have “1” represent the least healthy. The two questions were then summed together into one measure (2-10) of mental health functioning.

On the vitality scale, low scores represent someone who feels tired or worn out all the time, while a high score represents someone full of energy and pep (Busija et al., 2011). Vitality (1-5), which was measured by one question, was reverse coded so “1” is the least healthy. Finally, on the social functioning scale, a low score represents someone who experience many difficulties in normal social activities due to their physical and mental health and a high score represents someone who performs normal social activities without difficulty (Busija et al., 2011). Social Functioning (1-5), which was also measured by one question, was not recoded. As with the other three measures, “1” is the least healthy.

A question on a respondent’s self-perceived satisfaction with their lives/general well-being (1=very satisfied and 5=very unsatisfied) was included. This was included to measure whether social capital has the same effect on a respondent’s self-perceived mental well-being versus their measured mental well-being on the MCS-12.

*Social Capital:*

The coding of the social capital variables is described in paper one. The social capital variables are financial and non-financial transfers given and received, financial and non-financial reciprocity, and social participation.



Financial transfer(s) given represents that the respondent gave a transfer partner(s) money or financial assistance in the last two years but did not receive money or financial assistance in return. Non-financial transfer(s) given represents that the respondent gave a transfer partner(s) non-financial help, such as collecting firewood, cooking, taking care of people, or helping with farming, in the last two years, but did not receive non-financial help in return. Financial transfer(s) received represents that the respondent received money or financial assistance in the last two years from a transfer partner(s) but did not give money or financial assistance in return. Non-financial transfer(s) received represents that the respondent received non-financial help in the last two years from a transfer partner(s) but did not give non-financial help in return. Financial reciprocity represents that the respondent gave a transfer partner(s) respondent money or financial assistance in the last two years and the partner(s) gave money or financial assistance in return. Non-financial reciprocity represents that the respondent gave a transfer partner(s) respondent non-financial help, such as collecting firewood, cooking, taking care of people, or helping with farming, in the last two years, and the partner(s) gave non-financial help in return. Social participation measures the number of times a respondent went to a funeral, the market, a wedding, and/or a political meeting, as well as number of times speaking to the village headman and the traditional authority (classified as low, medium, and high).

*Control variables:*

Control variables include marital status, education level, religion, region, tribe, wealth quintile, household size, age, sex, HIV status, 2008 MCS-12, 2008 physical health score, financial shock in the last two years, non-financial shock in the last two years, and number of transfer partners. 2008 MCS-12 baseline was included because it is likely that

mental health in 2010 was influenced by mental health in 2008. The construction and scoring of marital status, education level, region, tribe, wealth quintile, household size, age, sex, financial shock in the last two years, non-financial shock in the last two years, 2008 MCS-12 and physical health score, and HIV status variables are described in paper 1. Based on distribution, religion was collapsed from 12 categories to four: none (23.00%), Muslim, Catholic/CCAP/Anglican (37.27%), or other which includes Baptist/Pentecostal/Seventh Day Adventist/Jehovah's Witness, and Church of Christ/Indigenous Religion (39.73%).

### Data Analysis

The data was analyzed using Stata 13. This study first provides descriptive statistics for mental health, then assesses bivariate relationships between the mental health outcomes of MCS-12, vitality, mental health functioning, social functioning, and overall satisfaction in 2010 and the social capital measures in 2008 using simple linear regression for continuous variables and simple logistic regression for binary variables. This study then used ordinary least squared multiple regressions with 2010 MCS-12, vitality, mental health functioning, social functioning, and overall satisfaction in 2010 as outcome variables and all of the social capital measures and control variables in 2008 as independent variables. A logistic regression was run with role functioning in 2010 as an outcome variable and all of the social capital measures and control variables in 2008 as independent variables. These six models were used to determine the association between 2008 social capital measures and mental health outcomes in 2010 while controlling for relevant socio-demographic, health status, and external variables. The social capital variables with a statistically significant relationship with a 2010 mental health outcome

variable were interacted with 2008 MCS-12 to determine if their associations with mental health in 2010 depended on mental health in 2008.

## **RESULTS**

### Descriptive Statistics

The sample's overall demographic, socio-economic, and social capital characteristics is described in paper one. The same sample used in paper one is used in paper two. Table 1 describes the mental health variables. In 2008, the average MCS-12 was 54.16 and in 2010, the average MCS-12 was slightly lower at 52.26. The MCS-12 ranges from 0 to 100, where a zero score indicates the lowest level of mental health and a 100 score indicates the highest level of mental health.

Looking at the breakdown of the 2010 MCS-12, 72.51% were in the healthier category of the role functioning measure and 27.49% were in the least healthy category. The range for vitality and social functioning was 1 through 5, with 1 being the least healthy. The mean for vitality was 4.02 and the mean for social functioning was 4.25. The mean for mental health functioning, which has a range of 2-10 with 10 being the healthiest, was 8.10.

The range for overall satisfaction was 1 through 5, with 1 being the least healthy. The mean for this variable was 4.02.

### Bivariate Analysis

Table 2 presents the bivariate analysis conducted between the measures of mental health (2010 MCS-12, the four components of the MCS-12, and the self-report overall satisfaction measure) and the seven measures of social capital. All social capital measures, except non-financial reciprocity, were correlated at a statistically significant level with at least one measure of mental health.

In this bivariate analysis, increases in the number of financial and non-financial transfers received were associated with poorer role functioning. Increases in financial transfers given and financial reciprocity were associated with a greater MCS-12 and better vitality, mental health functioning, social functioning, and overall satisfaction with life. Increases in non-financial transfers given were associated with better vitality, mental health functioning and social functioning. Finally, greater social participation was associated with better overall satisfaction.

### Multivariate Analysis

Table 5 presents the results of the multivariate analysis conducted on each of the 2010 mental health measures with the seven social capital measures and the 15 control variables. The mean variation inflation factor (VIF) for these models was less than 4.

In this multivariate analysis, four of the mental health measures were statistically significant with a measure of social capital. A medium level of social participation was associated with a worse 2010 MCS-12 and poorer mental health functioning. Greater

non-financial transfers given was associated with better vitality. Non-financial reciprocity was associated with worse social functioning.

Among the health status control variables, the 2008 MCS-12 and 2008 SF-12 physical health score were positively associated with all the mental health measures. The one exception was the relationship between 2008 MCS-12 and overall satisfaction was not statistically significant. HIV status did not have a statistically significant relationship with any of the mental health measures.

Among the external control variables, financial shocks were negatively associated with vitality and overall satisfaction and non-financial shocks were negatively associated with 2010 MCS-12, role functioning, mental health functioning, and social functioning.

Among the socio-demographic control variables, sex was positively associated with all the mental health measures and age was negatively associated with all of the mental health measures. Being from the central region was negatively associated with the 2010 MCS-12. The central and southern regions were positively associated with role functioning and negatively associated with mental health functioning. Being from the Chewa tribe was positively associated with 2010 MCS-12, role functioning, and vitality. The wealthiest quintile was associated with 2010 MCS-12, role functioning, and vitality and overall satisfaction and all wealth quintiles were associated with overall satisfaction. Household size was positively associated with 2010 MCS-12 and mental health functioning, while education level was positively associated with vitality and social functioning. Religion was also positively associated with vitality. Marital status and

number of transfer partners did not have a statistically significant relationship with any of the mental health measures.

### Interactions

Based on the multivariate analysis, the social capital variables with a statistically significant relationship with a 2010 mental health outcome variable were interacted with MCS-12 in 2008 to determine if their associations with mental health in 2010 depended on mental health in 2008. Non-financial transfers were interacted with 2008 MCS-12 for the outcome vitality; non-financial reciprocity was interacted with 2008 MCS-12 for the outcome social functioning; and social participation was interacted with 2008 MCS-12 for the outcomes 2010 MCS-12 and mental health functioning. There were no statistically significant interactions of 2008 MCS-12 with the social capital measures.

## **DISCUSSION**

Overall, the results of this analysis are mixed for the association between social capital, as measured by financial and non-financial transfers given and received, financial and non-financial reciprocity, and social participation and mental health, as measured by the 2010 MCS-12, the 4 components/scales of the 2010 MCS-12 (role/emotional functioning, social functioning, vitality, and mental health functioning), and overall satisfaction as perceived by the respondent. Only one measure of social capital has a positive association with a measure of mental health: non-financial transfers given is positively associated with vitality. Three other measures of social participation have a negative association with a mental health measure: a medium level of social participation is negatively

associated with a 2010 MCS-12 and mental health functioning, while non-financial reciprocity is negatively associated with social functioning.

In Malawi, social interactions are vital part of everyday life (Kohler, Behrman, & Watkins, 2007). Given the unexpected result that a medium level of social participation is negatively associated with 2010 MCS-12 and mental health functioning, an additional analysis was run on these two measures of mental health and social participation without the other social capital measures. The results were unchanged for the association between the aforementioned variables. However, this relationship is supported by the findings of Myroniuk & Anglewicz (2015) of a negative association between social participation and mental health in Malawi. Social participation activities may lead to obligations to provide support to others (Myroniuk & Anglewicz, 2015; Kawachi & Berkman, 2001). In addition, anonymity in Malawian villages is difficult and one's participation in certain political or social activities, such as highly-charged political meetings or funerals related to a HIV/AIDS death in which there is a surviving spouse who may also be infected, may be scrutinized and rumors created, leading to social stigma (Myroniuk & Anglewicz, 2015; Watkins, 2004). Therefore, participating in social participation activities may lead to additional financial and non-financial obligations or stigma which may be detrimental for one's overall mental health and mental health functioning.

An increase in non-financial transfers is associated with an increase in vitality, meaning having more energy. Stroud & Anglewicz (2015) point to social exchange as an explanation for why transfers may improve mental health in Malawi. Social exchange creates ties that provide social insurance through mutual obligation which spreads risks

and resources and provides security in times of need. Therefore, by providing non-financial help, one feels reassurance that they will be protected in times of need.

Looking specifically at vitality, people may feel more alive and energized after providing help to another. Stress can have negative effect on mental health (Lupien, McEwen, Gunnar, & Heim, 2009) and lead to symptoms such as fatigue and social withdrawal (Mayo Clinic, 2016). In Malawi, this stress may be the result of a non-financial or financial shock, particularly illness, loss of a loved one, crop loss, or income loss (Stroud & Anglewicz, 2015). Relieving the stress of others by providing non-financial help may relieve one's own internalized stress and the resulting fatigue, leaving one feeling more energized. In addition, some of these acts may be motivated by altruism which may make a person feel good and more "alive."

Even though non-financial transfers are positively associated with vitality, non-financial reciprocity is negatively associated with social functioning. Social functioning describes the ability to perform in normal social activities without difficulty. A decrease in social functioning represents someone who is experiencing many difficulties in normal social activities due to their physical and mental health. This is an unexpected finding since providing mutual non-financial help, such as collecting firewood, cooking, taking care of people, or helping with farming, usually involves social interaction. According to Kohler, Kohler, Anglewicz, & Behrman (2012), there is extensive mutual help across generations, but these patterns are not important in terms of resource allocation. In the Malawi context, it is possible that receiving reciprocal non-financial assistance is an engrained social obligation and part of the fabric of daily life in which family members



and neighbors are doing small things on a daily basis to help each (Weinreb, 2001); therefore, this mutual help does not produce the needed relief that financial help can. In addition, people may feel that they want to avoid social interactions to sidestep additional obligations so taking part in daily mutual help may become increasingly difficult and physically draining. According to Stroud & Anglewicz (2015), the social expectation to reciprocate can be a strong burden which varies by age, sex, and socio-economic status, with women taking the brunt of the reciprocity burden.

