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Examining the Sociodemographic and Physical Health Correlates of Psychosocial Functioning
among Indian Men and Women: A Latent Class Analysis Using WHO SAGE Study Data (2007-
2010)

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy
in Community Health Sciences

by

Apurva Vijay Barve

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ABSTRACT OF THE DISSERTATION

Examining the Sociodemographic and Physical Health Correlates of Psychosocial Functioning among Indian Men and Women: A Latent Class Analysis Using WHO SAGE Study Data (2007-2010)

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Doctor of Philosophy in Community Health Sciences

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Professor Courtney Thomas Tobin, Chair

This dissertation applied two theoretical perspectives, the Fundamental Cause Theory and the notion of Misclassification Bias, to comprehensively understand psychosocial functioning and explore its sociodemographic and physical health correlates among Indian adults. The theory-driven research questions were evaluated using the data from the World Health Organization's Study of Global Adult Ageing and Health (SAGE). The data were collected between 2007 and 2010.

The first study entitled, *'The Evaluation of the Multidimensional Indicators of Psychosocial Functioning and Its Sociodemographic Correlates among Indian Adults: WHO*

SAGE Study (2007-2010)’, described the relationship between the seven distinct indicators of the multidimensional psychosocial functioning, including sleep, cognition, affect, quality of life, depression, interpersonal relationships, and social connectedness. The relationship between these indicators and sociodemographic characteristics among adult Indian adults were also examined. Results showed that the reported levels of psychosocial functioning vary as a function of gender. Similarly, the results also established significant relationships between sociodemographic characteristics and psychosocial functioning separately among men and women.

The second study entitled, ‘*A Latent Class Analysis Approach to Evaluate the Multidimensional Nature of Psychosocial Functioning and Its Sociodemographic Correlates in the Indian Context: WHO SAGE Study (2007-2010)*’, used a latent class analysis approach to identify different classes of psychosocial functioning among men and women. Four latent classes of psychosocial functioning were identified for women, and three latent classes of psychosocial functioning were identified for men. The study also demonstrated that the membership of the latent classes varied across sociodemographic characteristics.

The third study entitled, ‘*An Examination of the Relationship between Psychosocial Functioning and Physical Health among Indian Men and Women: A Latent Class Analysis*’ showed that psychosocial functioning latent classes were predictors of the diagnosis of chronic diseases and multi-morbidity of chronic diseases among Indian men and women, controlling for sociodemographic characteristics.

In conclusion, this dissertation study underscores the relationship between psychosocial functioning and chronic disease diagnosis and also highlights the role of sociodemographic characteristics in patterning levels of psychosocial functioning among major subgroups within

Indian populations. Public health research, policy, intervention, and clinical implications of the dissertation are discussed.

This dissertation of Apurva Vijay Barve is approved.

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DEDICATION

I dedicate this dissertation to my *aai* Arundhati Barve, and my husband Yogesh Dandekar.

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<https://doi.org/10.1007/s10552-019-01145-7>

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CHAPTER 1: INTRODUCTION

On January 25, 2008, India's 59th Republic Day since independence from British Rule, India's first female president voiced concerns about the need for the country's economic growth to reflect its social growth and inclusion. She also urged citizens to prioritize social justice for India's most underprivileged and disregarded subgroups so that they may enjoy "the sunshine of the country's growth and development" along with the rest of India's citizens (Subramanian et al., 2009). While the country's overall health status has been progressively improving, widespread inequities in economic wellbeing and health status remain. This is particularly evident among traditionally socially disadvantaged groups such as women, and people from lower social castes and rural areas, who lag far behind their high caste and urban counterparts. Moreover, as the expansion of healthcare infrastructure in India has largely been limited to the prevention, diagnosis, and treatment of physical health ailments (Patel et al., 2016), the psychosocial functioning of its citizens have not been a priority. In this context, psychosocial functioning refers to individuals' level of functioning in social domains, such as their interpersonal relationships and social connectedness. It also encompasses their functioning in terms of personal domains, such as their quality of sleep, affect, cognition, and quality of life (World Health Organization, 2001). The different facets of psychosocial functioning are the building blocks of individuals' mental and physical health, and prior research suggests that the lack of understanding and prioritization of psychosocial functioning can lead to increased mental health disorders and exacerbate physical health conditions (Hatzenbuehler et al., 2013; Shrivastava et al., 2012; Vernooij-Dassen et al., 2005). Thus, the government's failure to prioritize the psychosocial functioning of India's citizens not only increases the unmet mental health needs of the population, but also limits knowledge of the ways that deficits in psychosocial functioning may also undermine physical health. Given the

paucity of empirical research in this area, new research is needed to inform data-driven health policies, interventions, and programs to improve psychosocial functioning in India.

Furthermore, India's societal changes over the last two decades may have important implications for the psychosocial functioning of Indian populations. For example, with India's rapidly developing economy, increasing the rates of urbanization has been a key component of the government's agenda. Along with urban development, climate change-related agricultural struggles resulting in low income, underemployment, debts, and difficult working conditions have contributed to a growing stream of migrants from rural to urban areas in India (Marshall & Randhawa, 2017). The changes associated with transformations in labor, industry, economy, migration, and technology have resulted in changes to the psychosocial structure, norms and nature of relationships, as well as increased competition for resources. As such, social stressors are increasing in India.

It is widely established that social stressors are one of the main risk factors for adverse psychosocial functioning, as it impacts outcomes such as sleep, emotions, interpersonal relationships (Caldwell & Redeker, 2009; Kessler, 1979; Pechtel & Pizzagalli, 2011). However, thus far the public health literature in India has greatly skewed toward studying physical health diseases as a way of improving the population health. Research suggests that different indicators of psychosocial functioning, such as interpersonal relationships, social connectedness, may serve as antecedents or consequences of mental health disorders, such as depression and anxiety (P. A. Barnett & Gotlib, 1988). Given the influence of psychosocial functioning on overall health, there is a need to evaluate patterns of psychosocial functioning in India to improve the health of this population.

There are several gaps in current knowledge. First, the current literature on psychosocial functioning is fragmented and no studies consider the dimensions of psychosocial functioning collectively. This limits our understanding how of distinct dimensions of psychosocial functioning are interrelated and the relative impact of distinct dimensions of psychosocial functioning on individuals' physical and mental health. Similarly, evaluating only one indicator of psychosocial functioning while ignoring other aspects can also lead to underestimating the effects of psychosocial functioning on individuals' physical health. Thus, there is a need to consider the dimensions of psychosocial functioning collectively. In addition, there is limited knowledge of how sociodemographic characteristics pattern psychosocial functioning among the Indian population. There is ample evidence to demonstrate sociodemographic inequities in physical health and common mental health disorders (e.g. depression) among Indian adults based on indicators of social standing (Subramanian et al., 2008; Vellakkal et al., 2013). Yet, there is a scarcity of evidence to explain the sociodemographic patterns in the underlying indicators of psychosocial functioning. Perhaps, sociodemographic patterns (for instance, subgroups based on religion, caste, marital status) in the reported levels of psychosocial functioning serves to widen the sociodemographic disparities in physical and mental health observed among Indian populations. Thus, there is a need to examine the sociodemographic patterns in psychosocial functioning among Indian adults. Similarly, there is a need to investigate the link between psychosocial functioning and physical health. Health inequities do not exist in a silo and addressing physical health diseases alone is insufficient to address the growing health disparities in India without also evaluating psychosocial functioning and sociodemographic characteristics (Gururaj et al., 2017). Thus, there is a need to study connections between psychosocial functioning and physical health among population groups in India.

This dissertation adds to the literature by assessing sociodemographic and physical health correlates of the psychosocial functioning among Indian adults. This is one of the first studies to describe multidimensional psychosocial functioning among Indian adults and describes the sociodemographic patterns related to psychosocial functioning. Because psychosocial functioning is one of the building blocks of mental and physical health, evaluating psychosocial functioning is one of the first steps toward understanding wide-spread health disparities in India.

1.1 Dissertation Overview

This dissertation applies two theoretical perspectives, the Fundamental Cause Theory (Link & Phelan, 1995) and the notion of Misclassification Bias (Aneshensel, 2005a), to comprehensively understand psychosocial functioning among Indian adults and to explore its correlates in terms of sociodemographic and physical health outcomes. The theory-driven research questions are evaluated using the data available from the World Health Organization's Study of Global Adult Ageing and Health (SAGE). The data was collected between 2007 and 2010 and was made available in 2012.

The first study evaluates the relationship between sociodemographic characteristics and the multidimensional psychosocial functioning, including sleep, cognition, affect, quality of life, depression, interpersonal relationships, and social connectedness, among adult Indian adults. The exploration of psychosocial functioning, in India and worldwide, is often geared toward understanding how a particular disorder influences the aspects of psychosocial functioning. This limits our understanding of how different facets of psychosocial functioning are related and collectively influence physical health in individuals and leads to underestimation of the impact of different indicators of psychosocial functioning on individuals' overall health. This dissertation study addresses this gap in the literature by providing a detailed description of the level of

psychosocial functioning in the Indian population independent of a particular disease/disorder categorization. Moreover, the sociodemographic patterning of many psychosocial functioning dimensions has received scant research attention. This limited understanding of the ways that sociodemographic characteristics may create variations in psychosocial functioning may obscure vulnerable population subgroups and may lead to further marginalization of at-risk populations. This dissertation extends the research in this area by evaluating the multidimensional indicators of psychosocial functioning separately and assessing the impact of the sociodemographic correlates associated with each of the indicators.

The second study delves deeper to assess the reported levels of multiple psychosocial functioning dimensions collectively and assesses the relationship between psychosocial functioning and sociodemographic characteristics. I examine the effects of all underlying psychosocial functioning indicators simultaneously, rather than taking a disorder-specific approach (Aneshensel, 2005b). This allows us to understand the collective impact of multidimensional psychosocial functioning on population subgroups and helps avoid the undercounting of existing psychosocial inequities (discussed in detailed later in the dissertation background). A latent variable will be constructed to identify different classes of mental health outcomes among men and women. The latent class model is useful to identify distinct hidden population subgroups. These subgroups are unique to one another but the individuals within the subgroups are similar to one another. The latent class analysis is useful in situations where the goal is to examine a complex construct that has multiple facets and requires measurement of multiple behaviors. Thus, this approach allows for the identification of unobservable subgroups within the population that can be used to better understand varying levels of impact of each of the indicators of psychosocial functioning. These latent classes (separate for men and women) will be used for all

subsequent analyses. After identifying the latent classes of psychosocial functioning for men and women, I will evaluate the sociodemographic correlates of this multidimensional assessment of psychosocial functioning.

The third study evaluates the relationship between psychosocial functioning and physical health outcomes among the Indian population. I study the relationship between the chronic disease diagnosis among Indian men and women and latent classes of psychosocial functioning, controlling for other sociodemographic factors. There is evidence to show the relationship between mental health and physical health in the Indian population. Yet there is little to no evidence to demonstrate the relationship between the physical health status and psychosocial functioning in this population. This limits our understanding of the role that psychosocial functioning plays to influence overall health. The third study contributes to the literature by providing some of the first evidence to demonstrate the relationship between physical health outcomes (e.g. chronic disease diagnosis) and psychosocial functioning. This study contributes to the growing literature that shows the association between various facets of psychosocial functioning and chronic diseases among the Indian populations.

Together, these three studies contribute a more nuanced understanding of psychosocial functioning among population subgroups in India to growing social science-based public health literature in India. Furthermore, to address the gaps in research and practice, my dissertation seeks to create an in-depth exploration of psychosocial functioning and its sociodemographic correlates (Study 1 and 2) and evaluate the relationship between psychosocial functioning and chronic disease diagnosis in their sociodemographic context among Indian men and women (Study 3). This is one of the first studies to provide an in-depth understanding of the social and contextual determinants of psychosocial health among Indian populations. This dissertation also focuses on

the multidimensional indicators of psychosocial functioning, namely sleep, cognition, affect, quality of life, depression, interpersonal relationships, and social connectedness. Even though there is clear evidence to demonstrate the importance of these psychosocial indicators in shaping our mental and physical health (Kalra et al., 2013; Schneiderman et al., 2001a), these indicators have received scant attention in Indian public health literature thus far.

In the sections that follow, I discuss key background literature on psychosocial functioning, mental health needs, and the relationship between psychosocial functioning and physical health in India. Second, I describe the theoretical perspectives that have guided this dissertation. I also propose a new integrated conceptual framework that guides the research questions and hypotheses tested in my dissertation research. Next, I provide a project overview and describe the data sources used in this dissertation. Fourth, the next three sections include studies 1-3, respectively. Finally, I conclude the dissertation with a discussion of the collective findings of three studies and provide the overall implications of this dissertation.

CHAPTER 2. BACKGROUND

2.1. The Construct of Psychosocial Functioning

The term *psychosocial functioning* reflects an individual's overall functioning in their social domains (e.g. interpersonal relationships and social connectedness) and psychological domains (e.g. cognition, affect, sleep, quality of life, and depression). Psychosocial functioning influences individuals' behaviors, thoughts, and actions through direct and indirect pathways. Social scientists posit that individual functioning can broadly be classified into two categories: (1) functioning within the context of daily living, and (2) functioning within the context of life as a whole, including the pursuit of values, and self-actualization (Ro & Clark, 2009). Accordingly, functioning can be viewed as a continual interaction and balancing between daily tasks and long-term values such as self-actualization (Rogers, 1957). In relationship to population health, the World Health Organization's International Classification of Functioning (WHO IFC; World Health Organization, 2001) defines functioning as an umbrella term that includes multiple categories – bodily functioning (physiological, psychological, and structural aspects), individual functioning, and social participation. In this context, disability is defined as a dysfunction occurring in any of these three categories – bodily impairments, activity limitation, and participation restrictions. Furthermore, the WHO also emphasizes studying contextual factors to comprehensively assess individual functioning (Badley, 2008). These contextual factors include (a) environmental factors such as social, institutional, cultural considerations, and built environment; and (b) personal factors such as gender, race, age, and financial assets. As such, the dimensions of psychosocial functioning should be studied together with contextual correlates, such as relevant sociodemographic characteristics. These contextual correlates are viewed as scene-

setters (variables that apply to everyone, such as gender and age) and are thought to act as facilitators and/or barriers to psychosocial functioning.

Thus, there is a need to evaluate the domains of psychosocial functioning collectively, rather than independently. Various indicators of psychosocial functioning are commonly studied in the existing literature to evaluate the effects of treatment and interventions, to assess factors that are associated with the development and prognosis of disorders, and to estimate longitudinal recovery and adjustment to acute disorders and/or chronic conditions. Thus, a plethora of studies have evaluated different facets of psychosocial functioning (for example, perceived quality of life, social connectedness, depressive symptomology) as an outcome and/or as predictors of mental and physical wellbeing. For example, a volume of research evaluates social isolation as a predictor of premature mortality (Holt-Lunstad et al., 2015). Likewise, decreased social connectedness is also established as an outcome of living with a stigmatized disorder, such as HIV (Chiu et al., 2008). This has led to two important gaps in literature. First, the existing literature on psychosocial functioning is fragmented in nature and these facets of psychosocial functioning have not yet been studied collectively, especially in the Indian public health literature. This prohibits us from understanding the relative impact of each of the facets of psychosocial functioning on individual health. There is evidence to suggest that different facets of psychosocial functioning do not exist in a silo and are influenced by each other. For instance, poor quality of sleep is associated with negative affect and cognitive difficulties (Fortunato & Harsh, 2006; Gildner et al., 2014). Similarly, the quality of interpersonal relationships predicts individuals' quality of life (Levasseur et al., 2004; Segrin & Taylor, 2007). However, there is an overall paucity of research that evaluates collective psychosocial functioning among Indian adults. Therefore, the present study adds to the

literature by evaluating the collective impact of the multidimensional psychosocial functioning among Indian men and women.

Thus, drawing on the WHO IFC definition of human functioning, this dissertation operationalizes psychosocial functioning into two main categories: (1) personal psychological functioning and (2) social functioning. Personal functioning is an individual's perception of their functioning in terms of sleep, cognition, negative affect, the quality of life, and experience of depression. Social functioning includes perceived quality of interpersonal relationships and perception of social connectedness with significant others, peers, colleagues, community, and society. We incorporate social and personal factors in psychosocial functioning because these factors are amenable to change and can be potentially targeted in health interventions. Whereas, self-actualization, self-acceptance, and purpose in life are seen as part of eudemonic well-being and on-going process of personal growth (Ryff & Singer, 2008). Furthermore, the term psychosocial functioning reflects "perceived" functioning specific to the respondent. In other words, perceived psychosocial functioning does not provide any detailed description of disease or health condition, but rather reflects the effects of the overall health status of the respondent on their over-arching psychosocial functioning.

Another key research gap is that even though psychosocial functioning is frequently examined to assess human health, surprisingly little is known about the social distribution of psychosocial functioning independent of a disease-categorization, especially in the Indian context. The study of psychosocial functioning in the public health literature has dramatically skewed toward examining the relationship between a disorder and a particular dimension of psychosocial functioning and as such, our knowledge of sociodemographic correlates of psychosocial functioning independent of any particular disorder diagnosis is limited (Ro & Clark, 2009). Rather,

various components of psychosocial functioning have been studied in conjunction with a specific disorder in India and other countries (for example Kohn & Schooler, 1973; Rodrigue, Morgan, & Geffken, 1990; Sears & Conti, 2002; Singh, Bassi, Junnarkar, & Negri, 2015; Singh, Junnarkar, & Sharma, 2015; Suurmeijer, Reuvekamp, & Aldenkamp, 2001). This is an important research gap. Over-reliance on using the lens of common mental health and physical health diseases to study population wellbeing and overlooking the available psychosocial resources restrict the comprehensive understanding of protective and risk factors that exist among different population subgroups.

Furthermore, research exploring the relationship between sociodemographic factors and psychosocial functioning will also underscore that opportunities for psychosocial wellbeing are not equally distributed and are highly correlated with social conditions and life-course related variables, such as SES in childhood, current SES, and other contextual socioeconomic correlates such as the area of residence, marital status. Therefore, we can argue that the inequities observed in health may be deeply rooted in the inequities found in the variations in the psychosocial functioning based on these fundamental sociodemographic correlates. Therefore, the primary purpose of this study to gather the evidence needed to describe how psychosocial functioning measured in terms of personal and social functioning varies among Indian population subgroups.

2.2. Associations between Psychosocial Functioning and Overall Health

Psychosocial functioning is, directly and indirectly, related to an individual's overall health. Psychosocial functioning in terms of sleep, cognition, interpersonal relationships, quality of life, social connectedness, affect, is recognized as an important but often underutilized and understudied mechanism in the complex and multi-faceted determinants of mental and physical health. The traditional view holds that the variation in psychosocial functioning is a symptom,

consequence, or non-specific variable related to mental or physical health disorders. As a result, the understanding and improvement of psychosocial functioning are given low priority in the treatment and prevention of physical and mental health disorders. An alternative perspective proposes that lowered psychosocial functioning can also be a contributory factor in the occurrence of various forms of mental health disorders and physical health diseases. The public health implications of giving increased attention to multidimensional psychosocial functioning include potentially effective and inexpensive interventions such as interventions to increase sleep quality, facilitate social connectedness and, enhance interpersonal relationships. The clinical implications include a discussion of overall psychosocial functioning with healthcare providers to understand patients' available resources and psychosocial pain-points.

Additionally, there is a reason to believe that the levels of psychosocial functioning and its relationship with sociodemographic correlates are strongly dependent on gender. Indian society is traditionally and historically stratified based on gender. Even today, strong gender-based norms, expectations, and patriarchal values continue to prevail in many spheres of life (Drèze & Sen, 2002). For instance, the lived experiences of men and women are gender-dependent – starting from elementary school where classrooms are divided based on the gender of adolescent boys and girls (Majumdar & Mooij, 2011; Rawal & Kingdon, 2010). Thus, gender shapes opportunities and vulnerabilities among men and women differently based on early-life socialization processes and structural inequalities (Ram et al., 2014). Sociologists posit that gender disparities emerge from the inequalities among men and women rooted in different socialization processes and unequal social power – overall, women earn less money, have less decisional powers, less personal and financial autonomy, and share more household and family demands than men (Rosenfield et al., 2000; Rosenfield & Smith, 2010). The effects of these socialization processes would be felt even

more acutely in India, given the wide-ranging disparities in educational, income, and occupational statuses of women, and gender-based discriminatory norms that create more vulnerabilities for women but offer more privileges for men (Saha, 2013; Shastri, 2014; Sivakumar, 2008). Existing research consistently demonstrates a female-disadvantage in terms of education, income, decision making powers, financial empowerment, and ultimately health in India (Pandey et al., 2002; K. Roy & Chaudhuri, 2008; L. Singh et al., 2013). Accordingly, one can argue that not only would the levels of psychosocial functioning vary based on gender, but that the sociodemographic patterns in psychosocial functioning and its relationship with health would also be different among men and women. However, there is an overall dearth of literature that explains psychosocial functioning and its relationship to health among women and men in the Indian context.

Furthermore, in the Indian context, gender-based disadvantages are often attributed to widespread neglect of women's health, nutrition, and other interests of women that influence their economic and social status, such as education, income, and employment (Osmani & Sen, 2003). Similarly, Bird & Rieker (1999) argue that gender has both biological and social dimensions and thus the gender-based disparities have biological as well as social sources. In this context, to understand the social dimensions of gender-based health disparities, the sociological literature poses two general hypotheses for reasons underlying gender-based differences. First, gender-based inequities reflect differential exposure and reduced access to material, social, and health opportunities that foster wellbeing (Arber & Cooper, 1999). Second, women report greater levels of health problems because they have greater vulnerability for material, behavioral, psychosocial, and biological risk-factors detrimental to their overall wellbeing (McDonough & Walters, 2001). The current dissertation explores the second hypothesis in the Indian context – gender-based health disparities observed in existing Indian public health literature may reflect unequal

sociodemographic patterns in the distribution of psychosocial functioning among Indian populations. As such, women may be more vulnerable to chronic physical health conditions because their levels of psychosocial functioning, which are building blocks of mental and physical health, are more acutely related to their social and economic advantages or disadvantages. For instance, the social status associated with marriage (such as being married, separated, or widowed) may be more closely associated with Indian women's overall psychosocial functioning than with levels of psychosocial functioning among Indian men. In other words, sociodemographic and economic disadvantages may affect individuals' psychosocial functioning differently based on their gender. Therefore, it is crucial to study the relationship between sociodemographic characteristics and psychosocial functioning separately for men and women. Thus, stratifying the analyses by gender allows us to observe how sociodemographic variables pattern psychosocial functioning differently for gender. However, one of the main limitations of Indian public health literature is the lack of gender-based explorations of psychosocial functioning. As such, one of the primary goals of this dissertation is to understand overall psychosocial functioning, including its sociodemographic and physical health correlates, separately among women and men.

In the following sections, I present the existing evidence demonstrating links between various dimensions of psychosocial functioning (namely, sleep, cognition, quality of life, affect, social connectedness, interpersonal relationship) and overall health outcomes among populations.

2.2.1. Sleep.

Sleep problems are a common occurrence in patients with mental or physical health disorders. For example, the most common form of sleep problem is insomnia, defined as sustained difficulties in initiating and/or staying asleep during the night, which causes problems during the day (D. Freeman et al., 2017a) is often comorbid with other mental health disorders (Baglioni et

al., 2011). There is an established relationship between experiences of insomnia and increases in psychotic experiences among the general population (Reeve et al., 2015). Sleep disturbance is associated with various forms of psychopathology through its reciprocal relationship with emotion regulation and its shared/interacting neurobiological underpinning (Harvey et al., 2011). Sleep disturbances are linked to two biological changes – (1) changes in the genes known to be important in the generation and regulation of circadian rhythms and (2) alterations in dopaminergic and serotonergic function (Harvey et al., 2011). Sleep researchers have also demonstrated that insomnia is a causal factor in the occurrence of psychotic experiences and other mental health disorders (D. Freeman et al., 2017a). Disturbed sleep is also associated with an increased occurrence of anxiety and depression in the general population. Recent studies have demonstrated a high comorbidity rate and a longitudinal association between sleep disturbances and common mental health disorders, including anxiety and depression among adults, teenagers, and younger children (Alvaro et al., 2013; Fichter et al., 2009; Gregory et al., 2006; Gregory & Eley, 2005). Similarly, disturbed sleep also carries several social, professional, and personal consequences. For instance, sleep disturbances are associated with lower academic and work performance, increased occurrences of accidents, and decreased quality of life (Calleja et al., 2007; Rosekind et al., 2010). Sleep is also related with recovery from acute physical health diseases and management of chronic diseases (Frieze, 2008; Shahar et al., 2001).

Similarly, there is an overall paucity of literature demonstrating how social factors influence sleep quality among Indian population subgroups. Sleep may be a mechanism through which sociodemographic disadvantage is linked to health inequities – an area of research that has been given inadequate attention. There is evidence to indicate that the association between sleep difficulties and occupation, age-groups, and income in India (Giri et al., 2013; Sharma &

Ahluwalia, 2010). As such, research suggests greater levels of sleep difficulties based on type of occupation, such as among physicians, medical school students, and nurses (Giri et al., 2013; (D. Roy et al., 2020). Similarly, aging and sociodemographic disadvantages, such as low levels of wealth, lack of employment, and low levels of education are also related to increases in sleep difficulties in Indian populations (Gambhir et al., 2014; Vancampfort et al., 2018). Interestingly, qualitative studies suggest that common mood-disorders, including anxiety and depression often manifest as sleep difficulties among Indian population, and especially among Indian women (Andrew et al., 2012; Pereira et al., 2007). Research from western countries also indicate that women are more likely to experience increased sleep difficulties than their male counterparts, owing to the unequal distribution of work stress and household responsibilities (Arber et al., 2009). However, there is a lack of research that investigates similar patterns in the Indian context. Consequently, sleep difficulties perhaps represent an unrecognized public health issue facing India, especially among women, given the rapidly aging of the population, changes in family structure resulting from economic and labor market changes, and epidemiological transitions (Stranges et al., 2012).

Taken together, existing research indicates that treating sleep disturbances will likely lead to a reduction in common mental health disorders, improve physical health, increase productivity, and enhance quality of life. Indeed, a randomized control trial found that compared to the psychotherapeutic treatment, as usual, treatment of sleep problems resulted in clear changes in insomnia, reduction in paranoia, hallucinations, and other improvements in mental health disorders, such as anxiety and depression (D. Freeman et al., 2017b). Furthermore, research also suggests that a relatively inexpensive online cognitive behavioral therapy focused on sleep improvement also has the potential of improving overall mental health and wellbeing among

participants (Lallukka & Sivertsen, 2017). From this perspective, the understanding and treatment of sleep problems should be given higher clinical importance. Insights on sleep patterns in this context also have clinical benefits. Because of the social stigma on seeking mental health services prevalent in India, the provider-patient conversation around experiences of sleep disorders could be the first step toward encouraging holistic psychosocial wellbeing in a primary care setting. Therefore, sleep is included in this dissertation as one of the key facets of psychosocial functioning.

2.2.2. Affect

The term “affect” reflects a spectrum of valence between feeling states and attitudes – positive affect represents the pleasant end of the spectrum (for instance, feeling grateful, upbeat) and negative affect represents the unpleasant end of the spectrum (for example irritability, sadness, contempt) (Fredrickson & Losada, 2005). Past research has shown that a higher level of positive affect is a predictor of subjective well-being (Diener, 2009; Lyubomirsky et al., 2005). Similarly, a bulk of research demonstrates the association between physical and mental health disorders and negative affect. For instance, negative affect has been established as one of the strongest predictors of depression in all age groups (Kovacs & Lopez-Duran, 2010; Watson et al., 1988; Watson & Clark, 1984). Similarly, negative affect is also related to anxiety disorders among adults and children alike (Keogh & Asmundson, 2004; King et al., 1991; Lonigan et al., 2003). Similarly, research from western countries indicate that women are more likely to experience negative affect than their men counterparts and the effects of aging on negative affect is dependent on gender (Thomsen et al., 2005). Research from Southeast Asian countries also indicates the protective benefits of education on women’s experiences of negative affect (Williams 2009; Agrawal et al. 2011). However, similar patterns have not yet been investigated for other sociodemographic characteristics in the Indian context. For instance, akin to economic advantages afforded by

education, marital status, especially among women, is also related to social advantages (e.g. being married) and disadvantages (e.g. being widowed or divorced) in the Indian society (Strohschein & Ram, 2017). Thus, it is possible that sociodemographic indicators pattern the levels of psychosocial functioning differently based on gender. In this context, evaluating negative affect separately among men and women and assessing its key sociodemographic correlates would help us identify vulnerable subgroups in this population.

In addition to exacerbating common mental health disorders, negative affect also worsens physical health disease outcomes. Among patients with fibromyalgia, negative affectivity is related to heightened vigilance to bodily sensations and catastrophic thinking about pain (Crombez et al., 2004). Negative affect is also associated with diabetes management (Conti et al., 2017; Vieth et al., 1997), cardiovascular health (Denollet et al., 2013; Hildebrandt & Hayes, 2012), asthma severity (Priel et al., 1994), distress (Watson & Pennebaker, 1989), health-related quality of life (Kressin et al., 2000). In light of this, negative affect may be one of the key indicators of overall psychosocial functioning that influences health through multiple mental and physical pathways.

Therapeutic efforts to reduce negative affect has physical and mental health benefits. Schnur et al., (2009) demonstrated the utility of reducing negative affect and increasing positive affect among women undergoing breast cancer radiotherapy. Other researchers have also focused on reducing negative affect as a way to reduce opioid dependence among patients with lower back pain (R. N. Jamison et al., 2013), decrease anhedonia (Craske et al., 2019), lessen bulimic symptoms and substance abuse (Burton et al., 2007), and reduce alcohol-dependence (Witkiewitz & Villarroel, 2009). Thus, an in-depth understanding of negative affect among population subgroups is essential. Therefore, negative affect is included in this dissertation as one of the facets of psychosocial functioning.

However, there is a paucity of research to facilitate our comprehensive understanding of negative affect in the Indian context. Two of the main research gaps in this context include a lack of in-depth understanding of population-based correlates of negative affect and lack of nationally representative evidence to show the association between negative affect and health among the Indian populations. Focusing on the negative affect may be one of the first steps toward reducing the occurrence of common mental health disorders and improve physical health outcomes among Indian populations.

2.2.3. Interpersonal relationships

In this dissertation, interpersonal relationships are used to assess individual's assessment of their relationships with their significant others. Because it is related to the interpersonal dimension of functioning, it is included in the social functioning part of multidimensional psychosocial functioning. Interpersonal relationships can profoundly shape an individual's behavior, thoughts, and emotions, sometimes with far-reaching effects. As a result, interpersonal relationships and experiences can influence the development, course, and consequences of specific mental health disorders, even those that can be traced to biological or cognitive factors (Segrin, 2001). Because interpersonal relationships play a central role in human happiness, physical, and mental health, an in-depth understanding of the level of interpersonal functioning is essential from an individual-focused clinical standpoint as well as a community-oriented public health perspective. Large epidemiological studies have established a clear relationship between the quality of interpersonal relationships and mortality and morbidity (Luo et al., 2012; Shye et al., 1995; Zautra et al., 1994). Therefore, the perceived quality of interpersonal relationships is one of the most important building blocks of an individual's psychosocial functioning.

Interpersonal relationships are vital for mental health across all life-stages. For instance, interpersonal dysfunction in early adolescence is one of the most robust predictors of the likelihood of unhealthy functioning in peer, family, romantic, and parenting roles (Hammen, 2009). Similarly, the intergenerational transmission of depression also involves not only genetically heritable factors but also the likelihood that depressed youth is often exposed to depressed parents and dysfunctional interpersonal family environment (Hammen et al., 2004). The perceived quality of interpersonal relationships is also associated with post-traumatic stress disorder (PTSD) (Laffaye et al., 2008), eating disorders (Lieberman et al., 2001), and anxiety disorders (Przeworski et al., 2011).

Understandably, public health interventions focusing on increasing the quality of interpersonal relationships would boost mental and physical health. For instance, randomized control trials focused on creating and strengthening interpersonal relationships have shown efficacy to reduce depressive symptoms in general community population (Bolton et al., 2003; Klier et al., 2001), among women experiencing postnatal depression (Mulcahy et al., 2010; Reay et al., 2006), among pregnant women (Spinelli & Endicott, 2003), and among adolescents (Mufson et al., 2004). Similarly, psychotherapies based on group-based interpersonal relationships have also shown efficacy to reduce PTSD (Markowitz et al., 2015), anxiety disorder (Stangier et al., 2011), and a host of other mental health disorders (Cuijpers et al., 2016; Van Schaik et al., 2006). Among the Indian population, there is some evidence to show the effectiveness of interpersonal-relationship based therapy to alleviate depressive symptoms (Chatterjee et al., 2008; Gomes et al., 2016; Patel et al., 2010, 2011) However, there is an overall dearth of research on interpersonal relationships in India and there is a lot of work to be done to attain comprehensive understanding

on how interpersonal relationships are patterned based on historical norms, social, and cultural processes, and its relationship to mental and physical health.

The seminal work of Baumeister & Leary (1995) provided evidence for the pervasive human need for frequent and pleasant interpersonal relationships, to belong, and a strong motivation to maintain a minimum quantity and quality of the interpersonal relationship. Similarly, research suggests that the perceived importance and quality of interpersonal relationships have strong associations with gender (Robinson, 2000). As such, low levels of interpersonal relationships may be particularly detrimental to women's psychosocial functioning as compared to men's psychosocial functioning. For instance, among married couples, women experience more interpersonal relationship issues than men because they typically occupy lower status and more subordinate positions than their husbands (Wanic & Kulik, 2011). Thus, there is a need to understand interpersonal relationships and their demographic correlates separately for men and women. Therefore, an understanding of the mental and physical health to develop effective clinical and public health interventions is incomplete without in-depth knowledge of interpersonal relationships.

2.3.4. Social connectedness

We have an intrinsic need for forming and maintaining meaningful personal and social connections. While the construct of interpersonal relationships focuses on the individuals' perceived quality of relationships to their significant others, social connectedness focuses on the perceived level of interpersonal social connections to the individuals' social community at large. Lee & Robbins (2000) argued that individuals have a strong need for belongingness or 'being a part of' to avoid loneliness and alienation and a sense of social connectedness is as in inherent component of individuals' need for belongingness. Therefore, perceived deficits in the frequency

and the quality of social connectedness can lead to feelings of isolation and social rejections. As such, the perceived level of social connectedness is an essential component of an individual's psychosocial functioning.

Like any other facets of the psychosocial functioning, social connectedness is important at all stages of an individual's life-course. For instance, in a longitudinal study Gillison et al. (2008) found that students' perceived relatedness at school robustly predicted their quality of life. Similarly, social connectedness among adolescence is related to a greater sense of well-being (Jose et al., 2012). Social connectedness also predicts other determinants related to psychosocial functioning and overall wellbeing. For instance, social connectedness is associated with acculturation and subjective well-being among immigrant populations (Yoon et al., 2008; Yoon & Lee, 2010). Furthermore, the level of social connectedness also predicts mental health disorders including depression (K. L. Williams & Galliher, 2006), anxiety (R. M. Lee & Robbins, 1998), and suicidal ideation (You et al., 2011). Similar to research on the relationship between interpersonal relationship and gender, there is also reason to believe that the perceived levels of social connectedness may be more important to women's overall psychosocial functioning as compared to men's psychosocial functioning in the Indian context. For instance, while some studies suggest that men are more prone to social isolation, other studies argue that women may be at a higher risk of losing the abilities to stay socially connected with their societies at large (Sato, 2020). Particularly, social structures within patriarchal societies may be enacted at household levels to restrict women's ability to connect with people outside their houses (Sato, 2020). Thus, it is critical to examine how sociodemographic characteristics, such as being married, or being employed, influence social connectedness differently among men and women. However, despite recent research that demonstrates the importance of social connectedness and heuristic

value of social connectedness for an individual's wellbeing, there is relatively little research to explain the nature and correlates of social connectedness among Indian men and women. Thus, there is a need to clarify the relationship between social connectedness and sociodemographic characteristics separately for men and women.

2.2.5. Quality of life

The term quality of life refers to the subjective assessment of the physical, psychological, and social domains of an individual's life that are influenced by the individual's life experiences, beliefs, expectations, and perceptions (Patrick & Erickson, 1993). Because quality of life is a subjective assessment of individual's overall life, it is included under personal functioning. A bulk of research evidence demonstrates a clear link between an individual's assessment of their quality of life and their physical and mental health outcomes. More specifically, an assessment of a good quality of life often predicts better overall health, including self-reported health, whereas an assessment of the poor quality of life is a robust predictor of poor health outcomes, including self-reported health (McEwen et al., 2009; Sprangers et al., 2014).

Understandably, the subjective assessment of the quality of life is also correlated with mood-disorders (A. J. Freeman et al., 2009; Jansen et al., 2013), anxiety-disorders (Sareen et al., 2006), stress-related disorders (Schelling et al., 1998; Schnurr et al., 2006), and burnout (Sprang et al., 2007; Takai et al., 2009). Existing research also suggests that the quality of life is worsened in psychiatric conditions than several major chronic diseases (Hansson, 2002). Taken together, this implies that a poor quality of life strongly related to major physical and mental health conditions. As such, an exploration of the quality of life is essential to understand the person's overall psychosocial functioning and wellbeing.

There is ample research evidence to demonstrate the relationship between physical health outcomes and quality of life in the Indian population. For instance, quality of life is affected among patients with vision loss and vision disorders (Finger et al., 2011; Fletcher et al., 1997), among patients experiencing stigma and living with epilepsy (Nehra et al., 2014), among patients living with HIV (Kohli et al., 2005; Wig et al., 2006), and patients living with mental health disorders (Lobana et al., 2001). However, a key limitation of the current literature is a lack of gender-focused research to explain the similarities and differences in the sociodemographic correlates of quality of life based on gender.

2.2.6. Cognition

In this dissertation, cognition refers to individuals' ability to concentrate and focus on activities. Mental health disorders have adverse impacts on individuals' cognition abilities. The Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association indicates that "many individuals with depression report impaired ability to think, concentrate, or make decisions. They may appear easily distracted or complain of memory difficulties. Those in intellectually demanding academic or occupational pursuits are often unable to function adequately even when they have mild concentration problems" (American Psychiatric Association, 2013). Cognitive models of depression posit that biases in the processing of emotional information contribute to the onset and maintenance of the disorder (Beck, 2002). A recent meta-analysis confirmed this hypothesis and suggested that the existence of biased attention to negative information in depression (Bar-Haim et al., 2007). Likewise, another meta-analysis indicated a memory bias for recall among people experiencing anxiety (Mitte, 2008). Thus, experiences of mental health disorders can change the way we process information and experience emotions.

Apart from changes in emotional processing, mental health disorders also can increase cognitive difficulties by affecting memories and increasing negative self-focus (Kuyken & Dalgleish, 1995; Watkins & Teasdale, 2001), adversely impact prefrontal mechanism for executive control (Wang et al., 2008), and impact the overall functioning of the brain (Ageta et al., 2008). Therefore, cognitive abilities, such as the ability to think, concentrate, make decisions, formulate ideas, reason, and remember are affected among people experiencing common mental health disorders, such as depression (Marazziti et al., 2010). As a result, cognition is an important component of our overall psychosocial functioning that has an impact on the individuals' mental and physical health. However, there is lack of gender-focused research to explain how sociodemographic correlates influence cognition among the Indian population. For instance, the protective benefits of education and income are gender-dependent and as such, men receive more protective benefits of education against cognitive difficulties in India (Weir et al., 2014a). Accordingly, it is important to understand whether other social and economic disadvantages are also differentially related to cognitive difficulties based on gender. However, lack of gender-focused research in this context limits our understanding of sub-groups of Indian men and women particularly vulnerable for cognitive difficulties based on their sociodemographic and/or economic disadvantages.

To summarize, this section (section 2.1) provides evidence that an individual's psychosocial functioning is closely related to their overall health. Moreover, psychosocial functioning may be one of the key building blocks of individuals' overall health. As such, understanding the populations' multidimensional psychosocial functioning may increase our knowledge, influence our treatment of population mental health, and help tailor public policy and interventions to the unique needs of the population subgroups. Similarly, gender inequalities

inherent in social norms, roles, and responsibilities, may also exacerbate the sociodemographic influences on psychosocial functioning unequally among men and women. Research implies that sociodemographic characteristics may create different vulnerabilities based on gender. For instance, greater familial responsibilities may affect women's quality of sleep and quality of interpersonal relationships (Horne et al., 2018; Wanic & Kulik, 2011) and the protective benefits of education and income are gender-based in the Indian context (Weir et al., 2014). Taken together, it indicates that there is a need to conduct gender-focused inquiry to appreciate the impact of sociodemographic characteristics on psychosocial functioning in this context. Thus, this dissertation investigates the ways that sociodemographic patterns in psychosocial functioning are different based on gender.

2.3. Sociodemographic Determinants of Psychosocial Functioning

The present patterns of health inequities are often intertwined with historical systems of social stratification. As most researchers recognize, disparities in health are linked to inequality in the population based on sociodemographic status (McLeod & Nonnemaker, 1999). A bulk of research supports a strong correlation between socioeconomic standing and health (Adler et al., 1994; Aneshensel & Sucoff, 1996; Luo & Waite, 2005; Y. Yu & Williams, 1999). However, there is very little research to explain whether the psychosocial functioning, in terms of personal functioning (sleep, affect, cognition, quality of life) and social functioning (interpersonal relationships and social connectedness) also varies based on the sociodemographic status of individuals. Evaluating the relationship between psychosocial functioning and sociodemographic characteristics is especially important in the Indian context owing to large economic and health disparities among population subgroups. For example, almost 363 million Indians (29.5% of India's total population) live below poverty lines and have vastly different lived experiences than

other subgroups of populations. Therefore, there is a need to understand how sociodemographic characteristics pattern psychosocial functioning in India. However, there is scant research evidence to inform the sociodemographic patterning of overall health and psychosocial functioning in India. This research gap also leads to a lack of understanding of the mechanisms through which socio-demographically-patterned psychosocial functioning may create population-level health inequities. Similarly, social interactions are multilayered and largely based on indicators of social hierarchy, such as age, gender, social caste, income level, educational attainment, area of residence, and religion. The following section summarizes the existing research and gaps in literature elucidating the association between sociodemographic characteristics and multidimensional indicators of psychosocial functioning.

Gender. Female gender is associated with an increased risk of cognitive difficulties and/or decline, especially among people from low educational backgrounds in India (J. Lee et al., 2014a; Mathuranath et al., 2010; Weir et al., 2014a). Similarly, women are at increased risk of depression in India (Poongothai et al., 2009b). However, the relationship between gender and other facets of psychosocial functioning is less conclusive in the Indian context. Studies from industrialized countries show that women are more likely to experience negative affect than men (Fujita et al., 1991; Thomsen et al., 2005). However, the results are mixed in the Indian context – some studies show that there is no difference in the experience of negative affect based on gender (Kaul et al., 2005; Singha & Raychaudhuri, 2016), while others support the finding that females are more likely to report negative affect than men (J. Agrawal et al., 2011). Similar mixed results regarding the association between gender and sleep disturbances also exist – some studies report that men have more sleep disturbances than women (Giri et al., 2013) while other studies report otherwise (Panda et al., 2012). There are currently no studies that describe the relationship between gender and

quality of life, social connectedness, and interpersonal interactions in the Indian context without the disease or disorder-specific categorization. One of the major limitations of the existing studies is the small sample size and a lack of nationally representative study that limits the in-depth understanding of negative affect. Therefore, there is a need to evaluate these relationships in using a representative dataset. In this context, it is also important to know how the relationship between psychosocial functioning and sociodemographic factors is different based on gender. It is possible that social and economic disadvantages may affect women more acutely than men. However, there is an overall paucity of research to indicate similarities and differences in how psychosocial functioning is patterned based on sociodemographic correlates among men and women. Thus, there is a need to conduct gender-focused inquiry of psychosocial functioning and its sociodemographic correlates.