The 2008 SF-12 physical health score is positively associated with all of the mental health outcomes in 2010, including overall satisfaction. This may be linked to having a better sense of well-being when one is able to be physically active, rather than isolated at home due to poor health. Experiencing a financial shock in the last two years is negatively associated with vitality and overall satisfaction, while experiencing a non-financial shock is negatively associated with 2010 MCS-12, role functioning, mental health functioning, and social functioning. This fits with previous research which shows that these two types of shocks lead to poor mental health outcomes in Malawi (Baird, de Hoop, & Ozler, 2011; Stroud & Anglewicz, 2015).

Even though numerous studies show a positive relationship between mental health and social capital (Hamano et al., 2010; Rose, 2000; Niemenan et al., 2010; Kawachi & Berkman, 2001; Wind & Komproe, 2012; Almedom, 2005; McKenzie, 2008; Elgar et al., 2011; Hassanzadeh et al., 2016; De Silva, Huttly, Harpham, & Kenward, 2007), this study only shows one positive association between a social capital measure and a mental health measure. However, these aforementioned studies do not use a measure of social

capital tailored to a sub-Saharan Africa setting and do not look at the individual components of mental health. In sub-Saharan Africa settings, there is a great deal of interdependence and communities are close-knit and ties of dependence are an important for protection in times of need (Swidler & Watkins, 2007). Even though social capital acts as social insurance in low income, resource poor settings in sub-Saharan Africa, it also brings the burden of mutual obligation, which can be a drain on mental health. In contrast, in developed nations, the focus of many of the previous studies, societies are more independent and social capital may be a way of bringing people together who may otherwise remain isolated or getting ahead in the capitalist culture. Given the different cultural context of sub-Saharan contexts such as Malawi, the measures of social capital in this study are meaningful and should be validated in other rural, sub-Saharan African settings.

Since there were 2008 social capital variables with statistically significant associations with 2010 mental health outcomes in the bivariate analysis, but not in the multivariate analysis, the bivariate associations between 2008 social capital variables and 2008 MCS-12, as well as between 2008 and 2010 MCS-12 scores were examined. The bivariate associations between 2008 social capital variables and 2008 MCS-12 scores were very similar to those between 2008 social capital and 2010 MCS-12 scores. In addition, the correlation coefficient between 2008 and 2010 MCS-12 scores was only .18. Coupled with low VIFs that were reported earlier, it cannot be concluded that the lack of statistical significant associations in the multivariate analysis were due to correlation between mental health scores between 2008 and 2010. On the other hand, there were some

significant associations between the social capital variables and MCS-12 in 2008 in the bivariate analysis, thus endogeneity could not be ruled out.

The vast majority of aforementioned studies are cross-sectional in nature; therefore, the direction of the relationship is often unclear. A strength of this study is the use of longitudinal data which addresses some of the limitations, including selection, of cross-sectional studies. However, attrition bias is a threat to longitudinal studies. This study analyzed differences between the study's sample of respondents who had a MCS-12 both in 2008 and in 2010 against those respondents who were missing a 2008 or 2010 MCS-12. Appendix 1 show there are differences between the samples in age, sex, marital status, education, and region. However, there are a large number of missing values for the sample of those missing a MCS-12; therefore, attrition bias is difficult to ascertain.

This research will contribute to the literature on social capital and mental health in developing countries and can be used to develop appropriate social capital interventions for mental health. Pronyk et. al. (2008), through a longitudinal, randomized trial in South Africa, find that social capital can be intentionally generated. This provides encouraging evidence that being able to measure social capital can lead to programs that increase social capital to provide better mental health protections for rural communities in sub-Saharan Africa. Further research should examine how to generate social capital in settings such as Malawi, based on the findings of this study, in order to improve mental health where there is lack of access to professional services. Additionally, this study finds that social capital affects components of mental health differently. The findings of this study can be used when researching and planning interventions to improve mental health

since interventions may need to be tailored toward the different realms of mental health. It must be noted that the MCS-12 looks at mental well-being, not specific mental disorders. Therefore, action still needs to be taken to provide accessible psychiatric services to those with clinical diagnoses.

**Table 1: Sample mental health characteristics, respondents with 2008 and 2010 MCS-12 scores, MLSFH 2008 and 2010**

<b>MENTAL HEALTH OUTCOMES</b> ( <i>n</i> =2,517)	
Variable	%(n) or mean(SD)
<b>2008 MCS-12</b>	54.16 (8.87)
<b>2010 MCS-12</b>	52.26 (9.76)
Role Functioning (0-1)	
Least Healthy (0)	27.49% (689)
Healthiest (1)	72.51% (1,817)
Vitality (1-5)	4.02 (1.02)
Mental Health Functioning (2-10)	8.10 (1.74)
Social Functioning (1-5)	4.25 (1.01)
<b>2010 Overall Satisfaction (self-report)</b>	4.02 (.98)

**Table 2: Bivariate analysis, associations between mental health measures 2010 and social capital measures 2008, respondents with 2008 and 2010 MCS-12 scores, 2008 and 2010 MLSFH**

	2010 MCS-12	Role Functioning	Vitality	Mental Health Functioning	Social Functioning	Overall Satisfaction
	Coefficient (s.e.)	Odds Ratio (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
<b>Financial Transfers Received</b>						
	.04 (.07)	.94 (.02)***	.01 (.01)	.02 (.01)	.01 (.01)	-.00 (.01)
<b>Non-financial Transfers Received</b>						
	-.03 (.07)	.94 (.02)***	.01 (.01)	.00 (.01)	.00 (.01)	-.01 (.01)
<b>Financial Transfer Given</b>						
	.26 (.07)***	1.00 (.02)	.04 (.01)***	.06 (.01)***	.03 (.01)***	.03 (.01)***
<b>Non-financial Transfer Given</b>						
	.10 (.07)	.97 (.02)	.03 (.01)***	.03 (.01)**	.02 (.01)*	.01 (.01)
<b>Financial Reciprocity</b>						
	.14 (.07)*	.99 (.02)	.03 (.01)***	.03 (.01)***	.02 (.01)***	.02 (.01)*
<b>Non-Financial Reciprocity</b>						
	-.05 (.06)	.98 (.01)	.01 (.01)	-.01 (.01)	.00 (.01)	-.00 (.01)
<b>Medium Social Participation</b>						
	-.41 (.45)	.97 (.10)	.08 (.04)	-.03 (.08)	.00 (.05)	.13 (.05)**
<b>High Social Participation</b>						
	.15 (.50)	.94 (.11)	.07 (.05)	.08 (.09)	.03 (.05)	.11 (.05)*

\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

**Table 3: Ordinary Least Square Regression and Logistic Regression (role functioning), associations between mental health outcomes 2010 and social capital measures 2008, respondents with 2008 and 2010 MCS-12 scores, 2008 and 2010 MLSFH**

	2010 MCS-12 ( <i>n</i> =2322)	Role Functioning ( <i>n</i> =2321)	Vitality ( <i>n</i> =2321)	Mental Health Functioning ( <i>n</i> =2321)	Social Functioning ( <i>n</i> =2321)	Overall Satisfaction ( <i>n</i> =2320)
	Coefficient (s.e.)	Odds Ratio (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
<b>SOCIAL CAPITAL</b>						
<b>Financial Transfer Received</b>						
	-.11 (.12)	1.00 (.03)	-.01 (.01)	-.01 (.02)	-.02 (.01)	.00 (.01)
<b>Non-financial Transfer Received</b>						
	-.05 (.14)	.94 (.03)	.00 (.01)	-.01 (.03)	.01 (.01)	-.01 (.01)
<b>Financial Transfer Given</b>						
	-.02 (.16)	1.08 (.04)	-.01 (.02)	-.01 (.03)	-.01 (.02)	.03 (.02)
<b>Non-financial Transfer Given</b>						
	.12 (.15)	.99 (.04)	.03 (.02)*	.04 (.03)	.03 (.02)	.00 (.02)
<b>Financial Reciprocity</b>						
	.08 (.14)	.95 (.03)	.01 (.01)	.02 (.02)	.02 (.01)	-.01 (.01)
<b>Non-financial Reciprocity</b>						
	-.10 (.13)	1.04 (.04)	-.01 (.01)	-.03 (.02)	-.03 (.01)*	.00 (.01)
<b>Social Participation (ref: Low Social Participation)</b>						
Medium	-1.10 (.45)*	.92 (.11)	-.01 (.04)	-.17 (.08)*	-.07 (.05)	.06 (.04)
High	-.66 (.58)	.88 (.13)	-.04 (.06)	-.07 (.10)	-.07 (.06)	.02 (.06)
<b>Partners</b>						
	.13 (.15)	1.02 (.03)	.00 (.01)	.02 (.03)	-.01 (.01)	.01 (.01)
<b>HEALTH STATUS</b>						
<b>2008 MCS-12</b>						
	.14 (.02)***	1.03 (.01)***	.01 (.00)***	.02 (.00)***	.01 (.00)***	.00 (.00)
<b>2008 SF12 Physical Health Score</b>						
	.11 (.03)***	1.01 (.01)*	.02 (.00)***	.03 (.00)***	.02 (.00)***	.01 (.00)***
<b>HIV Status (ref=Negative)</b>						
Positive/Refused	-.15 (.67)	1.04 (.18)	.03 (.07)	-.11 (.12)	-.01 (.07)	.00 (.07)
<b>EXTERNAL</b>						
<b>Financial Shock in Last Two Years (ref=No)</b>						
Yes	-.28 (.26)	.91 (.06)	-.05 (.03)*	-.03 (.05)	-.02 (.03)	-.06 (.03)*
<b>Non-financial Shock in Last Two Years (ref=No)</b>						

Yes	- .87 (.36)*	.82 (.07)*	-.04 (.04)	-.12 (.06)*	-.07 (.04)*	.02 (.04)
<b>SOCIO-ECONOMIC/DEMOGRAPHIC</b>						
<b>Region (ref=North)</b>						
Central	-2.08 (1.19)	2.34 (.68)***	-.16 (.12)	-.42 (.21)*	-.09 (.12)	.21 (.12)
South	-2.44 (1.25)*	2.51 (.76)***	-.22 (.12)	-.58 (.22)**	-.13 (.13)	.04 (.12)
<b>Religion (ref=Muslim)</b>						
Catholic/CCAP/ Anglican	-1.10 (1.07)	.98 (.28)	-.31 (.11)***	-.18 (.19)	-.18 (.11)	.03 (.11)
Other	-1.03 (1.08)	1.01 (.29)	-.29 (.11)**	-.16 (.19)	-.19 (.10)	-.04 (.11)
<b>Education Level (ref=No school)</b>						
Primary Level	.36 (.55)	.92 (.14)	.15 (.05)**	.06 (.10)	.14 (.06)**	-.03 (.06)
Secondary or Higher	.20 (.89)	.80 (.18)	.22 (.09)**	.07 (.16)	.18 (.09)*	.04 (.09)
<b>Age</b>						
	-.05 (.01)***	.99 (.00)***	-.01 (.00)***	-.02 (.00)***	-.01 (.00)***	-.01 (.00)***
<b>Wealth Quintile (ref=Poorest)</b>						
Quintile 2	.43 (.63)	1.05 (.17)	.09 (.06)	.13 (.11)	.05 (.06)	.16 (.06)**
Quintile 3	.08 (.64)	1.04 (.17)	.06 (.06)	-.04 (.11)	.01 (.07)	.16 (.06)**
Quintile 4	.96 (.66)	1.28 (.22)	.14 (.07)*	.02 (.17)	.02 (.07)	.28 (.07)***
Wealthiest	1.66 (.70)*	1.43 (.26)*	.20 (.07)**	.21 (.12)	.09 (.07)	.34 (.07)***
<b>Household Size (ref=1-3)</b>						
4-6	1.07 (.47)*	1.23 (.15)	.08 (.05)	.27 (.08)***	.12 (.05)**	.05 (.05)
7 or more	1.29 (.56)*	1.24 (.18)	.08 (.06)	.31 (.10)***	.12 (.06)*	.10 (.06)
<b>Tribe (ref=Tumbuka)</b>						
Yao	1.71 (1.43)	1.84 (.65)	-.03 (.14)	.43 (.25)	-.02 (.15)	.07 (.14)
Chewa	2.42 (1.19)*	2.16 (.62)**	.13 (.12)	.43 (.21)*	.07 (.12)	.08 (.12)
Other	1.29 (1.13)	1.32 (.35)	.02 (.11)	.32 (.20)	.14 (.16)	.05 (.11)
<b>Marital Status (ref=Married)</b>						
Not Married	-.23 (.55)	.97 (.13)	-.08 (.05)	-.10 (.10)	-.02 (.06)	-.05 (.06)
<b>Sex (ref=No)</b>						
Male	1.93 (.46)***	1.53 (.18)***	.17 (.05)***	.33 (.08)***	.15 (.05)***	.16 (.05)***