Age. Age is inversely associated with psychosocial functioning. Studies from India report that increasing age is associated with lowered cognitive abilities (Samuel et al., 2016; Selvamani & Singh, 2018), increased negative affect and depression (J. Agrawal et al., 2011; Piliaia et al., 2013; Poongothai et al., 2009b), decreased social connectedness (Sandeep Grover et al., 2018), lowered quality of interpersonal relationships (Norman et al., 1982), lowered quality of life (Deshmukh et al., 2015; Mudey et al., 2011). However, these studies suffer from a few methodological limitations such as fragmented and convenience study sample.

Socioeconomic status. There is some evidence to suggest that SES in terms of income and education are associated with poorer psychosocial functioning among the Indian populations. For instance, the relationship between cognitive decline and old age was stronger for individuals with lower income and lower educational backgrounds in India (J. Lee & Smith, 2014; Weir et al., 2014a). Similarly, the levels of social connectedness are reported to be lower among people from

low SES backgrounds in India (Mukherjee & Saraswati, 2011). Likewise, lower SES is also related to increased sleep disturbances among Indian populations (Gildner et al., 2014; Mazzotti et al., 2014; Peltzer & Pengpid, 2017). However, there are no studies to explain the relationship between the quality of interpersonal relationships, quality of life, and SES among Indian adults independent of a disease categorization.

Religion. Although India is home to the second-largest Muslim population in the world, estimated at around 150 million, Islam is still a minority religion that coexists with an overwhelming Hindu majority and other smaller religious communities (Desai & Tamsah, 2014). Studies have reported experiences of discrimination and bias against Muslims in India in the private and public industry sector (Sachar et al., 2006; Thorat & Attewell, 2007). Studies also reported poorer health status among Muslim individuals than other religious groups in India (Borooah, 2010). There is also some evidence to suggest that Muslim individuals experience lower levels of social connectedness than other religions (Mukherjee & Saraswati, 2011). However, there is an overall lack of studies to demonstrate how religions including Islam, Jainism, Sikhism, Christianity, and Hinduism influence other facets of psychosocial functioning among Indian adults.

Caste. Historically, the social caste was used as a means of social stratification with Brahmins (the general caste category) at the top of the social hierarchy and scheduled castes, other backward castes (OBCs), scheduled tribes and at the bottom of the social hierarchy. Historical sociopolitical deprivation and discrimination have led to wide-spread inequities in education and income between the general and protected castes. There is some evidence to support the association between lower social castes and the likelihood of depression among Indian adults (Kohrt et al., 2009). However, there are no studies that evaluate the relationship between an individual's social

caste and other facets of psychosocial functioning (sleep, cognition, affect, quality of life) in India using a nationally representative sample.

Similarly, there are currently no studies that elucidate the link between social cast and social functioning, in terms of interpersonal interactions and social connectedness, among the Indian population. For instance, interpersonal interaction based on strong social group caste identity is the hallmark of interpersonal relationships in India. While scholars agree that these categories of social hierarchy determine interactions in the Indian society (S. Pellissery et al., 2015; Sony Pellissery, 2008; Tuli & Chaudhary, 2010), there is no evidence to suggest that social hierarchies also pattern the level of perceived quality of interpersonal relationships among Indian adults. That is, it is not clear whether belonging to a historically lower category of social standing is related to experiences of poorer interpersonal interactions with significant others and lowered social connectedness within one's society at large. Thus, there is a need to understand whether the quality of interpersonal interactions and social connectedness is influenced by sociodemographic characteristics in India.

Area of residence. The area of residence plays a crucial role in determining health status among the Indian populations. For instance, in rural India the challenges of addressing psychosocial functioning and overall health are particularly substantial owing to limited access to healthcare systems. However, there is an overall paucity of research to explain the sociodemographic patterns in psychosocial functioning in rural and urban India.

India lacks resources in the field, and most of the available resources are located in major cities or highly urbanized states. This creates substantial health disparities between states. For example, according to the most recent National Mental Health Survey, the number of psychiatrists in the country varied from 0.05 for every 100,000 persons in Madhya Pradesh (central India) to

1.2 in southeastern Kerala (Gururaj et al., 2017). The geographic disparities are even greater depending upon the state – for example, the state Uttar Pradesh does poorly on almost all social and health indicators as compared to the state Kerala. However, there is little scholarship available to explain why these large state-level differences in health persist. Perhaps, state-level inequities reflect the unequal distribution of resources in rural areas as compared to urban residential areas. However, there are mixed results related to area of residence (rural vs. urban) and psychosocial health in India. While some research suggests that rural to urban migration and urban living is also positively associated with poor psychosocial health outcomes (Kusuma & Babu, 2018; Srivastava, 2009), others suggest that rural living is not associated with an elevated risk of psychosocial disorders (DeVylder et al., 2018; H. C. Ganguli, 2000). Some scholars believe that rural areas, with its emphasis on close-knit community-based living, are more equipped to take care of psychosocial needs to its residents than the fast-paced urban living (Almanzar et al., 2014; Liu et al., 2014). Hence, there is a need to explore how rural vs. urban living is associated with psychosocial functioning in India.

In conclusion, one of the important limitations of the existing literature on psychosocial functioning is that most of the studies have evaluated different facets of psychosocial functioning independently, rather than collectively. Thus, we do not know the relative importance of multidimensional indicators of psychosocial functioning to influence health outcomes among the Indian populations. Secondly, the existing studies suffer from several methodological limitations, such as fragmented sample size and use of convenience sample. Therefore, there is a need to evaluate socioeconomic factors related to psychosocial functioning in India using a nationally represented sample. Gathering research evidence and quantifying the psychosocial functioning status among vulnerable groups is one of the best methods to learn about mechanisms that drive

health inequities, for attracting governmental attention and subsequent tailoring of public policy to improve health.

2.4 Chronic Diseases, Epidemiological Transitions, and Chronic Diseases in India

As discussed earlier, the multidimensional indicators of psychosocial functioning are related to individual's overall health and can be used to improve health. Thus, there is a need to understand how the psychosocial functioning is related to physical health diseases. India is the second-most populous country in the world and is undergoing wide-ranging population changes that also reflect epidemiological transitions (Dandona et al., 2017). India's current disease pattern can be characterized by low mortality, high morbidity, and the double burden of communicable as well as non-communicable diseases (Yadav and Arokiasamy 2014). In the last 25 years, life expectancy at birth has increased by 8.6 years for men and 10.6 years for women, since 1990 (Dandona et al., 2017). However, this overall progress is not equitable for all populations groups and suffers from huge demographic variations. For example, the epidemiological transition ratio (disability-adjusted life-years due to communicable diseases vs. non-communicable chronic diseases and injuries combined) ranged from 0.16 for the state of Kerala to 0.74 for the state of Bihar in 2016, a greater than the four-times difference (Dandona et al., 2017). An increasing number of older populations has also been associated with an increased number of years lived with disability and/or chronic multiple non-communicable comorbidities. Diabetes, cerebrovascular disease (such as stroke), chronic obstructive pulmonary diseases (COPD), and ischemic heart diseases (angina) among the most common causes of DALY and years of life lost due to premature mortality in India (YLLs; WHO, 2010). However, the relationship between sociodemographic factors and health among the Indian population is not consistent across all diseases.

There is an established inverse sociodemographic gradient in some of the physical health diseases in Indian populations. The rates of maternal mortality, infant mortality, anemia, physical limitations and disability, and infectious disease are high among those with low socioeconomic status (SES) in terms of social caste, gender, education, and employment status (Nongkynrih et al., 2004; Özaltın et al., 2010; Rani et al., 2003; Vellakkal et al., 2013). Conversely, some studies have also found that some types of chronic diseases, including diabetes, hypertension, and obesity are “diseases of elites” with higher prevalence among high SES groups in India (Corsi & Subramanian, 2019). Some researchers also add to this debate by arguing that non-communicable diseases are not concentrated among elites in developing countries, but people from low SES groups are often under-diagnosed and under-report diseases. For instance, Vellakkal et al., (2013) found under-reporting of heart diseases, diabetes, hypertension, and depression among Indian populations when assessed by standardized criteria versus self-reported diagnosis. Thus, these mixed results complicate our understanding of the sociodemographic gradient of chronic conditions. Similarly, while the majority of the studies evaluate income and education as one of the main determinants of health, it is not clear how the societal structure in terms of prestige and position affects health in India. There is very little scholarship on how the prevalence of these chronic diseases differs based on social determinants of inequality, such as caste, marital status.

In conclusion, the prevalence and mortality associated with chronic diseases are growing in India. However, there is inadequate research to facilitate the evidence-based formulation of public policy, clinical practice, and public health interventions in India. There is an urgent need to address this research gap by explaining sociodemographic patterns in chronic diseases, and its relationship to psychosocial functioning. The indicators of psychosocial functioning, such as sleep, interpersonal relationships, social connectedness, are malleable to change and can potentially

create far-reaching positive results in an individual's personal, social, professional, and health domains.

2.5. Focusing on psychosocial health to improve physical health

Increasing mental and behavioral health services for people who have chronic medical conditions also has significant medical cost savings benefits (Blount et al., 2007). For example, in Hawaii Project, the entire Medicaid population of Oahu and those who had governmental insurance plans on the island were enrolled in the first large implementation of mental and behavioral health services for people with chronic diseases. The results found 38% to 15% cost savings in total medical expenditures (Pallak et al., 1993). Overutilization of physical health-related medical services and unwarranted physician visits are common among patients who experience comorbidity of mental and physical health conditions (Chiles et al., 1999; Fulop et al., 1989; Gabbard et al., 1997; Jencks, 1985). A meta-analysis of 91 studies found that supplementing medical physical health treatment with mental health interventions have shown to substantially reduce total medical cost by about 20% as compared to patients who did not receive any mental health treatment (Chiles et al., 1999). A cluster randomized control trial conducted in Goa, India found that a collaborative-stepped care intervention delivered by trained lay health counselors improves recovery rates for patients with common mental disorders in public primary care settings (Patel et al., 2010).

Understanding how mental and physical health interacts and disseminating the findings to healthcare institutions and practitioners is important for several reasons. First, the physical health illness of psychiatric patients also goes undetected (Heiberg et al., 2019; Phelan, Stradins, & Morrison, 2001). For instance, a medical evaluation study of California's public mental health record found that mental health professionals recognized patients' physical diseases less than half

of the time during the duration of the treatment (Koran et al., 1989). Likewise, evidence also shows that when patients receive care for physical disorders, their poor mental health status also often goes undetected (Bor, 2015). Thus, healthcare providers and also the patients themselves may miss detecting and treating mental disorders that may exist alongside and complicate physical illnesses. Secondly, even when the interconnectedness of physical and mental health is recognized, institutional and cultural barriers challenge the integration of mental and physical health services – some of these barriers include lack of time and cost-effective screenings, and different payment systems for services (Collins et al., 2013). Mental health stigma is one of the main barriers to mental health care in India (Gururaj et al., 2017). Thus, integrating mental health services within the primary care facilities will also help normalize the mental health needs of the general population.

While studies examining mental and physical health concomitance have added nuances to our understanding of the dynamic relationship between mental and physical health, the extant literature has overwhelmingly focused on developed industrialized countries. Thus, resource-poor countries, such as India are research poor settings for mental health research (Das et al., 2012). Making meaningful contributions to the nascent mental health research in India is important for three important reasons: (a) with substantial sociodemographic, cultural, and epidemiological changes, such as rapidly ageing populations, growing rates of urbanization and internal migration, the rates of mental health issues are likely to increase in the coming years; (b) as India's population living with chronic diseases morbidity and comorbidities increases, rising levels of mental health comorbidities will pose challenges to healthcare systems in terms of resources and readiness, to healthcare professionals in terms of managing patient adherence and care coordination given multi-morbidities, and to patients themselves in terms of burdensome, duplicative, and

disintegrated care services; (c) therefore, emphasizing the role of mental health in shaping population physical health is especially important in this context as a first step toward discovering sub-populations that might be especially vulnerable.

2.5. Research Gaps in Addressed by The Dissertation Study

Recent interdisciplinary literature shows evidence for the importance of psychosocial functioning for individuals' physical and mental health. Intuitively, the multidimensional indicators of psychosocial functioning also serve as the building blocks of an individual's mental health. Individuals' perceived quality of sleep, cognition, interpersonal interactions, social connectedness, and affect all have an impact on their mental health and physical health status. However, most studies of the psychosocial functioning, in India and worldwide, evaluate it in the context of a disorder. The exploration is often geared toward understanding how a particular disorder influences the aspects of psychosocial functioning. This dissertation study addresses this gap in the literature by providing a detailed description of the level of psychosocial functioning in the Indian population independent of a particular disease/disorder categorization (study # 1).

Similarly, different aspects of psychosocial functioning have received varying degrees of research attention in the Indian context. For instance, while there is ample research evidence to show how the socioeconomic status shapes the risk of depression and cognition in India, other facets of the psychosocial functioning have not received adequate research attention, such as affect, sleep, and interpersonal interactions. Moreover, there is an overall paucity of research to evaluate these indicators in a nationally representative sample and often are limited to a study sample that prevents insights beyond the research-specific settings. To address these two research gaps, this dissertation study assesses seven indicators of psychosocial functioning in a nationally representative sample of Indian men and women (study # 1).

While there is some research to demonstrate how socioeconomic status shapes some facets of psychosocial functioning, a lot of the research is not focused on a particular gender. While it is widely recognized that gender plays a large role in determining how socioeconomic status shapes psychosocial health, this line of research has received inadequate attention. This dissertation study addresses this gap by first evaluating whether gender is an important predictor of psychosocial functioning among Indian adults and then performing all analyses separately for each gender – this allows us to create a more focused analysis (study # 1). Similarly, the role of socioeconomic status has received inadequate research attention. This dissertation extends the research in this area by evaluating the multidimensional indicators of psychosocial functioning separately and assessing the impact of the socioeconomic status for each of the indicators (study # 1).

Much of the current research on psychosocial functioning is fragmented in nature. There is a paucity of research that explores these indicators simultaneously in a single model. As described earlier, this can lead to misclassification bias and undercounting of mental health needs. Attending to this critical research gap, this dissertation study uses the latent class analysis approach to examine the seven indicators of the psychosocial functioning simultaneously in a single model. This dissertation study also contributes to the literature by demonstrating the efficacy of using the latent class analysis in this context (study # 2). Moreover, we also evaluate whether the membership into the latent psychosocial class vary based on individuals' sociodemographic characteristics (study # 2). This statistical technique has not been used to study the psychosocial functioning of Indian adults thus far.

Finally, even though there is research evidence to show the relationship between mental health and physical health in the Indian population, there is little to no evidence to demonstrate the relationship between the physical health status and psychosocial functioning in this population.

My dissertation contributes to the literature to provide one of the first evidence to demonstrate the relationship between physical health outcomes, namely chronic disease diagnosis and psychosocial functioning. This understanding is one of the first steps toward prioritizing the focus on key indicators of psychosocial functioning, such as sleep, cognition, affect, in individual-focused clinical practices, and community-focused public health interventions (study # 3).

CHAPTER 3. THEORETICAL FRAMEWORK

Mental health research and practice in India has focused on understanding common disorders among Indian populations. However, it is also important to address underlying psychosocial functioning, such as social connectedness, interpersonal relationships, and sleep, cognition, which directly and indirectly influence individual mental health status. Existing research suggests that psychosocial functioning, such as the quality of sleep, has a pervasive impact on individuals' overall health (Luyster et al., 2012). Moreover, an individual's social standing can influence their reported level of psychosocial functioning (Arber et al., 2009;). However, there is a paucity of research to describe the levels of psychosocial functioning and recognize how sociodemographic characteristics shape psychosocial functioning among Indian populations. Thus, the in-depth understanding of underlying psychosocial functioning and the sociodemographic patterning of psychosocial and mental health among Indian populations, are key areas of research that are largely unexplored. An in-depth exploration of these relationships will help advance our understanding of mental health needs among this population and curate evidence-based mental health programs that enhance existing psychosocial resources and mitigate key risk factors.

Currently, there is no single theory or a framework to guide the development of research on this proposed topic. Nonetheless, the Fundamental Cause Theory by Link and Phelan (1995) and Aneshensel's (2005) notion of avoiding misclassification bias in mental health research can be combined to create an integrated framework to address existing research gaps in the current evidence base. The fundamental cause theory is a social-structural theory that captures the constructs and characteristics of individuals and the social conditions that shape the lives of the population and create disparities in health outcomes. These social conditions may affect an

individual's psychosocial functioning and increase their risk of adverse mental and physical health outcomes. The Fundamental Cause Theory provides a broader guiding framework for identifying the social and contextual factors that influence psychosocial functioning and for explaining the relationships between psychosocial functioning, sociodemographic characteristics, and physical health among these populations. Aneshensel's (2005) notion of avoiding misclassification bias in mental health research suggests that traditional social etiological model of evaluating a single disorder, such as people who report high quality of sleep vs. people who report a poor quality of sleep, is often inadequate to explain the full impact of social conditions on psychosocial health. The social etiological model may lead us to erroneously classify individuals who report high quality of sleep as *healthy*, whereas they may report poor functioning on other facets of psychosocial wellbeing. Thus, we run in the risk of misclassifying people as healthy vs. unhealthy if we only evaluate one indicator of psychosocial functioning. As such, there is a need to study multiple indicators of psychosocial functioning to comprehensively understand the relative impact of social circumstances, such as gender or marital status, on psychosocial functioning. Specifically, this theory is applied to the dissertation study 1 to assess the relationship between sociodemographic characteristics and multidimensional indicators of psychosocial functioning among Indian men and women. The notion of misclassification bias helps identify formulate research questions and design used in this dissertation. Specifically, seven dimensions of psychosocial functioning are assessed together to avoid the misclassification bias (study #2 and study #3). The following sections explain the fundamental cause theory followed by the discussion of misclassification bias and ways to avoid it. The final section presents and explains a conceptual model created for this dissertation from which testable hypotheses and specific research questions are drawn for each of the three parts of the study.

3.1 Fundamental Causes Theory

The Fundamental Cause Theory was developed out of growing concern that thus far researchers have mainly focused on proximate risk factors of diseases, such as diet and exercise; but, distal causes of disease, such as social conditions, had received less attention (Link & Phelan, 1995). By focusing on the proximate risk factors, we make an implicit assumption that individuals have the ability to control their lives and largely ignore the contextual factors that shape an individual's abilities and choices. Link and Phelan underscored the need for *contextualizing* the risk factors and postulated that social conditions within which individuals live, such as their level of income, education, experiences of stigma, are perhaps the fundamental causes of observed health disparities. For instance, in Indian context, being widowed as opposed to being married are associated with worsening of health among women but not among men (Perkins et al., 2016b). Similarly, the location of residence (rural vs. urban) greatly influences the access, affordability, and utilization of healthcare services in India (Mberu et al., 2016)

A fundamental social cause of health inequalities has four essential features: (1) it influences multiple disease outcomes (such as cancer, HIV, chronic diseases); (2) it affects these disease outcomes through multiple risk factors (such as, awareness, education, level of income); (3) it involves access to resources that can be used to avoid risks or minimize negative consequences of disease if it occurs (such as, access to health insurance); (4) association between a fundamental cause and health is reproduced overtime via replacement of intervening mechanisms (Phelan et al. 2010). These features make the relationship between fundamental causes and health obstinate and create a health gradient. The key constructs of fundamental cause theory are – fundamental causes, risk/protective factors, flexible resources, and a new elaboration by Freese and Lutfey (Freese & Lutfey, 2011) – *meta-mechanisms*.

Risk factors are broadly categorized into two groups: proximate and distal. Proximate causes are modifiable risk factors that have a direct impact— such as access to healthcare and urban vs. rural inequities in India. In contrast, distal causes can have indirect effects— such as the relationship between perceived levels of social connectedness and the prevalence of depression. A distal cause can be recognized as a fundamental cause when it has four essential features mentioned previously in the discussion. Link and Phelan noticed that discoveries that intervene at proximate risk factors (such as, new treatments) make health advances for those who can peruse them. Inequities are thus constructed because these breakthroughs are linked to fundamental causes (such as, knowledge or money required to avail new treatments). Hence, they emphasize on forming policies that encourage health advances while breaking the link between advances and flexible resources.

Link and Phelan describe that a fundamental cause of disease involves “a resource that determines the extent to which people can avoid risks for morbidity and mortality” (Link & Phelan, 1995). Merely addressing broader proximate causes of diseases (such as implementing mental health awareness public campaigns) is not adequate to lead to sustainable mental health improvements for all because other distal risk factors (such as lack of mental health utilization due to social stigma and fear of discrimination) will keep perpetuating unmet mental health needs and continue producing mental health disparities. Whereas, addressing distal fundamental causes (such as social stigma against mental health) would lead to health benefits by reducing risk factors (improved use of healthcare services). Thus, fundamental causes exert indirect effects on health outcomes through their impact on risk factors.

Flexible Resources explain the link between fundamental causes and health outcomes. Flexible resources (J. C. Phelan & Link, 2013a) are key resources, including knowledge, money, power, prestige, and beneficial social connections, that individuals can employ no matter what the risk and protective factors are in a given circumstance. Flexible resources are closely tied to fundamental causes – for instance, those who have more knowledge about disease risk factors are better able to protect themselves against diseases. Thus, flexible resources can explain and/or modify the association between fundamental causes and health. Flexible resources produce health disparities – for instance before cancer treatments were available, flexible resources had no bearing upon prognosis. However, when treatments were developed, people who had the money to get the treatment were in a better position to protect themselves against cancers. Thus, in this dissertation, the Study 1 evaluates the relationship between psychosocial functioning and flexible resources, such as education, income, childhood SES.

Link and Phelan further postulated that flexible resources – money, knowledge, power, prestige, beneficial social connections – operate at both contextual and personal level and link fundamental causes to diseases (Link & Phelan, 1995). These resources are called flexible because they can be used in different ways and in different situations to influence health outcomes. For instance, some of the reasons why SES is universally linked to health is because it impacts an individual's awareness, access, and affordability of health services (Adler et al., 1994; Aneshensel & Sucoff, 1996; D. R. Williams et al., 1997). For instance, in people belong to higher social caste groups are often able to gain access to health-protective factors through their social privileges, such as education, higher income, insurance, and beneficial social connections (such as, higher levels of institutional support) that can protect them against risk factors. Research also suggests

that while Indian women are at higher risk for depression, this risk is even higher among women belonging to lower social caste categories (Kohrt et al., 2009).

Freese and Lutfey (Freese & Lutfey, 2011) refined and elaborated the fundamental cause theory by suggesting ‘meta-mechanisms’ that links flexible resources to health and provides a more explanatory theory for the universality of health disparities. The first meta-mechanism *spillover* – similar to the notion of contextualizing risk factor – describes the processes where individuals use their flexible resources to better their health and these efforts produce benefits for people who are in their social networks. For instance, others’ health-related agencies such as proactive civic-engagement aimed at reducing neighborhood exposure to toxicity would confer benefits to everyone in the neighborhood independent of their agency. The second meta-mechanism – *habitus* – describe people’s disposition to actions that reflect an actor’s social position (Cockerham, 2013; Freese & Lutfey, 2011). For instance, tobacco use is linked to an individual’s social groups and gender (Corsi et al., 2014). Final meta-mechanism – *institutions* – shine a light on the dynamic action of institutions that impact an individual’s health. For example, institutions may give differential treatment to individuals based on a fundamental cause. There is evidence of caste-based preferences and discrimination in education and in labor market in India (Pandita, 2015; Siddique, 2011).

In summary, the fundamental causes (racism, SES, stigma) shape an individual’s access to flexible resources (money, prestige, power) that can influence an individual’s risk or protective factors to affect health. Link and Phelan urge researchers to contextualize risk factors to study the social conditions under which individual risk factors are related to diseases. For instance, interventions that address the effects of social caste on mental health will be more effective to decrease the risk of depression among women from lower social caste backgrounds than

interventions that ignore these crucial contextual factors. Changing behavior, according to Link and Phelan, is ineffective if we do not have a clear understanding of the social processes that lead to the exposure of risk factors. Hence, in this Indian context, it is important to study how crucial contextual variables, such as social caste, religion, age, gender, marital status, influence the psychosocial functioning.

3.2. An Approach to Avoid Misclassification Bias

Aneshensel (2005) urged mental health researchers to evaluate a full range of theoretically derived mental health outcomes simultaneously. She argues that medical sociologists and public health researchers so far have largely used the ‘Social Etiological Model’ to identify social risk factors related to the occurrence of a particular disorder. The social etiological model often focuses on a single disorder, such as major depression. Using this model, all respondents with the disorder are treated as “positive” for the outcome under investigation and others are treated as “negative” on the outcome. However, because of the nature of this model of investigation, respondents who are not diagnosed with the particular disorder that is singled out for the investigation are considered ‘*well or healthy*’. This leads to the discounting and underestimation of comorbidities despite the evidence that psychological disorders are highly comorbid (for instance, see Jensen, Martin, & Cantwell, 1997; Kaye et al., 2004; Kessler, 1979). For instance, people who do not have depression (or have not reached a detectable stage yet) nonetheless have considerable psychological distress that affects their social interactions, cognition, sleep, are misclassified as being “well” in a traditional social etiological model that only considers depression as a focal dependent variable. This leads to undercounting the number of people affected and the extent to which a given social condition (such as social caste) affects psychosocial functioning and especially when social conditions affect more than one domain of mental health (Aneshensel, 2005b).

Studies evaluating empirical associations between indicators of social placement (such as SES, social caste) and mental health demonstrate a dynamic relationship between social positions and health disorders (Bøe et al., 2012; Kohrt et al., 2009; C. Lee et al., 2005). For example, an individual's educational attainment has a unique relationship in terms of causation versus social selection for depression, antisocial disorder, attention deficient disorder, and anxiety (Miech et al., 1999). Thus, to find these patterns, multiple indicators of mental health are simultaneously evaluated in models that cast social determinants (such as SES, education) in the role of independent variables – as a focal point of investigation. This is in line with Link and Phelan's (1995) theory that treats social placement (in terms of education, income) as a fundamental cause of diseases, including mental health. Therefore, even though the prominent disorder-specific research design based on the social etiological model is appropriate for research questions that seek to understand causes of one the psychological disorder singled out for the investigation, it is not fitting for research where the goal is to emphasize the consequences of various social structures of people's overall mental health and life (Aneshensel, 2005b).

A central focus of this dissertation is to describe whether social conditions in terms of sociodemographic characteristics shape people's psychosocial functioning in India. My goal is not to identify the factors associated with a particular mental health disorder, but rather, to examine how society impacts the individual's psychosocial functioning and whether the levels of psychosocial functioning vary based on people's social arrangement (i.e. social caste, location of residence, gender). Therefore, in this context, Aneshensel's (2005) argument that when the goal is to study the mental health impact of a social attribute, a full range of relevant outcomes needs to be considered at the same time, is useful. Therefore, this dissertation evaluates seven indicators of psychosocial functioning simultaneously among adult men and women.

3.3. Application of the Fundamental Cause Theory and Misclassification Bias to the Present Study

Integration of two perspectives, one that urges researchers to highlight the importance of sociodemographic characteristics to creates disparities and the other that allows the examination of multiple indicators of psychosocial functioning simultaneously, provides an additional layer and a more expansive approach. Using the fundamental cause theory to study the psychosocial functioning shifts our attention from passively describing sociodemographic inequalities or treating sociodemographic characteristics merely as control variables to an in-depth exploration of sociodemographic patterns in psychosocial functioning that lead to inequities. Also given the paucity of public health theories specific to the Indian context, this proposed framework provides a testable framework to generate research in this area.

There are numerous benefits of using the fundamental cause theory to study the relationship between psychosocial functioning, sociodemographic characteristics, and physical health in India. The socio-cultural, geographical, and linguistic diversity of India cannot be overstated. For instance, there are more than 3000 recognized sub-castes that differ in their primary language, social norms, history, culture, religious traditions, and geographic locations. Therefore, the heterogeneous nature of the Indian population requires a framework that guides the study of health by considering a wide array of historical, cultural, biological, legal factors. Thus, the fundamental cause theory is useful in this context for examining social conditions that lead to health disparities.

Although it is clear how the SES, including income, education, lead to health disparities in India, it is not clear whether there are also sociodemographic patterns in the indicators of psychosocial functioning, such as social connectedness, sleep, cognition. There is research to suggest that way personal and social resources develop and operate may be different for socially

exploited, marginalized, and/or disadvantaged groups (Gallo et al., 2005). There is a need to establish the levels of psychosocial functioning among various population subgroups of India and to understand the relationship between psychosocial functioning and physical health outcomes in these populations.

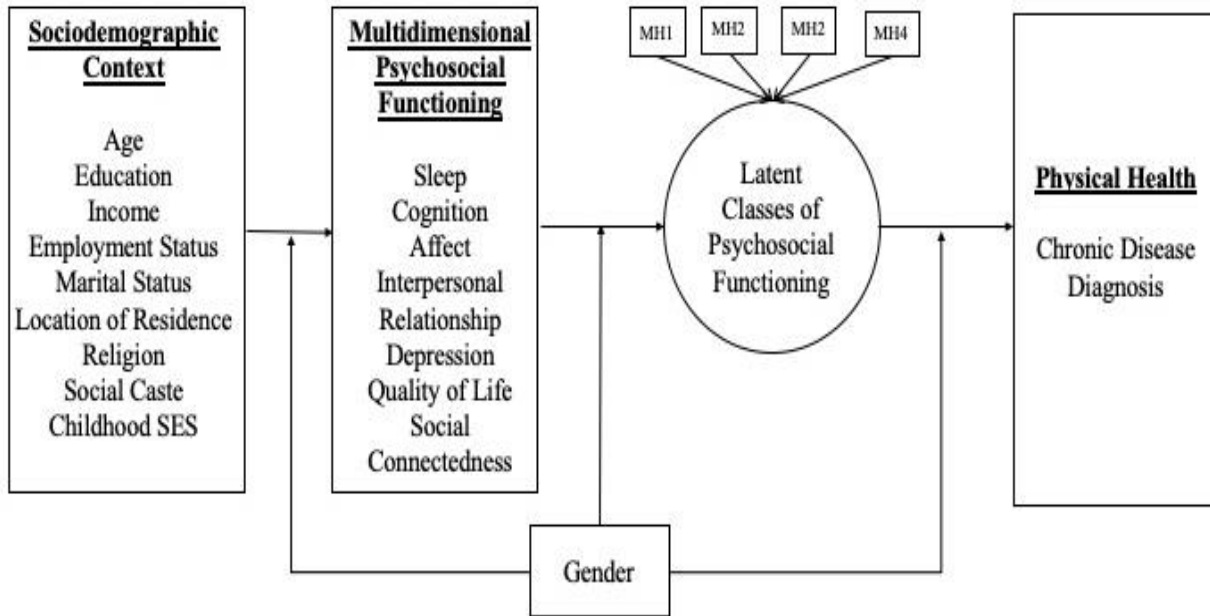
Application of the fundamental cause theory addresses two important research gaps discussed in this dissertation: (1) the lack of research to explain sociodemographic patterns in the psychosocial functioning among the Indian population; (2) the paucity of research to explain the relationship between holistic psychosocial functioning and the physical health outcomes among this population. In the present study, these two theories are applied to make several major new contributions to the growing mental health literature in India. First, there is currently inadequate research to explain whether an individual's psychosocial functioning in India varies based on their sociodemographic characteristics, such as gender, age, area of residence, caste, religion, and SES. In this context, the fundamental cause theory is useful to highlight the linkages between sociodemographic contextual factors and psychosocial functioning that have the potential to shape the individuals' physical health outcomes. Second, most of the existing literature focuses on the common mental health and physical health disorders among the Indian populations. Thus, drawing from Aneshensel's arguments regarding the avoidance of misclassification bias in mental health research, this is one the first studies to explore multidimensional indicators of psychosocial functioning among the Indian population and examine how it relates to the chronic disease diagnoses outcomes among this population.

3.4. Overarching Conceptual Framework

In this section, I explain my conceptual framework for understanding the relationship between mental health, physical health, and social determinants among Indian men and women.

The theory of the fundamental cause of diseases Link and Phelan (1995) and Aneshensel's (2005) recommendation of avoiding the misclassification bias is used to conceptualize the study model.

Figure 1. Conceptual Model



Overarching Dissertation Goal: To evaluate the socioeconomic patterns of psychosocial functioning among Indian men and women and create distinct homogenous sub-groups of the multidimensional psychosocial functioning to investigate the relationship between psychosocial functioning and chronic diseases among Indian adults.

Study #1 Goal: To examine the relationship between sociodemographic context and psychosocial functioning among Indian adult men and women.

Study #2 Goal: To create latent classes of the multidimensional indicators of psychosocial functioning and investigate the relationship between psychosocial latent classes and sociodemographic characteristics.

Study #3 Goal: To evaluate the relationship between psychosocial latent classes and physical health status, namely chronic disease diagnosis.

This dissertation primarily evaluates the link between social determinants and mental health and assesses the association between mental and physical health among Indian men and

women. Although this association is clear in research from other countries, there is relatively little evidence to elucidate nuances of association between mental and physical health in India. Furthermore, there is also an overall paucity of research that explains how sociodemographic characteristics pattern psychosocial functioning among Indian adults. This research gap creates two main limitations in the literature: one, we do not have information about the existing psychosocial resources among the population subgroups based on their psychosocial functioning. The knowledge of existing psychosocial resources, and lack thereof, is essential for creating effective public health programs. Second, we do not have information about the social conditions and sociodemographic characteristics that create disparities in psychosocial functioning among Indian adults. This is an important research gap given the sociodemographic diversity among Indian populations. Furthermore, social behaviors and norms in India are deeply entrenched in the indicators of social hierarchy, such as one's social caste, gender, marital status, religion. Therefore, it is important to understand how these sociodemographic variables pattern psychosocial functioning among population subgroups.

Building from fundamental cause theory and discussion of misclassification bias, I propose an integrated framework to explain how social determinants influence health outcomes in India. First, in dissertation study 1, I assess sociodemographic patterning of multidimensional indicators of psychosocial functioning outcomes. The integrated model suggests that the individuals' sociodemographic context influences their psychosocial functioning and this relationship between different based on the individual's gender. I begin by evaluating the relationship between gender and multidimensional indicators of psychosocial functioning controlling for all other sociodemographic factors. If there is a significant relationship between gender and psychosocial

functioning, then the relationship between sociodemographic factors and multidimensional indicators of psychosocial functioning will be analyzed separately for men and women.

Next, in dissertation Study 2, I will create latent classes of psychosocial functioning. Because the purpose of this dissertation is to evaluate the psychosocial functioning as a whole, instead of taking a disease-specific approach, seven indicators of mental health wellbeing will be used to create latent classes representing distinct classes of multidimensional psychosocial functioning among Indian men and women. The seven indicators include self-reported cognitive difficulties, interpersonal difficulties, affect, depressive symptomology, and sleep difficulties, quality of life, social connectedness.

Next, I will examine whether the membership of latent classes of psychosocial functioning varies based on an individual's sociodemographic context (study 2). The psychosocial functioning latent variable is represented in a circle and corresponding latent classes are represented in rectangles. The notion of contextualizing the risk factors and disease outcomes is one of the main tenets of Link and Phelan's (1995) theory of fundamental cause. In India, social context varies largely between cities and villages: culture, language, and hierarchical social norms based on gender and age and also access, availability and affordability of basic health infrastructural resources are starkly different depending on the location of residence. The rural vs. urban physical health divide is also firmly established in India, particularly for maternal and child health, health risk behaviors, and communicable diseases in India (A. Kumar & Singh, 2013, 2016; Saikia et al., 2013; P. K. Singh, 2013). However, whether psychosocial functioning also differs in rural and urban Indian is not known. Therefore, in study 2, I examine whether the membership to psychosocial functioning latent classes is different based on respondents' sociodemographic characteristics.

Finally, the integrated model suggests that there is a relationship between physical health in terms of chronic disease diagnosis and the latent classes of psychosocial functioning among Indian men and women controlling for sociodemographic context. There is a strong relationship between occurrence, management, prognosis, and consequences of chronic diseases and psychosocial functioning (Kimble et al., 2011; Schneiderman et al., 2001a; von Ruesten et al., 2012). Therefore, study 3 evaluates the relationship between latent classes of psychosocial functioning created based on multidimensional indicators and chronic disease diagnosis.

There are several caveats to this model. First, gender is not measured comprehensively in the dataset used for the dissertation and rather reported as a binary variable (male and female). Second, health behaviors are an important mechanism through which sociodemographic factors create health impacts. Link and Phelan have revised their theory to add habitus (behavior) as one of the important mechanisms through which flexible resources impact health (Phelan et al., 2010). However, behaviors (protective and risky) are not included in the model, as they are not being analyzed in the study. Finally, Phelan et al., (2010) also recognize the importance of institutions to create health inequities. In this context, institutions are private and public healthcare facilities. However, medical institutions are not included in the model.

In summary, the first study examines the relationship between sociodemographic context and multidimensional indicators of psychosocial functioning among Indian men and women. The second study then creates latent classes of psychosocial functioning and examines whether the membership of the latent classes depends on the sociodemographic characteristics of the respondents. Finally, the third study determines the association between the latent classes of psychosocial functioning and physical health status, namely, chronic disease diagnosis.

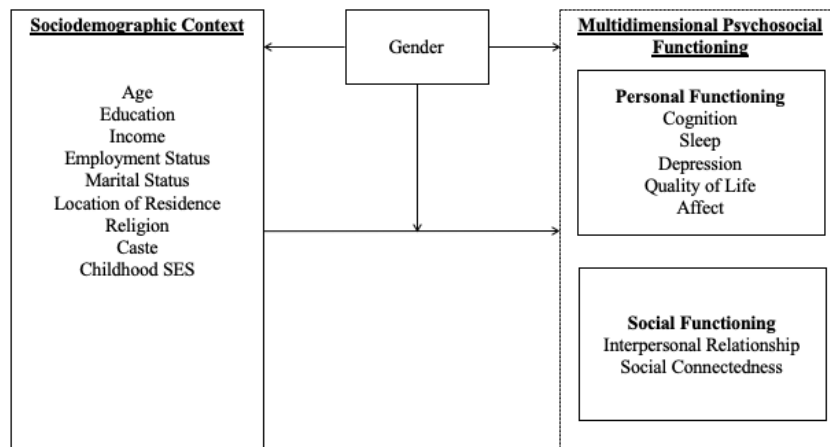
CHAPTER 4. PROJECT OVERVIEW

This dissertation consists of three studies:

Study 1: The Evaluation of Multidimensional Indicators of Psychosocial Functioning and Its Sociodemographic Correlates among Indian Adults: WHO SAGE Study (2007-2010).

Overall goal: Evaluate the sociodemographic correlates of multidimensional indicators of psychosocial functioning among Indian men and women.

Figure 2. Concept Map for Study 1



Aim # 1: Evaluate gender differences in the levels of psychosocial functioning in India

Hypothesis #1.1: Controlling for sociodemographic variables, women will have a greater level of cognitive-, sleep-, affect-, and interpersonal difficulties, lower quality of life, higher likelihood of depression, and lower perceived social connectedness than men.

Aim # 2: Assess sociodemographic differences in the levels of psychosocial functioning among Indian men and women.

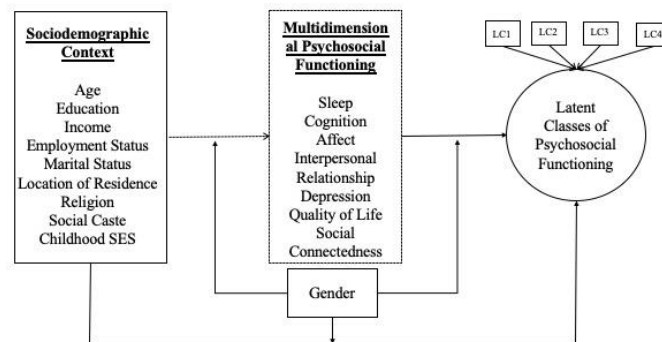
Hypothesis #2.1: Socioeconomic variables (namely, age, education, income, employment status, marital status, location of residence, religion, caste, and childhood SES) will be related to multidimensional indicators of psychosocial functioning among men.

Hypothesis #2.2: Socioeconomic variables (namely, age, education, income, employment status, marital status, location of residence, religion, caste, and childhood SES) will be related to multidimensional indicators of psychosocial functioning among men.

Study 2: A Latent Class Analysis Approach to Evaluate the Multidimensional Nature of Psychosocial Functioning and Its Sociodemographic Correlates in the Indian Context

Overall goal: Identify latent classes of the multidimensional indicators of psychosocial functioning among Indian men and women and examine their sociodemographic correlates

Figure 3. Concept Map for Study 2



Aim 1: Identify distinct latent classes of psychosocial functioning among men and women.

Hypothesis 1.1: There are underlying unobserved latent classes that divides the adult Indian women population into mutually exclusive and exhaustive latent sub-groups.

Hypothesis 1.2: There are underlying unobserved latent classes that divides the adult Indian men population into mutually exclusive and exhaustive latent sub-groups.

Aim 2: Examine the sociodemographic characteristics associated with membership in different latent classes of psychosocial functioning.

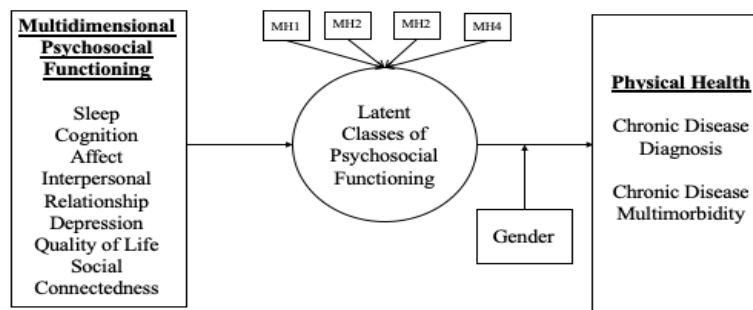
Hypothesis 2.1: Women's membership to psychosocial latent classes will vary based on their reported sociodemographic context.

Hypothesis 2.2: Men's membership to psychosocial latent classes will vary based on their reported sociodemographic context.

Study 3: An Examination of the Relationship between Psychosocial Functioning and Physical Health among Indian Men and Women: A Latent Class Analysis

Overall goal: To evaluate the extent to which the psychosocial functioning latent class membership is associated with physical health outcomes among Indian men and women, controlling for sociodemographic characteristics.

Figure 4. Concept Map for Study 3



Aim # 1: Evaluate the relationship between the latent classes of psychosocial functioning and diagnosis of a chronic disease condition (namely, hypertension, angina, asthma, arthritis, and chronic lung diseases)

Hypothesis #1.1: Controlling for sociodemographic characteristics, men’s likelihood of diagnosis of a chronic condition will be different based on their latent class categorization of psychosocial functioning.

Hypothesis #1.2: Controlling for sociodemographic characteristics, women’s likelihood of diagnosis of a chronic condition will be different based on their latent class categorization of psychosocial functioning.

Aim # 2: Evaluate the relationship between the latent classes of psychosocial functioning and chronic disease multimorbidity

Hypothesis #2.1: Controlling for sociodemographic characteristics, men’s likelihood of a chronic multimorbidity will be vary on their latent class categorization of psychosocial functioning.

Hypothesis #2.2: Controlling for sociodemographic characteristics, women’s likelihood of a chronic multimorbidity will be vary on their latent class categorization of psychosocial functioning.

CHAPTER 5. STUDY DATASET

This section provides a description of research dataset used in this dissertation to evaluate psychosocial functioning in India. This dissertation is based on data from the World Health Organization's SAGE (WHO Longitudinal Study of Global Aging and Adult Health) Wave 1 2007-2010. SAGE covers a broad range of topics, with a focus on health, disability, risk factors, stress, happiness, social networks, economic well-being, care-giving, health care utilization and health systems responsiveness (Kowal et al., 2010). This dataset was chosen because this is one of the few nationally representative and publicly available datasets that includes variables measuring multiple dimensions of psychosocial functioning, including depression, quality of sleep, social connectedness, quality of life, negative affect, interpersonal interaction, cognition, and chronic non-communicable disease outcomes. The WHO uses standardized sampling procedures, administration protocols, interviewer training and questionnaire design, translational protocols and variable definitions, which allowed for enough statistical power for this analysis. The survey instruments used in this study have been validated for Indian populations using a subset of the sample (Kowal et al., 2010; Ng et al., 2009).

5.1 SAGE Survey Sampling

The sampling strategy for the WHO SAGE is reported by Kowal et al (2012). The WHO SAGE respondents were selected using a stratified, multistage, random cluster sampling design (Kowal, Williams, et al., 2012). The following survey sampling and data collection procedures are reported in WHO SAGE handbook. The primary sampling units (PSU) were stratified by region and location using the Census Enumerated Area (CAE) as the sampling frame. Within each stratus, enumeration areas were selected independently with probability proportional to the size of the region. All respondents were adults (18 years or older). At the time of data collection, India had

29 states and seven union territories. 19 of the 28 states were included in the design representing 96% of the population. Six states were selected based on their geographic location and level of development. Strata were defined by the 6 states: Assam, Karnataka, Maharashtra, Rajasthan, Uttar Pradesh and West Bengal, and the respondent's location of residence (urban or rural). There are 12 strata in total. The 2000 Census demarcation was used as the sampling frame. Two stage and three-stage sampling were adopted in rural and urban areas, respectively. PSUs in rural areas (villages) and in urban areas (city wards) were selected probability proportional to size. The measure of size was the 2001 Census population in the village. SSUs (households) were selected using systematic sampling. TSUs (individuals) were selected using Kish tables. A sample of 379 EAs was selected as the primary sampling units (PSU; Kowal, Williams, et al., 2012).

5.2 SAGE Respondents.

The SAGE sample was pre-determined as all PSUs and households selected for the WHO Health Study (WHS)/SAGE Wave 0 survey were included. The data from WHO SAGE Wave 0 and 1 were linked based on unique household identifiers, individual identifiers, location, and sex. All samples from WHO SAGE 0 who were 50+ years of age were visited again in SAGE 1. All interviewers to collect data from respondents used standardized comprehensive interview guide developed by WHO SAGE. Proxy respondents were identified to respond on behalf of selected individual respondents who were unable to respond for themselves. Respondents were not required to be able to read and write. However, depending on their age, maturity, and cognition, as well as the place where they come from, written prompts were provided to respondents. All interviews were expected to last for 90 to 120 minutes depending on the nature of respondents. The preferred condition for interviewing respondents was in private, with no other member of the household present. If total privacy is not possible, the respondents were given an option to be interviewed

outside the house or where the respondent felt comfortable discussing sensitive matters (Kowal, Williams, et al., 2012).

Household weights for analysis at household level and individual weights for analysis at person level were calculated. These were based on the selection probability at each stage of selection. Individual weights were post-stratified by the six states, locality, sex and age groups (18-49, 50-59, 60-69, 70+) according to the 2006 projected population estimates. Household response rate and cooperation rate was 88% and 92% respectively. Individual response rate was 68% and cooperation rate was 92%.

**CHAPTER 6. STUDY ONE: EVALUATION OF THE MULTIDIMENSIONAL
INDICATORS OF PSYCHOSOCIAL FUNCTIONING AND ITS
SOCIODEMOGRAPHIC CORRELATES AMONG INDIAN ADULTS: WHO SAGE
STUDY (2007-2010)**

6.1. Introduction

Life expectancy for the Indian population is on the rise – however, the overall progress in the country’s health status suffers from wide-spread sociodemographic disparities that reflect historical and cultural inequities among population subgroups (Borooah, 2010; Dandona et al., 2017). Moreover, as the expansion of healthcare infrastructure in India has largely been limited to the prevention, diagnosis, and treatment of physical health ailments, the mental health needs of its citizens have not been a priority (Patel et al., 2016). In fact, a recent national survey of mental health found that the lifetime prevalence of a mental health disorder to be 13.7% and reported that currently, around 150 million Indians are in need of mental health services (Gururaj et al., 2017). Moreover, there is also limited understanding of the overall levels of psychosocial functioning among Indian populations. Existing research suggests that the multidimensional indicators of psychosocial functioning, such as quality of sleep, level of cognition, quality of interpersonal relationships, affect, are critical building blocks of our physical and mental health (Luyster et al., 2012; Umberson & Montez, 2010). However, psychosocial functioning has not been widely examined within India. Thus, there is a need to create an evidence base to enhance our understanding of psychosocial functioning and its determinants among Indian women and men.

Psychosocial functioning plays an important role in an individual’s daily experiences and influences their behaviors, thoughts, and actions. In relationship to population health, the World Health Organization’s International Classification of Functioning (WHO ICF; World Health

Organization, 2001) defines functioning as an umbrella term that includes multiple categories – bodily functioning (i.e. physiological, psychological, and structural aspects), individual functioning, and social participation. In this context, disability is defined as a dysfunction occurring in any of these three categories – bodily impairments, activity limitation, and participation restrictions. Furthermore, the WHO also emphasizes studying contextual factors to comprehensively assess individual functioning (Badley, 2008). These contextual factors include (a) environmental factors such as social, institutional, cultural considerations, and built environment; and (b) personal factors such as gender, race, age, and financial assets. Therefore, psychosocial functioning needs to be studied together with the contextual correlates, such as relevant sociodemographic characteristics. These contextual correlates are viewed as scene-setters (i.e. variables that apply to everybody, such as gender and age) and are thought to act as facilitators and/or barriers to psychosocial functioning. Thus, drawing on the WHO IFC definition of human functioning, the present study operationalizes psychosocial functioning into two main categories: (1) personal psychological functioning and (2) social functioning. Personal functioning is an individual’s perception of their functioning in terms of sleep, cognition, negative affect, the quality of life, and experience of depression. Social functioning includes perceived quality of interpersonal relationships and perception of social connectedness with significant others, peers, colleagues, community, and society. This study incorporates social and personal factors in psychosocial functioning because these factors are amenable to change and can be potentially targeted in health interventions.

An individual’s location in their social structure greatly influences the availability of and their access to resources that enhance psychosocial functioning (Link & Phelan, 1995; Turner & Marino, 1994). Given the vast geographical, linguistic, cultural, religious diversity in India and a

social structure deep-seated in social hierarchies, understanding how membership in different population sub-groups influences individual functioning is important for a multitude of reasons including implementation of interventions and development of health policies among others. Currently, no studies explain the multidimensional nature of psychosocial functioning among Indian population subgroups using one or more psychometrically strong and valid measures. Another limitation in the Indian public health literature is the limited attention given to understanding gender-based intersectionality in psychosocial functioning. There is an urgent need to bridge this research gap, especially because India is still deeply rooted in gendered norms that dictate individual behavior (Nielsen & Waldrop, 2014; Perkins et al., 2016a). Therefore, the effects of sociodemographic characteristics on psychosocial functioning are perhaps differ based on gender. In light of these research gaps, the present study seeks to examine sociodemographic variations in psychosocial functioning among Indian adults, among men and women. Therefore, this study aims to contribute to our current understanding of psychosocial functioning, which is the underlying building block of mental and physical health, and to describe the sociodemographic patterns in the psychosocial functioning among Indian men and women.

6.2. Background

6.2.1. Theoretical Rationale

Aneshensel (2005) encourages health researchers to evaluate a full range of theoretically derived outcomes simultaneously to inform our understanding of how social conditions affect overall health. She argues that medical sociologists and public health researchers so far have largely used the ‘Social Etiological Model’ to identify social risk factors related to the occurrence of a particular disorder. The social etiological model often focuses on a single disorder, such as anxiety disorder, and all respondents with the disorder are treated as ‘positive’ for the outcome

under investigation and others are treated as ‘negative’ on the outcome. However, because of the inherent nature of such a model of investigation, respondents who are not diagnosed with the particular disorder that is singled out for the investigation are considered ‘well’. This leads to the discounting of psychological and physical comorbidities despite the clear evidence that psychological disorders are highly comorbid (for instance, see Jensen, Martin, & Cantwell, 1997; Kaye et al., 2004; Kessler, 1979). For instance, people who do not have depression (or have not reached a detectable stage yet) can nonetheless have considerable psychological distress that affects other components of their psychosocial wellbeing, such as their social interactions, cognition, and sleep. Under the social etiological model, researchers may run in the risk of misclassifying these individuals as being ‘well’ by simply considering depression as the only focal outcome variable. This leads to undercounting of the number of people affected by a given social condition (such as the built environment; Aneshensel, 2005). Thus, the goal of the present study is to conduct a comprehensive examination of the relationship between sociodemographic characteristics and a full range of relevant indicators of psychosocial functioning.

Most scholars agree that disparities in physical and mental health are often linked to inequities that come from social stratification in the population (McLeod & Nonnemaker, 1999). A bulk of research from all over the world demonstrates the inverse relationship between socioeconomic disadvantage and physical and psychosocial functioning (Adler et al., 1994; Aneshensel & Sucoff, 1996; Luo & Waite, 2005; Y. Yu & Williams, 1999). The unique urgency of examining how sociodemographic factors influence psychosocial functioning in India cannot be overstated as almost 363 million Indians (29.5% of India’s total population) live below poverty lines and experience wide-spread disadvantage. Evaluation of the sociodemographic correlates of common psychological disorders and physical health disorders in India is receiving increasing

research attention (Vellakkal et al., 2013). Yet, there are still many gaps in knowledge regarding the fundamental mechanisms that create sociodemographic inequities in health in India. Moreover, a majority of these studies analyze psychosocial functioning as a health outcome of a disorder or predictor of a disorder. For example, cognitive and sleep difficulties among Indian adults are often assessed in context of common mental health disorders, such as depression or schizophrenia (M. Ganguli et al., 1999; Srinivasan & Tirupati, 2005). Without this underlying information, vulnerable population groups are at risk of being hidden and marginalized, leading to even greater unmet psychosocial needs among populations, and disparities in health. Therefore, the primary objective of the current study is to analyze the focal relationships between sociodemographic characteristics and indicators of psychosocial functioning among Indian adult women and men. The Fundamental Cause Theory (Link & Phelan, 1995) is particularly relevant and useful in this context.

Link & Phelan (1995) argue that fundamental social conditions, such as SES or stigma, create health inequities. A fundamental social cause has four essential features that help to maintain and perpetuate inequities. First, it influences multiple disease outcomes; secondly, it affects these disease outcomes through multiple risk factors; thirdly, it involves access to resources that can be used to avoid risks or minimize negative consequences of disease if it occurs; and finally, the association between a fundamental cause and health is reproduced overtime via replacement of intervening mechanisms. For example, poverty is widely established as one of the biggest correlates of virtually all health disorders in India and other countries (Dipankar Gupta, 2000; Peters et al., 2008; Wagstaff, 2002). These reproducible features make the relationship between fundamental causes and health obstinate and create a health gradient based on population subgroups. Link and Phelan further postulated that individuals' flexible resources – money, knowledge, power, prestige, beneficial social connections link fundamental causes to diseases

(Link & Phelan, 1995). These resources are called flexible because they are available both at the contextual and personal level and can be used in different ways and in different situations to influence health outcomes. Hence, it is crucial to contextualize risk factors and study the social conditions under which individual risk factors are related to diseases.

In this context, individuals' psychosocial functioning is a suitable measure to overcome the misclassification bias and assess population health. Psychosocial functioning encompasses a broad range of indicators that serve as building blocks of an individuals' daily wellbeing and influences their health status. Therefore, the use of a wide array of indicators helps us prevent overreliance on one type of indicator to gauge population health. Similarly, because there is a need to explain how psychosocial functioning is patterned based on sociodemographic indicators in India. This information is especially essential in India owing to the wide diversity in terms of cultural, linguistic, geographical, infrastructural, and social aspects of lived experiences of populations. Thus, in order to plan health interventions, guide health policy development, and inform public health research and practice, it is important to know how sociodemographic characteristics influence psychosocial functioning in the Indian context. Similarly, given the deeply rooted gendered norms of behavior, it is possible that gender is also one of the key determinants of psychosocial functioning and health in India. Thus, this study aims to examine the psychosocial functioning and evaluate its sociodemographic correlates separately among Indian men and women.

6.2.2. Psychosocial Functioning

Psychosocial functioning is used in the existing literature to evaluate the effects of treatment and interventions, to study factors that are associated with the development and prognosis of disorders, to evaluate longitudinal recovery and adjustment to acute disorders and/or

chronic conditions. Thus, a plethora of studies evaluate different facets of psychosocial functioning (for example, perceived quality of life, depressive symptomology) as an outcome and/or as predictors of mental and physical wellbeing. For example, a bulk of research evaluates social isolation as a predictor of premature mortality (Holt-Lunstad et al., 2015). Likewise, decreased social connectedness is also evaluated as an outcome of living with a stigmatized disorder, such as HIV (Chiu et al., 2008). Despite the frequent use of psychosocial functioning to assess human health, surprisingly little is known about the social distribution of psychosocial functioning, especially in the Indian context.

Furthermore, the study of psychosocial functioning in public health literature has dramatically skewed toward the study of disorders and as such, the knowledge of social correlates of psychosocial functioning independent of a disorder diagnosis is scant in the Indian context and also other countries (Ro & Clark, 2009). Rather, various components of psychosocial functioning have been studied in conjunction with a specific disorder in India and in other countries (for example see studies, Kohn & Schooler, 1973; Rodrigue, Morgan, & Geffken, 1990; Sears & Conti, 2002; Singh, Bassi, Junnarkar, & Negri, 2015; Singh, Junnarkar, & Sharma, 2015; Suurmeijer, Reuvekamp, & Aldenkamp, 2001). Lack of information on the psychosocial functioning independent of any disease diagnosis is a key research gap because it prevents our understanding of how and why some of the indicators of psychosocial functioning vary between different subgroups of the population. Furthermore, over-reliance on using the lens of common mental health and physical health diseases to study population wellbeing and overlooking the available psychosocial resources also constrains our comprehensive understanding of protective and risk factors among different population subgroups. Identifying sociodemographic patterning of psychosocial functioning will also highlight the role of social determinants of health in India –

opportunities for psychosocial wellbeing are not equally distributed and are highly correlated with social conditions and other life-course related variables, such as SES in childhood, current SES, and other contextual socioeconomic correlates such as the area of residence, marital status. Therefore, the inequities observed in health may be deeply rooted in the inequities found in the variations in the psychosocial functioning based on these fundamental sociodemographic correlates. Therefore, this study also gathers evidence base to describe how psychosocial functioning measured in terms of personal and social functioning vary among Indian population subgroups.

6.2.3 Determinants of Psychosocial Functioning

The availability and access to resources that enhance psychosocial functioning vary based on individual's socioeconomic and cultural standing. (Link & Phelan, 1995; Turner & Marino, 1994). Given the vast geographical, linguistic, cultural, religious diversity in India and a social structure deep-seated in social hierarchies, understanding how membership in different population sub-groups influences individual functioning is important for a multitude of reasons including implementation of evidence-based public health interventions and development of health policies among others. Currently, no studies explain the multidimensional nature of psychosocial functioning among Indian population subgroups using one or more psychometrically strong and valid measures. Another limitation in the Indian public health literature is the lack of attention given to understanding gender-based intersectionality in psychosocial functioning. There is an urgent need to bridge this research gap (Nielsen & Waldrop, 2014; Perkins et al., 2016a). Therefore, the effects of sociodemographic characteristics on psychosocial functioning are perhaps differ based on gender. In light of these research gaps, the present study seeks to examine

sociodemographic variations in psychosocial functioning among Indian adults, among men and women.

In addition, there is strong evidence to suggest that women experience higher levels of negative affect and are twice as likely to experience depression than men (Nolen-Hoeksema, 2001). Interestingly, evidence also suggests that there are no gender differences in the experience of happiness between men and women (Fujita et al., 1991; Mahon et al., 2005). Research suggests that women also experience other intense positive emotions, such as quality of social support and level of social connectedness (Reevy & Maslach, 2001; Shumaker & Hill, 1991; Vaux, 1985). Some researchers argue that experience of other intense positive psychosocial resources balances out women's higher levels of negative affect (Fujita et al., 1991). Likewise, Turner & Marino (1994) notably demonstrate that women experience both – higher levels of social support as well as psychological distress. It follows then that although the risks of common psychological disorders, such as depression, are higher among women; women have other psychosocial resources that may improve their overall psychosocial functioning. Thus, it is important to explore multiple dimensions of psychosocial functioning among men and women that go beyond evaluating psychosocial health based on the diagnosis of common mental disorder. Therefore, this study aims to assess the sociodemographic patterns in indicators of psychosocial functioning, separately for women and men.

6.2.4. Components of Psychosocial Functioning and its Association with Sociodemographic Characteristics

Historically, health research in India has been predominantly limited to physical health research. In recent years, researchers have begun paying attention to the psychological dysfunction and disorders among the Indian population, including common mental health disorders such as

depression and generalized anxiety disorder (see Grover, Dutt, & Avasthi, 2010; Patel et al., 2010). However, the studies of psychosocial resources and wellbeing among this population are scarce compared to investigations of physical ailments and common mental health problems. This creates a significant research gap that limits the comprehensive understanding of health among this population. Although indicators of psychosocial functioning, including sleep, affect, cognition, depression, have been studied widely in western countries, most studies evaluate these indicators as treatment or disease outcomes for various subgroups of populations. This section describes the current research on sociodemographic correlates of psychosocial functioning and discusses key gaps in current understanding, especially in the Indian context.

Personal Functioning

Negative affect

Seminal work by Watson, Clark, and Carey demonstrates that negative affect is one of the strongest predictors of psychiatric disorders, particularly depression and anxiety (Watson et al., 1988; Watson & Clark, 1984). Borrowing from Watson et al and Tellegen (1985) definition of negative affect, this study operationalizes negative affect as general subjective distress that includes a variety of aversive moods such as worry, nervousness, sadness, and loneliness. Tellegen also argues that mental health researchers need to study social correlates of negative affect, as our understanding of common mental health disorders would profit from an improved understanding of nature and correlates of negative affect. Hence, in the current study, the aim is to enhance our knowledge of key sociodemographic correlates of the experience of negative affect among Indian adults. The relationship between negative affect and sociodemographic factors has been studied in the United States (Watson et al., 1988). However, this relationship has not been explored in the Indian context. There is a very limited amount of research to describe how negative affect varies

based on sociodemographic characteristics among Indian adults. There is some evidence to suggest that negative affect is higher among women and older adults (Anas & Akhouri, 2013), rural women (K. Singh et al., 2014), and among women who were not working as compared to employed Indian women (Nathawat & Mathur, 1993). Nevertheless, some of the key limitations of these studies include a lack of representative sample and lack of psychometrically validated measures. Thus, the present study adds to the literature by describing the sociodemographic correlates of negative affect among Indian adults. Because negative affect is strongly related to common affective disorders, it is especially important to study negative affect among Indian populations.

Depression

A bulk of research explains the sociodemographic correlates of depression among Indian adults (Gorrindo et al., 2013; Sandeep Grover et al., 2010, 2010; Vellakkal et al., 2013). Evidence suggests that a greater number of depressive symptoms are associated with older age, low SES, female gender, divorce, bereavement, employment in informal sector, physical diseases, and illiteracy in India (Brinda et al., 2016; M. Ganguli et al., 1999; Sandeep Grover et al., 2010; Poongothai et al., 2009b; Sengupta & Benjamin, 2015; S. P. Sinha et al., 2013). While the urban-rural inequities in physical health are widely documented in India (Cowling et al., 2014), research findings that describes rural/urban disparities in psychosocial health are mixed. Some studies suggest that while rates of depression are slightly higher among urban populations (Sengupta & Benjamin, 2015), other researchers argue that overall prevalence rates of depressive disorders, such as depression and anxiety, do not differ greatly between urban vs. rural areas in India (H. C. Ganguli, 2000). Therefore, there is a need to clarify sociodemographic nuances in the experience of depression in India.

Sleep

Sleep is one of the most important biological drives of our lives and plays an important role in longevity and health (Mazzotti et al., 2014; Zepelin & Rechtschaffen, 1974). There is ample evidence to demonstrate that sleep has direct association with cancer (Sateia & Lang, 2008), diabetes (Zizi et al., 2010), hypertension (Calhoun & Harding, 2010), depression (Tsuno et al., 2005), obesity (Cappuccio et al., 2008) and multiple other common health disorders (Luyster et al., 2012). Gender differences in sleep are also well-established – women experience higher levels of sleep difficulties than men (Arber et al., 2009; Groeger et al., 2004; Sekine et al., 2006; B. Zhang & Wing, 2006). These gender differences in sleep quality have been explained using genetic and physiological differences (Dzaja et al., 2005; Manber & Armitage, 1999), but social explanations of these gender differences, such as childcare, gender-role stress, have received inadequate research attention. There is an overall paucity of literature to uncover how social factors influence sleep quality among Indian population subgroups. Sleep may be a mechanism through which sociodemographic disadvantaged is linked to health inequities – an area of research that has been given inadequate attention. Thus, there is a dearth of literature to describe the relationship between sleep and a wide range of sociodemographic characteristics. Sleep difficulties perhaps represent an unrecognized public health issue facing India, especially given the rapidly aging of the population, changes in family structure resulting from economic and labor market changes, and epidemiological transitions (Stranges et al., 2012). Thus, the present study takes a closer look at the sociodemographic correlates of sleep among adult Indian men and women.

Cognition

Cognitive difficulties have been explored as disease outcome in relationship with neurological, physical health disorders and aging. Increased cognitive difficulties are considered

as some of the common effects of physical health diseases (Katz et al., 2004; Reid-Arndt, 2009; Ribai et al., 2007; Thompson et al., 2011) and mental health disorders (Chamelian & Feinstein, 2006; Hollocks et al., 2014). Furthermore, social disadvantage has also been associated with cognitive difficulties. For example, unemployment (Fryer & Warr, 1984), being a foster care system (Cepukiene & Pakrošnis, 2011), experience of emotional abuse and neglect (Glaser, 2002), and experience of adverse early life stress and events (Pechtel & Pizzagalli, 2011; Van den Berg et al., 2010) are linked to increased cognitive difficulties. However, there is a paucity of research to demonstrate the relationship between overall sociodemographic characteristics and cognitive difficulties independent of any physical or psychological disorders, especially among Indian populations. Thus, the present study aims to add to the literature that demonstrates how sociodemographic characteristics influence experiences of cognitive difficulties among Indian men and women. This will also shed light on any subgroups of populations that are especially vulnerable to cognitive difficulties.

Quality of Life

Drawing from the World Health Organization's definition, in this paper quality of life is operationalized as individual's perception of their life in the context of the society-specific culture and values, and individual's perception of their life with regard to individual's goals, expectations, standards, and concerns (World Health Organization, 1996). This definition reinforces that quality of life is a subjective evaluation that is rooted in the cultural and societal environment specific to the respondent. There is strong evidence to demonstrate that quality of life is impacted by SES, race, gender and health status (Cherepanov et al., 2010; Cramer et al., 2006; Lubetkin et al., 2005; Perez et al., 2005). However, similar to limitations of research on cognition and sleep, research on the quality of life has been focused on evaluating quality of life as an impact of a particular disorder

in the Indian context (for example, see Durai & Nair, 2015; Mankar et al., 2011; Nirmal et al., 2008; Ramachandran et al., 2012). However, the effect of social and demographic conditions on quality of life has received very little research attention. The present study is one of the first studies to evaluate the relationship between sociodemographic characteristics and quality of life among Indian women and men using a nationally representative sample.

Social Functioning

Social Connectedness

There is a clear link between social connection and an individual's health – adults who are socially isolated and less integrated are more likely to die earlier than people who are socially connected. Social connections influence the risks of developing diseases, recovery from diseases, and foster cumulative advantage or disadvantage for health over the life course (Berkman & Glass, 2000; Courtens et al., 1996; Ell et al., 1992). Drawing from prior research, in present study, social connectedness is operationalized as individual's subjective appraisal of interpersonal closeness with social world –civic participation, social participation, and connections with extended family, peers, and friends (X. Huang et al., 2019; Kawachi & Berkman, 2014; Kowal, Williams, et al., 2012; R. M. Lee & Robbins, 2000). It is an individual's perception of their opportunities for interactions with members of their society. However, the interpersonal relationship is as individuals' perceived ease of their interpersonal interactions. Interpersonal relationships refer to the level of ease or difficulties in their more discrete, current relationships, whereas, social connectedness refers to the more enduring and ubiquitous experience of self in the context of the society. Therefore, together social connectedness and interpersonal relationship measure the level of and perceived quality of an individual's social relationships.

Interpersonal Functioning

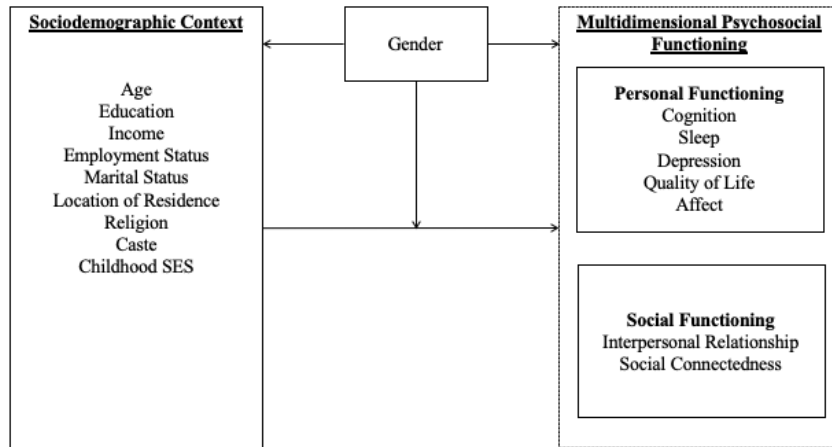
Deeply rooted social hierarchies guide all types of interpersonal relationships in India. The intersectional identity (age, gender, caste, occupation, SES, religion, marital status, location of residence among others) of the individual is one of the key features that shape the nature of interpersonal interactions in the formal as well as informal settings (Sony Pellissery, 2008). Because of the social-hierarchical complexities inherent in interpersonal relationships in India, it is important to study whether sociodemographic characteristics of an individual influence their interpersonal relationships and social. However, there is a paucity of research evidence to describe whether sociodemographic subgroups experience varying levels of social connectedness and difficulties or ease in interpersonal relationships. Even though the protective quality of social connections and interpersonal relationships is widely established, the availability of these resources is not equally distributed among all population subgroups (Turner & Marino, 1994). As such, there is a need to clarify whether social and cultural disadvantage and hierarchical structure affect an individual's availability and quality of interpersonal relationships and the extent of their social connectedness. The present study adds to the growing research that describes the ways in which social connectedness and interpersonal relationship are patterned based on sociodemographic characteristics in India.

6.2.5 Rationale for Present Study

Thus, there are three major research gaps in our understanding of the psychosocial functioning among Indian adults. First, there is a paucity of research to explain the underlying mechanisms and components of holistic aspects of wellbeing that create patterns in the mental and physical health of the populations, including lack of in-depth understanding of indicators of psychosocial functioning. Moreover, there is very little research to explain how the indicators of

psychosocial functioning vary across sociodemographic characteristics. Thus, the examination of the sociodemographic correlates associated with psychosocial functioning among Indian adults is essential to (a) identify vulnerable sub-groups of population and also (b) to locate available psychosocial resources among population sub-groups. Second, there have been increases in the number of research studies that investigate the psychosocial health among Indian adults and children (Sandeep Grover et al., 2010). However, the bulk of the research is focused on the medical model of health – concerned with understanding the impact of mental and physical health diseases and symptoms on an individual’s psychological wellbeing. While the results of such studies reinforce the need to pay close attention to the impact of diseases on human wellbeing, these studies do not explain the population’s overall existing levels of psychosocial functioning in relationship to its sociodemographic correlates, independent of any focus on disease/disorder. These sociodemographic correlates create nuances that have implications for public health research, medical practice, health policies, and health program implementation. Third, while it is widely established that social disadvantage is related to decrease various facets of psychosocial functioning, most evidence of sociodemographic correlates of health comes from studies conducted in North America and the United Kingdom. Owing to India’s socio-cultural, religious, and linguist diversity, translation of western evidence to the Indian context is challenging and often unsatisfactory. By understanding the sociodemographic patterns in overall psychosocial functioning, attention is focused on distinctions among population subgroups, and resulting public health practices will pay increased attention to the effects of sociodemographic variations of individual well-being.

Figure 5. The Multidimensional Nature of Psychosocial Functioning Among Indian Adults



As the Figure 1 illustrates, the primary purpose of this study is to evaluate the sociodemographic patterns in the multidimensional indicators of psychosocial functioning, separately for men and women. Difficulties in cognition, sleep, quality of life, affect, and standardized diagnosis of depression represent personal functioning. Social functioning consists of perceived difficulty or ease of interpersonal relationships and the level of social connectedness. It is important to highlight that the term multidimensional psychosocial functioning reflects ‘perceived’ functioning specific to the respondent. In other words, perceived psychosocial functioning does not provide any detailed description of disease or health condition, but rather indicates respondents’ over-arching psychosocial functioning based on myriad factors, such as gender, age, and other sociodemographic characteristics.

Specifically, this study has two aims. The first aim is to evaluate gender differences in the levels of psychosocial functioning in India. Based on previous research, it is hypothesized that women will have a greater burden of difficulties in their psychosocial functioning than men. The second aim is to assess sociodemographic differences in the levels of psychosocial functioning among Indian men and women. Drawing from fundamental cause theory of health inequities (Link

& Phelan, 1995), it is hypothesized that experience of social or economic disadvantage (that is, low levels of education, employment status, rural residency, membership in scheduled caste or tribal group), will be related to lowered levels of personal and social functioning.

6.3. Methods

6.3.1 Data

Data for this study came from the World Health Organization's SAGE (WHO Longitudinal Study of Global Aging and Adult Health) Wave 1 2007-2010. SAGE Wave 1 is a nationally representative data that covers a broad range of topics, with a focus on health, disability, disease risk factors, stress, happiness, social connection, economic well-being, caregiving, health care utilization, and health systems responsiveness (Kowal et al., 2010). The WHO uses standardized sampling procedures, administration protocols, interviewer training, and questionnaire design, translational protocols and variable definitions, which allowed for enough statistical power for the analyses. The survey instruments used in this study have been validated for Indian populations using a subset of the sample (Kowal et al., 2010; Ng et al., 2009).

The WHO SAGE respondents were selected using a stratified, multistage, random cluster sampling design (Kowal, Chatterji, et al., 2012; World Health Organization, 2020). The primary sampling units (PSU) were stratified by region and location using the Census Enumerated Area (CAE) as the sampling frame. Within each stratus, enumeration areas were selected independently with probability proportional to the size of the region. India has a total of 28 states and 7 union territories. Nineteen of the 28 Indian states were included in the design representing 96% of the population. Out of these 28 states, six states were selected based on their geographic location and level of development. The final strata were defined by the six states: (Assam, Karnataka, Maharashtra, Rajasthan, Uttar Pradesh, and West Bengal), and location of residence (urban or rural). Therefore, there were a total number of 12 strata. The 2000 Census demarcation was used as the sampling frame. Two-stage and three-stage sampling was adopted in rural and urban areas, respectively. PSUs in rural areas (villages) and in urban areas (city wards) were selected

probability proportional to size. The secondary sampling units (households) were selected using systematic sampling. The tertiary sampling units (individuals) were selected using Kish tables (Lavrakas, 2008).

6.3.2. Sample

All PSUs and households selected for the WHO Health Study (WHS)/SAGE Wave 0 survey were included in SAGE Wave 1. All samples from WHO SAGE 0 who were 50+ years of age were visited again as a part of the SAGE 1 data collection procedure. SAGE Wave 1 included a total of 11,230 completed interviews: 4,670 interviews with individuals aged 18-49 (3,625 women and 1,045 men) and 6,560 interviews with individuals aged 50-plus (3,256 women and 3,304 men)(World Health Organization, n.d.). All interviewers used a standardized comprehensive interview guide to aid data collection. Respondents were not required to be able to read and write. However, depending on their age, and cognition, as well as the place where they come from, written prompts were provided to respondents, as a memory aid for some questions or concepts may be more difficult to understand than others. All interviews lasted for 90 to 120 minutes depending on the nature of respondents. The preferred condition for interviewing respondents was in private, with no other member of the household present. If total privacy is not possible, the respondents were given an option to be interviewed outside the house or where they felt comfortable discussing sensitive information.

6.3.3. Measures

Outcome Variables

Cognition:

Cognition was measured based on a two-item scale that asks the respondents to rate their perceived cognitive difficulty in the last 30 days (Kowal et al., 2010). For example, “Overall in the last 30

days, how much difficulty did you have with concentrating or remembering things?” The response categories included (1) none, (2) mild, (3) moderate, (4) severe, and (5) extreme/cannot do. Scores ranged from 1 to 10. Higher scores indicated higher levels of cognitive difficulties. Internal validity in terms of Cronbach’s alpha (α) was 0.83 for the entire population (men = 0.83; women = 0.82).

Sleep:

Sleep was measured based on a two-item scale that asks the respondents to rate their perceived sleep difficulty in the last 30 days (Kowal et al., 2010). For example, “Overall in the last 30 days, how much difficulty did you have with sleeping, such as falling asleep, waking up frequently during the night or waking up too early in the morning?” The response categories included (1) none, (2) mild, (3) moderate, (4) severe, and (5) extreme/cannot do. Scores ranged from 2 to 10. Higher scores indicated higher levels of reported difficulties in sleep. Internal validity in terms of Cronbach’s alpha (α) was 0.84 for the entire population (men = 0.83; women = 0.84).

Affect:

Sleep was measured based on a two-item scale that asks the respondents to rate their perceived difficulty experienced in terms of affect in the last 30 days (Kowal et al., 2010). For example, “Overall in the last 30 days, how much of a problem did you have with feeling sad, low, or depressed?” The response categories included none (1) none, (2) mild, (3) moderate, (4) severe, and (5) extreme/cannot do. Scores ranged from 1 to 10. Internal validity in terms of Cronbach’s alpha (α) was 0.87 for the entire population (men = 0.86; women = 0.87).

Quality of Life:

Quality of life was measured based on 8-item WHOQOL-Bref scale that asks respondents questions about various aspects of daily living (Kowal, Chatterji, et al., 2012). The items asks respondents to indicate their perceived satisfaction with availability of money to meet their basic

needs, their perceived energy, satisfaction with their health, themselves, personal relationships, daily living activities, conditions of living places, overall life satisfaction, and overall perceived quality of life. For example, “How satisfied are you with the conditions of your living place?” Items are captured with a five-point Likert interval scale. Total quality of life is calculated by summing scores of eight items and possible scores can range from 0 to 40, with high scores indicating higher quality of life. Internal validity in terms of Cronbach’s alpha (α) was 0.85 for the entire population (men = 0.85; women = 0.85).

Depression:

Depression was categorized based on the ICD-10 criteria of mental and behavioral disorders (WHO, 1993). Then based on methods used in previous research this study followed two general criteria for classifying responders as a person suffering from ‘moderate to severe depression’ (Vellakkal et al., 2013). First, general criteria states that at least two of the following three symptoms must be present in last 12 months: (1a) a period lasting several days when the respondent felt sad, empty or depressed; (1b) a period lasting several days when the respondent lost interest in most things usually enjoy such as personal relationships, work or hobbies/recreation; (1c) a period lasting several days when the respondent have been feeling energy decreased or that are tired all the time. Second, these depressive episodes should last for at least 2 weeks. Third, if two of the general conditions are met, then a total of at least six symptoms should be present to classify an individual as having ‘moderate depression’. These six symptoms can be from the general criteria one and/or from following seven sub-conditions: (1) During this period, person did feel negative about him/herself or like he/she had lost confidence and/or did frequently feel hopeless - that there was no way to improve things; (2) During this period, person did feel anxious and worried most days; (3) During this period, the person did think of death, or wish he/she were dead,

and/or did he/she ever try to end own life; (4) During this period, did he/she have any difficulties concentrating; for example, listening to others, working, watching TV, listening to the radio, and/or did notice any slowing down in his/her thinking; (5) He/she did notice any slowing down in his/her moving around, and/or he/she were so restless or jittery nearly every day that he/she paced up and down and couldn't sit still; (6) He/she did notice any problems falling asleep, and/or, he/she did notice any problems waking up too early; and (7) During this period, he/she did lose his/her appetite. A binary variable was created based on the above-mentioned criteria and participants were classified into two categories: depressed vs. not depressed.

Interpersonal Relationships:

Interpersonal relationship was measured based on a four-item scale that asks the respondents to rate their perceived difficulties in interpersonal activities in the last 30 days (Kowal et al., 2010). For example, "Overall in the last 30 days, how much of a difficulty did you have with personal relationships or participation in the community?" The response categories included (1) none, (2) mild, (3) moderate, (4) severe, and (5) extreme/cannot do. Higher scores indicated higher level of perceived difficulties in interpersonal relationship interactions. Internal validity in terms of Cronbach's alpha (α) was 0.86 for the entire population (men = 0.86; women = 0.86).

Social Connectedness:

Based on previous research on social connected using the WHO SAGE data (X. Huang et al., 2019), social connectedness was measured with a 9 item scale. Five aspects of social interactions were measured: civic participation, social participation, meeting friends and relatives at respondents' place of residence, and visiting friends and family, participating in religious services. The respondents were asked to rate their level of social involvement in the last 12 months with a five-point Likert interval scale (response options ranged from never to daily). For example, "how

often in the last 12 months have you had friends over to your home?” Social connectedness was calculated by summing scores of eight items. Possible scores could range from 0 to 45, with high scores indicating higher level of social connectedness. Internal validity in terms of Cronbach’s alpha (α) was 0.73 for the entire population (men = 0.76; women = 0.64).

Sociodemographic correlates

Age

Following United Nation’s international guidelines for age categorizations, I created five age categories. Respondents between 18-24 years of age were coded as (0) Young Adults, respondents between 25-45 years were coded as (1) Adults, respondents between 46-65 were coded as (2) Middle-aged adults, respondents between 66-80 years were coded as (3) Older Adults and 80+ year old respondents were coded as (4) Elderly (United Nations, 1982).

Education

Respondents’ education level was coded as categorical variable with five levels. It was measured by categorizing the last completed grade level where (0) no formal education, (1) for less than secondary school completed (<7 years of schooling), (2) for secondary school completed (7 years of schooling), (3) high school (between and ‘7-12 years of schooling) and (4) for some college and or post graduate education.

Income quintiles

Respondents’ income was treated as a categorical variable with five levels representing the (1) Poorest, (2) Poorer, (3) Middle, (4) Richer and (5) Richest in terms of income. WHO SAGE dataset reports a validated asset (wealth) score index that was derived using WHO standard approach to estimating permanent income from survey data on household ownership of durable goods,

dwelling characteristics, neighborhood, access to water, electricity, sanitation (Vellakkal et al., 2013).

Caste

Social caste was coded as a categorical variable with four levels: (1) General Caste, (2) Scheduled Caste, (3) Scheduled Tribe, (4) Other (constituting respondents who do not have a caste or the respondents who belonged to ‘other backward castes’).

Marital status

Marital status was captured as a categorical variable with three groups, (0) Currently Married, (1) Never married, (2) Widowed and (3) Other (separated/divorced).

Location

Place of residence was categorized into two groups – (1) Rural and (0) Urban. WHO SAGE dataset reports this classification for respondents based on their geographic location.

Religion

Around 84% of respondents identified themselves as Hindu and a little over 12% of participants reported being Muslims. Therefore, religion was captured as a categorical variable three groups, (1) Hindu and (2) Muslim and (3) to capture all ‘Other’ religious groups (Jainism, Sikhism, Buddhism, and Christianity).

Employment status

Employment status was captured as a categorical variable with four groups: (0) Private Sector, (1) Unemployed, (2) Public Sector, (3) Self-employed, (4) Informal Employment.

Childhood SES

Childhood SES was created based on highest level of parental education. SAGE collected highest level of parental education data from respondents based on following categories: no formal

education, less than primary school, primary school completed, secondary school completed, high school or equivalent completed, college/pre-university/university completed, post graduate degree completed. Primary school in India starts around 5-6 years of age and lasts until 10 years of age (grade 1 to grade 5). Primary school is mandatory and free in public schools for each child in India under the Right to Education and Sarva Shiksha Abhiyan (Universal Education) mandate of Indian government (Planning Commission of India, 2014). Primary school is designed to give students basic education in writing, reading, social studies, and mathematics. In middle school, secondary school, and in high school, instructions are organized to be more subject-focused. Secondary school (grade 10) is the minimum level of educational requirement for most occupations in the labor market in India (Tilak, 2007). Therefore, since primary school completion is the minimum level of education, and due to fewer data observation for beyond secondary school completion at parental level of education, the highest parental education completed was divided into two groups (high vs. low) – secondary school completion and above was classified as high education. Less than secondary school or no formal education was classified as low parental education. In other words, parental education was categorized as high if either one of the parents had completed secondary school. Parental education was categorized as low if they both had not completed secondary school or reported having no formal education. Based on the reported parental education, childhood SES was reported as (0) High and (1) Low.

6.3.4. Analytic Strategy

There were three steps in this analysis. First, weighted means and percentages of key study variables were estimated; chi-square tests were used to assess significant men-women differences (Table 1). Next, each psychosocial functioning indicator was regressed on gender to evaluate whether these indicators varied by gender after controlling other sociodemographic characteristics

(Table 2). Finally, the relationship between sociodemographic characteristics and psychosocial functioning indicators were examined using ordinary least square regression (OLS) models and logistic regression model, separately for men and women (Table 3). Psychosocial functioning indicators, including social indicators of interpersonal relationship difficulty, social connectedness, and personal indicators of sleep, affect, perceived quality of life, and cognition were each regressed on sociodemographic factors, including SES covariates, namely education, income, employment status, childhood SES, and other sociodemographic characteristics, including age, marital status, social caste, religion, and location of residence. Because all of the psychosocial indicators are continuous variables in this analysis, linear regression models were conducted to assess the relationship between sociodemographic variables and psychosocial functioning indicators in seven separate models. Depression was created as a binary variable and hence a logistic regression model was used to examine sociodemographic correlates of depression. All analyses were cross-sectional in nature and conducted using STATA version 15.1.

6.4. Results

Table 1 shows the sample descriptive characteristics by gender. Majority of the sample belonged to early adulthood age category (26-45 years; 52.3%). Among men, 27.1% reported having completed less than primary school education (less than 5 years of school); however, 48.7% of the women reported no formal education. Thus, women were more likely to report lower rates of education than men ($p < .0001$). A majority of the sample belonged to the 'General caste' category (60%) and reported being currently married (81.7%). Women were more likely to report being widowed (13.1%) than men (3.3%) ($p < .0001$). A majority of the sample also reported being Hindu (84.2%) and living in an urban area (74.3%). Men (76.4%) were more likely to live in urban areas than women (72.2%; $p = .007$). Most of the men reported being 'self-employed' (48.3%) followed by informal employment (26.9%), whereas, a majority of women reported 'not working' (55.4%) followed by informal employment (19.9%). Thus, men were more likely to report employment status than women ($p < .0001$). There were no significant gender differences based on reported levels of income and religion.