\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

APPENDIX A1:

<b>Table A1: Differences in characteristics between respondents with MCS-12 in both 2008 and 2010 and those missing a MCS-12 in 2008 or 2010</b>		
	Not missing MCS-12 2008 or 2010 (n=2,517)	Missing MCS-12 2008 or 2010 (n=2,883)
<b>Mean Age</b>	41.4	43.6 <i>Missing 781 (27.57%)</i>
<b>Sex</b>		
Female	60.51	48.89
Male	39.49	51.11 <i>Missing 4 (.14%)</i>
<b>Education</b>		
No school	24.56	25.00
Primary	63.95	59.09
Secondary/Higher	11.49	15.91 <i>Missing 2,239 (82.92%)</i>
<b>Marital Status</b>		
Married	82.96	75.87
Not Married	17.04	24.13 <i>Missing 1,859 (65.62%)</i>
<b>Wealth</b>		
Poorest	20.48	21.43
Second	20.12	20.54
Third	19.76	19.64
Fourth	19.24	19.20
Wealthiest	20.40	19.20 <i>Missing 2,385 (84.19%)</i>
<b>Region</b>		
Central	34.37	28.03
South	32.26	40.83
North	33.37	31.15 <i>Missing 653 (23.05%)</i>



## **PAPER 3: THE INFLUENCE OF GENDER ON THE RELATIONSHIP BETWEEN SOCIAL CAPITAL AND MENTAL HEALTH**

### **INTRODUCTION**

Men and women may utilize social capital in different ways and their expectations from these relationships may differ. Since women are more likely to have closer, more intimate relationships with others compared to men and be more involved in domestic, rather than financial roles, they are more likely to have more non-financial relationships. Since men are the “money-makers” and have more decision-making control and power, they are more likely to have more and utilize more financial relationships. Also, since men have more power and more control outside the home, they are more likely to benefit from social participation in the community. Participation may protect or increase their social standing and financial investment in the community. Initial exploration of the relationship between the various social capital and mental health measures indicate a potential difference in this relationship between men versus women (see multivariate analysis from paper 2). Literature demonstrates the importance of gender norms in the structure and utilization of social relationships for men and women. These two points together provide a compelling rationale for exploring differences in social capital for men and women and the potential influence of gender in the relationship between social capital and mental health.

## **BACKGROUND**

Sex signifies biologically determined characteristics while gender specifies culturally and socially constructed variations, such as norms, roles, and relationships, between men and women (WHO, 2014). Gender is a social force that influences the differential power that men and women possess to control their lives (Astbury, 1996).

Compared to other countries, Malawi has extensive gender inequality. According to UNDP (2016)'s Human Development Report, Malawi ranks 145 out of 159 countries on the Gender Inequality Index, which examines reproductive health, empowerment, and economic activity. Malawian women face physical and sexual violence, as well as economic violence since men often will have complete control over their money, resources, and activities (Macintyre et al, 2013). In general, men in Malawi are decision-makers and provide financial security, while women have little autonomy (Lingren, Rankin, & Rankin, 2005).

In Malawi, women are usually homemakers and care-givers, while men earn money outside the house (Macintyre et al., 2013). Women's primary role is wife and mother, rather than leader or decision-maker. Men, on the other hand, are decision-makers (Lingren, Rankin, & Rankin, 2005).

In Malawi, women cite marriage as a way to meet their basic needs and the needs of their children (Mkandawire-Valhmu et al., 2013). However, women are constrained by less social power, less access to income, and little control in their marriages (Schatz, 2005;

Lingren, Rankin, & Rankin, 2005). In Malawi, forced sex within marriages is linked to the perceived marital obligation for women to have sex with their husbands and the belief that women must satisfy their husbands (Kathewera-Banda et al., 2005). This appears to be true across all socio-economic levels so cultural norms may outweigh economic power on sexual autonomy (Conroy, 2014).

Male domination in the household and sexual decision making put women at greater risk for HIV (Kathewera-Banda et al., 2005). Since women are often expected to defer to their husbands, women sometimes use covert contraception to avoid pregnancy or do not disclose their HIV status to avoid conflict (Gipson et al., 2010). However, some women are ready to act to reduce the risk of infection from their spouses by developing alternative strategies such as relying on social networks for advice and advocacy, discussing the dangers of infidelity with spouses, confronting the spouse's other partners, or divorcing (Schatz, 2005; Watkins, 2004). Malawi has the highest divorce rate in sub-Saharan Africa and perceptions that women have the right to divorce their husbands over fears of HIV have increased (Watkins, 2004).

## **LITERATURE REVIEW**

### Gender Attitudes and Power

Gender attitudes refer to people's beliefs about the appropriate role-related behaviors for females and males and how these attitudes towards females and males relate to gender stereotypes (Frieze & Ciccocioppo, 2009). Gender power, on the other hand, refers to how gender shapes power relations at all levels of society, from the household all the way

up to political decision-making. Attitudes, which define what are appropriate roles for women, can be the cause, consequence, and mechanism of power relations (Koester, 2015).

According to Molm & Hedley (1992), a basic indicator of gender inequality is how power is distributed between men and women. Power is structural potential (power to influence others), a process of behavioral or tactical influence, and the successful outcome of influence. Individual-level theories of gender and power propose that gender brings differences in traits and abilities which affect power use. According to the individual level theory of power, men and women acquire distinct roles through socialization, with men behaving more aggressively and competing rather than cooperating, and with women being more easily influenced into conforming when using power (Molm & Hedley, 1992). Structural theories of power propose that gender differences in power use are a function of structural advantages associated with gender in society. Structural power is the power to influence others and is determined by the control one has over events or resources others value. According to structural level theory of power, social stratification differentially allocates power resources and status privileges to males and females, which also produces differences at the micro level in the family, at work, etc. Therefore, according to this theory, men's greater advantages in society explain differences in both power strategies and outcomes of power between men and women (Molm & Hedley, 1992).

Social exchange theory is another way of understanding gender and power. Social exchange theory proposes that personal interactions are a negotiated exchange of material

or non-material goods and services that are carried out for individual goals and are based on estimates of punishments and rewards (Homans, 1958). Social exchange theory suggests that power affects behavior through a differential control over resources and structural position provides access to exchange partners (Molm & Hedley, 1992). The person with the least dependence, in terms of benefits, on the relationship has greater bargaining power. Greater access to support outside the relationship decreases dependency and allow the individual to better control outcomes within relationships (Bittman, England, Folbre, Sayer, & Matheson, 2003). When material transfers originate within a relationship, they reduce a woman's bargaining power with larger transfers increasing dependence (Luke, Goldberg, Mberu, & Zulu, 2011). Women may be less desirable in social capital resource exchanges due to a lack of resources which prevents them from being able to reciprocate when they borrow from men and others with more resources (Parks-Yancy, DiTomaso, & Post, 2008). Also, women act like power-disadvantaged individuals irrespective of their own power position and they respond strategically to the degree of mutual dependence rather than to power imbalance, even if it is in their favor (Molm & Hedley, 1992).

Transactional sex is often used to explain gender power in sub-Saharan Africa, although its meaning often depends on the context. Transactional sex, which is the exchange (transfer) of money and gifts for sex, is often viewed as a driver of gender differences in HIV infection rates in sub-Saharan Africa (Dunkle et al, 2004; Cote, Sobela, & Dzukoto, 2004; Wamoyi, Stobeanau, Bobrova, Abramsky, & Watts, 2016). However, these relationships often have meaning beyond a woman's economic circumstances. In Tanzania, the transactional relationship reflects a woman's power in the relationship as

women can exploit their sexuality (Wamoyi, Fenwick, Urassa, Zaba, & Stones, 2010). For adolescents in Burkino Faso, Ghana, Malawi, and Uganda, these relationships may not necessarily result from coercion, but may be viewed as normal part of dating and a girl's way of exercising agency in romantic relationships (Moore, Biddlecom, & Zulu, 2007). According to Swidler & Watkins (2006), patron-client ties ("ties of dependence") and redistribution to the needy are central to understanding transactional sex. These ties of dependence allow for upward mobility or economic independence for women, create binding relationships, and provide social insurance in times of need (Swidler & Watkins, 2006). In Malawi, women are not necessarily powerless victims of destitution, as these sexual relationships actually peaked when food and money were more available; rather, they safeguard one's entitlement to community support. Even when men are unlikely to provide support, single women take part in these relationships to avoid the danger of exclusion as an indirect survival mechanism (Verheijen, 2011).

In respect to gender attitudes, "traditional" gender role attitudes reflect the belief that women should be housewives and mothers, while men should be the decision makers and have jobs or other financial means to support their wives and children (Frieze & Ciccocioppo, 2009). Women's social, economic, and interpersonal dependence on men reinforces women's inequality through the continual adoption of less egalitarian gender attitudes by men and women (Baxter & Cane, 1995). Gender attitudes which characterize men as being designed for dominance with more powerful traits reinforce gender inequalities (Glick et al., 2004).

Gender attitudes and gender power in Africa have been measured in different ways in the literature. The Demographic and Health Survey (DHS) includes a women's empowerment module with measures on women's participation in household decisions, women's attitudes toward wife-beating by husbands, women's opinions on whether a woman can refuse sex to her husband, and hurdles faced by women in accessing health care for themselves (DHS, 2018). The Sexual Relationship Power Scale from Pulerwitz, Gortmaker, & DeJong (2000), which contains two sub-scales on decision-making and control, can be used to measure gender power. The 22 item Ambivalent Sexism Inventory, created by Glick & Fiske (1996) as an alternative to the older Spence and Helmreich's Attitudes Towards Women Scale (1980), contains the Hostile Sexism Scale and Benevolent Sexism Scale and can be used to measure gender attitudes. The Hostile Attitude Towards Women (Hostile Sexism) scale goes beyond just measuring traditional sexism but includes contemporary and subtle forms. Importantly, it has been used cross-culturally in 19 countries, including South Africa, Nigeria, Botswana (Glick et al., 2000; Kalichman et al, 2007). The measure of gender attitudes and gender power in the MLSFH questionnaire are most like the DHS women's empowerment module. However, a limitation of the three aforementioned measures is they are not adapted to the nuances of the Malawi context.