Table 1. Weighted Percent Distribution of Selected Demographic Characteristics by Gender, WHO SAGE India Wave 1 (2007/10)

TABLE 1. Weighted percent distribution of selected demographic characteristics by gender, WHO SAGE India Wave 1 (2007/10)

	Total		Men		Women		<i>p</i>
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	
Age Group							<.0001
18-25 (Young Adults)	1,778	14.6	487	10.4	1,405	18.8	
26-45 (Early Adults)	6,379	52.3	2,516	53.4	3,832	51.2	
46-65 (Middle-Aged Adults)	3,194	26.2	1,373	29.2	1,742	23.3	
66-80 (Older Adults)	809	6.6	326	6.9	476	6.4	
80+ (Elderly)	38	0.3	7	0.2	35	0.5	
Education							<.0001
College +	1,036	8.5	766	12.6	270	4.4	
High School	1,781	14.6	1,164	19.2	616	10.0	
Secondary School	1,981	16.2	1,189	19.6	792	12.9	
Less than secondary school	3,115	25.5	1,644	27.1	1,471	24.0	
No formal education	4,285	35.1	1,299	21.4	2,986	48.7	
Income Quintiles							0.447
Poorest	2,464	20.3	1,233	20.5	1,231	20.2	
Poorer	2,573	21.2	1,258	20.9	1,315	21.6	
Middle	2,410	19.9	1,232	20.4	1,178	19.3	
Richer	2,176	18.0	1,066	17.7	1,110	18.2	
Richest	2,497	20.6	1,238	20.5	1,260	20.7	
Caste							0.02
General	6,790	60.7	3,422	60.1	3,369	61.3	
Scheduled Caste	2,141	19.1	1,147	20.2	994	18.1	
Scheduled Tribe	719	6.4	356	6.3	363	6.6	
Other	1,538	13.7	768	13.5	769	14.0	
Marital Status							<.0001
Married	9,967	81.7	5,196	85.7	4,771	77.8	
Never Married	1,161	9.5	649	10.7	512	8.3	
Widowed	1,000	8.2	200	3.3	800	13.1	
Other	70	0.6	19	0.3	51	0.8	
Religion							0.701
Hindu	9,456	84.2	4,777	83.6	4,679	84.8	
Muslim	1,386	12.3	720	12.6	666	12.1	
Others	388	3.5	217	3.8	171	3.1	
Location							0.007
Urban	3,133	25.7	1,430	23.6	1,703	27.8	
Rural	9,065	74.3	4,633	76.4	4,431	72.2	
Employment Status							<.0001
Not working	3,315	29.5	199	4.6	3,811	55.4	
Public Sector	602	5.4	375	8.6	137	2.0	
Private Sector	1,005	9.0	505	11.6	426	6.2	
Self-Employed	3,673	32.7	2,100	48.3	1,139	16.6	
Informal Employment	2,632	23.4	1,168	26.9	1,368	19.9	

Notes: Weighted frequencies and percentages are shown; chi-square tests were conducted to evaluate the group differences between men and women

Table 2 evaluates whether gender accounts for differences in indicators of psychosocial functioning among Indian adults controlling for other relevant sociodemographic characteristics, including age, education, income quintile, marital status, social caste, religion, employment status, childhood SES, and location of residence. Results show that gender was a significant predictor of interpersonal difficulties, sleep difficulties, cognition, negative affect, and social cohesion (all $p < .05$). Specifically, Indian women reported statistically higher levels of difficulties in interpersonal

relationships, sleep, cognitive, and higher levels of negative affect than Indian men. However, Indian men reported lower levels of social connectedness than Indian women ($b = -2.49$; $SE = 0.23$; $p < .0001$). The odds of depression and quality of life did not statistically differ between Indian men and women after controlling for sociodemographic characteristics.

Table 2. Indicators of Psychosocial Functioning Regressed on Gender and Sociodemographic Characteristics, WHO SAGE India, Wave 1 (2007/10)

TABLE 2. Indicators of Psychosocial Functioning Regressed on Sociodemographic Characteristics WHO SAGE India, Wave 1 (2007)

	Depression		Interpersonal Relationship		Sleep		Cognition		Negative Affect		Social Connectedness		Quality of Life	
	OR	95% CI	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE
Unadjusted														
Gender (Ref.=Men)														
Women	1.30*	1.02 - 1.64	0.76***	0.11	0.4***	0.05	0.53***	0.05	0.49***	0.07	-4.00***	0.24	-0.62**	0.18
Intercept	0.07***	0.06 - 0.09	5.92***	0.86	3.12***	0.05	3.18***	0.04	3.37***	0.05	20.45***	0.19	29.67***	0.16
Adjusted^a														
Gender (Ref.=Men)														
Women	1.27	0.97 - 1.65	0.55***	0.14	0.37***	0.07	0.49***	0.07	0.45***	0.08	-2.48***	0.22	-0.31	0.22
Intercept	0.02***	0.01 - 0.06	5.27***	0.26	2.07***	0.16	1.93***	0.15	2.64***	0.18	18.72***	0.72	31.16***	0.54

Notes: Weighted regression results are shown; SE= Standard Errors; OR = Odds Ratios; Logistic or linear regression models were run depending on outcome variables; * = $p < .05$; ** = $p < .001$; *** = $p < .0001$;

^a= All models were adjusted for age, education, income, area of residence, religion, caste, employment status, marital status, and childhood SES.

The following section presents regression results for each of the personal and social indicator of psychosocial functioning for Indian men and women (please refer to Table 3).

Table 3. Indicators of Psychosocial Functioning Regressed on Sociodemographic Characteristics WHO SAGE India, Wave 1 (2007/10)

	Depression				Interpersonal Relationship				Sleep				Cognition				Affect				Social Connectedness				Quality of Life			
	Women		Men		Women		Men		Women		Men		Women		Men		Women		Men		Women		Men		Women		Men	
	Odds Ratio	95% CI	Odds Ratio	95% CI	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE	b	SE		
Age (Ref.=Young Adults(18-24))																												
25-45 (Early Adults)	1.58	0.92 - 2.7	1.26	0.52 - 3.04	0.33*	0.14	0.16	-0.38 - 0.7	0.5***	0.08	0.25*	0.13	0.6***	0.08	0.21	0.13	0.67***	0.11	0.07	0.18	0.30	0.29	1.08	0.67	-1.52***	0.26	-0.54	0.43
46-65 (Middle-Aged Adults)	2.4**	1.36 - 4.23	2.17	0.94 - 5	1.33***	0.19	0.79*	0.18 - 1.41	1.24***	0.10	0.86***	0.16	1.48***	0.10	0.97***	0.15	0.9***	0.13	0.61**	0.19	-0.20	0.31	0.49	0.67	-2.78***	0.25	-1.70***	0.47
66-80 (Older Adults)	2.16*	1.14 - 4.08	3.41**	1.47 - 7.89	2.3***	0.32	2.43***	1.73 - 3.14	1.88***	0.15	1.84***	0.18	2.38***	0.17	2.14***	0.16	0.81***	0.17	1.26***	0.21	-1.35***	0.37	-1.20	0.69	-4.06***	0.35	-3.91***	0.49
80+ (Elderly)	2.05	0.65 - 6.45	3.3	0.53 - 20.49	4.5***	0.75	5.9***	3.53 - 8.27	2.28***	0.41	2.84***	0.50	3.56***	0.37	3.9***	0.54	1.33**	0.45	1.94**	0.65	-3.41***	0.79	-6.45***	1.32	-6.64***	0.99	-6.80***	0.98
Education (Ref.=College+PostGrad)																												
High School	1.75	0.62 - 4.93	1.63	0.5 - 5.32	0.09	0.24	-0.3	-0.72 - 0.11	0.2	0.11	0.11	0.12	0.15	0.10	0.12	0.12	0.44**	0.13	0.07	0.15	0.22	0.36	-0.68	0.68	-0.95*	0.45	-0.33	0.43
Secondary School	1.24	0.44 - 3.46	1.44	0.44 - 4.72	0.11	0.23	0.12	-0.35 - 0.61	0.08	0.11	0.34*	0.14	0.08	0.12	0.24	0.13	0.43**	0.15	0.06	0.16	-0.33	0.43	-0.79	0.65	-1.05*	0.42	-1.08*	0.44
Less than secondary school	1.72	0.64 - 4.66	1.14	0.32 - 3.99	0.52*	0.25	0.43	-0.03 - 0.91	0.47**	0.13	0.32*	0.15	0.49***	0.13	0.26	0.14	0.61***	0.16	0.02	0.15	-0.16	0.43	-1.89*	0.74	-1.91***	0.46	-0.82	0.48
No formal education	2.44	0.89 - 6.65	1.1	0.3 - 4.01	0.72**	0.27	0.46	-0.07 - 1	0.39**	0.15	0.26	0.15	0.81***	0.15	0.38*	0.17	0.66***	0.17	0.01	0.17	-0.01	0.44	-2.50**	0.77	-1.68**	0.49	-0.87	0.49
Income Quintiles (Ref.=Poorest)																												
Poorest	1.02	0.74 - 1.41	0.9	0.5 - 1.62	-0.26	0.18	-0.53*	-1.03 - 0.02	-0.19*	0.09	-0.15	0.16	-0.14	0.09	-0.17	0.15	-0.26*	0.11	-0.03	0.15	0.26	0.22	0.89*	0.43	1.02***	0.24	1.30**	0.43
Middle	1.27	0.87 - 1.85	0.91	0.43 - 1.9	-0.2	0.22	-0.73**	-1.28 - -0.19	-0.1	0.11	-0.52**	0.16	0.03	0.11	-0.38**	0.15	-0.37***	0.11	-0.21	0.17	0.75**	0.25	1.87**	0.49	0.91**	0.29	2.11***	0.44
Richer*	0.71	0.46 - 1.1	0.55	0.24 - 1.22	-0.59***	0.20	-0.69*	-1.24 - -0.15	-0.2	0.11	-0.4*	0.17	-0.17	0.12	-0.46**	0.14	-0.58***	0.11	-0.38*	0.16	0.85**	0.29	2.82***	0.46	2.03***	0.31	2.89***	0.43
Richest	1	0.67 - 1.5	0.24**	0.1 - 0.56	-0.69***	0.19	-1.15***	-1.71 - -0.59	-0.21	0.11	-0.56**	0.17	-0.25*	0.12	-0.59***	0.16	-0.67***	0.12	-0.54***	0.17	0.89**	0.32	3.56***	0.62	3.15***	0.34	4.67***	0.49
Caste (Ref.=General)																												
Scheduled Caste	1.1	0.81 - 1.5	0.93	0.51 - 1.69	-0.2	0.18	0	-0.35 - 0.36	-0.05	0.08	0.11	0.11	0.08	0.09	0.11	0.12	0.23*	0.12	0.14	0.12	0.22	0.30	0.97*	0.41	-1.14***	0.25	-0.29	0.32
Scheduled Tribe	0.46**	0.26 - 0.81	0.33	0.1 - 1	-0.33	0.33	-0.5*	-0.96 - -0.04	-0.04	0.14	-0.06	0.15	0.03	0.14	-0.17	0.15	-0.29	0.22	0.13	0.20	1.36**	0.47	1.33*	0.62	-0.76*	0.35	-0.57	0.46
Other	1.37	0.96 - 1.95	1.82*	1.06 - 3.12	-1.49***	0.18	0.04	-0.42 - 0.51	0.12	0.11	0.41**	0.15	-0.37***	0.10	0.09	0.11	0.28*	0.11	0.3*	0.14	2.25***	0.31	2.77***	0.61	-0.46	0.25	-1.09**	0.41
Marital Status (Ref.=Married)																												
Never Married	0.06**	0.01 - 0.34	2.14	0.95 - 4.78	-0.05	0.18	0.15	-0.46 - 0.78	-0.18*	0.09	-0.13	0.12	0.16	0.11	0.08	0.13	-0.26*	0.13	-0.18	0.17	0.69	0.40	-0.36	0.73	0.55	0.32	0.05	0.40
Widowed	1.85**	1.26 - 2.7	3.07*	1.35 - 7.01	0.84***	0.19	-0.14	-0.64 - 0.35	0.51***	0.14	-0.15	0.21	0.32**	0.10	0.08	0.25	0.9***	0.14	0.36	0.25	-0.36*	0.18	-0.27	0.73	-1.56***	0.25	-0.39	0.49
Other	6.78**	2.02 - 22.77	0.54	0.05 - 5.77	0.1	0.73	0.46	-1.97 - 2.9	0.67	0.49	0.79	0.64	0.59	0.54	0.19	0.61	1.3	0.66	0.89	0.69	-1.28	0.81	-0.80	1.21	-1.28*	0.55	0.15	2.02
Location (Ref.=Urban)																												
Rural	1.04	0.72 - 1.51	0.97	0.55 - 1.72	-0.12	0.20	0	-0.34 - 0.32	0.22*	0.09	0.14	0.11	0.26*	0.11	0.08	0.10	0.12	0.13	0.41**	0.12	0.85*	0.38	1.83***	0.46	0.24	0.30	-0.31	0.34
Religion (Ref.=Hindu)																												
Muslims	0.93	0.63 - 1.36	1.64	0.92 - 2.92	0.56*	0.23	0.11	-0.44 - 0.66	0.21*	0.10	0.2	0.17	0.43***	0.10	0.12	0.12	0.2	0.14	0.49***	0.15	-0.35	0.28	1.10	0.56	-1.11**	0.41	-1.16*	0.44
Other	0.5	0.23 - 1.1	0.8	0.23 - 2.82	0.05	0.33	0.1	-0.72 - 0.93	-0.02	0.17	-0.14	0.22	-0.02	0.21	0.14	0.28	-0.14	0.21	-0.48*	0.23	0.53	0.47	0.23	0.62	0.87*	0.37	0.78	0.47
Employment Status (Ref.=Private Sector)																												
Unemployed	0.81	0.51 - 1.3	0.5	0.14 - 1.82	0.55*	0.22	1.1**	0.33 - 1.87	0.12	0.13	0.33	0.17	0.23	0.14	0.26	0.17	-0.11	0.19	-0.06	0.22	-2.59***	0.34	-0.87	0.85	0.47	0.34	-1.10	0.66
Public Sector	0.5	0.19 - 1.31	1.26	0.39 - 4.11	0.37	0.36	0.19	-0.28 - 0.67	0.17	0.21	-0.08	0.16	0.29	0.22	0.06	0.16	0.13	0.25	-0.27	0.17	1.35*	0.62	-0.09	0.69	0.69	0.51	0.50	0.43
Self-Employed	0.69	0.39 - 1.23	2.08	0.88 - 4.89	0.89**	0.26	0.36	0 - 0.73	0.12	0.15	0.06	0.12	0.37	0.15	0.16	0.11	-0.18	0.19	-0.07	0.15	-1.02**	0.35	0.84	0.49	0.84*	0.41	-0.18	0.36
Informal Employment	0.95	0.58 - 1.56	2.11	0.9 - 4.92	0.64*	0.26	0.33	-0.06 - 0.73	0.45**	0.13	0.17	0.14	0.41**	0.15	0.17	0.14	0.13	0.19	0.17	0.16	-0.98**	0.35	0.82	0.53	-0.55	0.38	-0.14	0.35
Childhood SES (Ref.=Low)																												
High	0.98	0.64 - 1.49	0.6	0.24 - 1.52	-0.34*	0.14	-0.31	-0.65 - 0.02	-0.19*	0.08	0.03	0.11	-0.14*	0.07	-0.11	0.12	0.02	0.09	0.05	0.15	0.18	0.23	-0.38	0.45	0	0.22	-0.06	0.31
Intercept	0.03***	0 - 0.11	0.02	0 - 0.12	5.53	0.39	5.57	4.85 - 6.3	2.23	0.21	2.41	0.25	1.92	0.21	2.46***	0.22	2.79***	0.26	2.82***	0.27	16.64***	0.64	16.72***	1.12	31***	0.76	30***	0.83

Notes: Weighted regression results are shown, SE= Standard Errors; OR = Odds Ratios; Logistic or linear regression models were run depending on outcome variables; * = p < 0.05; ** = p < 0.01; *** = p < 0.001.

6.4.1. Depression

Table 4. At a Glance – Depression Regressed on Sociodemographic Characteristics. WHO SAGE India, Wave 1 (2007/10)

	Depression	
	Women	Men
	Odds Ratio	Odds Ratio
Age (Ref=Young Adults)		
25-45 (Early Adults)	NS	NS
46-65 (Middle-Aged Adults)	↑	NS
66-80 (Older Adults)	↑	↑
80+ (Elderly)	NS	NS
Education (Ref =College+PostGrad)		
High School	NS	NS
Secondary School	NS	NS
Less than secondary school	NS	NS
No formal education	NS	NS
Income Quintiles (Ref =Middle)		
Poorer	NS	NS
Middle	NS	NS
Richer*	NS	NS
Richest	NS	↓
Caste (Ref =General)		
Scheduled Caste	NS	NS
Scheduled Tribe	↓	NS
Other	NS	↑
Marital Status (Ref =Married)		
Never Married	↓	NS
Widowed	↑	↑
Other	↑	NS
Location (Ref =Urban)		
Rural	NS	NS
Religion (Ref =Hindu)		
Muslims	NS	NS
Other	NS	NS
Work (Ref =Private Sector)		
Unemployed	NS	NS
Public Sector	NS	NS
Self-Employed	NS	NS
Informal Employment	NS	NS
Childhood SES (Ref =Low)		
High	NS	NS

Depression for men and women were analyzed separately because although gender was not a significant predictor at alpha level 0.05 controlling for other sociodemographic characteristics, it was a significant predictor at alpha level 0.10.

Women

Controlling for all other demographic characteristics, older women (age range 66-80 years) had 2.16 odds (95% CI = 1.14 – 4.08) and middle-aged women (age range 46-65 years) had 2.4 odds (95% CI =1.36 – 4.23) of experiencing depression compared to young women (18-24 years; both $p < .05$). There was no significant difference between odds of experiencing depression among adult

¹ The direction of the arrows indicates higher or lower odd of depression; NS = not statistically significant

women (age range 25-45 years), elderly-women (age 80+ years), and young women (age range 18-24 years). Moreover, controlling for all other demographic characteristics women who belonged to scheduled tribe had lower odds of depression than women who belonged to general caste (adjusted OR = 0.46; 95% CI = 0.26 - 0.81; $p < .001$). Controlling for all other demographic characteristics, women who reported never being married had lower odds of depression (adjusted OR = 0.06; 95% CI = 0.01 – 0.34; $p < .001$), whereas women who reported being widowed or being separated/divorced had higher odds of depression than women who reported being married (both $p < .001$). Education, income, religion, employment status, childhood SES, and location of residence were not significant predictors of depression among women.

Men

Controlling for all other demographic characteristics, older men (age range 66-80 years) had 3.41 odds (95% CI = 1.47 - 7.89; $p < .001$) of experiencing depression than their young men counterparts (18-24 years;). Moreover, controlling for other demographic characteristics, men who belonged with richest income quintile were less likely to experience depression than their counterparts who belonged to the poorest income quintile (adjusted odds: 0.24; 95% CI = 0.1 - 0.56; $p < .001$). Controlling for other demographic characteristics, men who belonged to ‘Other’ caste and men who reported being widowed had increased odds of depression than men who belonged to general caste and reported being married (both $p < .05$). Controlling for other demographic characteristics, education, location of residence, religion, employment status, and childhood SES were not a significant predictor of depression among men.

6.4.2. Interpersonal Relationship

Table 5. At a Glance – Interpersonal Relationship Regressed on Sociodemographic Characteristics. WHO SAGE India, Wave 1 (2007/10)

	Interpersonal Relationship	
	Women	Men
	<i>b</i>	<i>b</i>
Age (Ref =Young Adults)		
25-45 (Early Adults)	↑	NS
46-65 (Middle-Aged Adults)	↑	↑
66-80 (Older Adults)	↑	↑
80+ (Elderly)	↑	↑
Education (Ref =College+PostGrad)		
High School	NS	NS
Secondary School	NS	NS
Less than secondary school	↑	NS
No formal education	↑	NS
Income Quintiles (Ref =General)		
Poorer	NS	↓
Middle	NS	↓
Richer*	↓	↓
Richest	↓	↓
Caste (Ref =General)		
Scheduled Caste	NS	NS
Scheduled Tribe	NS	↓
Other	↓	NS
Marital Status (Ref =Married)		
Never Married	NS	NS
Widowed	↑	NS
Other	NS	NS
Location (Ref =Urban)		
Rural	NS	NS
Religion (Ref =Hindu)		
Muslims	↑	NS
Other	NS	NS
Work (Ref =Private Sector)		
Unemployed	↑	↑
Public Sector	NS	NS
Self-Employed	↑	NS
Informal Employment	↑	NS
Childhood SES (Ref =Low)		
High	↓	NS

Women

Controlling for all other demographic characteristics as age increases interpersonal difficulties increase for women (all $p < .05$). Similarly, women who reported no formal education had highest reported interpersonal relationship difficulties than women who reported college education ($b = 0.72$, $CI = 0.2 - 1.25$, $p < 0.001$) followed by women who reported less than secondary school education had higher reported interpersonal relationship difficulties than women who reported college education ($b = 0.52$, $CI = 0.3 - 1$, $p < 0.05$). Moreover, women who belonged to the highest

and the higher income quintiles reported lowest levels of interpersonal relationship difficulties than women who belonged to poorest income quintiles (both $p < 0.001$). Furthermore, women who reported their caste as 'Other' (caste not applicable or 'other backward castes'), reported lower levels of interpersonal difficulties than their general caste counterparts ($b = -1.49$; 95% CI = -1.85 - -1.14; $p < 0.001$). Controlling for all other demographic characteristics, Muslim women, and women who reported being self-employed, informally employed, and unemployed reported higher levels of interpersonal difficulties than Hindu women and women who reported being employed in private sector (all $p < 0.05$). Furthermore, women who reported high childhood SES status reported lower levels of interpersonal difficulties than the low childhood SES counterparts ($b = -0.34$; 95% CI = -0.61 - -0.07; $p < 0.05$). There was no statistically significant difference between reported levels of interpersonal difficulties based on reported location of residence among women.

Men

Controlling for other demographic characteristics, age was positively associated with increase in interpersonal difficulties among men. However, there was no statistically significant difference in interpersonal difficulties among early-adult men (25-45 years) and young men (18-24 years). Controlling for all other demographic income was negatively associated with reported levels of interpersonal difficulties among men (all $p < .05$). Controlling for other demographic characteristics men who belonged to scheduled tribes and men who reported being unemployed reported lower levels of interpersonal difficulties than men who belonged to general caste and men who were employed in private sector ($b = -0.5$, 95% CI = -0.96 - -0.04, $p < 0.05$; and $b = 1.1$; 95% CI = 0.33 - 1.87; $p < .001$, respectively). However, no statistically significant difference in reported levels of interpersonal difficulties among men based on their levels of education, marital status, area of residence, religion, and childhood SES.

6.4.3. Sleep

Table 6. At a Glance – Sleep Regressed on Sociodemographic Characteristics. WHO SAGE India, Wave 1 (2007/10)

	Sleep	
	Women	Men
	<i>b</i>	<i>b</i>
Age (Ref =Young Adults)		
25-45 (Early Adults)	↑	↑
46-65 (Middle-Aged Adults)	↑	↑
66-80 (Older Adults)	↑	↑
80+ (Elderly)	↑	↑
Education (Ref =College+PostGrad)		
High School	NS	NS
Secondary School	NS	↑
Less than secondary school	↑	↑
No formal education	↑	NS
Income Quintiles (Ref =General)		
Poorer	↓	NS
Middle	NS	↓
Richer*	NS	↓
Richest	NS	↓
Caste (Ref =General)		
Scheduled Caste	NS	NS
Scheduled Tribe	NS	NS
Other	NS	↑
Marital Status (Ref =Married)		
Never Married	↓	NS
Widowed	↑	NS
Other	NS	NS
Location (Ref =Urban)		
Rural	↑	NS
Religion (Ref =Hindu)		
Muslims	↑	NS
Other	NS	NS
Work (Ref =Private Sector)		
Unemployed	NS	NS
Public Sector	NS	NS
Self-Employed	NS	NS
Informal Employment	↑	NS
Childhood SES (Ref =Low)		
High	↓	NS

Women

Controlling for other demographic characteristics, as age increased reported levels of sleep difficulties increased among women. Controlling for other demographic characteristics, women who reported no formal education and less than secondary school education had higher levels of sleep difficulties than women who reported having completed college ($b = 0.47$; 95% CI = 0.2 - 0.73; $p < .001$ and $b = 0.39$; 95% CI = 0.11 - 0.68; $p < .001$, respectively). Similarly, controlling for other demographic characteristics women who reported belonging to poorer income quintile had lower sleep difficulties than women who belonged to poorest income quintile ($b = -0.19$; 95%; CI

= -0.37 – -0.01; $p < .05$). Controlling for other demographic characteristics women who reported never been married had lower levels of sleep difficulties than married women ($b = -0.18$; 95% CI = -0.35 – -0.01; $p < .05$) whereas women who were widowed had higher sleep difficulties than women who were married ($b = 0.51$; 95% CI = 0.23 - 0.8; $p < .0001$). Similarly, rural women reported higher levels of sleep difficulties than urban women ($b = 0.22$; 95% CI: 0.05 - 0.39; $p < .05$) and Muslim women reported higher sleep difficulties than Hindu women ($b = 0.21$; 95% CI = 0.01 - 0.41; $p < .05$). Furthermore, women who reported informal employment had higher levels of sleep difficulties than women who reported working in private sector ($b = 0.45$; 95% CI = 0.19 - 0.71; $p < .001$). Controlling for other demographic characteristics women who reported belonging to high childhood SES reported lower sleep difficulties than women who belonged to low childhood SES group ($b = -0.19$; 95% CI = -0.34 - -0.04; $p < .05$). Sleep difficulties among women did not differ based on their social caste.

Men

Controlling for other demographic characteristics as age was positively related to reported levels of sleep difficulties among men (all $p < .05$). Furthermore, controlling for other demographic characteristics, men who reported less than secondary school and secondary school education had higher levels of sleep difficulties than men who reported having completed college ($b = 0.32$; 95% CI = 0.03 - 0.62; $p < .05$ and $b = 0.34$; 95% CI = 0.07 - 0.61; $p < .001$, respectively). Controlling for other demographic characteristics men who reported belonging to middle-income, higher and highest income quintile had lower sleep difficulties than men who belonged to poorest income quintile ($b = -0.52$; 95% CI = -0.83 – -0.21; $p < .001$ and $b = -0.40$; 95% CI = -0.73 – -0.07; $p < .05$, and $b = -0.56$; 95% CI = -0.89 - -0.23; $p < .001$, respectively). Similarly, men who reported their caste as ‘Other’ (no caste or other backward caste) had higher sleep difficulties than men who

belonged to general caste category ($b = 0.41$; 95% CI = - 0.12 - 0.71; $p < .001$). However, controlling for other demographic characteristics there was no statistically significant differences in sleep difficulties among men based on their marital status, location of residence, religion, employment status, and childhood SES.

6.4.4. Cognition

Table 7. At a Glance – Cognition Regressed on Sociodemographic Characteristics. WHO SAGE India, Wave 1 (2007/10)

	Cognition	
	Women	Men
	\bar{b}	\bar{b}
Age (Ref =Young Adults)		
25-45 (Early Adults)	↑	NS
46-65 (Middle-Aged Adults)	↑	↑
66-80 (Older Adults)	↑	↑
80+ (Elderly)	↑	↑
Education (Ref =College+PostGrad)		
High School	NS	NS
Secondary School	NS	NS
Less than secondary school	↑	NS
No formal education	↑	↑
Income Quintiles (Ref =Middle)		
Poorer	NS	NS
Middle	NS	↓
Richer*	NS	↓
Richest	↓	↓
Caste (Ref =General)		
Scheduled Caste	NS	NS
Scheduled Tribe	NS	NS
Other	↓	NS
Marital Status (Ref =Married)		
Never Married	NS	NS
Widowed	↑	NS
Other	NS	NS
Location (Ref =Urban)		
Rural	↑	NS
Religion (Ref =Hindu)		
Muslims	↑	NS
Other	NS	NS
Work (Ref =Private Sector)		
Unemployed	NS	NS
Public Sector	NS	NS
Self-Employed	NS	NS
Informal Employment	↑	NS
Childhood SES (Ref =Low)		
High	↓	NS

Women

Controlling for other demographic characteristics increase in age was related to increase in reported levels of cognitive difficulties (all $p < .0001$). Furthermore, women who reported less than secondary school education and no formal education had higher levels of cognitive difficulties

than college educated women ($b = 0.49$; 95% CI: 0.23 - 0.75; $p < .0001$, and $b = 0.81$; 95% CI = 0.52 - 1.11; $p < .0001$, respectively). Controlling for other demographic characteristics women who reported belonging to the richest income quintile reported lower levels of cognitive difficulties as compared to women who belonged to poorest income quintiles ($b = -0.25$; 95% CI: -0.49 – -0.02; $p < .05$) and women who reported caste as ‘Other’ (other backward castes or no castes) reported lower levels of cognitive difficulties as compared to general caste women ($b = -0.37$; 95% CI: -0.58 – -0.17; $p < .001$). Similarly, women who reported being widowed and women from rural areas had higher levels of cognitive difficulties than women who reported being currently married and women from urban areas (both $p < .05$). Muslim women reported higher levels of cognitive difficulties as compared to their Hindu counterparts ($b = 0.43$; 95% CI = 0.23 - 0.64; $p < .0001$). Moreover, women who reported informal employment and women with low childhood SES backgrounds reported higher levels of cognitive difficulties as compared to women who reported working in a private sector and women from high childhood SES background (both $p < .05$).

Men

Controlling for all other demographic characteristics age was positive associated with cognitive difficulties among men (all $p < .001$). However, there was no statistically significant difference between early-adult men (25-45 years) and young men (18-24 years). Furthermore, men who reported no formal education had higher levels of cognitive difficulties than college educated men ($b = 0.38$; 95% CI = 0.05 - 0.71; $p < .05$). Similarly, men who belonged to middle-income, richer income, and richest income quintiles reported fewer cognitive difficulties than men who belonged to poorest income quintile (all $p < .05$, respectively). However, controlling for all other demographic characteristics reported levels of cognitive difficulties did not statistically differ

based on social caste, marital status, location, religion, employment status, and childhood SES among men.

6.4.5. Affect

Table 8. At a Glance – Affect Regressed on Sociodemographic Characteristics

	Negative Affect	
	Women	Men
	<i>b</i>	<i>b</i>
Age (Ref =Young Adults)		
25-45 (Early Adults)	↑	NS
46-65 (Middle-Aged Adults)	↑	↑
66-80 (Older Adults)	↑	↑
80+ (Elderly)	↑	↑
Education (Ref =College+PostGrad)		
High School	↑	NS
Secondary School	↑	NS
Less than secondary school	↑	NS
No formal education	↑	NS
Income Quintiles (Ref =General)		
Poorer	↓	NS
Middle	↓	NS
Richer*	↓	↓
Richest	↓	↓
Caste (Ref =General)		
Scheduled Caste	↑	NS
Scheduled Tribe	NS	NS
Other	↑	↑
Marital Status (Ref =Married)		
Never Married	↓	NS
Widowed	↑	NS
Other	NS	NS
Location (Ref =Urban)		
Rural	NS	↑
Religion (Ref =Hindu)		
Muslims	NS	↑
Other	NS	↓
Work (Ref =Private Sector)		
Unemployed	NS	NS
Public Sector	NS	NS
Self-Employed	NS	NS
Informal Employment	NS	NS
Childhood SES (Ref =Low)		
High	NS	NS

Women

Controlling for all other demographic characteristics as age went up reported levels of negative affect went up among women (all $p < .05$). Furthermore, as reported levels of education and income went up, reported levels of negative affect went down among women (all $p < .05$).

Controlling for all other demographic characteristics scheduled caste women and women belonging to ‘Other’ caste groups (other backward castes or no castes), reported higher levels of negative affect than women who belonged to general caste group ($b = 0.23$; 95% CI = 0 - 0.46; $p <$

.05 and $b = 0.28$; 95% CI = 0.06 - 0.49; $p < .05$, respectively). Moreover, women who reported never being married had lower levels of negative affect as compared to women who reported being married ($b = -0.26$; 95% CI = -0.51 - -0.01; $p < .05$); whereas, widowed women had higher negative affect than women who reported being married ($b = 0.90$; 95% CI = 0.62 - 1.18; $p < .0001$). Controlling for all other demographic characteristics levels of negative affect did not differ among women based on their location of residence, religion, employment status, and childhood SES.

Men

Controlling for other demographic characteristics increase in age was related to increase in negative affect went up among men (all $p < .001$). However, there was no statistically significant difference in negative affect between young men (18-24 years) and early-adult men (25-45 years). There was no statistically significant association between education and affect difficulties among men. Controlling for all other demographic characteristics men who reported belonging to richer or richest income quintiles had lower levels of negative affect as compared to men who belonged to poorest income quintiles (both $p < .05$). Controlling for all other demographic characteristics, men belonging to 'Other' caste groups (other backward castes or no castes) reported higher levels of negative affect than men who belonged to general caste group ($b = 0.30$; 95% CI = 0.03 - 0.57; $p < .05$). Controlling for all other demographic characteristics rural men and Muslim men reported higher levels of negative affect as compared to their urban and Hindu men counterparts (both $p < .001$). Whereas men from 'Other' religion group (Jain, Christianity, Sikhism) reported lower levels of negative affect than Hindu men ($b = -0.48$; 95% CI = -0.93 - -0.04; $p < .05$). However, levels of negative affect did not differ among men based on their marital status, employment status, and childhood SES among men.

6.4.6. Social Connectedness

Table 9. At a Glance – Social Connectedness Regressed on Sociodemographic Characteristics

	Social Connectedness	
	Women	Men
	<i>b</i>	<i>b</i>
Age (Ref =Young Adults)		
25-45 (Early Adults)	NS	NS
46-65 (Middle-Aged Adults)	NS	NS
66-80 (Older Adults)	↓	↓
80+ (Elderly)	↓	↓
Education (Ref =College+PostGrad)		
High School	NS	NS
Secondary School	NS	NS
Less than secondary school	NS	↓
No formal education	NS	↓
Income Quintiles (Ref =Poorest)		
Poorest	NS	↑
Middle	↑	↑
Richer*	↑	↑
Richest	↑	↑
Caste (Ref =General)		
Scheduled Caste	NS	↑
Scheduled Tribe	↑	↑
Other	↑	↑
Marital Status (Ref =Married)		
Never Married	NS	NS
Widowed	↓	NS
Other	NS	NS
Location (Ref =Urban)		
Rural	↑	↑
Religion (Ref =Hindu)		
Muslims	NS	↑
Other	NS	NS
Work (Ref =Private Sector)		
Unemployed	↓	NS
Public Sector	↑	NS
Self-Employed	↓	NS
Informal Employment	↓	NS
Childhood SES (Ref =Low)		
High	NS	NS

Women

Controlling for all other demographic characteristics, older women (66-80 years) and elderly women (80+ years) reported lower levels of social connectedness as compared to their young women (18-24 years) counterparts ($b = -1.36$; 95% CI = $-2.08 - -0.63$; $p < .0001$ and $b = -3.4$; 95% CI = $-4.96 - -1.84$; $p < .0001$, respectively). Similarly, controlling for other demographic characteristics, women from middle-income, richer-income, and richest-income groups reported higher levels of social connectedness than women from lowest poorest group (all $p < .001$). Controlling for all other demographic characteristics, including, age, education, income, location, marital status, religion, employment status, and childhood SES, women belonging to scheduled caste and ‘Other’ (other backward caste or no caste) groups reported higher levels of social

connectedness than general caste women ($b = 1.36$; 95% CI = - 0.44 - 2.29; $p < .001$ and $b = 2.25$; 95% CI = 1.64 - 2.87; $p < .0001$, respectively). Moreover, widowed women reported lower levels of social connectedness than their currently married counterparts ($b = - 0.36$; 95% CI = -0.71 - - 0.01; $p < .05$) and rural women reported higher levels of social connectedness as compared to urban women ($b = 0.85$; 95% CI = 0.11 - 1.6; $p < .05$). Women who worked in public sector reported higher levels of social connectedness than their private sector counterparts; however, women who reported being unemployed, self-employed or working in informal sector reported lower levels of social connectedness than women who worked in private sector (all $p < .05$). However, controlling for other demographic characteristics social connectedness did not significant differ based on reported educational level, religion, and childhood SES among women.

Men

Controlling for all other demographic characteristics, older men (66-80 years) and elderly men (80+ years) had lower levels of social connectedness as compared to their young men (18-24 years) counterparts ($b = - 1.46$; 95% CI = -2.89 - -0.03; $p < .0001$ and $b = - 6.65$; 95% CI = -9.29 - -4.02; $p < .0001$, respectively). Similarly, men who reported less than secondary school education and no formal education had lower levels of social connectedness as compared to men who were college graduate ($b = - 2.04$; 95% CI = -3.51 - -0.57; $p < .001$ and $b = - 2.61$; 95% CI = -4.13 - -1.09; $p < .001$, respectively). Likewise, income was positively associated with reported levels of social connectedness among men (all $p < .001$). Controlling for all other demographic characteristics, men from scheduled tribes, scheduled caste, and other (other backward caste or no caste) groups reported higher levels of social connectedness than their general caste counterparts (all $p < .05$). However, social connectedness levels did not differ significantly among men based on their marital status, employment status, and childhood SES. Controlling for all other demographic

characteristics rural men and Muslim men reported higher levels of social connectedness as compared to their urban men and Hindu men counterparts ($b = 1.84$; 95% CI = 0.88 - 2.8; both $p < .0001$).

6.4.7. Quality of life

Table 10. At A Glance: Quality of Life Regressed on Sociodemographic Characteristics

	Quality of Life	
	Women	Men
	\hat{b}	\hat{b}
Age (Ref = Young Adults)		
25-45 (Early Adults)	↓	NS
46-65 (Middle-Aged Adults)	↓	↓
66-80 (Older Adults)	↓	↓
80+ (Elderly)	↓	↓
Education (Ref = College+PostGrad)		
High School	↓	NS
Secondary School	↓	↓
Less than secondary school	↓	↓
No formal education	↓	↓
Income Quintiles (Ref = General)		
Poorer	↑	↑
Middle	↑	↑
Richer*	↑	↑
Richest	↑	↑
Caste (Ref = General)		
Scheduled Caste	↓	NS
Scheduled Tribe	↓	NS
Other	NS	↓
Marital Status (Ref = Married)		
Never Married	NS	NS
Widowed	↓	NS
Other	↓	NS
Location (Ref = Urban)		
Rural	NS	↓
Religion (Ref = Hindu)		
Muslims	↓	NS
Other	↑	NS
Work (Ref = Private Sector)		
Unemployed	NS	NS
Public Sector	NS	NS
Self-Employed	↑	NS
Informal Employment	NS	NS
Childhood SES (Ref = Low)		
High	NS	NS

Table 2 shows that the quality of life did not differ among men and women controlling for other sociodemographic characteristics. However, no current studies show sociodemographic correlates of quality of life among men and women in India independent of any disease outcome. Additionally, there is some evidence that quality of life differ based on gender (Bisegger et al., 2005; Mudey et al., 2011). Therefore, it was decided to evaluate quality of life separately for men and women.

Women

Controlling for all other demographic characteristics age was negatively related to the reported quality of life decreases among women; whereas, education and income were positively related to the reported levels of quality of life among women (all $p < .05$). Controlling for all other demographic characteristics, women who belonged to scheduled caste and scheduled tribe groups reported lower quality of life as compared to their general caste counterparts ($b = -1.14$; 95% CI = $-1.64 - -0.65$; $p < .0001$; and $b = -0.76$; 95% CI = $-1.44 - -0.07$; $p < .05$, respectively). Similarly, widowed women and women who reported being separated/living together/divorced reported lower levels of quality of life as compared to women who were currently married ($b = -1.56$; 95% CI = $-2.05 - -1.07$; $p < .0001$; and $b = -1.28$; 95% CI = $-2.37 - -0.18$; $p < .05$, respectively). Similarly, Muslim women reported lower quality of life, whereas women from 'Other' minority groups (Sikhism, Jain, Christianity) reported higher quality of life than Hindu women (all $p < .05$). Furthermore, women who reported being self-employed reported higher quality of life than women who reported working in a private sector ($b = 0.84$; 95% CI = $0.04 - 1.65$; $p < .05$). However, reported quality of life did not differ significantly among women based on their location of residence, and childhood SES.

Men

Controlling for other demographic characteristics, as age increases, reported quality of life decreases among men (all $p < .0001$). However, there was no statistically significant difference between reported levels of quality of life between early-adult men (25-45 years) and young men (18-24 years). Controlling for other demographic characteristics, the reported level of quality of life was lower among secondary school educated men as compared to college graduate men ($p < .05$). Moreover, controlling for other demographic characteristics as income goes up the reported

quality of life goes up among men (all $p < .001$). Controlling for other demographic characteristics men who belonged to 'Other' caste groups (no caste or other backward caste) and rural men reported lower quality of life as compared to their general caste and urban counterparts (both $p < .05$). However, controlling for all other demographic characteristics, reported levels of quality of life did not differ among men based on their marital status, religion, employment status, and childhood SES.

6.5. Discussion

The present study aimed to evaluate sociodemographic patterns in the multidimensional indicators of psychosocial functioning. Drawing from previous research and the fundamental cause theory of health inequities (Link & Phelan, 1995), it was hypothesized that sociodemographic factors would shape the levels of personal and social functioning for Indian adults. Overall, the study found support for these theory-driven key hypotheses – there were significant sociodemographic differences in psychosocial functioning among Indian adults. As such, social or economic disadvantage (in terms of age, income, education, employment status, marital status, and religion, caste) was associated with poorer psychosocial functioning. However, the study observed that socioeconomic patterns in psychosocial functioning were much more nuanced among women than among men. There were also interesting patterns created by some types of sociodemographic indicators that were inconsistent with the theory-based expectation, namely social caste and religion. Overall, this study contributes evidence to previous research and theory while also adding new insights into the ways in which sociodemographic characteristics shape psychosocial functioning in the Indian context. These findings also raise several directions for future research. The following sections discuss key findings.

6.5.1. Sociodemographic Patterns in Psychosocial Functioning

Age

Personal functioning and age

In line with previous research, results showed age as one of the most robust predictors of psychosocial wellbeing among Indian adults. Accounting for all other demographic factors, an increase in the age was linked to poorer levels of personal functioning including sleep, cognition, affect, and quality of life for women as well as men. However, the relationship between age and

depression was not consistent across all age categories for men and women. For example, among men, odds of depression were higher only for older adults between the ages of 66-80 years as compared to young men (18-24 years). Similarly, odds of depression for middle-aged adults (aged 46-65 years) were higher for women but not for men. This indicates that middle-age group was a vulnerable period for depression among Indian women but not for men.

The present results consistent with previous studies that demonstrate gender gaps in depression based on stages of life-cycle (Mirowsky, 1996). Some scholars argue that throughout the life-course, relative significance and burden of work and family circumstances vary greatly for men and women in ways that create steep disparities in experiences of stress, strain, financial and economic status, personal autonomy, social authority, and social recognition based on gendered norms and expectations (Marks et al., 2001; Mirowsky, 1996; Spain & Bianchi, 1996). Life situations, constraints, and opportunities for middle-aged men and women differ in multiple ways. For instance, roles and responsibilities of child-rearing of young, adolescents and older children, upkeep of other important household responsibilities, gaps in pay and discrimination in work opportunities, caring for elderlies, and conflicting work/life balance demands are greater for women than for men (Gore & Mangione, 1983; Nomaguchi & Milkie, 2003; Ross et al., 1990). Thus, psychologically, gender differences in middle-aged adults favor men's wellbeing over women (Mirowsky, 1996). This study showed that in Indian context, these gender differences in experience of depression among middle-aged adults remain even after adjusting for other important sociodemographic characteristics. While the research on geriatric depression in India is growing (Bansal et al., 2015; Rajkumar et al., 2009), there is also a need to closely examine the mechanisms that increase risks of depression among middle-aged women. Because depression is also related to various other mental and physical health co-morbidities, middle-aged women are

particularly vulnerable groups. Some research evidence also suggests that middle-aged populations and women are especially at risk for comorbidities related to depression (Miller & Cano, 2009; Nygaard et al., 2003; Pan et al., 2012). Social support, higher education, and economic well-being are often discussed as protective factors against depression in this age group for women (Ross et al., 1990; Thoits, 1991).

Social functioning and age

The findings revealed that as men and women age their difficulties in interpersonal functioning increase. Similarly, the perceived levels of social connectedness decrease only after the age of 65 years, among men and women. These findings reveal the unique relationship between an individual's age and the level of social connectedness and perception of the quality of interpersonal relationships. Even though the frequency of social connectedness does not decrease before the age of 65 years for men and women, the perceived ease of interpersonal functioning is diminished as Indian men and women age. This is consistent with research that suggests that age is negatively related to social network size, closeness to network members, frequency of contact, and the number of non-primary-group ties (Ajrouch et al., 2001, 2005; Cornwell et al., 2008). Interestingly, as compared to young adult men, difficulties in the interpersonal relationships do not increase until the age of 46 years, among men. However, difficulties in the interpersonal relationships increase for women at every stage of age in a linear fashion. As such, the present study adds to the growing literature of aging and psychosocial functioning as well as highlights the unique relationship between different stages of age, gender, and psychosocial functioning.

Education

Personal functioning and education

Negative affect and depression: Although education was not related to depression, it was a robust predictor of negative affect among women. However, education was not related to negative affect or depression among men. This highlights gender-based distinctions in how education influences emotions. Furthermore, because negative affect is one of the most consistent predictor of range of mental health disorders, including depression (Watson et al., 1988), perhaps the gender-based disparities in negative affect are related to gender-based disparities in depression. Hence, further research is needed to assess the relationship between negative affect and depression in Indian. Furthermore, additional research is needed to assess the role of education in shaping women's negative affect in Indian society even after holding all other relevant SES and demographic factors constant. For instance, education impacts women's empowerment and autonomy of decision-making in Indian context (Nayak & Mahanta, 2012; Senarath & Gunawardena, 2009) and it might be one of the mechanisms through which education shapes negative affect. Future research needs to clarify the mechanisms through which education creates these gender-based gradations in negative affect and depression in India.

Sleep: Consistent with previous studies, education produced differential influences on cognitive and sleep functioning among men and women (Cagney & Lauderdale, 2002; Farmer et al., 1995; J. Lee et al., 2015). A lower level of education (less than secondary school or no formal education) was a significant predictor of sleep among women but not among men. Among men, college-educated men experienced better levels of sleep as compared to men with middle to low levels of education (secondary school or less than primary school completion). But there was no difference in sleep difficulties among middle to higher ends of educational levels – specifically,

sleep quality among high-school educated and college-educated men were not different. Whereas among women, education was a protective factor against sleep difficulties only after achieving at least middle levels of education (secondary school completion). This suggests that the ways education influences men and women's vulnerability to sleep difficulties maybe through different mechanisms. These results are consistent with studies that show gender-based sociodemographic variation in sleep difficulties (Grandner et al., 2010; Sekine et al., 2006). Research has also found that low levels of education are associated with poor sleep quality (Caldwell & Redeker, 2009; Gellis et al., 2005). The study found that in the Indian context, the effect of education was more pronounced among women than among men. Sleep is one of the basic building blocks of wellbeing and as such, it is crucial to evaluate sleep as one of the key predictors of health in Indian population. The present study is one of the first steps toward demonstrating socioeconomic patterns in sleep in this population.

Cognition: Interestingly, men who reported at least some exposure to formal education reported no greater difficulties in cognitive functioning than college-educated men. This suggests that the level of education is a protective factor against cognitive difficulties for men even at very low levels of education (less than primary school education). Whereas among Indian women, education was a protective factor only after achieving at least middle levels of education (secondary school completion). This was consistent with a study that found that education was a protective factor against deteriorations in cognitive functioning only at middle and higher levels of education among Chinese adults (Hooren et al., 2007). Thus, although the education is one of the most robust predictors of cognitive functioning (Jefferson et al., 2011; Luo & Waite, 2005), the ways in which education offers protective benefits against cognitive functioning differs in important ways based on gender among Indian adults.

Quality of Life: Perceived quality of life increased as the level of education increased for both Indian men and women. These findings are consistent with previous research demonstrating a clear positive association between education and quality of life through a decrease of subjective distress and increases health-enhancing psychosocial resources, such as personal control (Mirowsky & Ross, 2003; Ross & Van Willigen, 1997a).

Social functioning and education

Low levels of education (namely, no formal education and less than primary school education) were related to higher interpersonal difficulties among women and lower levels of social connectedness among men. However, middle to higher levels of education (secondary school completion, high-school, and/or college degree) did not influence social functioning among men and women. Taken together, this indicates that education offered protective advantages for men and women in distinct ways. The findings are consistent with previous research that suggests social participation increases with education as the returns of social participation are also higher for people with higher educational backgrounds (J. Huang et al., 2009). However, the results also highlight that social functioning does not differ across educational levels in the Indian context once men and women have achieved a certain threshold of education (secondary school completion).

To sum, the benefits of education to functioning are universal, accumulative, and self-amplifying, and grow across the life course (Mirowsky & Ross, 2003; Ross & Wu, 1995). However, the results, especially the associations between sleep, cognition, interpersonal relationships and education, demonstrate that the levels of education that are protective for Indian men may not be protective for Indian women in a similar manner. Similarly, this study highlights that the effects of education are much more prominent and nuanced for women's functioning (for example, for negative affect) than for men's functioning in the Indian context.

Income

Personal functioning and income

Depression and negative affect: Accounting for all other demographic factors, the level of income did not predict the odds of depression among women. However, income was a protective factor against depression for men who belonged to the richest income quintile as compared to men who belonged to the poorest income quintile. Moreover, similar to links between education and negative affect, income produced distinct effects on negative affect among men and women. Among women, as income increased negative affect went down at all levels. However, among men, the protective benefits of income were only available for richer and richest income quintiles as compared to the poorest income quintile. The present results highlight the importance of studying multiple indicators of mental health functioning – although income and education were not relevant for standardized diagnosis of depression, it is a robust predictor of negative affect among Indian women. Thus, there is a need to closely examine the confluence of other sociodemographic factors and mechanisms through which income shapes negative affect among Indian women.

Sleep and Cognition: Notably, compared to the poorest income quintiles, all levels of income quintiles conferred a protective benefit against cognitive and sleep difficulties for men but for women the protective benefits of income on cognitive functioning were only available at the richest income quintiles. This indicates ‘diminishing returns of income’ for cognitive difficulties among women. According to the ‘Black’s diminishing returns hypothesis’, the protective effects of SES (such as education and income) are systematically smaller for African Americans than their White counterparts (Assari, 2017, 2018). In other words, African Americans receive lower health returns on their investments in education and income as opposed to their White counterparts.

Similar to the ethnic disparities in the US, the present study found evidence of ‘diminishing returns’ in gender-based disparities in personal functioning among the Indian population. As compared to women belonging to the poorest income quintiles, women experienced better cognitive functioning only at the richest income levels.

Quality of life: In line with theory and past research, quality of life was positively associated with income across both genders (Lubetkin et al., 2005).

Social functioning and income

Social connectedness and interpersonal relationships: In line with previous research (Kawachi & Berkman, 2014) and fundamental cause theory, income was positively related to social functioning among Indian men in a linear fashion. However, among women only those belonging to richer and the richest income quintiles reported lower levels of interpersonal difficulties than women from poorest income quintiles. Taken together, this indicates that any increase in income is linked to higher levels of social functioning among Indian men; however, Indian women receive these protective benefits of income only after reaching a certain threshold of income, namely middle-income quintile for social connectedness and richer income quintile for interpersonal interactions. There is a need to clarify the mechanisms that create these important gradations among women.

Furthermore, consistent with Aneshensel’s arguments (Aneshensel, 2005b) the results underscore the importance of studying multiple indicators of mental health functioning. For instance, although income and education did not affect likelihood of depression among men and women, it was a robust predictor of negative affect among women. This suggests that education and income can create significant psychological distress in terms of negative affect that would have been missed if standardized diagnosis of depression were evaluated as the only outcome.

Caste

Personal functioning and caste

The results showed that scheduled caste women reported higher negative affect and lower perceived quality of life. Whereas for men, belonging to ‘Other’ caste groups (having no official caste category or belonging to ‘other backward castes’) was more detrimental to personal functioning than any belonging to scheduled caste or scheduled tribe. Men from ‘Other’ castes reported higher odds of depression, higher negative affect, and lower quality of life than men from general castes category. Men from scheduled caste and the general caste did not differ in terms of sleep difficulties, cognitive difficulties, negative affect, depression, and quality of life. Thus, belonging to a historically and politically disadvantaged caste group did not always create lower levels of personal functioning among men and women. On the contrary, women from scheduled tribes and men from ‘Other’ castes reported lower odds of depression and higher levels of cognitive functioning, respectively. Thus, perhaps caste membership shapes the access and availability of different psychosocial resources, such as social support, beliefs of mastery, coping, that create differences in the indicators of personal functioning. Moreover, the availability of psychosocial resources may not always be linked to the caste hierarchy.

Social functioning and caste

Contrary to the hypotheses, women from ‘Other’ caste groups and men from scheduled tribe reported lower levels of difficulties in their interpersonal relationship than their general caste counterparts. Likewise, social connectedness was higher among women from scheduled tribes and ‘Other’ castes and men from scheduled castes, scheduled tribes, and ‘Other’ caste groups than their general caste counterparts. Taken together, the present results indicate that historical disadvantages in terms of social caste hierarchy do always translate into disadvantages

in terms of interpersonal relationships and overall social functioning. In reality, social functioning was not different or lower among historically disadvantaged caste groups than hierarchically advantaged social castes. Further research is urgently required to uncover the ways in which health disparities are created based on social castes in India.

Caste identity is one of the most pervasive forms of social stratification and inequities in Indian society. However, making a global assumption that caste disadvantages are also unequivocally linked to disadvantages in terms of personal and social functioning would be erroneous. There is a need to investigate the role of the social, political, structural, and cultural discrimination inherent in the social caste system as one of the determinants of functioning and health. The present study shows that although membership in a disadvantaged caste group created disparities in some facets of personal functioning, it served as a protective factor for other indicators of personal and social functioning. As the political unrest between different castes and religious groups is on the rise in recent years (BBC News, 2018; Goel et al., 2018; The New York Times, 2019), there is an urgent need to study the mechanisms that create inequities and also the mechanisms that act as protective factors among population subgroups.

Marital Status

Personal functioning and marital status

Among women, widowhood was detrimental to all indicators of personal functioning as compared to married women – women who reported being widowed also reported increased odds of depression, higher sleep difficulties, higher cognitive difficulties, higher negative affect, and decreased quality of life. Likewise, being separated or divorced increased women's experience of depression and decreased their quality of life. Widowhood also increased odds of depression for

men. However, overall, being married conferred benefits for women but the marital status was not a predictor of personal functioning among Indian men.

Social functioning and marital status

Similar to the relationship between personal functioning and marital status, marital status was not a predictor of social functioning among Indian men. However, among women, widowhood was linked to lowered levels of social functioning – expressly, increased difficulties in interpersonal relationships and decreased levels of social connectedness.

The current study highlights the particularly detrimental effects of widowhood on Indian women. Even after adjusting for all other relevant sociodemographic factors, widowhood emerged as a robust predictor of all indicators of personal and social functioning among women and increased odds of depression among men. These results are consistent with other research that explored widowhood as a predictor of diseases among Indian adults (Perkins et al., 2016a). Various explanations of damaging health effects of widowhood have been provided in the literature. These explanations include loss of economic, social, and psychological benefits offered by being in a married relationship, loss of social support, and social status (Umberson, 1992; K. Williams, 2004). Drawing on the fundamental cause theory, widowhood may worsen health by decreasing health-enhancing flexible resources available to individuals (J. C. Phelan & Link, 2013b).

Location

Personal functioning and location

Location of residence was not related to depression among men or women but created distinct patterns in personal functioning among men and women. For instance, rural residence was related to higher sleep and cognitive difficulties among women and higher levels of negative affect and lower quality of life among men. These results are consistent with past research that suggests

higher levels of cognitive impairments among Indian rural adults (H. C. Ganguli, 2000; Mberu et al., 2016). Weir, Lay, & Langa (2014) found female disadvantage in cognitive functioning in India and found an urban-rural divide in cognition overall.

Social functioning and location

The Location of residence was not a predictor of interpersonal relationships among Indian men and women. However, rural men and women reported higher levels of social connectedness than urban men and women. The rural-urban divide is one of the most pressing health inequity issues in India and the current study is one of the first studies to demonstrate variables that serve as potential mechanisms driving the inequities. Further research is needed to identify how the availability of psychosocial protective resources changes based on the area of residence in India.

Religion

Personal functioning and religion

Religion did not influence the likelihood of depression among men and women. However, Muslim women reported increased sleep and cognitive difficulties whereas Muslim men reported higher levels of negative affect and lower level of quality of life than their Hindu counterparts. Interestingly, there was no difference in men and women from 'Other' minority religions (Christianity, Jainism, Sikhism) and their Hindu counterparts in terms of personal functioning. On the contrary, men and women from 'Other' religious minorities reported a higher quality of life and lower levels of negative affect than their Hindu counterparts, respectively. Therefore, similar to results related to social caste, belonging to minority religion did not unequivocally present detrimental effects on personal functioning among men and women. The results highlight that even though Islam, Jainism, Sikhism, and Christianity are all minority religions in India, only Muslims

reported poorer personal functioning. Whereas, personal functioning was not different and, in some cases, better for other minority religions than the majority religion group (Hinduism) in India.

Social functioning and religion

The relationship between social functioning and religion also indicated important gender-based nuances. Muslim women experienced greater difficulties in interpersonal relationships; however, Muslim men reported higher social connectedness than their Hindu counterparts. Social functioning did not differ among other religious minorities and Hindus.

In India, the Muslims are the largest minority community constituting 13.4 percent of the population, yet lag seriously behind in terms of most of the human development indicators (Sachar et al., 2006). Religious marginalization – being religiously different from surrounding society – could be one of the reasons for elevated levels of difficulties for both men and women (McCullough & Larson, 1999). Nevertheless, the present study shows that only Muslims experienced detrimental effects of belonging to a minority religion in India. Hence, the reasons for diminished psychosocial functioning go beyond the mere categorization in minority-religion. Studies also report discrimination as one of the key barriers to health among Muslim populations, in India as well as in other countries (Amri, 2012; Laird et al., 2007; Thorat & Neuman, 2012). Hence, similar to caste disparities, there is a need to study religion-based political, structural, social, and cultural discrimination as one of the determinants of health disparities, rather than focusing merely on caste or religion as a determinant.

Employment Status

Personal Functioning and employment status

The type of employment was not related to personal functioning among men. Among women, informal employment was related to higher levels of sleep and cognitive difficulties than employment in the private sector. No other indicators of personal functioning were related to the type of employment among men and women.

Social functioning and employment status

Similar to the association between personal functioning and type of employment, women who were informally employed also indicated more difficulties in interpersonal relationships and lowered levels of social connectedness than women who worked in the private sector. Likewise, being unemployed, self-employment, and employment in the public sector were related to increased difficulties in interpersonal relationships. Interestingly, public sector employment was associated with higher levels of social connectedness than the private sector employment for women. Among men, unemployment was related to increased difficulties in interpersonal relationships. However, no other indicators of social functioning differed based on the type of employment among men.

In the present study, around 20% of the total women sample was engaged in informal employment. The informal employment is defined as employment that lacks in the contract-based wage and non-wage related benefits and hence offers little to no long-term financial security (Carr & Chen, 2004). Structural discriminations, poor working conditions, insufficient wages are inherent in the nature of informal employment. As such, informal workers often fail to meet minimum living standards and are exposed to vulnerabilities resulting from their surrounding built environment and neighborhood conditions as well as forced or voluntary internal migrations for

work opportunities (Kantor, 2009; Mohapatra, 2012). The study highlights increased psychosocial vulnerabilities related to informal employment among women even after accounting for other SES factors and demographic characteristics. Therefore, evaluating employment in a bivariate manner (employed or unemployed) may lead to erroneous assumptions about the role of employment on individual wellbeing, especially among women in India.

Childhood SES

Psychosocial functioning and childhood SES

Lower childhood SES, measured in terms of parental educational level, was related to cognitive, interpersonal, and sleep difficulties among women. This is consistent with past research conducted using the life-course theory framework. For example, Luo & Waite (2005) found that parents' education was a more robust predictor of adult cognitive functioning than parents' financial well-being among adult men as well as women. Research from other developing and under-developed settings, such as Burkina Faso, Pakistan, China, and India adults also demonstrates the importance of childhood SES for cognitive functioning in adulthood (Alderman et al., 1996; Crookston et al., 2014; J. Lee et al., 2014b; Maurer, 2010; Onur & Velamuri, 2016). The results also showed that childhood SES was not related to personal and social functioning among men. While there is an overall paucity of research on gender-based differences related to childhood SES, some research also suggests that early life SES can influence the risk of cognitive impairments in adulthood, especially for women (Z. Zhang et al., 2008). There is no research evidence that evaluates different pathways through which childhood SES distinctly affects functioning among women and men. Therefore, future research should evaluate childhood SES and life-course implications of how intergenerational educational mobility affect women's psychosocial functioning in India. For example, how would the effects of education vary if the

parental educational level was low (low childhood SES) but the individual's current SES is high (high current SES)?

6.5.2. Limitations

Three important caveats limit the strengths of the study. First, gender is reported as a binary variable (male and female) in WHO SAGE Wave 1. This restricts the generalizability of the findings to include all categories of gender and sexual identities. Nevertheless, WHO SAGE Wave 1 is well-suited for the study as it is the only nationally representative study that provides essential sociodemographic details and includes a comprehensive measure of psychosocial functioning. Similarly, the study included a rather detailed age categorization (from 18 years through ages 80+). Young adulthood and early-stage adults (18 to 25 years and 26-46 years, respectively) are marked with some significant life-course transitions, including completion of education, employment, and changes in family compositions. The age group of 45-65 is relatively stable but marked by age of retirement at the end. Likewise, the study also differentiates between older adults (66-80 years) and elderly persons (80+ years). As such, the present study is one of the first steps toward exploring sociodemographic patterns related to psychosocial functioning independent of any disease categorization among this population.

Second, the cross-sectional nature of the study precludes causal conclusions. However, prior research and theory suggests that social structures, social hierarchy, and social conditions shape individuals' life experiences, opportunities and accessibility of resources that perpetuate disparities in functioning and wellbeing. Future research should evaluate changes in sociodemographic characteristics (social mobility, such as from being single to being married, from being employed to being unemployed among other) using longitudinal data.

Finally, health behaviors are an important mechanism through which sociodemographic factors create health impacts. Link and Phelan revised their theory to add habitus (behaviors) as one of the important links between flexible resources and health (Phelan et al., 2010). However, behaviors (protective and risky behaviors) are not included in the study. Future studies should evaluate whether health behaviors, such as physical activity, diet, and substance use influence the relationship between sociodemographic variables and psychosocial functioning among these populations.

6.5.3. Conclusion and Implications

Findings from this study show that there are distinct sociodemographic patterns in psychosocial functioning across gender groups. While the relationship between sociodemographic characteristics and psychosocial functioning is in line with hypotheses derived from fundamental cause theory and other sociological theories of inequities based on stratification and hierarchy, the present study observed patterns that are inconsistent with broader theoretical expectations. For instance, based on theory, one would argue that disadvantaged status will always confer disadvantages in psychosocial functioning. Nonetheless, the present study found that some of the historically disadvantaged groups (e.g. lower caste groups and religious minorities) reported higher levels of functioning than the hierarchically advantaged groups. As such, results demonstrate that sociodemographic patterns in psychosocial functioning depend on the psychosocial indicator under investigation. This finding implies that future research needs to clarify the underlying mechanisms that create widespread inequities in health and wellbeing among Indian adults. For example, future research should study structural, political, cultural, and personal discrimination faced on different caste and religious groups as one of the fundamental causes of inequities in

India. Current explanations of inequities based on mere membership into castes or religions are inadequate.

This study also offers insights demonstrating noteworthy gender-based nuances in sociodemographic patterns for psychosocial functioning. While the study observed the gradation in levels of psychosocial functioning depending on sociodemographic features, the protectiveness of sociodemographic advantages was not equivalent across both genders. The present study found that the links between sociodemographic characteristics and different facets of psychosocial functioning are much more nuanced for Indian women than for Indian men. In other words, the relative importance of sociodemographic characteristics depends on the type of psychosocial functioning and the gender of the respondent. For instance, the type of employment was an important predictor of women's personal as well as social functioning, yet it did not influence psychosocial functioning among men. To summarize, the study underscores the need for additional research to investigate interactions among sociodemographic factors, health, and gender in an analysis that examines multiple indicators of functioning.

A major research implication of this finding is that, inconsistent with assumptions of previous research, an increase in sociodemographic statuses (increased income and education) is not always linked to proportionate increases in psychosocial functioning among women. For instance, women in the present study needed to reach a higher threshold of income and education to receive the protective benefits of these statuses. The findings in this context are consistent with 'the diminishing returns' research that explains distinctive racial patterns in health returns of income and education in the United States (Assari, 2017). The results highlight the importance of examining gender-based sociodemographic differences in health and wellbeing in future research. This result has important public health implications as it suggests that public health programs need

to take a gender-focused approach to tailor interventions to address psychosocial health needs among these populations. Similarly, future research in this area need to explore mechanisms related to creation of gender-based disparities in this population.

Furthermore, the present study makes a compelling case for examining multiple outcomes of psychosocial health. For instance, the study observed that even though some of the socioeconomic indicators (education and income) did not predict the likelihood of depression among men and women, they had clear links to negative affect among women. Negative affect is one of the strongest predictors of psychological disorders (Watson et al., 1988). This has important implications for future research – studying only the disease outcome (depression) and ignoring indicators of psychosocial functioning would lead to erroneous assumptions about the importance of sociodemographic features that are related to wellbeing. Thus, there is a need to evaluate the antecedents of depression, including negative affect, disordered sleep, and difficulties in interpersonal interactions, among Indian populations. Finally, the findings imply that public health programs should focus on increasing holistic psychosocial functioning among Indian population, especially among population subgroups that are especially vulnerable to adverse psychosocial functioning given sociocultural, political, and historical factors. Future research should also study the multiple vulnerable subgroups identified by the present study, including older and elderly adults, widowed individuals, women working in informal sections, rural populations, and Muslim men and women.

CHAPTER 7. STUDY TWO: A LATENT CLASS ANALYSIS APPROACH TO EVALUATE THE MULTIDIMENSIONAL NATURE OF PSYCHOSOCIAL FUNCTIONING AND ITS PREDICTORS IN THE INDIAN CONTEXT

7.1. Introduction

India's current disease pattern can be characterized by low mortality, high morbidity, and the double burden of communicable as well as non-communicable diseases (Dandona et al., 2017; Yadav & Arokiasamy, 2014). Increased life expectancy in old age has also been associated with an increased number of years lived with disability and/or chronic multiple comorbidities, with cardiovascular diseases and diabetes among the most common causes for years of healthy life lost due to disability and premature mortality (WHO, 2010). Even though researchers have made strides in elucidating the biological basis and social patterns of physical health disorders, comparatively little is known about psychosocial functioning among Indian populations. This is a significant gap in research as it limits our understanding of the individual, social, cultural, and contextual correlates of overall health and wellbeing in this population.

Psychosocial functioning has been extensively studied to evaluate population health in western and industrialized countries. Moreover, different dimensions of psychosocial functioning have been assessed as antecedents and consequences of specific diseases and disorders. For instance, there is a causal relationship between psychosocial functioning and the development of cardiovascular diseases (Krantz & McCeney, 2002; Strike & Steptoe, 2004), in addition to strong epidemiological evidence of an association between psychosocial functioning, longitudinal prognosis, and mortality after a complicated medical procedure, such as a lung transplant (Smith et al., 2016). Prior studies also suggest that psychosocial functioning is related to cancer diagnosis (Smith et al., 2016; Vinokur et al., 1989), chronic systemic low-grade inflammation (Rohleder,

2014), and a host of mental health disorders among various populations (Boyko et al., 2013; Byrd & McKinney, 2012; Kaneita et al., 2009; Kiesler, 1996). Thus, the evaluation of psychosocial functioning helps us to understand the causes as well as the consequences of physical and mental health. An in-depth understanding of psychosocial functioning is especially urgent in the Indian context given the double burden of diseases, rapid epidemiological transitions, and quickly changing social and family structures due to rapid increase in internal migrations (Chandrasekhar & Sharma, 2015; P. Mohan et al., 2019).

Although most scholars agree that psychosocial functioning is multidimensional (Ryff, 1995), our current understanding of psychosocial functioning is restricted by two main limitations. First, studies are generally limited to one or two types of psychosocial indicators rather than a comprehensive evaluation of the interconnectedness and distinctive features of the multiple indicators that make up psychosocial functioning. Second, psychosocial functioning is largely studied in the context of a particular disease outcome. As a result, the bulk of research is focused on the medical model of health (Engel, 2012) concerned with understanding variations in psychosocial functioning as one of the consequences of mental and physical health diseases. This indicates a significant gap in research as our understanding of comprehensive functioning across Indian population segments is largely focused on people living with a particular disease and not the holistic nature of psychosocial functioning independent of any disease categorizations. Hence, there is an urgent need to conduct an in-depth exploration of the multidimensional nature of psychosocial functioning among Indian adults.

Furthermore, much less is known about how various dimensions of psychosocial functioning are related to individual and contextual factors, such as socioeconomic status (SES), religion, and location of residence. Given the diversity of the Indian population, it is especially

important to bridge this gap to make informed health policy decisions, facilitate person-centered medical practice, and tailor health interventions to specific segments of the population. Moreover, although some dimensions of psychosocial functioning are widely studied in India (e.g. depression), other dimensions of psychosocial functioning lack adequate research prioritization (e.g. sleep, cognition, interpersonal relationships). These limitations are especially notable in the Indian public health and social science literature where the focus thus far has been on physical health disorders. Since India is undergoing demographic and epidemiological transitions and faces a double-burden of diseases, there is an urgent need to go beyond the disease-based medical model of research to understand the holistic psychosocial aspects of health and wellbeing as one of the key ways to achieve physical health wellbeing among the Indian population (Dandona et al., 2017). Similarly, our efforts to alleviate common mental health disorders among the Indian population would also largely benefit from an in-depth understanding of psychosocial indicators and their patterning based on sociodemographic factors. Therefore, the purpose of this study is to examine how psychosocial functioning is shaped by individual and contextual sociodemographic factors among Indian men and women using a person-centered analytic approach. As such, the current study evaluates the multidimensionality of psychosocial functioning by assessing seven dimension of personal and social functioning and evaluating their sociodemographic contextual correlates.

7.2 Background

7.2.1 Theoretical Framework for the Multidimensional Nature of Psychosocial Functioning

The World Health Organization (WHO) defines health as “a state of complex physical, mental, and social well-being, and not merely the absence of disease or infirmity” (The World Health Organization, 1946). Inherent in this definition is the notion that health is a multidimensional construct with several moving elements. Similarly, the bio-psychosocial model

suggests that psychosocial functioning is also one of the key ingredients of human wellbeing and clinicians and researchers must attend to psychological, social, and biological dimensions of wellbeing (Borrell-Carrió et al., 2004; George & Engel, 1980). Borrowing from the WHO and bio-psychosocial model of health, this paper defines psychosocial functioning as an individual's subjective assessment of their functioning in their personal and social context. Furthermore, some social scientists acknowledge the WHO definition of health and argue that the lack of mental disorder diagnosis is not a sufficient criterion for psychosocial wellbeing (Jahoda, 1958; Ryff & Singer, 1998). Therefore, there is a need to go beyond the mental health disease dichotomy (e.g. diagnosis of depression or lack of depression) and use multiple indicators to measure comprehensive psychosocial functioning among subgroups of populations.

To this end, Aneshensel (2005a) encourages mental health researchers to evaluate a full range of theoretically derived mental health outcomes simultaneously. For instance, people who do not have depression (or have not reached a detectable stage yet) may nonetheless have considerable psychological distress that affects their social interactions, cognition, and sleep. Yet, they are misclassified as being 'well' in a traditional social etiological model that only considers depression as a focal dependent variable. This leads to an undercounting of the number of people affected by a given social condition (e.g. poverty), especially when social conditions affect more than one domain of mental health (Aneshensel, 2005b). Similarly, Link & Phelan (1995) theorize that social conditions, such as socioeconomic status (SES), are fundamental causes of diseases. For example, SES patterns the availability of flexible resources, including money, knowledge, power, prestige, beneficial social connections, and operate at both contextual and personal level. This differential patterning of available resources creates sociodemographic patterns in health. While there is a clear link to demonstrate a sociodemographic pattern in health in the US and other

western countries (Hatzenbuehler et al., 2013; J. C. Phelan & Link, 2015), there is a paucity of research to demonstrate the salience of sociodemographic features for psychosocial functioning in the Indian society. Therefore, in this study, I also examine how sociodemographic characteristics create patterns in psychosocial functioning in the Indian context.

7.2.2 Components of Psychosocial Functioning

The present study evaluates psychosocial functioning using two main categories: (1) personal psychological functioning and (2) social functioning. Personal functioning is an individual's perception of their functioning in terms of sleep, cognition, negative affect, the quality of life, and experience of depression. Social functioning includes perceived quality of interpersonal relationships and perception of social connectedness with significant others, peers, colleagues, community, and society.

Social Functioning

Two key components of social functioning are social connectedness and interpersonal relationships. Social connectedness can broadly be defined as social participation in a range of social activities, events, and organizations (Kim et al., 2015). It includes both informal socialization (e.g. socializing with friends, colleagues, and other members of society) and social engagement as such volunteering and/or membership into a political organization (Kim et al., 2015). Social relationships and participation are essential to an individual's overall functioning. For instance, research suggests that positive social relationships buffer the pathogenic impact of stress (S. Cohen, 2004; Umberson & Montez, 2010), reduce the risk of premature death (Holt-Lunstad et al., 2015), and improve overall happiness (Ryff, 1995).

The second component of social functioning includes interpersonal relationships – it indicates the relative ease of interactions with close social ties. Social network research indicates

that there is a high level of interdependence between social connectedness and interpersonal relationships. People who have more close interpersonal ties also tend to have a high level of social connectedness and similarly, a high level of social connectedness can also lead to increased close interpersonal ties (McPherson & Smith-Lovin, 1987; Rotolo, 2000). Although these are interconnected components, scholars theorize that the processes that shape an individual's social connectedness and interpersonal relationships are distinct (Cornwell et al., 2008). For example, (a) engagement in social connectedness and interpersonal relationships may present competing demands on individual's time and energy (Sundeen, 1990); and (b) social connectedness outside of one's house may require higher levels of commitment for social interaction and participation than interpersonal relationships (Cornwell et al., 2008). Therefore, these two types of social functioning are interrelated and influence each other. Consequently, these two components should not be studied in isolation. There is an overall dearth of research to explain social connectedness and interpersonal relationships in the Indian context. This limits our understanding of how social functioning influences health among this population. Similarly, an in-depth understanding of social functioning can also help us identify potentially marginalized and socially isolated groups. Social isolation is one of the key predictors of poor health and premature death (Holt-Lunstad et al., 2015). Thus, this study evaluates social connectedness and interpersonal relationships as two cornerstones of social functioning.

Personal Functioning

Along with social functioning, an individual's perception of their functioning in terms of sleep, cognition, negative affect, the quality of life, and experience of depression converge and influence each other. Indeed, research suggests that insufficient sleep for just one night interferes with cognition (Riegel & Weaver, 2009), decreases the ability to concentrate on daily tasks, and

reduces enjoyment in interpersonal relationships (Roth & Ancoli-Israel, 1999). Likewise, the quality of interpersonal relationships also influences subjective wellbeing and life satisfaction (Burns & Machin, 2013; Froh et al., 2007). Moreover, a bulk of evidence demonstrates that the experience of depression is associated with high negative affect, reduced cognitive functioning, poor sleep, and lowered quality of life (Andrews & Titov, 2007; P. A. Barnett & Gotlib, 1988; Denollet, 2013). Although these different indicators of personal functioning share predictors, antecedents, and psychosocial consequences, few studies have investigated multiple types of personal functioning indicators simultaneously, and even fewer have considered them independent of any medical disease or mental disorder categorization. Alternatively, psychosocial functioning is often studied as an outcome or predictor of common mental health or physical health disorder diagnoses (see, for example, Caruso et al., 2017; Rabin et al., 2012). There is also paucity of research that describes personal functioning in the Indian context. These studies do not analyze the different types of psychosocial indicators individually and often combine them together to create a single index of overall psychosocial functioning. This prevents our understanding of specific variations in different indicators of psychosocial functioning and their role in creating sociodemographic patterning and disparities. Therefore, in this study, I evaluate seven indicators of psychosocial functioning simultaneously using a person-centered approach.

7.2.3. Sociodemographic Factors Associated with the Multidimensional Psychosocial Functioning

Sociodemographic features play a salient role in patterning indicators of psychosocial functioning. For instance, several studies have found differences in sleep quality, cognition, negative affect, and quality-of-life based on sociodemographic characteristics, such as education, gender, and employment status (Arber et al., 2009; Cherepanov et al., 2010; Jefferson et al., 2011;

Lotfaliany et al., 2019). Moreover, the inverse association between age and psychosocial functioning is universally established—adverse psychosocial conditions accelerate aging and psychosocial functioning diminishes as people age (Cramm et al., 2015; Hopman et al., 2009; Lin et al., 2012; Malzberg, 1940; Nilsson et al., 2003; Tell & Nilsson, 2006). Likewise, there is a clear relationship between gender and some indicators of psychosocial functioning, such as depression, interpersonal relationships, and negative affect (Rosenfield & Mouzon, 2013; Seedat et al., 2009). Specifically, the cognitive and psychological vulnerability based on sociodemographic status may be more prominent for women than for men (Lei et al., 2014). Some psychosocial indicators of functioning also show the effects of aging early in life among women than among men (Sara et al., 2003). For instance, while aging is positively related to the risk of depression, studies show that women are more vulnerable to depression in their middle ages than men (Mirowsky, 1996; Tait et al., 2012). Similar nuances are found in the relationship between education and psychosocial functioning. For example, education improves psychosocial functioning by increasing economic resources for men and women (Ross & Van Willigen, 1997b) and the risk of depression decreases more sharply for women than for men as the level of education increases (Ross & Mirowsky, 2006). Thus, the effect of education is different for men and women based on the indicator of psychosocial functioning under evaluation. Overall, this indicates that the benefits incurred from advantageous sociodemographic characteristics depend on the gender and the type of psychosocial functioning.

Nonetheless, our understanding of the ways in which psychosocial functioning is influenced based on individuals' sociodemographic characteristics is still limited. For instance, Klose & Jacobi (2004) found that different types of sociodemographic disadvantages were associated with higher risks for mental health disorders distinctly for men and women, yet the

overall emotional advantages of protective sociodemographic factors (such as being married, employment status, parenthood, social class) apply equally to men and women. Similarly, research shows that while women experience higher levels of psychological distress, they also experience other psychosocial advantages. For example, women accrue more intimate social ties, mobilize higher levels of social support during periods of stress than men, and lend more social support to significant others than men (Belle, 1987; Kawachi & Berkman, 2001; Wethington et al., 1987). Similarly, because of higher vulnerability to the effects of stress and psychological distress (Belle, 1987), one might expect that women also report lower quality of life than men. However, the results of gender-differences in quality of life are mixed. For instance, Linzer et al., (1996) found that gender differences in reported quality of life are eliminated when accounted for mental health disorders. Likewise, even though poor quality and duration of sleep creates daily life disturbances equally for men and women (Groeger et al., 2004), effects of sleep disturbances on cognitive and emotional functioning more pronounced among women than among men (Santhi et al., 2016; van der Helm et al., 2010). Therefore, the effect of a particular type of psychosocial indicator (such as sleep) is interrelated to other types of psychosocial indicators (such as cognition) and this relationship is different based on gender and other sociodemographic characteristics. This also suggests that although these psychosocial indicators are distinct from each other, they are not isolated and independent. Similarly, research shows that the relationship between sociodemographic characteristics and psychosocial functioning is non-linear and nuanced. However, because social science research is still nascent in India, there is very little research evidence to explain these patterns in Indian society. Thus, there is a need to evaluate these relationships in the Indian context. Therefore, considering different indicators of psychosocial

functioning simultaneously will provide new insights into the understanding of mental and physical health and vulnerabilities in this population.

In addition, advances have been made in identifying possible social, psychological, cognitive, and sociodemographic components of psychosocial functioning among individuals, but there has been little ‘cross-talk’ between these lines of investigation. For example, studies describe sociodemographic correlates of psychosocial functioning, such as sleep and cognition (Grandner et al., 2010; Jefferson et al., 2011), but very few studies evaluate these distinct indicators together. This particularly limits our understanding of mental and physical health among Indian populations. There is a growing understanding of sociodemographic correlates of physical health in India (Haddad et al., 2012; Kinra et al., 2010); however, understanding how social context affects mental functioning is still limited. Thus, additional research is warranted to understand how different facets of psychosocial functioning are distributed among different subgroups of the population. This is especially important, as India’s diversity in terms of geopolitical context, language, cultural norms, public infrastructural resources, and environmental resources cannot be overstated. Moreover, given that social norms and implicit rules that guide behaviors, decisions, and opportunities are still deeply rooted in patriarchal values and oppressive social status hierarchies (such as gender, social caste), there is a need to evaluate how sociodemographic factors influence psychosocial functioning in distinct ways for men and women.

7.2.4. Rationale of The Current Study

The overall purpose of this study is to identify subgroups of psychosocial functioning by using comprehensive indicators of psychosocial functioning. Based on this purpose, this study asks, *Research Question 1: Are there distinct latent classes (that is, subgroups) of psychosocial indicators based on seven distinct dimensions of psychosocial functioning among men and*

women? Here, psychosocial functioning is measured in terms of personal functioning (depression, quality of life, sleep, cognition, negative affect) and social functioning (interpersonal relationships and social connectedness). This study uses a latent class analysis (LCA) approach to identify these subgroups separately among men and women. LCA is a statistical technique that allows us to identify the hidden population subgroups as it empirically determines discrete latent variables (constructs that are not observed directly) from two or more variables to form population subgroups (Hagenaars & McCutcheon, 2002). These subgroups are unique to one another but the individuals within the subgroups are similar to one another. LCA provides the probability of a particular individual in the sample belonging to a latent class (Monga et al., 2007). LCA is useful in situations where the goal to examine a complex construct that has multiple facets requiring measurement of several constructs. In the context of the present study, LCA helps us to identify how multiple levels of psychosocial functioning indicators interact to create distinct subgroups of individuals.

Furthermore, based on extant research and theory, it is likely that age and socioeconomic status (SES) in terms of education, employment, income, childhood SES, and other contextual and personal indicators such as marital status, social caste, religion, location of residence would influence levels of psychosocial functioning among men and women (Brinkerhoff et al., 1997; Onur & Velamuri, 2016; Panda et al., 2012). Therefore, given the heterogeneous patterns of psychosocial functioning and that latent classes may have different characteristics in terms sociodemographic features of an individual, the present study also asks *Research Question 2: Is membership in latent classes of psychosocial functioning associated with age, SES, social caste, religion, marital status, and location of residence (urban vs. rural) among Indian men and women?*

7.3. Methods

7.3.1. Data

Data for this study came from the World Health Organization's SAGE (WHO Longitudinal Study of Global Aging and Adult Health) Wave 1 2007-2010. SAGE Wave 1 is a nationally representative data that covers a broad range of topics, with a focus on health, disability, disease risk factors, stress, happiness, social connection, economic well-being, caregiving, health care utilization, and health systems responsiveness (Kowal et al., 2010). The WHO uses standardized sampling procedures, administration protocols, interviewer training, and questionnaire design, translational protocols and variable definitions, which allowed for enough statistical power for the analyses. The survey instruments used in this study have been validated for Indian populations using a subset of the sample (Kowal et al., 2010; Ng et al., 2009).

The WHO SAGE respondents were selected using a stratified, multistage, random cluster sampling design (Kowal, Chatterji, et al., 2012; World Health Organization, 2020). The primary sampling units (PSU) were stratified by region and location using the Census Enumerated Area (CAE) as the sampling frame. Within each stratus, enumeration areas were selected independently with probability proportional to the size of the region. India has a total of 28 states and 7 union territories. Nineteen of the 28 Indian states were included in the design representing 96% of the population. Out of these 28 states, six states were selected based on their geographic location and level of development. The final strata were defined by the six states: (Assam, Karnataka, Maharashtra, Rajasthan, Uttar Pradesh, and West Bengal), and location of residence (urban or rural). Therefore, there were a total number of 12 strata. The 2000 Census demarcation was used as the sampling frame. Two-stage and three-stage sampling was adopted in rural and urban areas, respectively. PSUs in rural areas (villages) and in urban areas (city wards) were selected

probability proportional to size. The secondary sampling units (households) were selected using systematic sampling. The tertiary sampling units (individuals) were selected using Kish tables (Lavrakas, 2008).

7.3.2. Sample

All PSUs and households selected for the WHO Health Study (WHS)/SAGE Wave 0 survey were included in SAGE Wave 1. All samples from WHO SAGE 0 who were 50+ years of age were visited again as a part of the SAGE 1 data collection procedure. SAGE Wave 1 included a total of 11,230 completed interviews: 4,670 interviews with individuals aged 18-49 (3,625 women and 1,045 men) and 6,560 interviews with individuals aged 50-plus (3,256 women and 3,304 men; World Health Organization, n.d.). All interviewers used a standardized comprehensive interview guide to aid data collection. Respondents were not required to be able to read and write. However, depending on their age, and cognition, as well as the place where they come from, written prompts were provided to respondents, as a memory aid for some questions or concepts may be more difficult to understand than others. All interviews lasted for 90 to 120 minutes depending on the nature of respondents. The preferred condition for interviewing respondents was in private, with no other member of the household present. If total privacy is not possible, the respondents were given an option to be interviewed outside the house or where they felt comfortable discussing sensitive information.

7.3.3. Measures

Outcome variables

The present study used indicators of psychosocial functioning to create latent classes of Indian men and women. The continuous indicators were transformed into dichotomous variables to facilitate creation of latent classes to identify subgroups of psychosocial functioning among

Indian men and women. Creation of binary dichotomous variables of psychosocial functioning (high/low functioning for a given indicator) was also necessary to run LCA model using STATA 15.1 (Lanza et al., 2015). A procedure for LCA is available as a STATA-plugin free of charge at <http://methodology.psu.edu/>. All procedures used for creating the dichotomous variables are described in detail below:

Quality of life

The WHO Quality of Life brief (WHOQOL-bref) inventory was used to measure the level of perceived quality of life among study participants (Kowal, Chatterji, et al., 2012). The WHOQOL- bref does not provide a cut-off point to delineate better or worse quality of life (Silva et al., 2014). However, two commonly used approaches to create cut-offs for subjective quality of life and subjective wellbeing into binary variables are ‘70% of the maximum score’ and ‘1 standard deviation (SD) below the mean’ (Al-Fayez & Ohaeri, 2011; Cummins, 2005). When I used the ‘70% of the maximum score’ cut-off categorized 44% of the total population (43% men and 44% of women) into the ‘low quality of life’ group. The cut-off point of ‘1 SD below the mean’ categorized 14.23% of the total population (13% of men and 15% of women) into the ‘low quality of life’ group.