### Gender, Social Capital, and Mental Health

Studies have found that gender may indirectly influence mental health biomedically (genetic, hormonal, anatomical, physiological), psychosocially (personality, coping, symptom reporting), or through other social determinants (Affifi, 2007; Astbury, 1999; Rosenfield & Mouzon, 2013; Astbury, 1999). Biologically, women tend to suffer from

more internalizing mental disorders such as anxiety and depression, while men tend to suffer from more externalizing disorders such as substance abuse and antisocial behavior (Rosenfield & Mouzon, 2013). However, biology rarely acts on its own to create gender inequities in mental health (Affifi, 2007). Differences between men and women's roles and responsibilities, and position in society influence vulnerability to mental health disorders (Afifi, 2007; Astbury, 1999). For example, women's low status in society is a risk factor for poor mental health (Afifi, 2007). Also, gender differences in life events and social position, including lower socio-economic standing and gender-based violence, may contribute to the large differences in depression rates between men and women (Astbury, 1999).

When coping with stressful events, men tend to be more stoic, less expressive, and more likely to try to control the situation, while women tend to pray, elicit social support, and express their feelings. This difference in coping techniques, in which men endeavor to control the situation in a problem-focused way, may explain why men have lower rates of depression, which is an internalizing disorder (Rosenfield & Smith, 2009).

According to Kawachi & Berkman (2001), gender is an important modifier between social ties and mental health. Gender differences in social network involvement explain why women report significantly higher levels of psychological distress than men. Women are more likely to continue more emotionally supportive relationships and tend to be afflicted by the stress of those they maintain close relationships with ("contagion of stress"). Women also collect more social support, beyond their spouses, during times of stress, which leaves men more open to mental and physical damage if widowed since



they are more reliant on their wives for emotional support. Finally, women deliver more regular and effective social support to others, resulting in an unequal flow of support between men and women (“support gap”).

Since gender appears to influence the relationship between social capital and mental health, it is important to examine this dynamic. This paper will test this hypothesis that the relationship between social capital and mental health will differ for men and women. Women are more likely to engage in non-financial relationships and these relationships improve their mental health; and men are more likely to engage in financial relationships and participate in the community and these relationships improve their mental health.

## **METHODS**

### Data

This third paper uses data from the 2008 and 2010 “Malawi Longitudinal Study of Families and Health” (MLSFH). The MLSFH is described in paper one. The sample is restricted to 2517 male and female respondents with a MCS-12 in both 2008 and 2010. This paper uses 2008 data for the social capital variables, the gender variables, and for the control variables. The mental health outcome variables are from the 2010 data.

### Variables

#### *Gender:*

Gender, being a different from biological sex, is measured by gender attitudes and gender power.

The gender attitudes and gender power variables were created from the following questions:

GENDER ATTITUDE QUESTIONS	1. Do you think it is proper for a wife to leave her husband if: a. He does not support her and the children financially? b. He beats her frequently? c. He is sexually unfaithful? d. She thinks he might be infected with HIV? e. He does not allow her to use family planning? f. He cannot provide her with children? g. He does not sexually satisfy her?	1=Yes 0=No
	2. If a woman often refuses sex with her husband, is it acceptable for the husband to: a. Sleep with another sexual partner? b. Sleep with her by force?	1=Yes 0=No
GENDER POWER QUESTIONS	3. Is it acceptable for you to go to: a. The local market without informing your husband? b. The local health center without informing your husband?	1=Yes 0=No
	4. How much power do you have to travel where and when you want?	A lot=1 Some=2 A little=3 None=4
	5. How able are you to make decisions in the household?	A lot=1 Some=2 A little=3 None=4
NOT INCLUDED	6. A woman has the right to refuse unprotected sex with her husband when she: a. Thinks her husband may have HIV/AIDS b. Thinks she may have HIV/AIDS	1=Yes 0=No

\*not original order of questions

A factor analysis was conducted to assess which questions should be used to measure the concept of gender. Questions 4 and 5 were recoded into binary measures with 1 equaling “yes” (a lot, some, and a little) and 0 equaling “no” (none). The factor analysis showed

that questions 1 and 2 could be grouped together as one variable with an alpha of .48 and questions 3, 4, and 5 could be grouped together as one variable with an alpha of .52.

Question 6 did not fit as a measure.

Since questions 1 and 2 were opinion questions about gender attitudes in intimate relationships, they were combined by into one variable by summing 1a-g and 2a-b. This variable, called gender attitudes, was then recoded into a binary variable based on the median. Therefore, 1 is negative gender attitudes and 0 is positive gender attitudes. Negative gender attitudes mean one has gender attitudes that advocate “traditional” gender roles for women and men. As mentioned in the literature review, “traditional” gender role attitudes reflect the belief that women should be housewives and mothers, while men should be the decision makers and have jobs or other financial means to support their wives and children (Frieze & Ciccocioppo, 2009).

Since questions 3, 4, and 5 were personal questions gaging an individual’s control over decision-making and travel, they were combined by into one variable by summing 3a-b, 4, and 5. This variable, called gender power, was then recoded into a binary variable. Therefore, 1 is low gender power (1=0) and 0 is having more gender power. Therefore, someone with no gender power does not have any control over their own decision-making and travel.

### *Mental Health:*

The mental health variables are first described in paper two: 2010 MCS-12; the 4 components/scales of the 2010 MCS-12 which includes role/emotional functioning,

social functioning, vitality, and mental health functioning; and overall satisfaction as perceived by the respondent.

The MCS-12 ranges from 0 to 100, where a zero score indicates the lowest level of mental health and a 100 score indicates the highest level of mental health. MCS-12 contains a subset of 12 items representing vitality, social functioning, role emotional, mental health (Gandek et al., 1998). On the role-emotional scale, a low score represents someone who experiences many problems with work or daily activities, while a high score represents someone with none of these problems owing to their emotional health (Busija et al., 2011). On the mental health functioning scale, a low score represents someone with high levels of nervousness and/or depression and a high score represents someone who is calm and peaceful (Busija et al., 2011). On the vitality scale, low scores represent someone who feels fired or worn out all the time, while a high score represents someone full of energy and pep (Busija et al., 2011). Finally, on the social functioning scale, a low score represents someone who experiences many difficulties in normal social activities due to their physical and mental health and a high score represents someone who performs normal social activities without difficulty (Busija et al., 2011). A question on a respondent's overall satisfaction measures one's self-perceived lives/general well-being.

#### *Social Capital:*

The coding of the social capital variables is described in paper one. The social capital variables include financial and non-financial transfers given and received, financial and non-financial reciprocity, and social participation.

Financial transfer(s) given represents that the respondent gave a transfer partner(s) respondent money or financial assistance in the last two years but did not receive money or financial assistance in return. Non-financial transfer(s) given represents that the respondent gave a transfer partner(s) non-financial help, such as collecting firewood, cooking, taking care of people, or helping with farming, in the last two years, but did not receive non-financial help in return. Financial transfer(s) received represents that the respondent received money or financial assistance in the last two years from a transfer partner(s) but did not give money or financial assistance in return. Non-financial transfer(s) received represents that the respondent received non-financial help in the last two years from a transfer partner(s) but did not give non-financial help in return. Financial reciprocity represents that the respondent gave a transfer partner(s) respondent money or financial assistance in the last two years and the partner(s) gave money or financial assistance in return. Non-financial reciprocity represents that the respondent gave a transfer partner(s) respondent non-financial help, such as collecting firewood, cooking, taking care of people, or helping with farming, in the last two years, and the partner(s) gave non-financial help in return. Social participation measures the number of times a respondent went to a funeral, the market, a wedding, and a political meeting, as well as number of times speaking to the village headman and the traditional authority (classified as low, medium, and high).

*Control Variables:*

Control variables include marital status, education level, religion, region, tribe, wealth quintile, household size, age, sex, HIV status, 2008 MCS-12, 2008 physical health score,

financial shock in the last two years, non-financial shock in the last two years, and number of transfer partners. Marital status, education level, region, tribe, wealth quintile, household size, age, sex, financial shock in the last two years, non-financial shock in the last two years, 2008 MCS-12 and physical health score, and HIV status are described in paper one. Religion is described in paper two.

### Data Analysis

The data was analyzed using Stata 13. This study first ran descriptive statistics for mental health outcomes, social capital variables, gender attitudes and power, and demographics stratified by sex. This study then assessed bivariate relationships between the mental health outcomes of MCS-12, role functioning, vitality, mental health functioning, social functioning, and overall satisfaction in 2010 with gender attitudes and gender power stratified by sex using simple linear regression for continuous variables and simple logistic regression for binary variables. This study then used ordinary least squared multiple regressions, stratified by sex, with 2010 MCS-12, vitality, mental health functioning, social functioning, and overall satisfaction in 2010 as outcome variables and 2008 gender attitudes and gender power, all the 2008 social capital measures, and 2008 control variables as independent variables. A logistic regression, stratified by sex, was run with role functioning in 2010 as an outcome variable and 2008 gender attitudes and gender power, all the 2008 social capital measures, and 2008 control variables as independent variables. These six models were used to determine the association between 2008 social capital measures, 2008 gender attitudes and gender power, and mental health outcomes in 2010 for males and females separately while controlling for relevant socio-demographic, health status, and external variables. The social capital variables with a

statistically significant relationship with a 2010 mental health outcome variable in paper two, including 2008 MCS-12 with social participation, vitality with non-financial transfer given, mental health functioning with social participation, and non-financial reciprocity with social functioning, were stratified by sex then interacted separately with gender attitudes and gender power to determine if gender attitudes and gender power are related to social capital in 2008 for men and women separately.

## **RESULTS**

### Descriptive Statistics

Table 1 describes the sample's characteristics stratified by sex. The average 2008 MCS-12 was 52.99 for females and 55.95 for men. There was a slight decrease in 2010 with MCS-12 scores of 51.31 for females and 53.70 for men. Looking at the breakdown of the 2010 MCS-12 score, men had slightly higher scores for all four components of role functioning, vitality, mental health functioning, and social functioning. Men also had a higher 2010 overall satisfaction score (4.14 versus 3.94 for women).

Looking at social capital, males had greater number of average transfers received (4.17 versus 3.96), greater number of average financial transfers given (3.50 versus 2.89), greater average financial reciprocity (3.14 versus 2.48), and greater average social participation (2.10 versus 1.73). Women, on the other hand, had a greater average number of non-financial transfers received (3.86 versus 3.36), greater average number of non-financial transfers given (3.82 versus 3.28), and greater average non-financial reciprocity (3.59 versus 2.86).

Positive gender attitudes were 61.15% for men and 51.96% for men, while negative gender attitudes were 38.85% for men and 48.04% for women. Higher gender power was 87.49% for men and 54.95% for women, while low gender power was 12.51% for men and 45.05% for women.

Most men and women were married (79.65% of women; 88.03% of men), had a primary level education (62.11% of women; 66.77% of men), and were HIV negative (90.15% of women; 91.35% of men). The average age was 40.58 years for women and 42.55 years for men. There were fewer Muslim men (24.75%) and women (20.32%) than Catholics/CCAP/Anglican (37.10% of women; 37.27% of men) and other religions (38.15% of women; 39.73% of men)

### Bivariate Analysis

Table 2 provides the results of the bivariate analysis. The bivariate analysis was conducted between the measures of mental health (2010 MCS-12, the four components of the MCS-12, and the self-report overall satisfaction measure) and gender attitudes and gender power. There were opposite associations between females and males for low gender power.

For women, negative gender attitudes were negatively associated with the 2010 MCS-12, vitality, and overall satisfaction. Low gender power was positively associated with role functioning, vitality, mental health functioning, and social functioning.



For men, negative gender attitudes were not associated at statistically significant level with any lower mental health outcomes. Low gender power was negatively associated with role functioning, vitality, and mental health functioning.

### Multivariate Analysis

Table 3 and 4 present the results of the multivariate analysis conducted on each of the 2010 mental health measures with the gender attitudes and gender power variables, seven social capital measures, and the 15 control variables for women and men separately.

#### *Women:*

For women, negative gender attitudes were negatively associated with overall satisfaction. Low gender power was positively associated with 2010 MCS-12, vitality, mental health functioning, and social functioning.

Only one measure of social capital was associated at statistically significant level with a mental health measure. More non-financial transfers given were associated with better vitality.

Among the health status control variables, the 2008 MCS-12 was positively associated with 2010 MCS-12, role functioning, vitality, mental health functioning, and social functioning. The 2008 SF-12 physical health score was positively associated with 2008 MCS-12, vitality, mental health functioning, social functioning, and overall satisfaction. HIV status did not have a statistically significant relationship with any of the mental

health measures. None of external control variables had a statistically significant relationship with a mental health outcome.

Among the socio-demographic control variables, region was positively associated with role functioning and religion was negatively associated with vitality.” Other” tribe was positively associated with social functioning. Primary education was positively associated with social functioning and secondary or higher education was positively associated with vitality and social functioning. Age was negatively associated with all mental health outcomes except 2010 MCS-12. All wealth quintile levels were positively associated with overall satisfaction and the richest quintile was positively associated with 2010 MCS-12, role functioning, and vitality. Having a household size of 4 to 6 people was positively associated with 2010 MCS-12 and mental health functioning and having a household size of 7 or more was positively associated mental health functioning. Marital status and number of transfer partners did not have a statistically significant relationship with any of the mental health measures.

*Males:*

For men, negative gender attitudes were positively associated with vitality. Gender power did not have a statistically significant relationship with any of the mental health measures.

Two measures of social capital were statistically significant with a mental health measure. Non-financial transfers received were negatively associated with role

functioning. Medium social participation was negatively associated with 2010 MCS-12, mental health functioning, and social functioning

Among the health status control variables, the 2008 MCS-12 was positively associated with 2010 MCS-12, role functioning, vitality, mental health functioning, and social functioning. The 2008 SF-12 physical health score was positively associated with 2008 MCS-12, vitality, mental health functioning, and social functioning. Positive HIV status was positively associated with 2010 MCS-12, role functioning, and social functioning.

Among the external variables, having a non-financial shock in the last two years was negatively associated with 2010 MCS-12 and role functioning. The number of transfer partners was negatively associated with social functioning.

Among the socio-demographic control variables, being from the southern region was negatively associated with 2010 MCS-12, vitality, and mental health functioning. Primary education was positively associated with vitality. Age was negatively associated with all mental health outcomes. The fourth and the richest quintile was positively associated with overall satisfaction. Having a household size of 4 to 6 people was positively associated with mental health functioning and social functioning, and having a household size of 7 or more was positively associated with 2010 MCS-12, vitality, mental health functioning, and social functioning. Religion, tribe, and marital status did not have a statistically significant relationship with any of the mental health measures.

### Interactions

Tables 5-8 present the results of the interaction analyses. Based on the multivariate analysis from paper two, the social capital variables with a statistically significant relationship with a 2010 mental health outcome variable, including 2008 MCS-12 with social participation, vitality with non-financial transfer given, mental health functioning with social participation, and non-financial reciprocity with social functioning, were stratified by sex then interacted separately with gender attitudes and gender power to determine if gender attitudes and gender power were related to social capital in 2008 for men and women. There were no statistically significant interactions with the social capital measures for both men and women.

In addition, a model with all the interaction terms was run with gender attitudes and gender power. None of the interactions were statistically significant with the social capital measures. In table 5, low gender power is positively associated with 2010 MCS-12, vitality, mental health functioning, and social functioning for females. In table 6, low gender power is positively associated with 2010 MCS-12 and mental health functioning for females. In table 8, negative gender attitudes are positively associated with vitality and low gender power is negatively associated with mental health functioning for males.

## **DISCUSSION**

Prior to stratifying the analyses by sex (male and female), sex was interacted with gender attitudes and gender power to determine if sex modified the influence of gender attitudes and gender power on mental health. In Appendix 1, the results show that negative gender

attitudes were associated with increased 2010 MCS-12, vitality, mental health functioning, social functioning, and overall satisfaction for men. Low gender power was associated decreased vitality for men. For this reason, subsequent analyses were conducted separated for men and women.

There are clear differences between men and women when examining the role of gender on the relationship between social capital and mental health. For women, more non-financial transfers given were associated with better vitality. Negative gender attitudes were negatively associated with overall satisfaction and low gender power was positively associated with 2010 MCS-12, vitality, mental health functioning, and social functioning for women. For men, non-financial transfers received were negatively associated with role functioning and medium social participation was negatively associated with 2010 MCS-12, mental health functioning, and social functioning. Negative gender attitudes were positively associated with vitality and gender power did not have a statistically significant relationship with any of the mental health measures for men.

Looking at gender attitudes among women, negative gender attitudes was negatively associated with overall satisfaction, which is a self-perceived sense of well-being. Low status for women is a risk for poor mental health (Afifi, 2007). Women's social, economic, and interpersonal dependence on men reinforces women's inequality through the continual adoption of less egalitarian gender attitudes by men and women (Baxter & Cane, 1995). Women may feel a decrease in well-being if they perceive that they have a lower status than men.

For women, low gender power was associated with increases in MCS-12, vitality, mental health functioning, and social functioning. This is an unexpected result since one may expect that more power for decision-making and self-determination would lead to better mental health. However, looking at the Malawi context in which families live on compounds, often within extended families, it is possible that women do not feel comfortable traveling by themselves or making decisions for one's self rather than for the benefit of the group. According to Molm & Hedley (1992), women act like power-disadvantaged individuals irrespective of their own power position and they respond strategically to the degree of mutual dependence rather than to power imbalance, even if it is in their favor. In addition, women may internalize the belief that men should have all the power in society. Also, within patron-client relationships, women not only benefit from material benefits, but also from the social insurance it provides (Swidler & Watkins, 2007); therefore, it is possible that ties of dependence are beneficial for women's mental health since they provide reassurance in times of need where more independence can be detrimental, as well as isolating, since one may feel they have fewer close relationships to rely on.

For men, negative gender attitudes were associated with increases in vitality. Since gender attitudes which characterize men as being designed for dominance with more powerful traits reinforces gender inequalities (Glick et al., 2004), it is possible that these negative attitudes make men feel more powerful. This in turn can be energizing, as men feel more virile.

For women, increases in non-financial transfers given were associated with increased vitality. This may be related to women's proclivity towards giving more emotional support in relationships than men (Kawachi & Berkman, 2001). It is possible that relieving the stress of others through the provision of non-financial help may relieve some of their own stress, leaving them feeling more "alive" and full of energy, especially since it has given them more social insurance for the future. In addition, some of these acts may be motivated by altruism which may make women feel good and more "alive." The role of non-financial transfers for women fits into the hypothesis that since women tend to be caregivers and have domestic roles instead of being wage earners, they are more likely to value non-financial relationship which produces better mental health.

Although non-financial transfers are positively associated with vitality, non-financial reciprocity is negatively associated with social functioning in women. As discussed in paper two, in the Malawi context, it is possible that this mutual help does not produce the needed relief that financial help can since receiving reciprocal non-financial assistance is an engrained social obligation (Weinreb, 2001). In addition, people may feel that they want to avoid social interactions to sidestep additional obligations so taking part in daily mutual help may becoming increasingly difficult and physically draining. Looking specifically at gender, women are more likely to have more emotionally intimate relationships and tend to be afflicted by the stress of those they maintain close relationships with (Kawachi & Berkman, 2001). Although helping others may improve vitality by relieving stress through the creation of more social insurance, non-financial reciprocity may be more emotionally draining because of the continued social obligations it creates for both parties.

For men, non-financial transfers received were negatively associated with role/emotional functioning. Men are less likely to mobilize social support during times of stress and they primarily rely on spouses for support (Kawachi & Berkman, 2001). Therefore, receiving social support in the form of non-financial transfers from outside spousal relationships may be stress inducing and hurt their pride, which in turn may decrease men's role functioning. There were no statistically significant associations between financial transfers and mental health for men or women; therefore, there is no support for the hypothesis that men are more likely to engage in financial relationships and these relationships improve their mental health.

Also, a medium level of social participation was associated with decreases in 2010 MCS-12 score and mental health functioning for men. This goes against the hypothesis that social participation increases men's mental health since it may increase their social status, thus reinforcing their power. As mentioned in paper two, Myroniuk & Anglewicz (2015) found a negative association between social participation and mental health in Malawi which may be attributed to the additional financial and non-financial obligations that may result from participation in the community. Having the burden of these additional obligations may be detrimental for men's mental health.

For men and women, the 2008 SF-12 physical health score was positively associated with increases in 2010 MCS-12, vitality, mental health functioning, and social functioning. As mentioned in paper two, this may be attributed to better well-being from being active and in better health, rather than isolated at home with poor health. For men, positive HIV



status was associated with increases in 2010 MCS-12, role functioning, and social functioning. An association between HIV status and mental health was not found in paper two. This is an unexpected result as being HIV positive has been linked to poor mental health (Chorwe-Sugani, Sefasi, & Pindani, 2015; Brandt, 2009). It is unknown if this particular subset is receiving treatment or not. One possibility is that knowing one's HIV status is empowering and eliminates the stress around uncertainty, which can cause poor mental health. However, research shows that people living with HIV or AIDS suffer from more mental health problems than non-affected individuals and half suffer from psychiatric disorders, with depression being the most common (Brandt, 2009). More research is needed to explain this relationship.

For women, experiencing a financial shock in the last two years was associated with decreased overall satisfaction. For men, experiencing a non-financial shock in the last two years was associated with a lower 2010 MCS-12 score and lower role functioning. As mentioned in paper two, this fits with previous research which shows that these two types of shocks lead to poor mental health outcomes in Malawi (Baird, de Hoop, & Ozler, 2011; Kohler, Payne, Bandawe, & Kohler, 2017). However, more research is needed to distinguish why women are more affected by financial shocks and men are more affected by non-financial shocks since the opposite would be expected given that women have more domestic roles and men are the wage-earners in Malawian society.

A strength of this study is the use of longitudinal data which addresses some of the limitations, including selection, of cross-sectional studies. Looking at the interactions, none of the relationships were statistically significant, meaning gender attitudes and

gender power were not related to social capital in 2008 for men and women. However, according to Kawachi & Berkman (2001), gender is an important modifier between social ties and mental health. A possible limitation of this study is the gender measures did not capture all the important aspects of gender attitudes and gender power in the Malawi context. There are standardized instruments that have been validated cross-culturally for gender attitudes and gender power. It is recommended that a validated instrument such as the DHS Women's Empowerment module, the Sexual Relationship Power Scale (Pulerwitz, Gortmaker, & DeJong, 2000) which contains two sub-scales on decision-making and control, or the 22 item Ambivalent Sexism Inventory (Glick & Fiske, 1996) be adapted to the Malawi context, then used to evaluate gender power and gender attitudes in Malawi to determine if there are differences in outcomes compared to this study. In addition, qualitative data can be used to enrich data. According to Schatz and Williams (2012), mixed methods can contextualize and validate quantitative survey data. In the rural Malawi context, qualitative data can provide nuances about gender attitudes and gender power which cannot be captured through survey data.