Two Receiver-Operating Characteristic curve (ROC) were created to assess the diagnostic ability of the two different cut-off points. Receiver operating characteristic (ROC) curve is the plot that depicts the trade-off between the sensitivity and 1-specificity across a series of cut-off points when the diagnostic test is continuous or on ordinal scale (minimum 5 categories; Kumar & Indrayan, 2011). The ROC curve is useful to evaluate the discriminant ability of a test to select absence or presence of a condition (in this case, absence or presence of low quality of life) and comparing the efficacy of two more tests for classifying a condition (in this case, two different cut-

off points based on two different approaches). I used the total area under ROC as an index for measuring performance of the two cut-off points. The larger the total area under the curve, the better efficiency of the cut-off point. The total area under the curve when the cut-off was set to '70% of maximum score' was 0.62. The total area under the curve when the cut-off was set to 1-SD below the mean was 0.73. Therefore, I decided to use 1-SD below the mean as a cut-off to create a binary (low/high) quality of life variable. People below the -1 SD cut-off were assigned value of (1) Low Quality of Life and people above the cut-off point were assigned a value of (0) High Quality of Life.

Sleep

There were no standardized cut-off points for the sleep difficulty sub-scale of the WHO SAGE survey (Kowal et al., 2010). Therefore, I used ROC curve analysis to evaluate the most effective cut-off for the study sample. First, I created a cut-off based on '1 SD above the total mean' score ($M = 3.77$; $SD = 1.93$) of the sleep difficulty scale. Second, I created a second variable by using a cut-off by collapsing Likert-type response category options into two groups. I recorded (1) High sleep difficulties for responses that indicated their sleep difficulties as either moderate, severe, or extreme/cannot do, and (0) Low sleep difficulties for responses that indicated their sleep difficulties as none, or mild. The classification that used '1 SD above the mean' as cut-off categorized 19.32% of the total population (17% men and 21% of women) into the 'High Sleep Difficulties' group. The cut-off point created by using Likert-type response categories categorized 33.23% of the total population (32% of men and 34% of women) into the 'High Sleep Difficulties' group. I then conducted the ROC analysis and found that the total area under the curve for the cut-off created by collapsing Likert type response was 0.64. The total area under the curve for the cut-off created by using '1 SD above mean' was 0.66. Therefore, I decided to use 1-SD above the

mean as a cut-off to create a binary (low/high) sleep difficulties variable. People above the -1 SD cut-off were assigned the value of (1) High Sleep Difficulties and people below the cut-off point were assigned a value of (0) Low Sleep Difficulties.

Social connectedness

There were no standardized cut-off points for the WHO social connectedness scale (Kowal et al., 2010). There are multiple ways of defining low or high social connectedness in the existing research. For example, Richards (2016) used the criteria of having 3 or more strong social ties (friends) and being active in at least one social organization (political, religious, or social establishment) as a cut-off point for low/high social connectedness. Whereas, other researchers have used one SD above the mean to be a cut-off point for differentiating between low social connectedness vs. high social connectedness (Arango et al., 2016; Pretty et al., 1994). I conducted a ROC analysis to evaluate whenever the cut-off point of ‘one SD below the mean’ was efficient for categorizing individuals into high/low social connectedness categories. The ‘1 SD below the mean’ cut-off point categorized 11.62% of the total population into the ‘Low Social Connectedness’ group (6% of men and 15% of women). The total area under the curve for the cut-off created by using ‘1SD below mean’ was 0.65. Therefore, I decided to use 1-SD above the mean as a cut-off to create a binary (low/high) social connectedness indicator. People below the -1 SD cut-off were assigned value of (1) Low Social Connectedness and people above the cut-off point were assigned a value of (0) High Social Connectedness.

Negative Affect

To determine a cut-off for creating a binary negative affect variable I followed two methods. First, based on the methodology used by previous researchers (Peterson & Janssen, 2007), I used one SD above the mean to categorize ‘High Negative Affect’. The cut-off point

created by using '1 SD above the mean' categorized 20% of the total population (18% of men and 22% of women) into the 'High Negative Affect' group. Second, I created a cut-off by recording 1 as "High Negative Affect" for responses that indicated their negative affect as (moderate, severe, or extreme/cannot do) and 0 as "Low Negative Affect" for responses that indicated their negative affect as (none, or mild). The cut-off point created by using Likert-type responses categorized 35.87% of the total population (34% of men and 37% of women) into the 'High Negative Affect' group. The ROC analysis was then conducted and found that the total area under the curve for the cut-off created by using Likert type response was 0.73. The total area under the curve for the cut-off created by using '1-SD above mean' was 0.77. Therefore, I decided to use 1-SD above the mean as a cut-off to create a binary (low/high) negative affect variable. People above the -1 SD cut-off were assigned value of (1) High Negative Affect and people below the cut-off point were assigned a value of (0) Low Negative Affect.

Cognition

Previous research has used normative mean and standard deviation to create cut-offs for cognitive tests (Baker et al., 2018; Brookes et al., 2015). Therefore, to determine a cut-off for creating a binary cognitive difficulty variable I followed two methods. First, I used one SD above the mean to categorize 'High Cognitive Difficulties'. The cut-off point created by using '1 SD above the mean' categorized 23.79% of the total population (22% of men and 25% of women) into the 'High Cognitive Difficulties' group. Second, I created a cut-off by recording (1) High Cognitive Difficulties for responses that indicated their cognitive difficulties as moderate, severe, or extreme/cannot do, and (0) Low Cognitive Difficulties for responses that indicated their cognitive difficulties as none, or mild. The cut-off point created by collapsing Likert-type responses categorized 31.18% of the total population (30% of men and 33% of women) into the

‘High Cognitive Difficulties’ group. I then conducted the ROC analysis and found that the total area under the curve for the cut-off created by using Likert type response was 0.73. The total area under the curve for the cut-off created by using ‘1-SD above mean’ was 0.76. Therefore, I decided to use 1-SD above the mean as a cut-off to create a binary (low/high) cognitive difficulties variable. People above the -1 SD cut-off were assigned value of (1) High Cognitive Difficulties and people above the cut-off point were assigned a value of (0) Low Cognitive Difficulties.

Interpersonal difficulties

In absence of a standardized or clinical cut-off, I followed the same methodological approach as an approach to create a binary ‘cognitive difficulties’ and ‘sleep difficulties’ variables. First, I used one SD above the mean to categorize ‘High Interpersonal Difficulties’. The cut-off point created by using ‘1 SD above the mean’ categorized 14.81% of the total population (13% of men and 16% of women) into the ‘High Interpersonal Difficulties’ group. Second, I created a cut-off by recording (1) High Interpersonal Difficulties for responses that indicated their cognitive difficulties as moderate, severe, or extreme/cannot do and (0) Low Interpersonal Difficulties for responses that indicated their cognitive difficulties as (none, or mild). The cut-off point created by using Likert-type responses categorized 33% of the total population (32% of men and 34% of women) into the ‘High Interpersonal Difficulties’ group. I then conducted the ROC analysis and found that the total area under the curve for the cut-off created by using Likert type response was 0.70. The total area under the curve for the cut-off created by using ‘1-SD above mean’ was 0.75. Therefore, I decided to use 1-SD above the mean as a cut-off to create a binary (low/high) cognitive difficulties variable. People above the -1 SD cut-off were assigned value of (1) High Interpersonal Difficulties and people above the cut-off point were assigned a value of (0) Low Interpersonal Difficulties.

Sociodemographic variables

Age

Following the United Nation's international guidelines for age categorizations, I created five age categories. Respondents between 18-24 years of age were coded as (0) Young Adults, respondents between 25-45 years were coded as (1) Adults, respondents between 46-65 were coded as (2) Middle-aged adults, respondents between 66-80 years were coded as (3) Older Adults and 80+ year old respondents were coded as (4) Elderly (United Nations, 1982).

Education

Respondents' education level was coded as categorical variable with five levels. It was measured by categorizing the last completed grade level where (0) no formal education, (1) for less than secondary school completed (<7 years of schooling), (2) for secondary school completed (7 years of schooling), (3) high school (between and '7-12 years of schooling) and (4) for some college and or post graduate education.

Income quintiles

Respondents' income was treated as a categorical variable with five levels representing the (1) Poorest, (2) Poorer, (3) Middle, (4) Richer and (5) Richest in terms of income. WHO SAGE dataset reports a validated asset (wealth) score index that was derived using WHO standard approach to estimating permanent income from survey data on household ownership of durable goods, dwelling characteristics, neighborhood, access to water, electricity, sanitation (Vellakkal et al., 2013).

Caste

Social caste was coded as a categorical variable with four levels: (1) General Caste, (2) Scheduled Caste, (3) Scheduled Tribe, (4) Other (constituting respondents who do not have a caste or the respondents who belonged to ‘other backward castes’).

Marital status

Marital status was captured as a categorical variable with three groups, (0) Currently Married, (1) Never married, (2) Widowed and (3) Other (separated/divorced).

Location

Place of residence was categorized into two groups – (1) Rural and (0) Urban. WHO SAGE dataset reports this classification for respondents based on their geographic location.

Religion

Around 84% of respondents identified themselves as Hindu and a little over 12% of participants reported being Muslims. Therefore, religion was captured as a categorical variable three groups, (1) Hindu and (2) Muslim and (3) to capture all ‘Other’ religious groups (Jainism, Sikhism, Buddhism, and Christianity).

Employment status

Employment status was captured as a categorical variable with four groups: (0) Private Sector, (1) Unemployed, (2) Public Sector, (3) Self-employed, (4) Informal Employment.

7.3.4. Analytic Strategy

First, the estimated weighted means and percentages of key study variables were estimated; chi-square tests were used to assess significant men-women differences (Table 11). LCA is an optimal strategy for identifying unobserved (latent) groups represented in a heterogeneous sample. The STATA LCA Plug-in was used to perform the analysis (Lanza et al., 2015). Seven binary

(low/high) measurement items (interpersonal difficulty, cognitive difficulty, negative affect, depression, quality of life, social connectedness and sleep difficulty) were included in the model. To identify a finite number of latent classes, a series of latent class models were estimated by increasing the class size in every model. I then examined models with one latent class, two latent classes, and so on. For each model, I assessed whether there was an improvement in model fit as compared to the previous model with fewer classes. Multiple model fit indexes including degrees of freedom, log likelihood ratio, Akaike information criterion (AIC), Bayesian information criterion (BIC), and adjusted BIC (aBIC) were evaluated (see Table 12 for women and Table 14 for men). As the number of classes increased, AIC, BIC, and adjusted BIC decreased, indicating improved model fit. Meaningfulness and distinctiveness of each class were also carefully considered to arrive at the best fitting model. In other words, the study took into consideration how well a final solution model will be interpreted, how distinct each solution model was as compared to a model with fewer classes, and how easily could the classes be labeled to reflect a distinct subgroup (see Table 13 and Table 15 for men). All analyses were performed separately for men and women.

Next, to evaluate whether the membership into the latent classes was related to sociodemographic characteristics, the association between each sociodemographic characteristic and latent class membership was evaluated using chi-squared tests of significance (see Table 16 for women and Table 17 for men). I used percentage of class membership by each sociodemographic variable to describe characteristics of each latent class. All analyses were conducted in STATA 15.1.

7.4 Results

Table 11. Weighted percent distribution of selected demographic characteristics by gender, WHO SAGE India Wave 1 (2007/10)

	Total		Men		Women		<i>p</i>
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%	
Age Group							<.0001
18-25 (Young Adults)	1,778	14.6	487	10.4	1,405	18.8	
26-45 (Early Adults)	6,379	52.3	2,516	53.4	3,832	51.2	
46-65 (Middle-Aged Adults)	3,194	26.2	1,373	29.2	1,742	23.3	
66-80 (Older Adults)	809	6.6	326	6.9	476	6.4	
80+ (Elderly)	38	0.3	7	0.2	35	0.5	
Education							<.0001
College +	1,036	8.5	766	12.6	270	4.4	
High School	1,781	14.6	1,164	19.2	616	10.0	
Secondary School	1,981	16.2	1,189	19.6	792	12.9	
Less than secondary school	3,115	25.5	1,644	27.1	1,471	24.0	
No formal education	4,285	35.1	1,299	21.4	2,986	48.7	
Income Quintiles							0.447
Poorest	2,464	20.3	1,233	20.5	1,231	20.2	
Poorer	2,573	21.2	1,258	20.9	1,315	21.6	
Middle	2,410	19.9	1,232	20.4	1,178	19.3	
Richer	2,176	18.0	1,066	17.7	1,110	18.2	
Richest	2,497	20.6	1,238	20.5	1,260	20.7	
Caste							0.02
General	6,790	60.7	3,422	60.1	3,369	61.3	
Scheduled Caste	2,141	19.1	1,147	20.2	994	18.1	
Scheduled Tribe	719	6.4	356	6.3	363	6.6	
Other	1,538	13.7	768	13.5	769	14.0	
Marital Status							<.0001
Married	9,967	81.7	5,196	85.7	4,771	77.8	
Never Married	1,161	9.5	649	10.7	512	8.3	
Widowed	1,000	8.2	200	3.3	800	13.1	
Other	70	0.6	19	0.3	51	0.8	
Religion							0.701
Hindu	9,456	84.2	4,777	83.6	4,679	84.8	
Muslim	1,386	12.3	720	12.6	666	12.1	
Others	388	3.5	217	3.8	171	3.1	
Location							0.007
Urban	3,133	25.7	1,430	23.6	1,703	27.8	
Rural	9,065	74.3	4,633	76.4	4,431	72.2	
Employment Status							<.0001
Not working	3,315	29.5	199	4.6	3,811	55.4	
Public Sector	602	5.4	375	8.6	137	2.0	
Private Sector	1,005	9.0	505	11.6	426	6.2	
Self-Employed	3,673	32.7	2,100	48.3	1,139	16.6	
Informal Employment	2,632	23.4	1,168	26.9	1,368	19.9	

Notes: Weighted frequencies and percentages are shown; chi-square tests were conducted to evaluate the group differences between men and women

As reported in Study # 1, Table 1 shows the sample descriptive characteristics by gender. Majority of the sample belonged to early adulthood age category (26-45 years; 52.3%). Among men, 27.1% reported having completed less than primary school education (less than 5 years of school); however, 48.7% of the women reported no formal education. Thus, women were more

likely to report lower rates of education than men ($p < .0001$). A majority of the sample belonged to the 'General caste' category (60%) and reported being currently married (81.7%). Women were more likely to report being widowed (13.1%) than men (3.3%) ($p < .0001$). A majority of the sample also reported being Hindu (84.2%) and living in an urban area (74.3%). Men (76.4%) were more likely to live in urban areas than women (72.2%; $p = .007$). Most of the men reported being 'self-employed' (48.3%) followed by informal employment (26.9%), whereas, a majority of women reported 'not working' (55.4%) followed by informal employment (19.9%). Thus, men were more likely to report employment status than women ($p < .0001$). There were no significant gender differences based on reported levels of income and religion.

Table 2 indicates that, overall, women were more likely to experience depression, higher cognitive difficulties, higher levels of negative affect, higher levels of sleep difficulties, lower quality of life, higher levels of interpersonal difficulties, and lower levels of social connectedness than their men counterparts (all $p < .05$; see Table 2).

7.4.1. Research Question 1: Latent Class Analysis for Men and Women

Women:

A four-class model provided the best fit with good convergence for women (see Table 3). Based on the fit criteria and meaningfulness of the groups, four classes for women were identified (see Figure 1). The classes were (1) Low psychosocial functioning ($n = 472$, $\% = 7.03$); (2) High cognitive difficulties ($n = 729$, $\% = 10.85$); (3) High sleep difficulties and negative affect ($n = 683$, $\% = 10.16$); (4) High Psychosocial functioning ($n = 4,832$, $\% = 71.96$). Class-specific item-probabilities for four latent classes of psychosocial functioning among women are reported in Table 4. Women in *low psychosocial functioning* class had low item-response probabilities on depression (0.31) but reported high item-response probabilities on sleep (0.83), cognition (0.95),

interpersonal relationships difficulties (0.76), high negative affect (0.80), low quality of life (0.71), and low social connectedness (0.73). Women in *high cognitive difficulties* class had high item-response probabilities on cognitive difficulties (0.66) but low item-response probabilities on all other indicators of psychosocial functioning. Women in *high sleep difficulties and negative affect* had high item-response probabilities on sleep difficulties (0.54) and negative affect (0.73). Women in *high psychosocial functioning* had low-item response probabilities on sleep difficulties (0.04), cognitive difficulties (0.00), negative affect (0.04), and depression (0.03); whereas, high item-response probabilities on quality of life (0.96) and social connectedness (0.84), indicating high levels of overall psychosocial functioning (see Table 4 and figure 1).

Table 12. Fit Statistics for Latent Class Analysis - Women

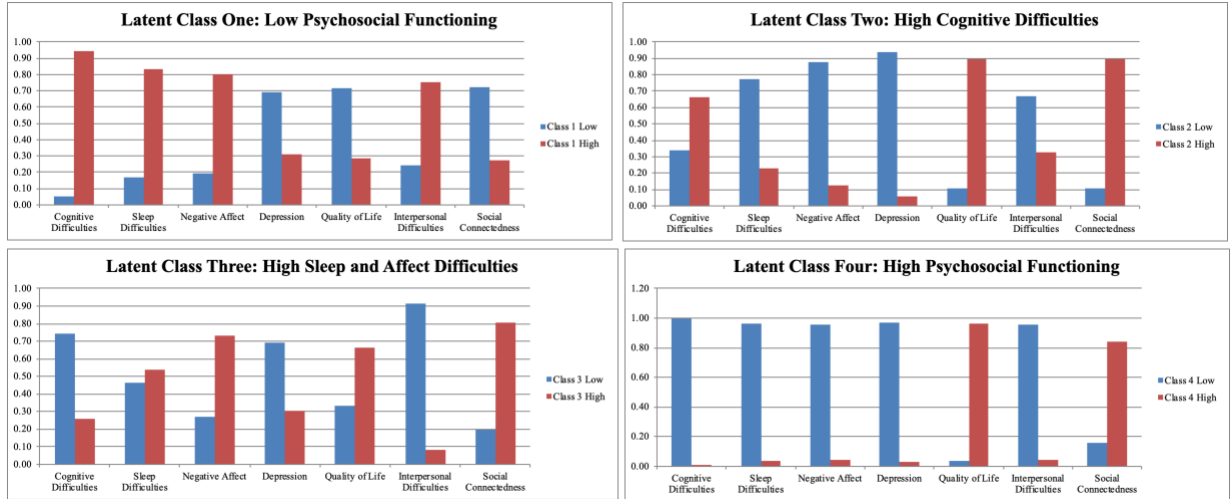
Table 3: Fit Statistics for Latent Class Analysis - Women					
Number of Latent Classes	DF	BIC	aBIC	AIC	LL
1	120	5819	5797	5772	-22193
2	112	947	899	845	-19721
3	104	695	622	538	-19560
4	96	462	364	251	-19409
5	99	515	391	250	-19400

Notes: DF = Degrees of freedom; BIC = Bayesian Information Criterion; aBIC = Adjusted Bayesian Information Criterion; AIC = Akaike Information Criterion; LL = Log Likelihood

Table 13. Class Specific Item Response Probabilities for Four Latent Class Models of Psychosocial Functioning - Women

Latent Class	Psychosocial Functioning Indicator	Cognitive Difficulties	Sleep Difficulties	Negative Affect	Depression	Quality of Life	Interpersonal Difficulties	Social Connectedness
Class 1	Low	0.05	0.17	0.20	0.69	0.71	0.24	0.73
Class 1	High	0.95	0.83	0.80	0.31	0.29	0.76	0.27
Class 2	Low	0.34	0.77	0.88	0.94	0.10	0.67	0.10
Class 2	High	0.66	0.23	0.12	0.06	0.90	0.33	0.90
Class 3	Low	0.74	0.46	0.27	0.69	0.34	0.92	0.20
Class 3	High	0.26	0.54	0.73	0.31	0.66	0.08	0.80
Class 4	Low	1.00	0.96	0.96	0.97	0.04	0.96	0.16
Class 4	High	0.00	0.04	0.04	0.03	0.96	0.04	0.84

Figure 6. Class Specific Item Response Probabilities for Latent Class Analysis - Women



Men:

A three-class model provided the best fit with good convergence for men (see Table 4). Although in terms of fit indices, a four-class model provided a slightly better fit than a three-class model, the improvements in fit indices very small. Therefore, by also considering meaningfulness of classes, a three-class model was selected for men. Class-specific item-probabilities for four latent classes of psychosocial functioning among men are reported in Table 6 and Figure 2. The classes were (1) Low Psychosocial Functioning (n = 139, % = 3.28); (2) Moderate Personal Functioning (n = 438, % = 10.3); (3) High Psychosocial Functioning (n = 3,676, % = 86.42). Men in *low psychosocial functioning* class had high item-response probabilities on sleep (0.86), cognition (0.97), interpersonal relationships difficulties (0.79), high negative affect (0.87), low quality of life (0.76). Men in *Moderate Personal Functioning* class had moderate to high item-response probabilities on cognitive difficulties (0.45), sleep difficulties (0.43), negative affect (0.41). Men in *high psychosocial functioning* class had low-item response probabilities on sleep

difficulties (0.03), cognitive difficulties (0.06), negative affect (0.05), and depression (0.02); whereas, high item-response probabilities on high quality of life (0.96) and high social connectedness (0.96), indicating high levels of overall psychosocial functioning (see Table 6).

Table 14. Fit Statistics for Latent Class Analysis - Men

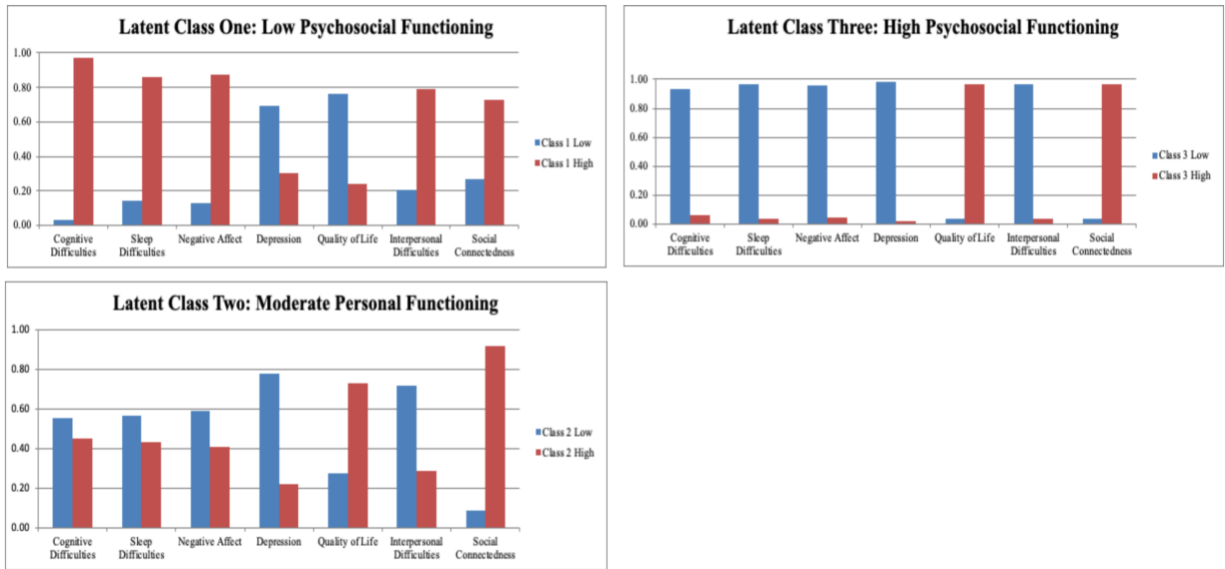
Table 5: Fit Statistics for Latent Class Analysis - Men					
Number of Latent Classes	DF	BIC	aBIC	AIC	LL
1	120	3652	3630	3608	-12144
2	112	549	502	454	-10559
3	104	444	371	298	-10473
4	96	400	302	203	-10418

Notes: DF = Degrees of freedom; BIC = Bayesian Information Criterion; aBIC = Adjusted Bayesian Information Criterion; AIC = Akaike Information Criterion; LL = Log Likelihood

Table 15. Class Specific Item Response Probabilities for Four Latent Class Models of Psychosocial Functioning - Men

Latent Class	Psychosocial Functioning Indicator	Cognitive Difficulties	Sleep Difficulties	Negative Affect	Depression	Quality of Life	Interpersonal Difficulties	Social Connectedness
Class 1	Low	0.03	0.14	0.13	0.70	0.76	0.21	0.27
Class 1	High	0.97	0.86	0.87	0.30	0.24	0.79	0.73
Class 2	Low	0.55	0.57	0.59	0.78	0.27	0.71	0.09
Class 2	High	0.45	0.43	0.41	0.22	0.73	0.29	0.91
Class 3	Low	0.94	0.97	0.95	0.98	0.04	0.97	0.04
Class 3	High	0.06	0.03	0.05	0.02	0.96	0.03	0.96

Figure 7. Class Specific Item Response Probabilities for Latent Class Analysis - Men



7.4.2. Research Question 2: Association between latent class membership and sociodemographic characteristics

Women:

There was a statistically significant difference in the psychosocial functioning latent class membership and key sociodemographic characteristics among women, including age, education, income, caste, marital status, location of residence, religion, and employment status (all $p < .05$). Middle-aged women (46-65 years old) were more likely to belong to ‘Overall low psychosocial functioning’. The latent class four ‘High Psychosocial Functioning’ was characterized by a high proportion of early adult women (25-45 years old, $n = 2449$, 56%). However, the latent class two ‘High Cognitive Difficulties’ and the latent class three ‘High Sleep Difficulties and Negative Affect’ also characterized by the highest probability of women from the early adult age-group ($n = 411$, 44%, and $n = 389$, 53%, respectively). However, the majority of the young adult women (18-24 years old) belonged to latent class four ‘Overall High Psychosocial Functioning’. All associations were significant at $<.0001$ p values. The latent class one ‘Low Psychosocial

Functioning’, the latent class two ‘High Cognitive Difficulties’, and the latent class three ‘High Sleep Difficulties and Negative Affect’ were all characterized by high proportions of women who reported no formal education (76%, 71%, and 61%, respectively). In terms of income, women who belonged to the poorest income groups were more likely to belong to latent class one ‘Low Psychosocial Functioning’ (n = 193, 31%). Similarly, the latent class two ‘High Cognitive Difficulties’ and the latent class three ‘High Sleep and Affect Difficulties’ were characterized by women who belonged to the poorest income quintiles (24% and 25%, respectively). Women from the richest income group were more likely to belong to the latent class four ‘High Psychosocial Functioning’ (n = 1,034, 23%). Women who belonged to the general caste group reported being married and reported being Hindu were more likely to belong to the latent class four ‘High Psychosocial Functioning’ (62%, 81%, and 86%, respectively). The latent class one ‘Low Psychosocial Functioning’ was characterized by women from the rural areas (n = 502, 79%). The latent class one ‘Low Psychosocial Functioning’ and the latent class two ‘High Cognitive Difficulties’ and the latent class four ‘High Sleep and Affect Difficulties’ were characterized by a high proportion of women who reported being unemployed (49%, 46%, and 48%, respectively).

Table 16. Bivariate Association Between Sociodemographic Characteristics and Latent Classes for Women

Latent Class	Latent Class 1		Latent Class 2		Latent Class 3		Latent Class 4		P-value
Latent Class Name	<i>Class One: Low Psychosocial Functioning</i>		<i>Class Two: High Cognitive Difficulties</i>		<i>Class Three: High Sleep and Affect Difficulties</i>		<i>Class Four: High Psychosocial Functioning</i>		
	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	
Age									<.0001
18-24 Young Adults	12	1.93	43	4.57	40	5.48	972	22.06	
25-45 (Early Adults)	193	30.61	411	43.54	389	52.99	2449	55.59	
46-65 (Middle-Aged Adults)	259	40.91	351	37.21	245	33.40	842	19.12	
66-80 (Older Adults)	147	23.32	133	14.04	57	7.77	138	3.14	
80+ (Elderly)	20	3.24	6	0.63	3	0.36	4	0.08	
Education									<.0001
College + Post Grad	0	0.00	5	0.54	10	1.32	252	5.72	
High School	10	1.60	20	2.16	35	4.75	550	12.49	
Secondary School	16	2.61	42	4.45	50	6.75	696	15.80	
Less than secondary school	125	19.84	210	22.27	189	25.73	1064	24.16	
No formal education	480	75.95	666	70.58	451	61.45	1842	41.82	
Income Quintiles									<.0001
Poorest	193	30.50	231	24.49	187	25.48	776	17.61	
Poorer	151	23.89	206	21.81	183	24.97	907	20.60	
Middle	138	21.78	195	20.64	147	20.04	847	19.22	
Richer	80	12.70	160	16.93	131	17.90	842	19.11	
Richest	70	11.12	152	16.14	85	11.61	1034	23.47	
Caste									<.001
General Caste	385	60.88	597	63.28	403	54.87	2736	62.11	
Scheduled Caste	124	19.69	195	20.69	153	20.82	757	17.19	
Scheduled Tribe	46	7.32	87	9.17	36	4.96	274	6.23	
Other	77	12.11	65	6.86	142	19.34	638	14.47	
Marital Status									<.0001
Currently Married	374	59.19	722	76.51	535	72.91	3567	80.96	
Never Married	5	0.87	35	3.72	9	1.26	459	10.41	
Widowed	247	39.02	178	18.88	172	23.44	354	8.04	
Other	6	0.91	8	0.89	18	2.39	26	0.58	
Location									<.05
Urban	130	20.57	201	21.34	192	26.15	1324	30.06	
Rural	502	79.43	743	78.66	542	73.85	3081	69.94	
Religion									<.001
Hindu	498	78.82	768	81.33	611	83.28	3812	86.55	
Muslims	123	19.51	140	14.81	105	14.32	458	10.40	
Other	11	1.68	36	3.86	18	2.40	135	3.06	
Employment Status									<.0001
Private Sector	24	3.73	35	3.70	58	7.87	287	6.51	
Unemployed	307	48.55	439	46.48	354	48.26	2567	58.28	
Public Sector	10	1.57	12	1.26	10	1.30	101	2.30	
Self-Employed	94	14.95	233	24.64	106	14.42	695	15.78	
Informal Employment	197	31.20	226	23.93	207	28.14	754	17.12	

Notes: Weighted frequencies and percentages are shown; chi-square tests were conducted to evaluate the group differences between latent classes

Men:

There was a statistically significant difference in the psychosocial functioning latent class membership and key sociodemographic characteristics among men, including age, education, income, marital status, religion, and employment status (all $p < .05$). However, there was no statistically significant difference in the latent class membership and reported caste and location

of residence among male respondents. Latent class one 'Low Psychosocial Functioning' was characterized by a high number of middle-aged adults (n = 105, 35%). Similarly, latent class two 'Moderate Personal Functioning' was characterized by a high number of middle-aged adults (n = 342, 45%). However, early adults (25-45 years) had a high probability of belonging to the latent class one 'High Psychosocial Functioning' (n = 1,818, 57%). All associations were significant at $<.0001$ p values. In terms of education, the proportions of less than secondary school educated (n = 112, 38%) and men without any formal education (n = 85, 29%) were highest in latent class one 'Low Psychosocial Functioning' than across any other two latent classes ($p < .05$). The proportion of men from the poorest income groups was significantly higher in latent class one 'Low Psychosocial Functioning' (n=120, 40%) and latent class two 'Moderate Personal Functioning' (n=208, 27%). The proportion of men from the richest income groups was significantly higher in latent class three 'High Psychosocial Functioning' (n=689, 22%). The latent class one 'Low Psychosocial Functioning' was also characterized by men who reported being self-employed (n = 170, 57%). The proportion of Muslim men was higher in the latent class one 'Low Psychosocial Functioning' (n = 82; 27.37%) than the other two latent classes ($p < .001$).

Table 17. Bivariate Association Between Sociodemographic Characteristics and Latent Classes for Men

	Latent Class 1		Latent Class 2		Latent Class 3		P-value
	Class One: Low Psychosocial Functioning		Class Two: Moderate Personal Functioning		Class Three: High Psychosocial Functioning		
	N	%	N	%	N	%	
Age (mean)	66.25 (years)		62.07 (years)		53.63 (years)		
Age							<.0001
18-24 Young Adults	4	1.43	28	3.70	385	12.06	
25-45 (Early Adults)	85	28.55	268	34.96	1818	57.03	
46-65 (Middle-Aged Adults)	105	35.36	342	44.59	828	25.97	
66-80 (Older Adults)	97	32.45	126	16.41	156	4.88	
80+ (Elderly)	7	2.21	3	0.34	2	0.05	
Education							<.0001
College + Post Grad	7	2.35	47	6.09	431	13.51	
High School	33	10.94	76	9.89	671	21.05	
Secondary School	61	20.49	122	15.95	630	19.76	
Less than secondary school	112	37.72	253	33.00	831	26.06	
No formal education	85	28.50	269	35.07	626	19.63	
Income Quintiles							<.0001
Poorest	120	40.11	208	27.09	618	19.40	
Poorer	84	28.29	200	26.00	644	20.21	
Middle	39	13.14	160	20.88	655	20.54	
Richer	34	11.31	128	16.66	582	18.25	
Richest	21	7.15	72	9.36	689	21.60	
Caste							0.69
General Caste	172	57.63	445	57.92	1934	60.68	
Scheduled Caste	57	19.16	167	21.80	634	19.90	
Scheduled Tribe	13	4.46	40	5.27	203	6.37	
Other	56	18.75	115	15.01	416	13.06	
Marital Status							<.0001
Currently Married	264	88.64	675	87.83	2721	85.34	
Never Married	12	3.97	32	4.19	375	11.75	
Widowed	20	6.64	59	7.70	87	2.73	
Other	2	0.75	2	0.29	5	0.17	
Location							0.31
Urban	56	18.94	148	19.32	756	23.70	
Rural	242	81.06	620	80.68	2432	76.3	
Religion							<.001
Hindu	204	68.37	631	82.21	2699	84.67	
Muslims	82	27.37	119	15.5	370	11.61	
Other	13	4.26	18	2.29	119	3.72	
Employment Status							<.001
Private Sector	14	4.76	71	9.25	390	12.24	
Unemployed	18	5.94	21	2.78	142	4.45	
Public Sector	22	7.32	36	4.63	293	9.2	
Self-Employed	170	56.99	357	46.46	1541	48.33	
Informal Employment	74	24.99	283	36.89	822	25.77	

Notes: Weighted frequencies and percentages are shown; chi-square tests were conducted to evaluate the group differences between latent classes

7.5. Discussion

In the current study, I examined patterns of psychosocial functioning, namely social functioning, and personal functioning, among a nationally representative sample of Indian men and women using LCA. This study demonstrated the utility of a person-centered approach to model the multidimensional facets of psychosocial functioning. Using LCA, the study provided an insightful and parsimonious depiction of the complex interplay between different indicators of psychosocial functioning among Indian adults. The existing literature, using a more traditional approach of combining all indicators of psychosocial functioning in one variable, demonstrates that psychosocial functioning is often related to sociodemographic characteristics including age, disease status, SES, and other contextual factors (for example, see Mehta et al., 2014; Raju et al., 2010). In contrast, LCA provided a more nuanced description of the interplay between indicators of functioning in this population. As such, this is one of the first studies to empirically demonstrate the multidimensional nature of psychosocial functioning among nationally representative Indian sample.

Three distinct latent classes for men and four distinct latent classes for women were identified. Among women, ‘Class 4: High Psychosocial Functioning’ included 72% of the sample, while ‘Class 2: High Cognitive Difficulties’ and ‘Class 3: High Sleep and Affect Difficulties’ and ‘Class 1: Low Psychosocial Functioning’ included 11%, 10%, and 7% of the population, respectively. Among men, ‘Class 3: High Psychosocial Functioning’ included 86% of the population; whereas, ‘Class 2: Moderate Personal Functioning’, and ‘Class 1: Low Psychosocial Functioning’ included 10% and 3% of the population respectively. The use of LCA substantially reduced the complexity of the data and allowed for a more efficient assessment of multiple indicators of psychosocial functioning with a limited number of latent classes. This approach also

demonstrated that certain types of psychosocial functioning, such as sleep, cognition, negative affect, are more likely to vary among population samples than other psychosocial functioning, such as interpersonal relationships and social connectedness. Furthermore, this approach allowed the study to uncover important differences between the population segments. The subgroups belonging to the classes had significantly different sociodemographic compositions that demonstrated a social gradient for psychosocial functioning between classes. Overall, both men and women in the latent class characterized by overall low psychosocial functioning were more likely to be older, less educated, and report lower income levels than men and women who belonged to the latent class characterized by overall high psychosocial functioning.

7.5.1. Latent Classes of Psychosocial Functioning for Men

Among men, there was a clear social and economic gradient in latent class membership based on education, income, employment. Similarly, location of residence was also associated with latent class membership. The ‘Class 1 Low Psychosocial Functioning’ and ‘Class 2 Moderate Personal Functioning’ together comprised of 13% of the men sample. The ‘Class 1 Low Psychosocial Functioning’ was characterized by high levels of difficulties in sleep, cognition, negative affect, low quality of life, low social connectedness, and moderate level of depression. The ‘Class 2 Moderate Personal Functioning’ was characterized by moderate levels of personal functioning in terms of moderate cognitive difficulties, sleep difficulties, and negative affect. Members of latent Class 1 and 2 were more likely to be older, less educated (i.e. less than secondary school or no formal education), belonged to low income groups, were either self-employed or informally employed, and lived in rural areas. In contrast, men from ‘Class 3 High Psychosocial Functioning’ were younger (mean age 54 years), had completed more years of education than men from other two latent classes, and were more likely to belong to higher income

groups. These findings are in agreement with previous research that shows sociodemographic patterns in psychosocial functioning (Carpiano et al., 2008; DeVlyder et al., 2018) and add to the burgeoning literature on psychosocial functioning among Indian populations. This current study provides some of the first evidence to demonstrate functioning among Indian men on eight different indicators of psychosocial functioning.

Notably, the study found that the middle age group (45-65 years) in India is a vulnerable sub-group among men. The present study also found the latent Class 2 characterized by ‘Moderate Personal Functioning’ and latent Class 1 characterized by ‘Low psychosocial functioning’ were predominated by middle-aged adult men (45-65 years). While some evidence from the United States suggests that middle age is a predictor of *better* psychosocial functioning and low levels of depression among men (Mirowsky & Ross, 1992; Poongothai et al., 2009a), this age-specific pattern in the psychosocial functioning was not observed in this study. The results are consistent with evidence from India demonstrating that middle-age may not be a health-protective period among Indian adults. On the contrary, Poongothai et al., (2009) reported that the risk of depression steadily increases throughout the life span among Indian adults, including during middle-age. These findings are useful for targeted interventions to improve personal functioning among middle-aged men as it may bolster successful aging in this population. Similarly, there is a need for further research in this population segment to clarify underlying mechanisms and identify vulnerable sub-groups.

7.5.2. Latent Classes of Psychosocial Functioning for Women

Among women, the ‘Class 1 Low Psychosocial Functioning’ was characterized by highest number of middle-aged adult women (46-65 years), little to no formal education, unemployed or informally employed women, and women from poor income quintiles. This indicates that

sociodemographic disadvantage was related to membership into ‘Class 1 Low Psychosocial Functioning’ among women. This was consistent with past research and theory that shows adverse psychosocial functioning as a consequence of various social disadvantages (Link & Phelan, 1995; Pearlin, 1999).

A large body of evidence suggests that the quality of sleep and cognition decrease in late adulthood (Groeger et al., 2004; Y.-L. Huang et al., 2002; Lei et al., 2014). However, the study found that difficulties in cognition and sleep can also be observed among Indian women between 25-45 years of age. Notably, both ‘Class 2 High Cognitive Difficulties’ and ‘Class 3 High Sleep and High Negative Affect’ were characterized by a high number of early adult women (25-45 years). Thus, the present study found that the age period between 25-45 years is a vulnerable period for personal functioning in terms of sleep, cognition, and negative affect among Indian women.

Studies have examined the adverse effects of cognitive, sleep, and affect difficulties on psychosocial functioning in late adulthood (Baglioni et al., 2011; Yokoyama et al., 2010). However, relatively little research is conducted to examine the association between sleep, negative affect, cognition and other facets of psychosocial functioning among younger age groups (Breslau et al., 1996; Buysse et al., 2008; Oginska & Pokorski, 2006). There is some evidence to suggest that sleep difficulties among young women (between ages of 25-35 years) is a risk factor for deterioration of psychosocial functioning, including increased risk of depression and anxiety (Jackson et al., 2014). Yet, there is an overall paucity of research to elucidate personal functioning among this age group in India. To the best of my knowledge, this study is one of the first evidence to suggest deteriorated cognition, sleep, and negative affect among early adult Indian women. There is a need for additional research to identify mechanisms that shape sleep, cognition, and negative affect among early-stage adult women in India. This age group also presents an important

period during which early interventions may have significant clinical implications. For example, there is some longitudinal evidence to demonstrate a substantial increase in the risk of new onsets of depression among those with sleep disturbances and difficulties at the baseline during periods of early adulthood (Baglioni et al., 2011; Ford & Kamerow, 1989). Other longitudinal research also suggests that sleep and cognition are interlinked among younger adults (Hoch et al., 1994; Michael Vanderlind et al., 2014). Hence, further research to evaluate the personal functioning across age groups of Indian women is warranted.

7.5.3. Limitations

The limitations of this analysis include the cross-sectional nature of the data that restricts some of the conclusions as causal directions of the class associations cannot be established. In future research, the psychosocial functioning sub-group classification should be validated using longitudinal data. Furthermore, the mechanisms that influence the intertwining of certain facets of psychosocial functioning (such as, sleep difficulties, negative affect among men as well as women) needs closer examination. Similarly, the relationship between age and psychosocial functioning was more nuanced among women than among men and should be explored further in future research in this area. For example, some sociological theorists suggest that middle adulthood is especially vulnerable age period of overall psychosocial functioning among women because of increasing family responsibilities towards parents and children, conflicting professional demands, and social barriers such as sexism and discrimination (Mirowsky, 1996; Rosenfield & Mouzon, 2013; Sara et al., 2003). While these explanations are intuitive, they need to be evaluated in the Indian context using intersectional studies that assess gender, age, and sociocultural norms concerning psychosocial functioning. Moreover, gender was reported as a binary (male or women) variable in this study, and therefore, the findings need to be validated across all gender categories.

Finally, health behaviors, such as physical activity, diet, can influence one's psychosocial functioning. However, health behaviors were not considered within the scope of the study. Future research in this area should examine the effects of health behavior on the reported levels of psychosocial functioning among Indian populations.

7.5.4. Conclusions and Future Directions

Despite these limitations, the present research has shown the merits of the LCA method for empirically characterizing the multidimensional nature of psychosocial functioning into distinct and homogeneous classes. Moreover, the present study addresses three important gaps in the literature and facilitates a more nuanced understanding of psychosocial functioning among Indian adults. First, the findings add to existing knowledge about the multidimensional nature of psychosocial functioning by demonstrating that certain indicators of psychosocial functioning are perhaps intertwined. For example, among men, 'Class 2 Moderate Personal Functioning' was characterized by moderate levels of sleep difficulties, cognitive difficulties, and negative affect. Likewise, among women class 2 was characterized by 'High Cognitive Difficulties' and latent class 3 was characterized by 'High Sleep and Affect Difficulties'. This is consistent with previous research that shows convergent functional pathways and overlapping regions in the brain that influence negative affect and cognitive control (Goel et al., 2018; Ochsner & Gross, 2005; Shackman et al., 2011). Similarly, the relationship between poor sleep quality, decreased regulation of negative emotions, and cognitive difficulties are seen across different age groups (Dahl, 1996; Mauss et al., 2013; Ohayon & Vecchierini, 2002, 2005). The present study is one of the first to provide this evidence in the Indian population.

Secondly, the study highlights some gender-based nuances in the relationship between age and psychosocial functioning. Among latent classes for men, of middle-aged men (46-65 years)

was the highest represented age category for ‘Class 1 Low Psychosocial Functioning’ and ‘Class 2 Moderate Personal Functioning’. Among latent classes for women, there were the highest proportion of middle-aged women in ‘Class 1 Low Psychosocial Functioning’, however ‘Class 2 High Cognitive Difficulties’ and ‘Class 3 High Sleep and Affect Difficulties’ were characterized by a high number of early adult women (25-45 years). Therefore, future research should explore middle and early adulthood as a vulnerable sub-group and specify gender-based differences in personal functioning across the life span.

Third, there is a clear link between sociodemographic characteristics and physical health among the Indian population (Haddad et al., 2012; Kinra et al., 2010; Subramanian et al., 2006). Yet, there is an overall paucity of literature to illustrate the association between sociodemographic indicators and psychosocial functioning among the Indian population. This study adds to the literature by demonstrating a sociodemographic gradient in psychosocial functioning – social disadvantage was associated with poorer reporting of psychosocial functioning. Future research should evaluate the relationship between physical health and psychosocial functioning among this population.

These results also have implications for public health research, interventions, and practice. Knowledge of these demographic patterns and homogenous classes of psychosocial functioning is useful for tailoring public health policies to meet the specific needs of the population segments, especially given the linguistic, cultural, and geographical diversity of Indian society. For example, the results suggest that psychosocial functioning has more a complex relationship with demographic characteristics among women than among men. Thus, these findings suggest that public health interventions and policies aimed at improving psychosocial functioning should be gender-focused to be effective. The current finding that certain indicators of psychosocial

functioning (such as sleep and negative affect) are interlinked is also useful for tailoring targeted disease prevention and health promotion interventions in population sub-groups. Additionally, studies from other countries report a relationship between indicators of psychosocial functioning and physical health. For example, daily psychosocial functioning in terms of interpersonal, social, and personal environment is related to common chronic physical health diseases such as hypertension (Wryobeck et al., 2007) and diabetes (Zizi et al., 2010). Thus, patient-provider communication regarding patients' perception of their psychosocial functioning in terms of sleep, cognition during their regular primary care visits could also be beneficial to the overall health and wellbeing. Therefore, future research should evaluate whether the membership into these latent classes is also associated with the physical health status of the population subgroups in India.

**CHAPTER 8: STUDY THREE: AN EXAMINATION OF THE RELATIONSHIP
BETWEEN PSYCHOSOCIAL FUNCTIONING AND PHYSICAL HEALTH AMONG
INDIAN MEN AND WOMEN: A LATENT CLASS ANALYSIS**

8.1. Introduction

India's remarkable economic, political, technological, and cultural transformation over the last few decades has secured the country's position as a powerful geopolitical force in the world. Yet, there are some clear paradoxes in the country – despite the economic successes, the healthcare system of India is now facing a double burden of infectious, communicable and non-communicable chronic diseases (Dandona et al., 2017; P. Mohan et al., 2019). Similarly, even though the population's life expectancy continues to increase, women and children still bear a substantial burden of mortality and disability (Paul et al., 2011), infectious diseases are inadequately controlled (John et al., 2011), and chronic disease-related disability and premature mortality are on the rise (Horton & Das, 2011). While maternal, infant, and infectious disease-related mortality and disability have been longstanding and closely tied to poverty, chronic diseases are newly emerging at epidemic rates and are straining the healthcare system in India. Following an epidemiological transition during the last few decades, chronic diseases, including cardiovascular and respiratory diseases, mental health-related disorders, diabetes, and cancers, have become leading causes of mortality and disability (GBD 2013 DALYs and HALE Collaborators et al., 2015). Furthermore, epidemiological projections also suggest a 23% increase in mental health conditions between 2013 and 2025 (Charlson et al., 2016).

Psychosocial functioning is related to risks, development, prognosis, and consequences of chronic diseases. The relationship between psychosocial determinants and the development of chronic diseases was recognized as early as 1892 by professor and physician Dr. William Osler

(S. Haynes et al., 1980; Osler, 1897). There is also early longitudinal evidence from the seminal Framingham Study to show that emotions and psychosocial health influence the development of chronic diseases, including angina, myocardial infarction, and coronary heart diseases (Diamond, 1982; Eaker et al., 1983; S. Haynes et al., 1980; S. G. Haynes & Feinleib, 1980). In recent years, a bulk of cross-sectional and longitudinal research has increasingly reaffirmed the link between comprehensive psychosocial functioning on the development and management of and mortality from chronic conditions (Crotty et al., 1994; Segui et al., 2000; Tyack et al., 2016). Thus, psychosocial functioning is an important predictor of chronic disease diagnosis.

In the Indian context, the relationship between some of the most common chronic conditions and facets of psychosocial functioning are noted in research. For instance, Kalra et al. (2013) conducted a systematic review of peer-reviewed studies evaluating the psychosocial aspects of diabetes in India and made 94 recommendations for national guidelines to incorporate psychosocial-based care into the diabetes care continuum. Taken together, research suggests that improvements in individuals' psychosocial functioning can lead to a reduction in the impact of chronic diseases and healthy aging in any given society.

Furthermore, because successful living with chronic diseases requires substantial modifications in lifestyle, changes in behaviors, and continuous monitoring, the psychosocial impact of these disorders is enormous (Schneiderman et al., 2001b). Chronic diseases have long lasting impacts on individuals' psychosocial functioning. Evidence suggests that people with chronic conditions are at heightened risk of depressive symptoms, anxiety, lack of mastery, and diminished self-efficacy (Palinkas et al., 1990; Penninx et al., 1996). Moreover, living with chronic diseases can also exacerbate feelings of loneliness, reduce cognitive functioning and adversely impact interpersonal relationships (Bratzke et al., 2018; Petite et al., 2015). Taken together, this

suggests that there is a bi-directional relationship between psychosocial functioning and physical health status – that psychosocial functioning can lead to chronic diseases and chronic diseases can worsen psychosocial functioning. Thus, there is a need to explore the relationship between psychosocial functioning and chronic diseases. However, there is a paucity of in-depth analysis of the relationship between psychosocial functioning and the emerging burden of chronic diseases among Indian populations, which has important implications for healthcare practice, research, and policy. Therefore, the present study evaluates the psychosocial functioning as a predictor of chronic conditions among Indian men and women.

Although the discussion of psychosocial aspects of chronic diseases is becoming increasingly nascent in the Indian public health literature (Abraham et al., 1999; Khurana et al., 2006; Sridhar & Madhu, 2002), there remain several gaps that limit our understanding of the relationship between psychosocial functioning and chronic diseases in India. For example, while there is some evidence to demonstrate the importance of factors such as social support and self-management strategies for the successful maintenance of chronic diseases (Abraham et al., 1999; V. Mohan et al., 2014), there is no nationally representative research examining the relationship between psychosocial functioning and chronic diseases among Indian adults. An exploration of multiple dimensions of psychosocial functioning using a nationally representative sample is important for understanding chronic diseases for two main reasons. First, previous research demonstrates a relationship between psychosocial functioning and chronic disease, this link has not been evaluated among the Indian population. Second, in-depth understanding of the indicators of psychosocial functioning that are closely related to chronic diseases is also important in development of public policies and interventions to promote psychosocial functioning among this population.

Furthermore, there is very little evidence to explain how gender influences the relationship between psychosocial functioning and chronic diseases. It is crucial to recognize gender as one of the important determinants of health especially in the Indian context as social norms, roles, and responsibilities are still dictated by patriarchal values. Similarly, Indian women often assume the roles of primary caregivers for their family (R Gupta, 2009; Rashmi Gupta et al., 2009). Therefore, women tend to experience a greater burden of responsibilities in Indian households, which may further strain their psychosocial functioning. In this context, the lack of gender-stratified studies that evaluate the association between psychosocial functioning and chronic diseases separately for men and women limits our understanding of the Indian context. Furthermore, adverse psychosocial functioning can be a risk factor of chronic diseases and the relationship between psychosocial functioning and chronic diseases may depend on other important sociodemographic factors, such as income, education, and marital status. Thus, there is also a need to account for sociodemographic differences in the relationship between psychosocial functioning and chronic diseases among women and men. However, currently, there is an overall paucity of research to explain the association between psychosocial functioning and chronic diseases in India.

Finally, there is very little research evidence to show the relationship between common facets of psychosocial functioning, such as sleep, cognition, and chronic multimorbidity in the Indian context. Multimorbidity, defined as living with more than one chronic condition at the same time, is one of the main challenges of healthcare systems all around the world (Marengoni et al., 2011). Multimorbidity of chronic conditions is associated with the complex integrated care continuum, increased risks of side-effects from drug interactions and polypharmacy, and greater modifications to day-to-day activities, including functional declines (K. Barnett et al., 2012; Bayliss et al., 2003; Richardson et al., 2011). Thus, there is an urgent need to evaluate the

relationship between psychosocial functioning and the multimorbidity of chronic diseases in the Indian context, as an increasingly higher number of populations in India live with chronic multimorbidity (Mini & Thankappan, 2017).

Therefore, in light of these research gaps, the primary aim of the present study is to evaluate the relationship between psychosocial functioning and chronic diseases separately among Indian men and women. The present study considers the relationships between psychosocial functioning and five chronic diseases, including angina, hypertension, arthritis, chronic lung disorder, asthma, and chronic multimorbidity. Differences across sociodemographic characteristics are also accounted for in all analyses.

8.2. Background

Non-communicable chronic diseases—primarily including cardiovascular diseases, chronic lung diseases, and cancers—accounted for around 72% of deaths all over the world in 2016, and around 86% of premature deaths related to these conditions occurred in low/middle-income countries, like India (Lall et al., 2018; Naghavi et al., 2017). In India, ischemic heart disease is the leading cause of death, followed by chronic obstructive lung disorder (Naghavi et al., 2017). Other chronic conditions, such as stroke, lower respiratory infection, asthma, and diabetes, chronic kidney disease, have also emerged among the top ten causes of mortality in India in 2017 (Naghavi et al., 2017). However, despite the mounting evidence that psychosocial functioning is related to chronic diseases, there is a paucity of research that explains psychosocial correlates of chronic diseases in this population. Thus, there is a need to investigate how psychosocial functioning contributes to the diagnosis of chronic diseases in this population.

8.2.1 Chronic Conditions and Psychosocial Functioning

Hypertension and Angina

In India, about 70% of heart disease-related and 94% of stroke-related deaths occur in people younger than 70 years as compared with 22% and 6% of heart disease and stroke-related deaths in Western countries (D. T. Jamison et al., 2006). Hypertension, defined as systolic BP \geq 140 and/or diastolic BP \geq 80 mm Hg, is directly related to more than half of the stroke-related deaths and around one-quarter of cardiovascular deaths. High blood pressure is the fourth leading risk factor of death and disability in India and its timely management could lead to the prevention of 300,000 of the 1.5 million deaths annually from cardiovascular diseases (R Gupta & Gupta, 2009). Without adequate, timely control through pharmaceutical and behavioral changes, these global disparities in health will increase. In India, the number of years of life lost because of coronary heart disease deaths before the age of 60 years is projected to increase from 7.1 million in 2004 to 17.9 million in 2030. According to these estimates, by 2030, more life years will be lost as a result of this disease in India than is projected for China, Russia, and the USA combined (World Health Organization, 2004). Thus, there is an urgent need to study the psychological, social, and behavioral correlates of high blood pressure and heart diseases among Indian men and women.

Angina is one of the most common risk factors of coronary heart diseases that occur due to obstruction of coronary arteries. Angina pectoris (or angina) is chest pain or discomfort that occurs due to a lack of oxygen-rich blood in one's heart muscle (Dorland, 2019). The rate of mortality from coronary heart disease in India relies on a myriad of contextual and personal determinants, such as the area of residence and income levels (Nazareth et al., 2010). For example, mortality from coronary heart disease range from 75 to 100 per 100,000 people in the sub-

Himalayan states of Nagaland, Meghalaya, Himachal Pradesh, and Sikkim to 340 to 430 per 100,000 individuals in Andhra Pradesh, Tamil Nadu, Punjab, and Goa, with the highest rates in Goa (Rajeev Gupta et al., 2006). However, there is very little evidence to explain these group-level disparities in India.

Psychological stress is also recognized as one of the triggering factors of heart-related diseases, including hypertension and angina. Similarly, deterioration of psychosocial functioning is also one of the common outcomes of living with heart diseases such as hypertension and angina (Taylor & Aspinwall, 1996). Research shows that women have a higher prevalence of angina than men – all over the world (Hemingway Harry et al., 2008) and also in India (Krishnan et al., 2016). In India, older people and women report greater physical limitations, lower health-related quality of life, and frequent symptoms of angina than younger people and men (Huffman et al., 2019). Previous research suggests that physical limitations and quality of life are associated with diminished psychosocial functioning, especially among people living with chronic diseases (Bishop, 2005; Cowan et al., 2020; McDermott et al., 2019). This suggests that worsening of psychosocial functioning is a risk factor associated with chronic disease diagnosis. However, this relationship has not been explored among the Indian populations. Moreover, lower-income, lower education, being widowed or living alone also increases the psychological impact of heart-related diseases (Krantz & McCeney, 2002). Evidence also suggests that women living with heart diseases are more likely to report receiving less tangible support than men and also likely to experience a more severe impact of psychosocial stress than men (Boutin-Foster & Charlson, 2007; Feizi et al., 2012; Kristofferzon et al., 2003). Taken together, this suggests that the overall psychosocial functioning and heart-related diseases influence each other, and this relationship may also depend on sociodemographic characteristics. Therefore, understanding the relationship between

psychosocial factors and chronic diseases is important to the complete understanding of why, how, and in whom psychological factors are contributors to disease.

Furthermore, research also suggests that patients with coronary heart diseases are more likely to experience negative affect (Schmidt et al., 2011), depression (Lespérance et al., 2000), anxiety (Jespersen et al., 2013). There is also evidence of cognitive difficulties (Adams et al., 2020), sleep difficulties and related fatigue (Kimble et al., 2011), and reduced levels of social connectedness (Chaix, 2009; Sundquist et al., 2004) among people living with heart diseases. Taken together this suggests that coronary heart disease-related related risk factors are clustered with other adverse effects on common indicators of psychosocial functioning. However, the relationship between psychosocial functioning and chronic conditions is not yet studied comprehensively in the Indian context. The main limitations of literature in this context involve the lack of representativeness of study samples and a lack of gender-focused approaches. Our understanding of the psychosocial effects of chronic diseases in India is limited to the evaluation of the health-related quality of life, gender differences, and regional disparities. Therefore, the present study assesses the relationship between heart-disease related risk factors, including hypertension and angina, and comprehensive indicators of psychosocial functioning using a latent class analysis approach.

Arthritis

Rheumatoid arthritis is an autoimmune disease that affects around 0.5% - 1% of the adult population in industrialized countries (Scott et al., 2010). The prevalence rate of arthritis in India ranges from 0.50 to 0.75% and the prevalence rate goes up to 3.5% to 5.2% among people living with other chronic conditions, such as musculoskeletal diseases (Handa et al., 2016; Kar, 1994). Arthritis affects multiple joints in the body, primarily joints of the hands and feet. Arthritis is

indicated by joint swelling, pain, stiffness, and possible loss of function and can also include skin, respiratory, cardiac and neurological manifestation. A bulk of research shows that uncontrolled arthritis can cause joint damage, disability, increased dependence on others for activities of daily living, decreased quality of life, and cardiovascular and other comorbidities, and shorter life expectancies (Crowson et al., 2013; Deo et al., 2012; Scott et al., 2010). For instance, research indicates that Indian patients with arthritis are more likely to develop subclinical atherosclerotic coronary artery disease and anemia (Sundeep Grover et al., 2006). Furthermore, the risk for premature death due to cardiovascular diseases is approximately 12.6% in the urban Indian populations with arthritis and 7.4% in the rural Indian populations with arthritis (Deo et al., 2012). Thus, arthritis often is accompanied by other chronic diseases that require substantial lifestyle changes, affect physical functionality, and are influence functioning in the personal, occupational, and social aspects of patients' life. However, the psychosocial effects of arthritis are not well studied in India.

There is some evidence to demonstrate deterioration in health-related quality of life, limited physical functioning, limited social functioning, and poor mental health among Indian people living with arthritis (A. Aggarwal et al., 2006; Bedi et al., 2005). However, evidence from these studies is limited by their lack of representativeness due to small and segmented sample sizes. Similarly, research on the relationship between arthritis and psychosocial functioning indicators such as sleep, interpersonal relationships, cognition, social connectedness is very limited (Chopra et al., 2002). We also do not know whether adverse psychosocial functioning is also a risk factor for arthritis. These gaps in the literature limit our understanding of these common chronic diseases in this population. Therefore, the present study assesses the relationship between arthritis and comprehensive indicators of psychosocial functioning using a latent class analysis approach.

Asthma and chronic lung diseases

Chronic respiratory diseases, primarily bronchial asthma and chronic obstructive pulmonary disease (COPD), together account for a global burden of more than 400 million patients (Mannino & Buist, 2007; Masoli et al., 2004). In India, these conditions contribute to 7% of deaths and a 3% loss of disability-adjusted life years (Jindal et al., 2012). In India, studies report prevalence rates of asthma from 2.4% to 3.5% among the adult populations (A. N. Aggarwal et al., 2006; Chowgule et al., 1998; Jindal et al., 2000). In India, there is some research to indicate a positive relationship between sociodemographic disadvantages and the diagnosis of asthma and chronic lung conditions (Jindal et al., 2012; Kinra et al., 2010). For instance, there is clear evidence of asthma diagnosis and toxic environmental exposures in India and worldwide (D. Gupta et al., 2006; Hylkema & Blacquièrè, 2009). Furthermore, there is some evidence to show a worsening of mental health among Indian people living with chronic lung conditions, including asthma (Behera et al., 2006; Ghosh & Sharma, 2006; Misra et al., 2015; Sreedhar, 1989). Despite the lack of nationally representative studies in India, there are a few studies from other countries that provide insights into the potential association between psychosocial functioning and asthma in India. For instance, a recent meta-analysis found considerable cognitive difficulties associated with asthma, particularly among vulnerable groups with severe asthma (Irani et al., 2017). Similarly, chronic lung conditions, including asthma also may require significant limitations to an individual's community participation, interpersonal relationships, and a possible range of physical activities. These lifestyle modifications and restrictions can be disabling and worsen psychosocial functioning (McDonald et al., 2019; Schatz et al., 2005). However, there is no research to explain whether the worsening of psychosocial functioning is also a risk factor for diagnosis of chronic lung conditions. Therefore, a holistic understanding of the psychosocial impact of chronic lung

conditions is required in the Indian context, as these conditions often necessitate significant modifications in behavior, affect the range of physical functioning, and require day-to-day symptom management.

8.2.2. Comorbidity of chronic conditions

Chronic conditions generally cluster together – people with one chronic condition are more likely to develop other chronic conditions—and with the rising longevity of India’s population, a greater number of people will live with multiple chronic conditions. The number of older populations over the age of 60 years has risen from 19.6 million (5% of the total population) in 1951 to 98 million (9% of the total population) in 2011 worldwide. This group of population is projected to increase to 11% by 2025 and 19% by 2050 (J. E. Cohen, 2003). Similar trends are observed in India – life expectancy at birth is increasing and as people live longer, the prevalence of chronic diseases is also on the rise (Dandona et al., 2017). As a result, the population of India living with multiple chronic conditions, or multimorbidity, is expected to increase in the coming years. As such, personal, social, and environmental determinants of multimorbidity of chronic conditions is receiving growing interests in research and practice.

The term multimorbidity is defined here as the existence of two or more chronic conditions within one person (Valderas et al., 2009). Although the term comorbidity also indicates the existence of two or more chronic conditions, it refers to the combination of additional diseases beyond the main index disorder of interest (such as the comorbidity of cardiovascular disorders for patients living with arthritis). This definition of comorbidity implies that the main interest of the research is in the index condition (for instance, arthritis) and the possible effects of the other disorders (cardiovascular diseases) on the main disease of interest (Marengoni et al., 2011). Therefore, in this context, it is important to clarify that the focus of the present study is on the

multimorbidity of different chronic conditions rather than the additive impact of comorbidity on a given index condition of interest.

The prevalence of multimorbidity is associated with older age, and socioeconomic disadvantages, and is greater in low to middle-income countries (Marengoni et al., 2011; Roman Lay et al., 2020). Similarly, the health status of individuals living with multimorbidity is worsened by limitations in physical functioning and activities of daily living, increased healthcare costs, poor quality of life, and higher mortality from medical complications (Boyd & Fortin, 2010; Fortin et al., 2004, 2005). Furthermore, several studies report that the likelihood of developing mental health-related disorders increases with the increasing number of physical chronic conditions (K. Barnett et al., 2012; Gunn et al., 2012). Studies from India also show that the multimorbidity of chronic conditions increases the likelihood of depression and poor self-rated health (Arokiasamy et al., 2015), and a greater morbidity burden (Pati et al., 2015). Furthermore, a systematic literature review found that multimorbidity is more common in women than among men (Violan et al., 2014). Taken together, this suggests that chronic physical conditions are often multimorbid and co-occur with common mental health morbidities, worsen individual functioning, require longer hospital stays, and increase the cost of care and mortality (Langan et al., 2013). However, the overall psychosocial functioning, such as sleep, cognition, and interpersonal relationships, has not been studied as a predictor of multimorbidity in the Indian context. This understanding is crucial to identify vulnerable population sub-groups to develop targeted public health interventions.

An increase in chronic disease diagnosis and multimorbidity of these conditions puts an inordinate strain on India's healthcare system. India's primary care model was designed to support acute, infectious, and seasonal disorders (Jindal et al., 2012). As a result, chronic disease diagnoses are often made at late stages of diseases and/or during hospitalization due to complications from

undiagnosed chronic conditions (World Health Organization, 2011). Furthermore, the burden on the healthcare system is amplified by multimorbidity of the physical and mental health conditions. Thus, continuous care of chronic conditions in primary care will require remodeling of the healthcare system. One of the ways to reduce risks of chronic conditions is through enhancements in populations' psychosocial functioning. The common indicators of psychosocial functioning, such as sleep, cognition, affect, interpersonal relationships, social connectedness, are often touted as ingredients of healthy aging (McKee & Schüz, 2015; Sowa et al., 2016). However, there is very little evidence from India to demonstrate the relationship between individuals' psychosocial functioning and chronic conditions. A better understanding of this association is necessary to tailor interventions to reduce the burden of multimorbidity and to align health-care services more closely with patients' needs to facilitate healthy aging.

8.2.3 Rationale for current study

The role of emotions in chronic diseases was first noted over 300 years ago by Thomas Willis in 1674. Willis claimed that diabetes was caused by “extreme sorrow” (Rubin & Peyrot, 2002). More recently, existing literature from high-income countries demonstrates a clear link between worsening of psychosocial functioning and physical chronic conditions. However, this relationship is not yet well established in the Indian public health literature. Thus, evaluating the relationship between psychosocial functioning and chronic diseases would contribute to a more nuanced knowledge about factors that predispose, establish, maintain, and perpetuate chronic diseases in the Indian populations. Furthermore, creating an evidence base to show the double burden of chronic diseases as well as the related detriments in psychosocial functioning will lead to increased public health awareness of co-existence of mental and physical health conditions. It will also help in the tailoring of public health interventions to meet the needs of the population,

facilitate changes in population health policies. Moreover, it also can bring about structural practical changes, such as the incorporation of mental health services in primary health settings – a solution advocated by several researchers to address the growing chronic and mental health multimorbidity and to the associated reduce healthcare cost.

Therefore, the overall purpose of this study is to conduct an in-depth exploration of the relationship between psychosocial functioning and chronic disease diagnosis among Indian men and women. I assess psychosocial functioning in terms of personal functioning (i.e. depression, quality of life, sleep, cognition, negative affect) and social functioning (i.e. interpersonal relationships and social connectedness). I also use a latent class analysis (LCA) approach to identify subgroups of distinct psychosocial functioning patterns separately among men and women. LCA is a statistical technique that allows us to identify hidden population subgroups, and it is used to empirically determine discrete latent variables (constructs that are not observed directly) from two or more variables to form population sub-groups (Hagenaars & McCutcheon, 2002). These subgroups are unique to one another but the individuals within the subgroups are similar to one another. LCA provides the probability of a particular individual in the sample belonging to a latent class (Monga et al., 2007). LCA is useful in situations where the goal to examine a complex construct that has multiple facets requiring measurement of several constructs. In the context of the present study, LCA helps us to identify how multiple levels of psychosocial functioning indicators interact to create distinct subgroups of individuals.

The first aim of the study is to evaluate the relationship between the latent classes of psychosocial functioning and the diagnosis of a chronic condition. I ask *Research Question One: Is there a relationship between the latent classes of psychosocial functioning and diagnosis of a chronic condition among men and women, controlling for sociodemographic characteristics?* It is

hypothesized that among men and women, greater psychosocial functioning will be related to fewer odds of chronic disease diagnosis as compared to poorer psychosocial functioning.

The second aim of the study is to evaluate the relationship between the latent classes of psychosocial functioning and chronic disease multimorbidity. I ask *Research Question Two: Is there a relationship between the latent classes of psychosocial functioning and chronic multimorbidity (one chronic condition vs. two or more chronic conditions) among men and women, controlling for sociodemographic characteristics?* It is hypothesized that among men and women, greater psychosocial functioning will be related to fewer odds of chronic disease multimorbidity as compared to poorer psychosocial functioning.

8.3. Methods

8.3.1. Data

Data for this study came from the World Health Organization's SAGE (WHO Longitudinal Study of Global Aging and Adult Health) Wave 1 2007-2010. SAGE Wave 1 is a nationally representative data that covers a broad range of topics, with a focus on health, disability, disease risk factors, stress, happiness, social connection, economic well-being, caregiving, health care utilization, and health systems responsiveness (Kowal et al., 2010). The WHO uses standardized sampling procedures, administration protocols, interviewer training, and questionnaire design, translational protocols and variable definitions, which allowed for enough statistical power for the analyses. The survey instruments used in this study have been validated for Indian populations using a subset of the sample (Kowal et al., 2010; Ng et al., 2009).

The WHO SAGE respondents were selected using a stratified, multistage, random cluster sampling design (Kowal, Chatterji, et al., 2012; World Health Organization, 2020). The primary sampling units (PSU) were stratified by region and location using the Census Enumerated Area

(CAE) as the sampling frame. Within each stratus, enumeration areas were selected independently with probability proportional to the size of the region. India has a total of 28 states and 7 union territories. Nineteen of the 28 Indian states were included in the design representing 96% of the population. Out of these 28 states, six states were selected based on their geographic location and level of development. The final strata were defined by the six states: (Assam, Karnataka, Maharashtra, Rajasthan, Uttar Pradesh, and West Bengal), and location of residence (urban or rural). Therefore, there were a total number of 12 strata. The 2000 Census demarcation was used as the sampling frame. Two-stage and three-stage sampling was adopted in rural and urban areas, respectively. PSUs in rural areas (villages) and in urban areas (city wards) were selected probability proportional to size. The secondary sampling units (households) were selected using systematic sampling. The tertiary sampling units (individuals) were selected using Kish tables (Lavrakas, 2008).

8.3.2. Sample

All PSUs and households selected for the WHO Health Study (WHS)/SAGE Wave 0 survey were included in SAGE Wave 1. All samples from WHO SAGE 0 who were 50+ years of age were visited again as a part of the SAGE 1 data collection procedure. SAGE Wave 1 included a total of 11,230 completed interviews: 4,670 interviews with individuals aged 18-49 (3,625 women and 1,045 men) and 6,560 interviews with individuals aged 50-plus (3,256 women and 3,304 men)(World Health Organization, n.d.). All interviewers used a standardized comprehensive interview guide to aid data collection. Respondents were not required to be able to read and write. However, depending on their age, and cognition, as well as the place where they come from, written prompts were provided to respondents, as a memory aid for some questions or concepts may be more difficult to understand than others. All interviews lasted for 90 to 120 minutes

depending on the nature of respondents. The preferred condition for interviewing respondents was in private, with no other member of the household present. If total privacy is not possible, the respondents were given an option to be interviewed outside the house or where they felt comfortable discussing sensitive information.

8.3.3. Measures

The Latent Classes of Psychosocial Functioning

The latent classes of psychosocial functioning among men and women were created based on seven indicators of psychosocial functioning: depression (0 = No depression; 1 = depression), interpersonal difficulties (0 = low interpersonal difficulties; 1 = high interpersonal difficulties), social connectedness (0 = high social connectedness, 1 = low social connectedness), quality of life (0 = high quality of life, 1 = low quality of life), negative affect (0 = low negative affect, 1 = high negative affect), cognition (0 = low cognitive difficulties, 1 = high cognitive difficulties), sleep (0 = low sleep difficulties, 1 = high sleep difficulties).

Latent Classes among Men: Three latent classes of psychosocial functioning were identified among men: (1) poor psychosocial functioning, (2) moderate psychosocial functioning, (3) high psychosocial functioning. Additional information on the psychosocial functioning latent classes among men is provided in Study # 2.

Latent Classes among Women: Four latent classes of psychosocial functioning were identified among women: (1) poor psychosocial functioning, (2) high cognitive difficulties, (3) high sleep and affect difficulties, (4) high psychosocial functioning. Additional information on the psychosocial functioning latent classes among women are provided in Study # 2.

Symptom Based Chronic Disease Standardizations

Angina

Participants completed the standard WHO Rose questionnaire (Rose, 1965). Standardized diagnosis of angina was derived from a set of symptom-based questions, combined with a diagnostic algorithm as laid out by WHO Rose questionnaire (Cook et al., 1989; Fischbacher et al., 2001). The Rose questionnaire has been validated among Indian populations (Fischbacher et al., 2001). The questions and criteria for standardized symptom-based angina are presented in Appendix 1. Angina was created as a binary variable: (0) No Angina (referent category), (1)

Angina

Arthritis

Participants completed the standard WHO symptom-based determination of arthritis. I then applied the algorithm to diagnose symptom-based arthritis as developed in a diagnostic item probability study implemented by WHO (Moussavi et al., 2007) and as implemented in previous research (Arokiasamy et al., 2015). The questions and criteria for standardized symptom-based arthritis are presented in Appendix 1. Arthritis was created as a binary variable: (0) No Arthritis (referent category), (1) Arthritis

Hypertension Grade 1 and Grade 2

The assessment of grade 1 and grade 2 hypertension based on diastolic and systolic blood pressure was based on direct physical examination undertaken at the time of the interview. The systolic and diastolic blood pressure measures were taken three times with participants in seated positions. The average of three readings was used to assess hypertension. Hypertension was determined by criteria of systolic BP ≥ 140 and/or diastolic BP ≥ 80 mm Hg (B. Williams et al.,

2018). Hypertension was created as a binary variable: (0) No hypertension (referent category), (1) Hypertension

Chronic Lung Disease

I followed the previous used symptom-based criteria identifying chronic lung disease (Arokiasamy et al., 2015). The questions and criteria used for standardized symptom-based asthma are presented in Appendix 1. Chronic lung disease was created as a binary variable: (0) No chronic lung disease (referent category), (1) Chronic lung disease

Asthma

Participants completed the standard WHO symptom-based determination of asthma. I used the algorithms to determine people with asthma based on diagnostic methodology used in previous research in this population (Arokiasamy et al., 2015). The questions and criteria used for standardized symptom-based asthma are presented in Appendix 1. Asthma was created as a binary variable: (0) No Asthma (referent category), (1) Asthma

Chronic disease multimorbidity

I defined multimorbidity as having two or more chronic conditions. Multimorbidity was created as a binary variable: (0) One Chronic Condition (referent category), (1) Multimorbidity.

Sociodemographic variables

Age

Following United Nation's international guidelines for age categorizations, I created five age categories. Respondents between 18-24 years of age were coded as (0) Young Adults, respondents between 25-45 years were coded as (1) Adults, respondents between 46-65 were coded as (2) Middle-aged adults, respondents between 66-80 years were coded as (3) Older Adults and 80+ year old respondents were coded as (4) Elderly (United Nations, 1982).

Education

Respondents' education level was coded as categorical variable with five levels. It was measured by categorizing the last completed grade level where (0) no formal education, (1) for less than secondary school completed (<7 years of schooling), (2) for secondary school completed (7 years of schooling), (3) high school (between and 7-12 years of schooling) and (4) for some college and or post graduate education.

Income Quintiles

Respondents' income was treated as a categorical variable with five levels representing the (1) Poorest, (2) Poorer, (3) Middle, (4) Richer and (5) Richest in terms of income. WHO SAGE dataset reports a validated asset (wealth) score index that was derived using WHO standard approach to estimating permanent income from survey data on household ownership of durable goods, dwelling characteristics, neighborhood, access to water, electricity, sanitation (Vellakkal et al., 2013).

Caste

Social caste was coded as a categorical variable with four levels: (1) General Caste, (2) Scheduled Caste, (3) Scheduled Tribe, (4) Other (constituting respondents who do not have a caste or the respondents who belonged to 'other backward castes').

Marital status

Marital status was captured as a categorical variable with three groups, (0) Currently Married, (1) Never married, (2) Widowed and (3) Other (separated/divorced).

Location

Place of residence was categorized into two groups – (1) Rural and (0) Urban. WHO SAGE dataset reports this classification for respondents based on their geographic location.

Religion

Around 84% of respondents identified themselves as Hindu and a little over 12% of participants reported being Muslims. Therefore, religion was captured as a categorical variable with three groups, (1) Hindu and (2) Muslim and (3) to capture all 'Other' religious groups (Jainism, Sikhism, Buddhism, and Christianity).

Employment status

Employment status was captured as a categorical variable with four groups: (0) Private Sector, (1) Unemployed, (2) Public Sector, (3) Self-employed, (4) Informal Employment.

8.3.4. Analytic Strategy:

There were three steps in this analysis. First, the weighted means and percentages of key study variables were estimated; chi-square tests were used to assess significant gender differences (Table 18). Second, I established the weighted percentage distribution of symptom-based chronic disease diagnosis by demographic characteristics among women (Table 19) and men (Table 20).

Next, I ran six weighted logistic regression models to evaluate whether the membership into the latent classes was related to chronic disease diagnoses (hypertension, angina, arthritis, asthma, chronic lung disorder) and chronic disease multimorbidity (see Table 21 for women and Table 22 for men), controlling for sociodemographic characteristics. For these analyses, the latent classes of psychosocial functioning among men and women are treated as if it were an 'observed' predictor variable, and the research methods used in previous research were followed (Richards, 2016). Although this treatment of latent class variables can potentially lead to underestimation of standard error (Bolck et al., 2004), the statistical bias is reduced here: the possible impact of misclassification error is minimized due to the high degree of confidence in the latent class membership determined based on the fit indices. Furthermore, the latent classes among men and

women are substantively distinguishable from each other and indicate how well people were assigned to classes. Meaningfulness and distinctiveness of each class were also carefully considered to arrive at the best fitting model. In other words, the study took into consideration how well a final solution model will be interpreted, how distinct each solution model was as compared to a model with fewer classes, and how easily could the classes be labeled to reflect a distinct subgroup. Additionally, the latent class variable allows us to consider all the seven multidimensional indicators of psychosocial functioning simultaneously in one model. All analyses were conducted in Stata 15.1.

In addition, to mitigate the cost that models with latent variables carry in terms of transparency and interpretability, I also conducted the following supplementary analyses: (1) I ran six weighted logistic regression models to evaluate the relationship between chronic disease outcomes and manifest indicators of psychosocial functioning used in Study 1 (cognition, sleep, affect, quality of life, depression, interpersonal relationship, and social connectedness). Specifically, controlling for sociodemographic correlates, chronic disease outcomes (angina, hypertension, arthritis, chronic lung disorder, asthma, multimorbidity) were regressed on indicators of psychosocial functioning among men and women separately. In total, six weighted models for women and six models for men were run (see Table 23 for women and Table 24 for men). These analyses indicate whether there is a relationship between the individual manifest variables of psychosocial functioning (as reported by the sample) and chronic diseases. These analyses also provide additional layer of evidence to demonstrate the relationship between psychosocial functioning and chronic diseases. (2) Goodness of fit between the supplementary models using manifest indicators of psychosocial functioning and the planned models using latent classes of psychosocial functioning was compared using methods developed by Archer &

Lemeshow (2006) (See Table 25 for women and Table 26 for men). The use of latent predictors can add significant value to the analyses as laid out by Aneshensel (2008), however, they also carry a cost in terms of transparency and interpretability. Conducting supplementary analyses to test the goodness of fit of each model that uses latent predictors and comparing it to models that use manifest variables help us weigh whether using models that use latent predictors are better models in terms of statistical fit and substantive understanding.

8.4 Results

Table 18 shows the sample descriptive characteristics by gender. A majority of the sample belonged to early adulthood age category (26-45 years; 52.3%). Among men, 27.1% reported having completed less than primary school education (less than 5 years of school); however, 48.7% of the women reported no formal education. Thus, women were more likely to report lower rates of education than men ($p < .0001$). A majority of the sample belonged to the 'General caste' category (60%) and reported being currently married (81.7%). Women were more likely to report being widowed (13.1%) than men (3.3%) ($p < .0001$). A majority of the sample also reported being Hindu (84.2%) and living in an urban area (74.3%). Men (76.4%) were more likely to live in urban areas than women (72.2%; $p = .007$). Most men reported being 'self-employed' (48.3%), followed by informal employment (26.9%), whereas, a majority of women reported 'not working' (55.4%) followed by informal employment (19.9%). Thus, men were more likely to report employment status than women ($p < .0001$). There were no significant gender differences in reported levels of income and religion. Around 59% of the entire sample had no chronic disease, around 32% of the sample had at least one chronic disease, and around 10% of the population had a chronic disease multimorbidity. Around 30% of men ($n = 1364$) had at least one chronic condition and around 10% of men had a chronic disease multimorbidity ($n = 445$). Similarly, around 34% of women ($n = 2491$) had at least one chronic condition and around 10% of women had a chronic disease multimorbidity ($n = 712$). However, the difference in chronic disease diagnosis between men and women was not statistically significant ($p = 0.06$)

Table 18. Weighted percent distribution of selected demographic characteristics by gender, WHO SAGE India Wave 1 (2007-10)

TABLE 1. Weighted percent distribution of selected demographic characteristics by gender, WHO SAGE India Wave 1 (2007/10)

	Total		Men		Women		p
	N	%	N	%	N	%	
Age Group							<.0001
18-25 (Young Adults)	1,778	14.6	487	10.4	1,405	18.8	
26-45 (Early Adults)	6,379	52.3	2,516	53.4	3,832	51.2	
46-65 (Middle-Aged Adults)	3,194	26.2	1,373	29.2	1,742	23.3	
66-80 (Older Adults)	809	6.6	326	6.9	476	6.4	
80+ (Elderly)	38	0.3	7	0.2	35	0.5	
Education							<.0001
College +	1,036	8.5	766	12.6	270	4.4	
High School	1,781	14.6	1,164	19.2	616	10.0	
Secondary School	1,981	16.2	1,189	19.6	792	12.9	
Less than secondary school	3,115	25.5	1,644	27.1	1,471	24.0	
No formal education	4,285	35.1	1,299	21.4	2,986	48.7	
Income Quintiles							0.447
Poorest	2,464	20.3	1,233	20.5	1,231	20.2	
Poorer	2,573	21.2	1,258	20.9	1,315	21.6	
Middle	2,410	19.9	1,232	20.4	1,178	19.3	
Richer	2,176	18.0	1,066	17.7	1,110	18.2	
Richest	2,497	20.6	1,238	20.5	1,260	20.7	
Caste							0.02
General	6,790	60.7	3,422	60.1	3,369	61.3	
Scheduled Caste	2,141	19.1	1,147	20.2	994	18.1	
Scheduled Tribe	719	6.4	356	6.3	363	6.6	
Other	1,538	13.7	768	13.5	769	14.0	
Marital Status							<.0001
Married	9,967	81.7	5,196	85.7	4,771	77.8	
Never Married	1,161	9.5	649	10.7	512	8.3	
Widowed	1,000	8.2	200	3.3	800	13.1	
Other	70	0.6	19	0.3	51	0.8	
Religion							0.701
Hindu	9,456	84.2	4,777	83.6	4,679	84.8	
Muslim	1,386	12.3	720	12.6	666	12.1	
Others	388	3.5	217	3.8	171	3.1	
Location							0.007
Rural	3,133	25.7	1,430	23.6	1,703	27.8	
Urban	9,065	74.3	4,633	76.4	4,431	72.2	
Employment Status							<.0001
Not working	3,315	29.5	199	4.6	3,811	55.4	
Public Sector	602	5.4	375	8.6	137	2.0	
Private Sector	1,005	9.0	505	11.6	426	6.2	
Self-Employed	3,673	32.7	2,100	48.3	1,139	16.6	
Informal Employment	2,632	23.4	1,168	26.9	1,368	19.9	
Chronic Disease Diagnosis							0.06
No Chronic Diseases	7,034	58.5	2,804	60.3	4,181	56.6	
One Chronic Disease	3,841	31.9	1,399	30.1	2,491	33.7	
Chronic Multimorbidity	1,157	9.6	445	9.6	712	9.6	

Notes: Weighted frequencies and percentages are shown; chi-square tests were conducted to evaluate the group differences between men and women

Four latent classes for women and three latent classes of psychosocial functioning were identified and reported in Study # 2.

Tables 19 and 20 show the weighted percentage distribution of having any single chronic disease (i.e. angina, hypertension, arthritis, chronic lung disease, asthma) and living with a chronic disease comorbidity (vs. having one chronic condition) across sociodemographic characteristics for women. Overall, hypertension was the most commonly diagnosed chronic condition among men (19.5%) and women (18.8%), followed by angina (7.3% among men and 12% among women).

Among women, a social gradient was observed in the diagnosis of all five chronic disorders. As such, the percentages of women belonging to chronic disease diagnosis category were higher among women from older age groups, low education groups, and other socially disadvantageous backgrounds, such as belonging to a minority religion, being widowed or separated, and belonging to historically marginalized social castes (see Table 19).

Among men, there was a social gradient in the diagnosis of angina, arthritis, chronic lung disorder, and asthma – the percentages of men belonging to chronic disease diagnosis category were higher in women from older age groups, low education groups, and other socially disadvantageous backgrounds, such as belonging to a minority religion and historically marginalized social castes. However, the percent of men diagnosed with hypertension was higher among more educated and higher-income groups (see Table 20).