### Implications

Future research should examine how gender power and gender attitudes vary according to kinship systems (matrilineal and patrilineal) in Malawi and similar contexts. Specifically, whether marriage patterns based on kinship systems affect social capital and its corresponding relationship with social capital. The northern district of Rumphi is mostly patrilineal, in which the wife moves into the husband's house and inheritance is through the son. The southern district of Balaka is predominately matrilineal, in which the husband moves in with the wife and inheritance is traced through the female line. On the

other hand, the central region of Mchinji is not rigidly matrilineal and spouses can live within the wife or husband's natal home or away from both natal homes (Anglewicz & Reniers, 2014; Reniers & Tfamily, 2008). It is possible that that marriage patterns affect a spouse's power within the home and how women are viewed, which in turn affect women's social capital.

In addition, research should also investigate the role that programs which promote women's empowerment and egalitarianism may play on mental health. Studies focused on HIV in Africa have found that increasing women's rights reduce risky sexual behaviors (Depadilla, Windle, Wingood, Cooper, & DiClemente, 2011; VanderDrift, Agnew, Harvey, & Warren, 2013; Widman, Golin, Grodensky, & Suchindran, 2013). Also, promoting more positive attitudes towards women and women and female self-efficacy may improve women's well-being (Ackerman & de Klerk, 2002, Jewkes, Dunkle, Nduna, & Shai, 2010).

Future programs should develop interventions specifically tailored for men and women. Social mobilization around bringing attention to the importance of mental health can focus on both men and women. For women, creating support networks focused on mental health may be more effective since they value intimate relationships. For men, fundraising efforts for mental health treatment may bring men together in a non-threatening way and create additional financial networks for men to rely on.

**Table 1: Sample characteristics, male and female respondents with 2008 and 2010 MCS-12 scores, MLSFH 2008 and 2010**

	<b>FEMALE</b>	<b>MALE</b>
	<b>% (n) or mean(SD)</b>	<b>% (n) or mean(SD)</b>
	60.51% (1523)	39.49% (994)
<b>MENTAL HEALTH OUTCOMES</b>		
<b>2008 MCS-12</b>	52.99 (9.32)	55.95 (7.8)
<b>2010 MCS-12</b>	51.31 (10.05)	53.70 (9.11)
Role Functioning	.70 (.46)	.77 (.42)
Vitality	3.93 (1.02)	4.16 (.10)
Mental Health Functioning	7.94 (1.75)	8.35 (1.70)
Social Functioning	4.16 (1.04)	4.38 (.95)
<b>2010 Overall Satisfaction</b>	3.94 (.97)	4.14 (.97)
<b>SOCIAL CAPITAL VARIABLES</b>		
<b>Financial Transfers Received</b>	3.96 (2.76)	4.17 (2.77)
<b>Non-financial Transfers Received</b>	3.86 (2.71)	3.36 (2.66)
<b>Financial Transfer Given</b>	2.89 (2.59)	3.50 (2.66)
<b>Non-financial Transfer Given</b>	3.82 (2.71)	3.28 (2.58)
<b>Financial Reciprocity</b>	2.48 (2.68)	3.14 (2.85)
<b>Non-Financial Reciprocity</b>	3.59 (3.07)	2.86 (2.82)
<b>Social Participation</b>	1.73 (.76)	2.10 (.78)
Low	45.44% (692)	25.65% (255)
Medium	35.72% (544)	38.23% (380)
High	18.84% (287)	36.12% (359)
<b>GENDER ATTITUDES AND POWER</b>		
Gender Attitudes		
Negative Gender Attitudes	48.04% (675)	38.85% (357)
Positive Gender Attitudes	51.96% (730)	61.15% (562)
Gender Power		
Low Gender Power	45.05% (633)	12.51% (115)
Higher Gender Power	54.95% (772)	87.49% (804)
<b>DEMOGRAPHICS</b>		
Marital Status		
Married	79.65% (1,213)	88.03% (875)
Not Married	20.35% (310)	11.97% (119)
Education		
No School	31.39% (478)	14.10% (140)
Primary Level	62.11% (946)	66.77% (663)
Secondary or Higher	6.50% (99)	19.13% (190)
HIV Status		
Negative	90.15% (1,373)	91.35% (908)
Positive/Refused	9.85% (150)	8.65% (86)
Religion		
Muslim	24.75% (377)	20.32% (202)
Catholic/CCAP/Anglican	37.10% (565)	37.27% (373)
Other	38.15% (581)	39.73% (419)
Region		
Central	33.09% (504)	36.32% (361)
South	34.80% (530)	28.37% (282)
North	32.11% (489)	35.31% (351)
Age	40.58 (16.35)	42.55 (16.52)

**Table 2: Bivariate analysis, associations between mental health measures 2008 and gender measures 2008, respondents with 2008 and 2010 MCS-12 scores, 2008 and 2010 MLSFH**

	2010 SF-12 MCS	Role Functioning	Vitality	Mental Health Functioning	Social Functioning	Overall Satisfaction
	Coefficient (s.e.)	Odds Ratio (s.e.)	Coefficient (s.e)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
<b>FEMALE</b>						
Negative Gender Attitudes <sup>^</sup>	-1.09 (.54)*	1.21 (.14)	-.13 (.05)**	-.16 (.09)	-.06 (.06)	-.16 (.05)***
Low Gender Power <sup>^</sup>	1.95 (.54)***	1.30 (.15)*	.21 (.05)***	.35 (.09)***	.19 (.06)***	.04 (.05)
<b>MALE</b>						
Negative Gender Attitudes <sup>^</sup>	-.03 (.61)	1.16 (.19)	.11 (.07)	-.04 (.12)	.01 (.06)	-.05 (.07)
Low Gender Power <sup>^</sup>	-1.20 (.90)	.63 (.14)*	-.21 (.10)*	-.34 (.17)*	-.07 (.09)	-.14 (.10)

\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

<sup>^</sup>reference those with positive gender attitudes/higherpower

**Table 3: Ordinary Least Square Regression and Logistic Regression (role functioning), associations between mental health outcomes 2010, social capital measures 2008, and gender attitudes and gender power 2008, FEMALE respondents with 2008 and 2010 MCS-12 scores, 2008 and 2010 MLSFH**

	2010 MCS-12 ( <i>n</i> =1404)	Role Functioning ( <i>n</i> =1403)	Vitality ( <i>n</i> =1403)	Mental Health Functioning ( <i>n</i> =1403)	Social Functioning ( <i>n</i> =1403)	Overall Satisfaction ( <i>n</i> =1402)
	Coefficient (s.e.)	Odds Ratio (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
<b>GENDER</b>						
<i>Gender Attitudes (ref: Positive Gender Attitudes)</i>						
Negative Gender Attitudes	-.39 (.54)	.96 (.13)	-.05 (.05)	-.04 (.09)	-.01 (.06)	-.14 (.05)**
<i>Gender Power (ref: Higher Level Gender Power)</i>						
Low Gender Power	1.54 (.55)**	1.24 (.16)	.15 (.05)**	.24 (.09)**	.15 (.06)**	-.02 (.05)
<b>SOCIAL CAPITAL</b>						
<b>Financial transfer received</b>						
	-.16 (.16)	.96 (.04)	-.01 (.02)	-.01 (.03)	-.02 (.02)	-.01 (.02)
<b>Non-financial transfer received</b>						
	.04 (.20)	.97 (.05)	.00 (.02)	.01 (.03)	.01 (.02)	.00 (.02)
<b>Financial transfer given</b>						
	-.25 (.22)	1.07 (.06)	-.02 (.02)	-.04 (.04)	-.02 (.02)	.03 (.02)
<b>Non-financial transfer given</b>						
	.07 (.21)	.96 (.05)	.04 (.02)*	.04 (.03)	.02 (.02)	-.01 (.02)
<b>Financial reciprocity</b>						
	.22 (.20)	.94 (.05)	.02 (.02)	.03 (.03)	.04 (.02)	-.01 (.02)
<b>Non-financial reciprocity</b>						
	-.20 (.18)	1.02 (.04)	-.03 (.02)	-.05 (.03)	-.04 (.02)*	.00 (.02)
<i>Social Participation (ref: Low Social Participation)</i>						
Medium Social Participation	-.89 (.58)	1.03 (.14)	-.01 (.06)	-.11 (.10)	-.09 (.06)	.06 (.06)
High Social participation	-.64 (.88)	.94 (.19)	-.04 (.08)	-.09 (.15)	-.07 (.09)	-.05 (.08)
<b>Partners</b>						
	.23 (.20)	1.04 (.05)	.00 (.02)	.03 (.03)	.02 (.02)	.00 (.02)
<b>HEALTH STATUS</b>						
<b>2008 MCS-12</b>						
	.16 (.03)***	1.03 (.01)***	.01 (.00)***	.02 (.00)***	.02 (.00)***	.00 (.00)
<b>2008 SF12 Physical Health Score</b>						
	.10 (.03)***	1.01 (.01)	.02 (.00)***	.03 (.01)***	.01 (.00)***	.01 (.00)***
<b>HIV Status (ref=Negative)</b>						

Positive/Refused	-1.34 (.88)	.80 (.16)	.04 (.09)	-.21 (.15)	-.13 (.09)	.02 (.09)
<b>EXTERNAL</b>						
<b>Financial Shock in Last Two Years (ref=No)</b>						
Yes	-.05 (.35)	.90 (.08)	-.04 (.03)	.00 (.06)	.00 (.04)	-.07 (.03)*
<b>Non-financial Shock in Last Two Years (ref=No)</b>						
Yes	-.61 (.47)	.94 (.11)	-.03 (.05)	-.10 (.08)	-.05 (.05)	.05 (.05)
<b>SOCIO-ECONOMIC/DEMOGRAPHIC</b>						
<b>Region (ref=North Region)</b>						
Central Region	-1.69 (1.63)	3.20 (1.18)***	-.05 (.16)	-.50 (.28)	-.06 (.17)	.22 (.16)
South Region	-1.15 (1.73)	3.35 (1.32)***	-.08 (.17)	-.46 (.29)	-.03 (.18)	.03 (.17)
<b>Religion (ref=Muslim)</b>						
Catholic/CCAP/ Anglican	-.87 (1.33)	.89 (.29)	-.31 (.13)*	-.12 (.23)	-.16 (.14)	-.07 (.13)
Other	-.60 (1.35)	.97 (.33)	-.27 (.13)*	-.09 (.23)	-.11 (.14)	-.10 (.13)
<b>Education Level (ref=No school)</b>						
Primary Level	.59 (.71)	.92 (.16)	.12 (.07)	.11 (.12)	.19 (.07)**	.03 (.07)
Secondary or Higher	.75 (1.35)	.90 (.28)	.30 (.13)*	.14 (.23)	.37 (.14)**	.20 (.13)
<b>Age</b>						
	-.04 (.02)	.99 (.00)*	-.01 (.00)***	-.01 (.00)***	-.01 (.00)***	-.01 (.00)***
<b>Wealth Quintile (ref=Poorest)</b>						
Quintile 2	1.07 (.85)	1.01 (.21)	.20 (.08)*	.25 (.14)	.16 (.09)	.20 (.08)**
Quintile 3	.43 (.88)	1.20 (.26)	.13 (.09)	-.01 (.15)	.06 (.09)	.25 (.09)***
Quintile 4	1.12 (.90)	1.29 (.28)	.20 (.09)*	.05 (.15)	.07 (.09)	.34 (.09)***
Richest	2.04 (.95)*	1.70 (.39)*	.27 (.09)***	.23 (.16)	.12 (.10)	.38 (.09)***
<b>Household Size (ref=1-3)</b>						
4-6	1.31 (.64)*	1.34 (.20)	.08 (.06)	.26 (.11)*	.05 (.06)	.08 (.06)
7 or more	1.05 (.77)	1.35 (.25)	-.02 (.07)	.28 (.13)*	.03 (.08)	.08 (.07)
<b>Tribe (ref=Tumbuka)</b>						
Yao	1.25 (1.47)	1.27 (.47)	.22 (.14)	.08 (.25)	.07 (.15)	-.02 (.14)
Chewa	-.16 (1.93)	.83 (.37)	.26 (.19)	-.32 (.33)	.11 (.20)	-.06 (.19)
Other	.37 (1.36)	.83 (.28)	.09 (.13)	.03 (.23)	.31 (.14)*	.01 (.13)
<b>Marital Status (ref=Married)</b>						
Not Married	-.25 (.77)	1.19 (.21)	-.09 (.07)	-.22 (.13)	.02 (.08)	-.05 (.07)

\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

**Table 4: Ordinary Least Square Regression and Logistic Regression (role functioning), associations between mental health outcomes 2010, social capital measures 2008, and gender attitudes and gender power 2008, MALE respondents with 2008 and 2010 MCS-12 scores, 2008 and 2010 MLSFH**

	2010 MCS-12 ( <i>n</i> =915)	Role Functioning ( <i>n</i> =915)	Vitality ( <i>n</i> =915)	Mental Health Functioning ( <i>n</i> =915)	Social Functioning ( <i>n</i> =915)	Overall Satisfaction ( <i>n</i> =915)
	Coefficient (s.e.)	Odds Ratio (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
<b>GENDER</b>						
<b>Gender Attitudes</b> ( <i>ref: Positive Gender Attitudes</i> )						
Negative Gender Attitudes	.01 (.62)	.74 (.14)	.14 (.07)*	-.01 (.11)	.03 (.06)	-.07 (.07)
<b>Gender Power</b> ( <i>ref: Higher Level Gender Power</i> )						
Low Gender Power	-.70 (.90)	.80 (.20)	-.16 (.09)	-.25 (.17)	-.04 (.09)	-.04 (.10)
<b>SOCIAL CAPITAL</b>						
<b>Financial transfer received</b>						
	.05 (.18)	1.11 (.06)	.00 (.02)	.00 (.03)	.00 (.02)	.00 (.02)
<b>Non-financial transfer received</b>						
	-.18 (.21)	.88 (.05)*	.01 (.02)	-.04 (.04)	.01 (.02)	-.03 (.02)
<b>Financial transfer given</b>						
	.27 (.23)	1.09 (.08)	-.01 (.02)	.03 (.04)	.01 (.02)	.00 (.02)
<b>Non-financial transfer given</b>						
	.13 (.23)	1.02 (.07)	.02 (.02)	.02 (.04)	.02 (.02)	.02 (.02)
<b>Financial reciprocity</b>						
	-.13 (.20)	.94 (.06)	.00 (.02)	-.01 (.04)	.00 (.02)	-.01 (.02)
<b>Non-financial reciprocity</b>						
	.15 (.21)	1.10 (.07)	.00 (.02)	.01 (.04)	-.01 (.02)	.00 (.02)
<b>Social Participation</b> ( <i>ref: Low Social Participation</i> )						
Medium Social Participation	-1.49 (.73)*	.69 (.15)	-.03 (.08)	-.28 (.14)*	-.07 (.07)	.06 (.08)
High Social participation	-.71 (.81)	.74 (.18)	-.03 (.09)	-.10 (.15)	-.08 (.08)	.09 (.09)
<b>Partners</b>						
	-.13 (.21)	.95 (.06)	-.01 (.02)	.00 (.04)	-.04 (.02)*	.02 (.02)
<b>HEALTH STATUS</b>						
<b>2008 MCS-12</b>						
	.14 (.04)***	1.03 (.01)***	.01 (.00)***	.02 (.01)*	.01 (.00)***	.00 (.00)
<b>2008 SF12 Physical Health Score</b>						



	.09 (.05)*	1.00 (.01)	.02 (.00)***	.03 (.01)***	.02 (.00)***	.01 (.01)
<b>HIV Status (ref=Negative)</b>						
Positive/Refused	2.47 (1.05)*	2.07 (.73)*	.05 (.11)	.17 (.20)	.24 (.11)*	-.04 (.11)
<b>EXTERNAL</b>						
<b>Financial Shock in Last Two Years (ref=No)</b>						
Yes	-.64 (.40)	.87 (.10)	-.08 (.04)	-.06 (.07)	-.05 (.04)	-.05 (.04)
<b>Non-financial Shock in Last Two Years (ref=No)</b>						
Yes	-1.22 (.54)*	.60 (.10)*	-.04 (.06)	-.13 (.10)	-.10 (.06)	-.02 (.06)
<b>SOCIO-ECONOMIC/DEMOGRAPHIC</b>						
<b>Region (ref=North Region)</b>						
Central Region	-2.00 (1.75)	1.70 (.88)	-.33 (.18)	-.24 (.32)	-.11 (.18)	.29 (.19)
South Region	-3.94 (1.82)*	2.24 (1.23)	-.41 (.19)*	-.71 (.34)*	-.30 (.19)	.24 (.20)
<b>Religion (ref=Muslim)</b>						
Catholic/CCAP/ Anglican	-1.85 (1.84)	1.15 (.68)	-.29 (.19)	-.36 (.34)	-.21 (.19)	.30 (.20)
Other	-2.02 (1.85)	1.12 (.67)	-.30 (.19)	-.36 (.34)	-.31 (.19)	.18 (.20)
<b>Education Level (ref=No school)</b>						
Primary Level	-.25 (.94)	.87 (.28)	.20 (.10)*	.00 (.17)	.00 (.10)	-.14 (.10)
Secondary or Higher	-.22 (1.25)	.79 (.31)	.24 (.13)	.04 (.23)	-.01 (.13)	-.10 (.13)
<b>Age</b>						
	-.07 (.02)***	.98 (.01)***	-.01 (.00)***	-.02 (.00)***	-.01 (.00)***	-.01 (.00)***
<b>Wealth Quintile (ref=Poorest)</b>						
Quintile 2	-.89 (.97)	1.07 (.33)	-.08 (.10)	-.10 (.18)	-.15 (.10)	.12 (.10)
Quintile 3	-.72 (.94)	.80 (.23)	-.06 (.10)	-.15 (.17)	-.08 (.10)	.06 (.10)
Quintile 4	.29 (.98)	1.20 (.36)	.03 (.10)	-.10 (.18)	-.06 (.10)	.22 (.11)*
Richest	.87 (1.03)	1.10 (.33)	.08 (.11)	.12 (.19)	.04 (.11)	.30 (.11)**
<b>Household Size (ref=1-3)</b>						
4-6	.74 (.71)	1.04 (.22)	.10 (.07)	.30 (.13)*	.24 (.07)***	-.03 (.08)
7 or more	1.79 (.83)*	1.19 (.29)	.23 (.09)**	.37 (.15)*	.25 (.08)***	.11 (.09)
<b>Tribe (ref=Tumbuka)</b>						
Yao	-.11 (1.85)	1.17 (.68)	.07 (.19)	-.09 (.34)	.07 (.19)	-.02 (.20)
Chewa	-3.50 (2.15)	.30 (.19)	-.28 (.23)	-.50 (.40)	-.13 (.22)	-.11 (.23)
Other	-1.03 (1.79)	.64 (.36)	.01 (.19)	-.22 (.33)	-.08 (.18)	-.13 (.19)

**Marital Status** (*ref=Married*)

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Not Married	.46 (.98)	.63 (.18)	-.04 (.10)	.13 (.18)	.02 (.10)	-.14 (.11)
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\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

**Table 5: Interactions with gender attitudes and statistically significant associations between mental health outcomes 2010 and social capital measures 2008, FEMALE, respondents with 2008 and 2010 MCS-12 scores, 2008 and 2010 MLSFH**

	2010 MCS-12 (n=1404)	Vitality (n=1403)	Mental Health Functioning (n=1403)	Social Functioning (n=1403)
	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
<i>Gender Attitudes (ref: Positive Gender Attitudes)</i>				
Negative Gender Attitudes	-.08 (.76)	.03 (.10)	-.02 (.13)	.03 (.09)
<i>Gender Power (ref: Higher Level Gender Power)</i>				
Low Gender Power	1.56 (.54)***	.15 (.05)**	.25 (.09)**	.15 (.06)**
Financial transfer received	-.18 (.16)	-.01 (.02)	-.01 (.03)	-.02 (.02)
Non-financial transfer received	.06 (.20)	.00 (.02)	.01 (.03)	.01 (.02)
Financial transfer given	-.26 (.22)	-.02 (.02)	-.04 (.04)	-.02 (.02)
Non-financial transfer given	.08 (.20)	.05 (.02)**	.04 (.04)	.02 (.02)
Financial reciprocity	.24 (.20)	.02 (.02)	.03 (.03)	.04 (.02)
Non-financial reciprocity	-.21 (.18)	-.03 (.02)	-.05 (.03)	-.03 (.02)
<i>Medium Social Participation (ref: low)</i>				
High Social Participation (ref: low)	-1.90 (1.19)	-.04 (.08)	-.28 (.20)	-.07 (.09)
<b>Negative Gender Attitudes*Medium Social Participation</b>	-2.06 (1.12)		-.20 (.19)	
<b>Negative Gender Attitudes*High Social Participation</b>	2.60 (1.68)		.39 (.29)	
<b>Negative Gender Attitudes*Non-financial transfer given</b>		-.02 (.02)		
<b>Negative Gender Attitudes*Non-financial reciprocity</b>				-.01 (.02)

\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

**Table 6: Interactions with gender power and statistically significant associations between mental health outcomes 2010 and social capital measures 2008, FEMALE, respondents with 2008 and 2010 MCS-12 scores, 2008 and 2010 MLSFH**

	2010 MCS-12 (n=1404)	Vitality (n=1403)	Mental Health Functioning (n=1403)	Social Functioning (n=1403)
	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
<i>Gender Attitudes (ref: Positive Gender Attitudes)</i>				
Negative Gender Attitudes	-.40 (.54)	-.05 (.05)	-.04 (.09)	-.01 (.06)
<i>Gender Power Gender Power (ref: Higher Level Gender Power)</i>				
Low Gender Power	1.76 (.76)*	.08 (.10)	.29 (.13)*	.16 (.09)
Financial transfer received	-.16 (.16)	-.01 (.02)	-.01 (.03)	-.02 (.02)
Non-financial transfer received	.04 (.20)	.00 (.02)	.01 (.03)	.01 (.02)
Financial transfer given	-.25 (.22)	-.02 (.02)	-.04 (.04)	-.02 (.02)
Non-financial transfer given	.08 (.21)	.04 (.02)	.04 (.04)	.02 (.02)
Financial reciprocity	.22 (.20)	.02 (.02)	.03 (.03)	.04 (.02)
Non-financial reciprocity	-.20 (.18)	-.03 (.02)	-.05 (.03)	-.04 (.02)
Medium Social Participation ( <i>ref: low</i> )	-.67 (.77)	-.01 (.06)	-.04 (.13)	-.09 (.06)
High Social Participation ( <i>ref: low</i> )	-.54 (1.11)	-.05 (.08)	-.12 (.19)	-.07 (.09)
<b>Low Gender Power*Medium Social Participation</b>	-.49 (1.14)		-.14 (.19)	
<b>Low Gender Power*High Social Participation</b>	-.20 (1.73)		.10 (.29)	
<b>Low Gender Power*Non-financial transfer given</b>		.02 (.02)		
<b>Low Gender Power*Non-financial reciprocity</b>				.00 (.02)

\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

**Table 7: Interactions with gender attitudes and statistically significant associations between mental health outcomes 2010 and social capital measures 2008, MALE, respondents with 2008 and 2010 MCS-12 scores, 2008 and 2010 MLSFH**

	2010 MCS-12 (n=915)	Vitality (n=915)	Mental Health Functioning (n=915)	Social Functioning (n=915)
	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
<i>Gender Attitudes (ref: Positive Gender Attitudes)</i>				
Negative Gender Attitudes	.25 (1.13)	.14 (.11)	.06 (.21)	-.02 (.09)
<i>Gender Power (ref: Higher Level Gender Power)</i>				
Low Gender Power	-.74 (.90)	-.16 (.09)	-.25 (.17)	-.04 (.09)
Financial transfer received	.06 (.18)	.00 (.02)	.00 (.03)	.00 (.02)
Non-financial transfer received	-.18 (.21)	.01 (.02)	-.04 (.04)	.01 (.02)
Financial transfer given	.27 (.23)	-.01 (.02)	.03 (.04)	.01 (.02)
Non-financial transfer given	.14 (.23)	.02 (.03)	.03 (.04)	.02 (.02)
Financial reciprocity	-.14 (.20)	.00 (.02)	-.01 (.04)	.00 (.02)
Non-financial reciprocity	.14 (.21)	.00 (.02)	.01 (.04)	-.01 (.02)
Medium Social participation (ref: low)	-1.12 (.94)	-.03 (.08)	-.23 (.17)	-.07 (.07)
High Social participation (ref: low)	-.91 (1.02)	-.03 (.09)	-.08 (.19)	-.08 (.08)
<b>Negative Gender Attitudes*Medium Social Participation</b>	-.97 (1.47)		-.12 (.27)	
<b>Negative Gender Attitudes*High Social Participation</b>	.56 (1.58)		-.06 (.29)	
<b>Negative Gender Attitudes*Non-financial transfer given</b>		.00 (.03)		
<b>Negative Gender Attitudes*Non-financial reciprocity</b>				.02 (.02)

\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

**Table 8: Interactions with gender power and statistically significant associations between mental health outcomes 2010 and social capital measures 2008, MALE. respondents with 2008 and 2010 MCS-12 scores, 2008 and 2010 MLSFH**

	2010 MCS-12 (n=915)	Vitality (n=915)	Mental Health Functioning (n=915)	Social Functioning (n=915)
	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
<i>Gender Attitudes (ref: Positive Gender Attitudes)</i>				
Negative Gender Attitudes	.01 (.62)	.14 (.07)*	.00 (.11)	.03 (.06)
<i>Gender Power (ref: Higher Level Gender Power)</i>				
Low Gender Power	-1.02 (1.59)	-.29 (.16)	-.58 (.30)*	-.17 (.13)
Financial transfer received	.05 (.18)	.00 (.02)	.00 (.03)	.00 (.02)
Non-financial transfer received	-.19 (.21)	.01 (.02)	-.04 (.04)	.01 (.02)
Financial transfer given	.27 (.23)	-.01 (.02)	.03 (.04)	.01 (.02)
Non-financial transfer given	.12 (.23)	.02 (.02)	.02 (.04)	.02 (.02)
Financial reciprocity	-.14 (.20)	.00 (.02)	.00 (.04)	.00 (.02)
Non-financial reciprocity	.15 (.21)	.00 (.02)	.02 (.04)	-.01 (.02)
Medium Social Participation (ref: low)	-1.55 (.78)*	-.03 (.08)	-.35 (.14)*	-.06 (.07)
High Social Participation (ref: low)	-.79 (.85)	-.03 (.09)	-.15 (.16)	-.08 (.08)
<b>Low Gender Power*Medium Social Participation</b>	.37 (2.07)		.53 (.38)	
<b>Low Gender Power*High Social Participation</b>	.64 (2.41)		.40 (.45)	
<b>Low Gender Power*Non-financial transfer given</b>		.04 (.04)		
<b>Low Gender Power*Non-financial reciprocity</b>				.04 (.03)

\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

## APPENDIX 1:

**Table A1: Interactions of gender attitudes and gender power with sex, respondents with 2008 and 2010 MCS-12 scores, 2008 and 2010 MLSFH**

	2010 MCS-12 (n=2319)	Role Functioning (n=2318)	Vitality (n=2318)	Mental Health Functioning (n=2318)	Social Functioning (n=2318)	Overall Satisfaction (n=2317)
	Coefficient (s.e.)	Odds Ratio (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)	Coefficient (s.e.)
<b>GENDER</b>						
<i>Gender Attitudes (ref: Positive Gender Attitudes)</i>						
Negative Gender Attitudes	-1.27 (.48)**	.79 (.10)*	-.11 (.05)*	-.20 (.08)*	-.08 (.05)	-.19 (.05)***
<i>Gender Power (ref: Higher Level Gender Power)</i>						
Low Gender Power	.83 (.48)	1.03 (.13)	.10 (.05)*	.12 (.08)	.09 (.05)	-.05 (.05)
<b>INTERACTIONS OF SEX WITH GENDER ATTITUDES AND GENDER POWER</b>						
Sex*Gender Attitudes	2.47 (.68)***	1.32 (.24)	.34 (.07)***	.39 (.12)***	.19 (.07)**	.17 (.07)**
Sex*Gender Power	-.94 (1.01)	.96 (.24)	-.22 (.10)*	-.26 (.18)	-.08 (.10)	.02 (.10)
<b>SOCIAL CAPITAL</b>						
<b>Financial transfer received</b>						
	-.12 (.12)	1.00 (.03)	-.01 (.01)	-.02 (.02)	-.02 (.01)	.00 (.01)
<b>Non-financial transfer received</b>						
	-.08 (.14)	.93 (.03)*	.00 (.01)	-.02 (.03)	.01 (.01)	-.02 (.01)
<b>Financial transfer given</b>						
	.00 (.16)	1.08 (.04)*	-.01 (.02)	.00 (.03)	.00 (.02)	.03 (.02)
<b>Non-financial transfer given</b>						
	.09 (.15)	.98 (.04)	.03 (.02)*	.03 (.03)	.02 (.02)	.00 (.02)
<b>Financial reciprocity</b>						
	.12 (.14)	.96 (.04)	.01 (.01)	.03 (.02)	.02 (.01)	-.01 (.01)
<b>Non-financial reciprocity</b>						
	-.10 (.13)	1.04 (.04)	-.02 (.01)	-.03 (.02)	-.03 (.01)*	.00 (.01)
<i>Social Participation (ref: Low Social Participation)</i>						
Medium Social Participation	-.92 (.45)*	.95 (.11)	.00 (.04)	-.14 (.08)	-.06 (.05)	.07 (.04)
High Social participation	-.21 (.58)	.97 (.14)	-.01 (.06)	.00 (.10)	-.04 (.06)	.03 (.06)

\*p-value: .05 \*\*p-value: .01 \*\*\*p-value: .001

## CONCLUSION

This research focused on rural Malawi where access to mental health services is very limited and alternatives to improve mental health are needed. The aim of this dissertation was to advance knowledge about what influences social capital and what social capital means for the mental health of men and women in developing countries in sub-Saharan Africa. To achieve this objective, this dissertation carried out three separate studies using data from the 2008 and 2010 “Malawi Longitudinal Study of Families and Health” (MLSFH) (1523 females and 994 males with 2008 and 2010 SF-12 mental health scores). The objective of the first study was to identify the determinants of social capital in rural Malawi and offer a measure of social capital tailored for sub-Saharan African settings. The objective of the second study was to examine the relationship between social capital and mental health in rural Malawi. Finally, the objective of the last study was to determine whether gender acts as a moderator in the relationship between social capital and mental health. This conclusion provides a summary of the dissertation’s findings and provides recommendations for future programming and research.

Paper 1 examined the determinants of social capital which can be grouped into socio-economic/demographic, health status, religiosity, self-determination, and external categories. Overall, there was mixed evidence of the association of selected determinants with the social capital measures in paper 1. The measures of social capital were social participation, transfers (financial and non-financial), and reciprocity (financial and non-financial). None of the independent variables were statistically significant for all seven social capital measures, although being from the Central region and attending Church



within the last week was correlated with five out of seven measures. This analysis showed that the seven social capital measures are comprehensive measures of social capital when focusing on resource poor countries in sub-Saharan Africa, such as Malawi where community, kin, and social obligations are central to rural life. By identifying the determinants of social capital, interventions focused on the determinants positively associated with social capital can be developed or tailored to increase social capital to improve mental health. Also, vulnerable groups, meaning those with less social capital, can be more easily identified so mental health interventions can be targeted towards them. Operational research is needed to explore how to increase social capital in sub-Saharan African communities based on what is known about the influence of determinants on social capital.

Paper 2 focused on the relationship between social capital and mental health. The results of this analysis were mixed for the association between social capital and mental health. Results of the multivariate regression analysis indicates that only one measure of social capital was correlated with the composite 2010 MCS-12 score: those reporting a medium compared to low level of social participation had a lower level of mental well-being. Examination of the component measures of the MSC-12 and social capital yielded mixed results. There was a positive association between non-financial transfers given and vitality (having energy). Negative associations were observed between non-financial reciprocity and social functioning, as well as social participation and mental well-being. Additional financial, non-financial, and social obligations may result from these activities, which may create negative associations with mental health measures. Compared to previous studies which focused on developed countries, this study provided

a better, more encompassing measurement of social capital's effect on mental health, tailored to low resource settings, by capturing the uniqueness of the sub-Saharan African context where giving and receiving and participating in the community are part of the fabric of society and provide social insurance in times of need. This research also contributes to the literature on social capital and mental health in developing countries by demonstrating that social capital affects the components of mental health differently. Findings can be used to develop appropriate social capital interventions tailored toward the different realms of mental health. Further research should examine how to generate social capital in settings such as Malawi, based on the findings of this study, in order to improve mental health where there is lack of access to professional services.

Paper 3 focused on the gender as a moderator in the relationship between social capital and mental health. There were clear differences between men and women when examining the role of gender on the relationship between social capital and mental health. For women, more non-financial transfers given were associated with better vitality. Negative gender attitudes, which are attitudes around role-related behaviors for men and women in intimate relationships, were negatively associated with overall satisfaction and low gender power, which is an individual's control over decision-making and travel, was positively associated with 2010 MCS-12, vitality, mental health functioning, and social functioning for women. For men, non-financial transfers received were negatively associated with role functioning and medium social participation was negatively associated with 2010 MCS-12, mental health functioning, and social functioning. Negative gender attitudes were positively associated with vitality and gender power did not have a statistically significant relationship with any of the mental health measures for

men. Looking at the interactions, none of the relationships were statistically significant, meaning gender attitudes and gender power were not related to social capital in 2008 for men and women; however, it is possible the gender measures did not capture all the important aspects of gender attitudes and gender power in the Malawi context. A mixed methods approach, in which qualitative data is used to enrich collected quantitative data, is recommended in future research on gender's influence on the association between social capital and mental health. In the rural Malawi context, qualitative data can provide nuance about gender attitudes and gender power which cannot be captured through survey data. These findings suggest future programs should develop interventions specifically tailored for men and women.

In conclusion, there are no known studies that offer a comprehensive measurement of social capital in rural, sub-Saharan African settings. This dissertation provided meaningful measures of social capital that capture the uniqueness of the sub-Saharan context where giving and receiving and participating in the community are the fabric of society and provide social insurance in times of need. In addition, there is little research on the determinants of social capital, if any, in this context. This dissertation provided insight on the determinants of social capital in a resource-poor setting. This dissertation also showed that social capital may affect different components of mental health differently, so it is important to examine the individual components of mental health in future research, as well as when researching and planning interventions to improve mental health. Finally, this dissertation highlighted that it is important to consider gender when planning social capital interventions for mental health since there are clear differences between men and women.

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