Table 19. Weight Percentage Distribution of Symptom-Based Chronic Disease Diagnosis by Demographic Characteristics among Women, WHO SAGE India Wave 1 (2007-10)

Sociodemographic Factors	Symptom-Based Chronic Disease Diagnosis																	
	Angina			Hypertension			Arthritis			Chronic Lung Disorder			Asthma			Comorbidity vs. one chronic condition		
	Standardized Diagnosis	%	N	Standardized Diagnosis	%	N	Standardized Diagnosis	%	N	Standardized Diagnosis	%	N	Standardized Diagnosis	%	N	Standardized Diagnosis	%	N
Standardized Symptom-based Diagnosis																		
No	4,540	88.0	--	5,063	81.2	--	5,623	90.1	--	5,868	94.1	--	6,008	96.3	--	1,891	73.0	--
Yes	621	12.0	--	1,176	18.8	--	616	9.9	--	371	5.9	--	231	3.7	--	700	27.0	--
Age Group																		
18-25 (Young Adults)	36	3.7	954	118	11.0	1,069	28	2.6	1,070	20	1.9	1,070	13	1.2	1,070	44	22.2	196
26-45 (Early Adults)	309	11.2	2,766	520	15.7	3,312	292	8.8	3,312	168	5.1	3,312	94	2.8	3,312	270	21.3	1,265
46-65 (Middle-Aged Adults)	207	18.2	1,140	408	27.4	1,487	229	15.4	1,487	129	8.7	1,487	95	6.4	1,487	280	32.5	862
66-80 (Older Adults)	65	22.9	285	121	34.7	349	65	18.6	349	51	14.5	349	29	8.2	349	100	39.6	254
80+ (Elderly)	4	24.4	16	8	39.8	21	2	8.4	21	3	13.8	21	1	2.7	21	5	41.4	13
Education																		
College +	2	0.8	231	28	10.9	259	14	5.3	259	0	0.2	259	1	0.3	259	10	22.5	42
High School	27	4.9	545	98	15.6	626	35	5.6	626	22	3.6	626	13	2.0	626	34	18.0	190
Secondary School	48	7.0	684	116	14.6	798	47	5.8	798	19	2.4	798	11	1.3	798	35	14.8	236
Less than secondary school	146	11.9	1,226	304	20.7	1,470	154	10.5	1,470	92	6.3	1,470	69	4.7	1,470	178	26.7	666
No formal education	399	16.1	2,475	630	20.4	3,086	366	11.9	3,086	236	7.7	3,086	138	4.5	3,086	443	30.4	1,458
Income Quintiles																		
Poorest	161	15.4	1,048	254	19.8	1,280	144	11.3	1,280	93	7.3	1,280	68	5.3	1,280	189	33.6	564
Poorer	132	12.1	1,090	261	19.6	1,336	145	10.8	1,336	91	6.8	1,336	44	3.3	1,336	166	28.7	577
Middle	140	14.0	1,006	211	17.6	1,202	115	9.6	1,202	83	6.9	1,202	50	4.2	1,202	121	23.1	524
Richer	99	10.4	943	210	18.6	1,127	87	7.7	1,127	59	5.3	1,127	31	2.7	1,127	115	27.3	422
Richest	89	8.3	1,074	239	18.5	1,294	125	9.7	1,294	44	3.4	1,294	37	2.9	1,294	108	21.5	503
Caste																		
General	425	13.3	3,198	719	18.2	3,958	387	9.8	3,958	242	6.1	3,958	166	4.2	3,958	454	27.1	1,675
Scheduled Tribes	104	10.6	979	223	19.3	1,154	121	10.5	1,154	77	6.6	1,154	38	3.3	1,154	144	31.3	459
Scheduled Caste	46	12.9	355	94	22.5	416	41	9.9	416	19	4.5	416	12	2.9	416	41	22.9	181
Other	47	7.4	629	140	19.7	712	66	9.3	712	33	4.7	712	15	2.0	712	60	21.9	276
Marital Status																		
Married	489	12.1	4,049	872	17.8	4,911	485	9.9	4,911	276	5.6	4,911	182	3.7	4,911	508	25.3	2,009
Never Married	5	1.0	455	55	11.0	504	14	2.9	504	5	1.0	504	3	0.5	504	13	15.7	83
Widowed	110	17.9	615	229	29.7	772	110	14.2	772	86	11.1	772	46	6.0	772	159	34.1	466
Other	18	42.3	42	18	35.4	52	6	12.1	52	4	7.8	52	0	0.3	52	19	58.2	33
Religion																		
Hindu	521	11.8	4,415	975	18.3	5,325	526	9.9	5,325	304	5.7	5,325	190	3.6	5,325	549	25.0	2,197
Muslim	73	12.4	595	150	20.3	737	75	10.2	737	64	8.7	737	39	5.2	737	124	40.1	310
Others	27	17.5	151	51	28.7	177	15	8.3	177	3	1.6	177	2	1.3	177	26	30.6	84
Location																		
Rural	460	12.4	3,722	850	18.7	4,539	470	10.3	4,539	290	6.4	4,539	173	3.8	4,539	528	27.8	1,901
Urban	161	11.2	1,439	326	19.2	1,700	146	8.6	1,700	81	4.7	1,700	58	3.4	1,700	171	24.8	689
Employment Status																		
Not working	261	8.9	2,942	647	18.3	3,544	332	9.4	3,544	204	5.8	3,544	105	3.0	3,544	354	26.0	1,365
Public Sector	9	9.0	99	24	19.0	127	12	9.7	127	5	4.2	127	3	2.3	127	12	26.2	46
Private Sector	35	13.3	261	64	20.0	317	27	8.6	317	18	5.7	317	7	2.3	317	39	32.0	123
Self-Employed	135	16.0	844	196	18.7	1,048	112	10.7	1,048	62	5.9	1,048	48	4.6	1,048	126	25.9	488
Informal Employment	181	17.8	1,016	244	20.3	1,202	133	11.0	1,202	82	6.8	1,202	68	5.6	1,202	168	29.4	570

Notes: Weighted frequencies and percentages are shown

Table 20. Weight Percentage Distribution of Symptom-Based Chronic Disease Diagnosis by Demographic Characteristics among Men, WHO SAGE India Wave 1 (2007-10)

Sociodemographic Factors	Symptom-Based Chronic Disease Diagnosis																	
	Angina			Hypertension			Arthritis			Chronic Lung Disorder			Asthma			Comorbidity vs. one chronic condition		
	Standardized Diagnosis	%	N	Standardized Diagnosis	%	N	Standardized Diagnosis	%	N	Standardized Diagnosis	%	N	Standardized Diagnosis	%	N	Standardized Diagnosis	%	N
Symptom-based Diagnosis																		
Yes	244	7.3	--	782	19.5	--	252	6.30	--	312	7.8	--	286	7.1	--	505	27.0	--
No	3,122	92.8	--	3,224	80.5	--	3,754	93.70	--	3,694	92.2	--	3,720	92.9	--	1,364	73.0	--
Age Group																		
18-25 (Young Adults)	14	3.4	402	52	11.5	454	5	1.13	454	18	4.1	444	17	3.8	454	25	22.5	109
26-45 (Early Adults)	137	7.1	1,926	409	18.0	2,268	114	5.04	2,268	141	6.5	2,178	103	4.6	2,268	224	24.7	907
46-65 (Middle-Aged Adults)	89	9.3	961	283	24.0	1,182	115	9.70	1,182	113	10.1	1,121	99	8.4	1,182	180	27.3	659
66-80 (Older Adults)	42	19.3	220	92	31.9	287	41	14.43	287	39	15.2	258	42	14.6	287	74	38.8	190
80+ (Elderly)	1	25.2	5	3	50.3	6	1	14.80	6	1	12.5	5	1	12.3	6	3	55.2	5
Education																		
College +	23	4.8	467	394	76.1	517	18	3.51	517	11	2.2	494	18	3.5	517	32	15.2	208
High School	38	5.6	693	685	82.3	832	45	5.41	832	64	8.0	805	53	6.4	832	81	23.1	353
Secondary School	51	7.5	679	678	84.0	807	41	5.06	807	62	7.9	781	47	5.9	807	88	26.9	328
Less than secondary school	94	10.0	948	893	78.5	1,137	88	7.77	1,137	85	7.9	1,076	64	5.7	1,137	144	26.8	537
No formal education	77	10.6	725	708	78.4	904	84	9.31	904	90	10.6	850	79	8.7	904	160	36.0	444
Income Quintiles																		
Poorest	86	12.3	704	151	17.2	879	74	8.44	879	79	9.5	835	51	5.8	879	139	35.3	394
Poorer	76	10.0	759	153	17.3	883	62	7.06	883	69	8.3	836	66	7.4	883	117	31.0	376
Middle	51	7.3	709	166	19.5	850	53	6.25	850	78	9.6	813	60	7.0	850	103	25.2	408
Richer	45	7.3	618	163	21.5	758	41	5.46	758	39	5.4	720	43	5.6	758	57	17.2	331
Richest	25	3.5	723	206	24.9	827	46	5.51	827	46	5.8	802	43	5.2	827	89	24.8	360
Caste																		
General	139	6.6	2,119	476	18.8	2,528	164	6.47	2,528	182	7.4	2,445	150	6.0	2,528	273	24.8	1,100
Scheduled Tribes	76	10.8	704	160	18.8	854	54	6.37	854	83	10.1	822	61	7.2	854	122	29.8	407
Scheduled Caste	14	6.1	232	69	26.1	263	18	6.89	263	10	4.1	248	7	2.8	263	23	19.2	118
Other	54	11.8	458	134	24.3	551	40	7.31	551	37	7.6	491	43	7.8	551	87	35.9	243
Marital Status																		
Married	257	8.6	3,001	761	21.1	3,605	263	7.30	3,605	274	8.0	3,428	233	6.5	3,605	457	27.4	1,670
Never Married	18	4.5	389	53	11.9	441	4	0.93	441	20	4.6	432	17	3.9	441	23	18.4	128
Widowed	9	8.0	116	23	16.3	143	9	6.44	143	18	12.8	139	12	8.5	143	24	34.9	69
Other	0	0.0	7	2	25.6	8	0	0.00	8	0	0.0	7	0	0.0	8	0	0.0	3
Religion																		
Hindu	234	7.9	2,963	734	20.8	3,521	231	6.56	3,521	239	7.1	3,360	225	6.4	3,521	411	25.8	1,593
Muslim	35	8.1	435	76	14.5	526	27	5.09	526	53	10.4	507	33	6.2	526	73	34.8	209
Others	14	12.5	116	29	19.2	150	19	12.51	150	20	14.5	139	5	3.1	150	21	30.7	68
Location																		
Rural	231	8.5	2,712	584	18.0	3,247	226	23.83	950	273	30.6	892	214	6.6	3,247	418	28.8	1,450
Urban	52	6.5	801	255	7.9	950	50	1.54	3,247	39	4.4	892	48	5.1	950	87	20.7	419
Employment Status																		
Not working	6	3.4	167	18	9.6	184	9	4.89	184	11	6.3	176	5	2.6	184	15	40.5	36
Public Sector	8	2.6	313	98	27.0	362	20	5.43	362	17	5.0	340	15	4.1	362	26	15.1	171
Private Sector	29	7.3	400	120	24.8	485	20	4.14	485	26	5.7	456	27	5.6	485	62	27.6	223
Self-Employed	126	7.4	1,690	374	18.4	2,033	132	6.48	2,033	169	8.5	1,979	141	6.9	2,033	246	26.8	917
Informal Employment	115	12.2	943	229	20.2	1,133	96	8.47	1,133	89	8.4	1,054	74	6.5	1,133	157	30.0	521

Notes: Weighted frequencies and percentages are shown

8.4.1. Research Question One

Is there a relationship between the latent classes of psychosocial functioning and chronic conditions among women?

Among women, there was a statistically significant relationship between the latent classes of psychosocial functioning and the diagnosis of angina, arthritis, asthma, and chronic lung disorder, controlling for sociodemographic characteristics. However, there was no relationship between the latent classes of psychosocial function and symptom-based diagnosis hypertension (see Table 21). Controlling for sociodemographic characteristics, the odds of angina for members of the latent class characterized by low psychosocial functioning was 3.59 (95% CI = 2.3 - 5.6), among members of the latent class characterized by high cognitive difficulties was 1.79 (95% CI = 1.27 - 2.52), and among members of the latent class characterized by high sleep and affect difficulties was 3.99 (95% CI = 2.85 - 5.58). Moreover, controlling for sociodemographic characteristics, the odds of arthritis for members of the latent class characterized by low psychosocial functioning was 2.53 (95% CI = 1.74 – 3.69), among members of the latent class characterized by high cognitive difficulties was 1.52 (95% CI = 1.09 – 2.12), and among members of the latent class characterized by high sleep and affect difficulties was 2.23 (95% CI = 1.53 – 3.25). Similarly, controlling for sociodemographic characteristics, the odds of asthma for members of the latent class characterized by low psychosocial functioning was 5.71 (95% CI = 3.36 – 9.70), among members of the latent class characterized by high cognitive difficulties was 2.05 (95% CI = 1.14 – 3.68), and among members of the latent class characterized by high sleep and affect difficulties was 4.34 (95% CI = 2.57– 7.30). Likewise, controlling for sociodemographic characteristics, the odds of chronic lung disease for members of the latent class characterized by

low psychosocial functioning was 4.47 (95% CI = 2.88 – 6.93), among members of the latent class characterized by high cognitive difficulties was 1.66 (95% CI = 1.12 – 2.46), and among members of the latent class characterized by high sleep and affect difficulties was 4.11 (95% CI = 2.74– 6.17).

Overall, these results demonstrate the significant relationship between chronic disease and the psychosocial functioning among women. Substantively, the results suggest that deterioration of psychosocial functioning, in terms of overall low functioning, high cognitive difficulties, and high sleep and affect difficulties, is associated with a chronic disease diagnosis among Indian women.

Table 21. Standardized Chronic Diseases Regressed on Latent Classes of Psychosocial Functioning Among Women Controlling for Sociodemographic Characteristics WHO SAGE India, Wave 1 (2007)

	Angina		Hypertension		Arthritis		Chronic Lung Disorder		Asthma		Comorbidity	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Latent Classes for Psychosocial Functioning (Ref: High Psychosocial Functioning)												
Low Psychosocial Functioning	3.59***	2.3 - 5.6	1.35	0.92 - 1.97	2.53***	1.74 - 3.69	4.47***	2.88 - 6.93	5.71***	3.36 - 9.7	3.14***	2.16 - 4.56
High Cognitive Difficulties	1.79***	1.27 - 2.52	1.12	0.86 - 1.46	1.52*	1.09 - 2.12	1.66*	1.12 - 2.46	2.05*	1.14 - 3.68	1.67**	1.15 - 2.44
High Sleep and Affect Difficulties	3.99***	2.85 - 5.58	0.96	0.64 - 1.44	2.23***	1.53 - 3.25	4.11***	2.74 - 6.17	4.34***	2.57 - 7.3	3.07***	2.06 - 4.57
Age (Ref.=Young Adults (18-24))												
25-45 (Early Adults)	1.85*	1.11 - 3.09	1.46	0.91 - 2.34	3.02**	1.55 - 5.89	1.68	0.81 - 3.47	1.15	0.5 - 2.61	0.85	0.43 - 1.71
46-65 (Middle-Aged Adults)	2.75***	1.59 - 4.74	2.86***	1.77 - 4.62	5.04***	2.5 - 10.16	2.4*	1.11 - 5.18	2.25	0.97 - 5.22	1.44	0.73 - 2.86
66-80 (Older Adults)	3.5***	1.84 - 6.62	3.61***	2.12 - 6.17	5.85***	2.66 - 12.86	3.49**	1.38 - 8.84	2.71*	1.09 - 6.73	1.74	0.8 - 3.75
80+ (Elderly)	2.92	0.74 - 11.5	4.25**	1.57 - 11.46	1.72	0.36 - 8.2	1.96	0.44 - 8.62	0.49	0.08 - 3	1.66	0.41 - 6.76
Education (Ref.=College+PostGrad)												
High School	8.74**	2.56 - 29.8	1.6	0.81 - 3.15	1.12	0.42 - 2.95	18.19**	2.14 - 154.07	7.3	0.86 - 61.39	0.63	0.15 - 2.56
Secondary School	10.34***	2.93 - 36.49	1.41	0.72 - 2.73	1.09	0.36 - 3.23	9.49*	1.16 - 77.15	3.77	0.72 - 19.77	0.46	0.11 - 2
Less than secondary school	11.94***	3.37 - 42.21	1.73	0.87 - 3.45	1.47	0.53 - 4.11	16.25**	2.08 - 126.96	8.05*	1.62 - 39.9	0.75	0.19 - 2.94
No formal education	13.45***	3.82 - 47.3	1.37	0.67 - 2.77	1.29	0.49 - 3.38	14.13*	1.78 - 112.16	5.16*	1.03 - 25.8	0.64	0.16 - 2.49
Income Quintiles (Ref.=Poorest)												
Poorer	0.9	0.62 - 1.32	1.04	0.77 - 1.41	1.01	0.65 - 1.56	1.02	0.64 - 1.62	0.63	0.37 - 1.09	0.97	0.63 - 1.51
Middle	1.11	0.73 - 1.69	0.89	0.65 - 1.21	0.89	0.62 - 1.27	1.11	0.7 - 1.76	0.82	0.45 - 1.49	0.67*	0.47 - 0.97
Richer	0.88	0.59 - 1.3	0.98	0.73 - 1.32	0.76	0.52 - 1.09	0.91	0.54 - 1.52	0.6	0.32 - 1.11	0.92	0.6 - 1.42
Richest	0.87	0.55 - 1.39	0.99	0.72 - 1.37	1.05	0.7 - 1.56	0.66	0.38 - 1.16	0.72	0.37 - 1.4	0.72	0.46 - 1.12
Caste (Ref.=General)												
Scheduled Caste	0.61***	0.42 - 0.87	1.1	0.83 - 1.44	1.03	0.75 - 1.39	1.03	0.7 - 1.5	0.72	0.45 - 1.15	1.29	0.89 - 1.88
Scheduled Tribe	0.74	0.46 - 1.21	1.33	0.9 - 1.96	0.98	0.57 - 1.68	0.7	0.35 - 1.37	0.61	0.22 - 1.68	0.81	0.43 - 1.54
Other	0.39***	0.25 - 0.61	1.08	0.83 - 1.41	0.92	0.65 - 1.31	0.62	0.42 - 0.93	0.39***	0.24 - 0.63	0.57**	0.38 - 0.83
Marital Status (Ref.=Married)												
Never Married	0.22*	0.06 - 0.82	0.93	0.54 - 1.61	0.94	0.38 - 2.29	0.45	0.13 - 1.56	0.32	0.03 - 2.84	0.78	0.23 - 2.55
Widowed	0.72	0.51 - 1.02	1.17	0.9 - 1.53	0.84	0.61 - 1.16	1.01	0.67 - 1.51	0.72	0.5 - 1.06	0.92	0.67 - 1.25
Other	3.62***	1.45 - 9.02	2.77	0.63 - 12.13	1.31	0.4 - 4.29	1.1	0.25 - 4.88	0.03**	0 - 0.36	2.84	0.87 - 9.28
Location (Ref.=Urban)												
Rural	0.92	0.56 - 1.48	0.95	0.71 - 1.27	1.15	0.82 - 1.62	1.2	0.76 - 1.91	0.99	0.56 - 1.74	1.08	0.73 - 1.59
Religion (Ref.=Hindu)												
Muslims	0.88	0.55 - 1.39	1.13	0.77 - 1.65	0.91	0.55 - 1.51	1.31	0.88 - 1.96	1.27	0.76 - 2.14	1.97	1.23 - 3.15
Other	1.88*	1.06 - 3.32	1.66	0.95 - 2.92	0.86	0.47 - 1.55	0.27*	0.09 - 0.81	0.43	0.16 - 1.13	1.46	0.77 - 2.76
Employment Status (Ref.=Private Sector)												
Unemployed	0.47*	0.27 - 0.83	0.9	0.58 - 1.41	1.04	0.58 - 1.86	0.83	0.46 - 1.49	0.95	0.42 - 2.13	0.55*	0.32 - 0.94
Public Sector	0.78	0.3 - 2	0.97	0.46 - 2.03	1.24	0.51 - 2.99	0.87	0.26 - 2.85	1.14	0.24 - 5.25	0.93	0.32 - 2.65
Self-Employed	0.78	0.43 - 1.41	0.88	0.54 - 1.42	1.07	0.58 - 1.95	0.75	0.39 - 1.44	1.47	0.57 - 3.75	0.6	0.34 - 1.05
Informal Employment	0.83	0.47 - 1.47	0.91	0.53 - 1.54	1.01	0.54 - 1.87	0.78	0.42 - 1.44	1.67	0.71 - 3.89	0.62	0.35 - 1.1
Intercept	0.01***	0 - 0.03	0.08***	0.03 - 0.22	0.01***	0 - 0.06	0.01***	0 - 0.16	0.01***	0 - 0.02	0.54	0.12 - 2.26

Notes: Weighted regression results are shown; Logistic regression analyses were conducted separately for each outcome; comorbidity is defined as having more than one chronic disease diagnosis; * = p < .05; ** = p < .001; *** = p < .0001;

Is there a relationship between the latent classes of psychosocial functioning and chronic conditions among men?

Among men, there was a statistically significant relationship between latent classes of psychosocial functioning and the diagnosis of angina, arthritis, asthma, and chronic lung disorder, controlling for other sociodemographic characteristics. However, there was no relationship between the latent classes of psychosocial function and the diagnosis of hypertension (see Table 22). Controlling for sociodemographic characteristics, the odds of angina for members of the latent

class characterized by low psychosocial functioning was 8.24 (95% CI = 3.93 – 17.27) and among members of the latent class characterized by moderate personal psychosocial functioning was 3.33 (95% CI = 2.02 – 5.48). Similarly, controlling for sociodemographic characteristics, the odds of arthritis for members of the latent class characterized by low psychosocial functioning was 2.26 (95% CI = 3.12 – 4.56) and among members of the latent class characterized by moderate personal psychosocial functioning was 2.03 (95% CI = 1.25 – 3.29). Controlling for sociodemographic characteristics, the odds of chronic lung disorder for members of the latent class characterized by low psychosocial functioning was 5.24 (95% CI = 2.75 – 9.96) and among members of the latent class characterized by moderate personal psychosocial functioning was 3.36 (95% CI = 2.19 – 5.16). Controlling for sociodemographic characteristics, the odds of asthma for members of the latent class characterized by low psychosocial functioning was 4.79 (95% CI = 2.78 – 8.26) and among members of the latent class characterized by moderate personal psychosocial functioning was 3.43 (95% CI = 2.07 – 5.69).

Overall, these results demonstrate the significant relationship between chronic disease and the psychosocial functioning among men. Substantively, the present results suggest that deterioration of psychosocial functioning, in terms of overall low psychosocial functioning or even moderate difficulties in personal functioning, is indicative of a chronic disease diagnosis among Indian men.

Table 22. Standardized Chronic Diseases Regressed on Latent Classes of Psychosocial Functioning Among Men Controlling for Sociodemographic Characteristics WHO SAGE India, Wave 1 (2007)

	Angina		Hypertension		Arthritis		Chronic Lung Disease		Asthma		Comorbidity	
	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI	Odds Ratio	95% CI
Latent Classes of Psychosocial Functioning (Ref. = High Psychosocial Functioning)												
Low Psychosocial Functioning	8.24***	3.93 - 17.27	1.23	0.77 - 1.97	2.26*	1.12 - 4.56	5.24***	2.75 - 9.96	4.79***	2.78 - 8.26	3.28***	1.72 - 6.27
Moderate Personal Functioning	3.33***	2.02 - 5.48	0.81	0.58 - 1.15	2.03**	1.25 - 3.29	3.36***	2.19 - 5.16	3.43***	2.07 - 5.69	1.71*	1.12 - 2.63
Age (Ref.=Young Adults (18-24))												
25-45 (Early Adults)	1.72	0.49 - 5.97	1.27	0.69 - 2.34	2.86	0.61 - 13.42	1.57	0.54 - 4.56	1.6	0.52 - 4.87	0.6	0.15 - 2.32
46-65 (Middle-Aged Adults)	2.15	0.61 - 7.62	1.76	0.92 - 3.34	5.03*	1.08 - 23.35	2.11	0.74 - 6.02	2.23	0.73 - 6.81	0.65	0.16 - 2.62
66-80 (Older Adults)	4.26*	1.17 - 15.51	2.6**	1.34 - 5.02	6.88*	1.46 - 32.41	2.47	0.81 - 7.46	3.01	0.9 - 10.01	0.93	0.22 - 3.89
80+ (Elderly)	4.41	0.32 - 59.53	7.56*	1.5 - 37.95	7.89*	1.18 - 52.78	0.91	0.14 - 5.66	1.06	0.1 - 11.22	1.52	0.22 - 10.5
Education (Ref.=College+PostGrad)												
High School	0.82	0.24 - 2.75	0.8	0.49 - 1.31	1.5	0.56 - 3.97	4.21**	1.59 - 11.09	2.53	1.07 - 5.96	1.93	0.84 - 4.42
Secondary School	0.85	0.3 - 2.43	0.79	0.47 - 1.35	1.26	0.46 - 3.41	3.36*	1.22 - 9.24	1.65	0.54 - 5	1.99	0.82 - 4.84
Less than secondary school	0.79	0.27 - 2.27	1.14	0.71 - 1.85	1.58	0.62 - 4.02	2.76*	1.1 - 6.9	1.2	0.46 - 3.09	1.87	0.89 - 3.96
No formal education	0.65	0.22 - 1.9	1.17	0.7 - 1.96	1.73	0.67 - 4.44	3.53**	1.49 - 8.38	2.21	0.87 - 5.62	2.54*	1.14 - 5.66
Income Quintiles (Ref.=Poorest)												
Poorer	0.85	0.45 - 1.6	1.08	0.68 - 1.69	0.92	0.49 - 1.71	0.96	0.57 - 1.62	0.91	0.51 - 1.61	0.89	0.49 - 1.62
Middle	0.67	0.33 - 1.37	1.28	0.82 - 1.98	0.92	0.45 - 1.88	1.47	0.83 - 2.59	1.24	0.64 - 2.41	0.69	0.36 - 1.3
Richer	0.65	0.33 - 1.27	1.31	0.82 - 2.1	0.74	0.36 - 1.52	0.76	0.39 - 1.48	0.81	0.39 - 1.68	0.47*	0.23 - 0.96
Richest	0.38*	0.15 - 0.95	1.75	1.07 - 2.87	0.95	0.44 - 2.07	1.24	0.65 - 2.35	1.05	0.49 - 2.23	1.04	0.5 - 2.18
Caste (Ref.=General)												
Scheduled Caste	1.37	0.73 - 2.57	1.12	0.74 - 1.7	0.77	0.41 - 1.45	1.31	0.75 - 2.26	1.21	0.69 - 2.13	1.15	0.68 - 1.95
Scheduled Tribe	0.81	0.37 - 1.74	1.7	0.92 - 3.16	0.89	0.44 - 1.81	0.47	0.21 - 1.01	0.47*	0.24 - 0.94	0.48*	0.23 - 0.98
Other	1.72	0.84 - 3.56	1.25	0.86 - 1.84	1.1	0.61 - 2.01	1.05	0.56 - 1.94	1.1	0.61 - 2.01	1.65	0.94 - 2.91
Marital Status (Ref.=Married)												
Never Married	0.97	0.28 - 3.31	0.63	0.35 - 1.14	0.27	0.07 - 1.03	0.98	0.37 - 2.59	1.59	0.65 - 3.88	0.52	0.15 - 1.71
Widowed	0.56*	0.32 - 0.98	0.59*	0.4 - 0.87	0.56*	0.35 - 0.9	1.23	0.63 - 2.37	1.53	0.76 - 3.04	0.94	0.52 - 1.7
Other	1		1.66	0.26 - 10.51	1		1	--	1			
Location (Ref.=Urban)												
Rural	1.08	0.56 - 2.08	0.63**	0.45 - 0.87	1.2	0.69 - 2.09	2.01*	1.12 - 3.59	1.71	0.99 - 2.93	1.37	0.80 - 2.34
Religion (Ref.=Hindu)												
Muslims	0.66	0.3 - 1.43	0.67	0.41 - 1.08	0.59	0.27 - 1.27	1.34	0.77 - 2.33	1.01	0.5 - 2.03	1.11	0.6 - 2.04
Other	1.62	0.57 - 4.6	0.85	0.37 - 1.97	2.3	0.98 - 5.42	2.71*	1.11 - 6.63	0.47	0.09 - 2.42	1.3	0.46 - 3.64
Employment Status (Ref.=Private Sector)												
Unemployed	0.44	0.17 - 1.13	0.36*	0.14 - 0.88	1.78	0.46 - 6.87	1.17	0.33 - 4.06	0.21*	0.05 - 0.88	1.01	0.24 - 4.17
Public Sector	0.27*	0.11 - 0.64	0.8	0.47 - 1.38	0.96	0.3 - 3.04	0.78	0.25 - 2.42	0.63	0.21 - 1.91	0.34*	0.13 - 0.88
Self-Employed	0.85	0.38 - 1.9	0.67	0.44 - 1.02	1.16	0.5 - 2.66	1.03	0.47 - 2.29	0.7	0.31 - 1.57	0.61	0.3 - 1.25
Informal Employment	1.27	0.59 - 2.72	0.8	0.5 - 1.28	1.48	0.64 - 3.4	0.98	0.42 - 2.29	0.61	0.26 - 1.43	0.64	0.29 - 1.41
Intercept	0.05**	0 - 0.34	0.26	0.1 - 0.66	0.01***	0 - 0.07	0.01***	0.01-0.03	0.01***	0 - 0.14	0.34	0.04 - 2.67

Notes: Weighted regression results are shown; Logistic regression analyses were conducted separately for each outcome; comorbidity is defined as having more than one chronic disease diagnosis; * = p < .05; ** = p < .001; *** = p < .0001;

8.4.2. Research Question Two:

Is there a relationship between the latent classes of psychosocial functioning and chronic disease comorbidity (vs. chronic disease morbidity) among women?

Among women, there was a statistically significant relationship between the latent classes of psychosocial functioning and living with chronic disease comorbidity, controlling for other sociodemographic characteristics (see Table 21). Controlling for sociodemographic characteristics, the odds of chronic disease comorbidity (vs. living with one chronic disease) for

members of the latent class characterized by low psychosocial functioning was 3.14 (95% CI = 2.16 - 4.56), among members of the latent class characterized by high cognitive difficulties was 1.67 (95% CI = 1.15 - 2.44), and among members of the latent class characterized by high sleep and affect difficulties was 3.07 (95% CI = 2.06 - 4.57).

Is there a relationship between the latent classes of psychosocial functioning and chronic disease comorbidity (vs. chronic disease morbidity) among men?

There was a statistically significant relationship between the latent classes of psychosocial functioning and living with chronic disease comorbidity, controlling for sociodemographic characteristics (see Table 22). Controlling for sociodemographic characteristics, the odds of chronic disease comorbidity (vs. living with one chronic disease) for members of the latent class characterized by low psychosocial functioning was 3.28 (95% CI = 1.72 - 6.27) and among members of the latent class characterized by moderate personal functioning was 1.71 (95% CI = 1.12 - 2.63).

8.4.3. Supplementary Analyses

Models with manifest predictors of psychosocial functioning:

Among women, controlling for sociodemographic correlates, the odds of angina were significantly high among women with depression, high sleep difficulties, and high cognitive difficulties (all p -values < .05). Among women, controlling for sociodemographic correlates, the odds of angina were significantly low among women with high quality of life (p < .05). Similarly, controlling for sociodemographic correlates, the odds of hypertension were significantly higher among women with high negative affect, high sleep difficulties, and high social connectedness (all p -values < .05). Additionally, the odds of arthritis were significantly high among women with depression,

low quality of life and high sleep difficulties controlling for all sociodemographic correlates (all p -values $<.05$). Likewise, the odds of chronic lung disorder were high among women with high negative affect, low quality of life, high sleep difficulties (all p -values $<.05$). Similarly, the odds of asthma were high among women with depression, high negative affect, and low quality of life (all p -values $<.05$). Finally, the odds of multimorbidity of disorder were high among women with low quality of life, and high sleep difficulties (all p -values $<.05$). Thus, overall the results indicate that the relationship between psychosocial functioning and chronic diseases are mixed among Indian women. In particular, some chronic diseases, such as chronic lung disorder, asthma, and angina are more consistently related to indicators of psychosocial functioning than other chronic conditions. Moreover, sleep and quality of life is more consistently related to chronic diseases than other indicators, controlling for sociodemographic characteristics.

Table 23. Chronic Disease Outcomes Regressed on Manifest Indicators of Psychosocial Functioning Among Women WHO SAGE India, Wave 1 (2007)

	Angina		Hypertension		Arthritis		Chronic Lung Disorder		Asthma		Multimorbidity	
	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>
Psychosocial Functioning^a												
Depression	2.26***	1.48 - 3.45	0.86	0.64 - 1.14	1.53*	1.03 - 2.25	1.17	0.83 - 1.65	2.27**	1.33 - 3.86	1.32	0.9 - 1.93
Interpersonal Relationship	0.99	0.93 - 1.04	1.01	0.97 - 1.04	0.97	0.93 - 1.01	0.97	0.92 - 1.01	1.02	0.95 - 1.07	0.99	0.93 - 1.03
Cognition	1.11*	1.01 - 1.22	1.05	0.97 - 1.12	1.06	0.97 - 1.15	1.07	0.96 - 1.17	1.07	0.91 - 1.25	1.05	0.95 - 1.16
Negative Affect	0.96	0.88 - 1.04	0.91**	0.85 - 0.97	0.94	0.87 - 1.02	1.14**	1.03 - 1.24	1.10*	1.01 - 1.19	1.07	0.96 - 1.17
Social Connectedness	0.98	0.94 - 1	1.03*	1 - 1.04	1.02	0.98 - 1.04	1.00	0.96 - 1.03	0.98	0.94 - 1.01	0.99	0.95 - 1.02
Quality of Life	0.96*	0.92 - 0.99	1.01	0.98 - 1.03	0.96*	0.92 - 0.99	0.92***	0.88 - 0.96	0.91***	0.86 - 0.96	0.96*	0.92 - 0.99
Sleep	1.31***	1.2 - 1.41	1.09**	1.03 - 1.14	1.26***	1.16 - 1.36	1.19***	1.08 - 1.3	1.05	0.91 - 1.2	1.19***	1.1 - 1.28
Intercept	0.02***	0.00 - 0.16	0.04***	0.01 - 0.15	0.03	0.01 - 0.20	0.01***	0.00 - 0.18	0.04***	0.00 - 0.59	0.89***	0.14 - 5.56

Notes: Weighted regression results are shown; OR = Odds Ratios; Logistic regression models were run: * = $p <.05$; ** = $p <.001$; *** = $p <.0001$;

^a= All models were adjusted for age, education, income, area of residence, religion, caste, employment status, marital status.

Among men, controlling for sociodemographic correlates, the odds of angina were significantly high among men with high sleep difficulties (all p -values $<.05$). Among men, controlling for sociodemographic correlates, there were no significant differences in odds of hypertension based on indicators of psychosocial functioning. Additionally, the odds of arthritis

were significantly high among men with low quality of life, and high sleep difficulties controlling for all sociodemographic correlates (all p -values $<.05$). Likewise, the odds of asthma were high among men with depression, high interpersonal relationship difficulties, high cognitive difficulties, low quality of life, and high sleep difficulties (all p -values $<.05$). Similarly, the odds of chronic lung disorder were high among men with depression, low quality of life, and high sleep difficulties (all p -values $<.05$). Finally, the odds of multimorbidity of disorder were high among men with high interpersonal relationship difficulties, low quality of life, and high sleep difficulties (all p -values $<.05$). Overall, the results are mixed. Similar to women, chronic lung disorder, asthma, and multimorbidity is more consistently associated with psychosocial functioning than other chronic conditions. The results also confirm the findings from models that use latent predictors and demonstrate that there is no statistically significant relationship between odds of hypertension and the indicators of psychosocial functioning among men.

Table 24. Chronic Disease Outcomes Regressed on Manifest Indicators of Psychosocial Functioning Among Men WHO SAGE India, Wave 1 (2007)

	Angina		Hypertension		Arthritis		Chronic Lung Disorder		Asthma		Multimorbidity	
	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>
Psychosocial Functioning^a												
Depression	1.67	0.84 - 3.28	0.69	0.39 - 1.18	1.05	0.5 - 2.19	2.08*	1.18 - 3.65	2.43**	1.3 - 4.51	1.37	0.73 - 2.53
Interpersonal Relationship	0.95	0.86 - 1.03	1.04	0.97 - 1.11	0.97	0.9 - 1.04	0.97	0.89 - 1.04	0.92*	0.84 - 0.99	0.93*	0.86 - 0.99
Cognition	1.18	0.96 - 1.43	0.97	0.88 - 1.06	1.05	0.91 - 1.21	1.07	0.95 - 1.21	1.14*	1.01 - 1.28	1.06	0.93 - 1.2
Negative Affect	0.97	0.82 - 1.14	0.95	0.85 - 1.05	1.01	0.86 - 1.17	0.95	0.83 - 1.08	1.05	0.93 - 1.18	1.00	0.87 - 1.15
Social Connectedness	1.01	0.95 - 1.06	1.00	0.97 - 1.02	1.02	0.98 - 1.07	1.01	0.95 - 1.06	1.04*	1 - 1.08	1.04	0.99 - 1.08
Quality of Life	0.97	0.88 - 1.05	1.00	0.96 - 1.04	0.93**	0.88 - 0.98	0.93**	0.87 - 0.97	0.93**	0.88 - 0.98	0.93**	0.87 - 0.98
Sleep	1.49***	1.28 - 1.72	1.11	0.99 - 1.22	1.14*	1 - 1.28	1.32***	1.17 - 1.48	1.15*	1.01 - 1.29	1.22**	1.07 - 1.38
Intercept	0.04	0.00 - 1.63	0.19	0.03 - 1.02	0.04**	0.00 - 0.36	0.02**	0.00 - 0.35	0.04*	0.00 - 0.90	0.90	0.05 - 15.94

Notes: Weighted regression results are shown; OR = Odds Ratios; Logistic regression models were run; * = $p <.05$; ** = $p <.001$; *** = $p <.0001$;

^a = All models were adjusted for age, education, income, area of residence, religion, caste, employment status, marital status.

Test of Goodness of Fit Between Models with Latent Predictors and Manifest Predictors:

Based on methods from Archer and Lemeshow (2006), tests of Goodness of fit were conducted to evaluate models with latent predictor (planned analyses) and models with manifest

predictors (supplementary analyses). Results indicate that controlling for sociodemographic variables, for models with latent predictors, among women, models did not indicate goodness of fit when the outcome variables were chronic lung disorder and asthma. However, models with angina, hypertension, arthritis, and multimorbidity indicated goodness of fit (see Table 25). Results also indicate that controlling for sociodemographic variables, for models with manifest predictors, among women, models did not indicate goodness of fit when the outcome were angina, arthritis, and asthma. However, models with hypertension, chronic lung disorder, and multimorbidity indicated goodness of fit (see Table 25). The goodness of fit tests indicates that overall, among women, models with latent predictors provided better fit than models that used manifest predictors of psychosocial functioning. However, there is a need to take a closer look at models that did not indicate goodness of fit for models with latent variables (chronic lung disorder, asthma). Interestingly, neither models with latent predictors nor models with manifest variables provided goodness of fit for the model with asthma as an outcome variable.

Table 25. Goodness of Fit Between Latent Predictor and Manifest Predictor - Women

Goodness of Fit for Models with Latent Predictors ^a	Outcome Variable	Goodness of Fit for Models with Manifest Predictors ^a
Good Fit	Angina	Lack of Fit
Good Fit	Hypertension	Good Fit
Good Fit	Arthritis	Lack of Fit
Lack of Fit	Chronic Lung Disorder	Good Fit
Lack of Fit	Asthma	Lack of Fit
Good Fit	Multimorbidity	Good Fit

Notes: Latent predictors included four latent classes for women; Manifest predictors included seven indicators of psychosocial functioning

^a= All models were adjusted for age, education, income, area of residence, religion, caste, employment status, marital status.

Among men, controlling for sociodemographic variables, for models with latent predictors, models did not indicate goodness of fit when the outcome variables were angina and arthritis. However, models with hypertension, chronic lung disorder, asthma and multimorbidity

indicated goodness of fit (see Table 26). Results also indicate that controlling for sociodemographic variables, for models with manifest predictors, among men, models did not indicate goodness of fit when the outcome variables were angina, chronic lung disorder, asthma, and multimorbidity. However, models indicated goodness of fit when outcome variables were hypertension, and arthritis. The goodness of fit tests indicates that overall, among men, models with latent predictors provided better fit than models that used manifest predictors of psychosocial functioning. However, there is a need to take a closer look at models that did not indicate goodness of fit for models with latent variables (angina, arthritis). Interestingly, neither models with latent predictors nor models with manifest variables provided goodness of fit for the model with angina as an outcome variable.

Table 26. Goodness of Fit Between Latent Predictor and Manifest Predictor - Men

Table 25: Goodness of Fit Between Latent Predictor and Manifest Predictor - Men

Goodness of Fit for Models with Latent Predictors^a	Outcome Variable	Goodness of Fit for Models with Manifest Predictors^a
Lack of Fit	Angina	Lack of Fit
Good Fit	Hypertension	Good Fit
Lack of Fit	Arthritis	Good Fit
Good Fit	Chronic Lung Disorder	Lack of Fit
Good Fit	Asthma	Lack of Fit
Good Fit	Multimorbidity	Lack of Fit

Notes: Latent predictors included three latent classes for men; Manifest predictors included seven indicators of psychosocial functioning

^a= All models were adjusted for age, education, income, area of residence, religion, caste, employment status, marital status.

8.5 Discussion

The overall purpose of the study was to conduct an in-depth exploration of the relationship between psychosocial functioning and chronic disease diagnosis among Indian men and women. The aims of the present study were twofold. First, to determine the relationship between psychosocial functioning (personal functioning in terms of cognition, affect, sleep, quality of life, and social functioning in terms of social connectedness and interpersonal relationships) and chronic disease diagnosis (hypertension, angina, arthritis, asthma, chronic lung disease) among Indian men and women. Second, to determine the relationship between psychosocial functioning (personal functioning in terms of cognition, affect, sleep, quality of life, and social functioning in terms of social connectedness and interpersonal relationships) and the multimorbidity of chronic disease diagnosis (one chronic disease vs. more than one chronic disease). The current study sought to contribute to the emerging evidence base demonstrating the association between psychosocial functioning and chronic diseases in the Indian context. Currently, there is a lack of a gender-focused research base to address the psychosocial impact of living with chronic conditions in India. Therefore, the present study analyzed the psychosocial functioning as a predictor of chronic disease diagnosis separately for men and women controlling for sociodemographic characteristics. Next, to evaluate the impact of growing multimorbidity of chronic conditions, I analyzed the psychosocial functioning as a predictor of chronic multimorbidity (vs. living with one chronic condition), separately for men and women. Overall, the latent classes that characterized decreased psychosocial functioning among men and women were associated with greater odds of a diagnosis of chronic diseases among men and women. Similarly, decreased psychosocial functioning was associated with greater odds of living with chronic multimorbidity

(two or more chronic diseases) as compared to living with one chronic disease among men and women. This study contributes to the literature by providing new evidence regarding the relationship between common indicators of psychosocial functioning and chronic diseases among men and women and also provides directions for future research.

8.5.1. Chronic Disease Morbidity and Psychosocial Functioning

The present study provides some of the first evidence to describe the relationship between comprehensive psychosocial functioning and chronic diseases in the Indian context. Among men and women, the members of the latent class characterized by deterioration in the psychosocial functioning had significantly higher odds of chronic disease diagnosis of angina, arthritis, chronic lung disease, and asthma after controlling for sociodemographic variables. These results are consistent with previous research demonstrating an association between decreased levels of psychosocial functioning and chronic disease diagnosis among Indian men and women. For instance, studies have reported detriments in sleep quality and chronic diseases in India, including asthma (M. Singh et al., 2016), arthritis (Koyanagi et al., 2014), and angina (Dutt et al., 2013; Jacob et al., 2017)(Dutt, Janmeja, Mohapatra, & Singh, 2013; Jacob, Shaik, Sivaprasad, Poongadan, & Rauf, 2017). There is also some evidence of a negative association between interpersonal relationships and chronic diseases, including hypertension and arthritis (Kalavar & Jamuna, 2011; Naghavi et al., 2017; R. Singh, 2014). However, the present study is one of the first from India that demonstrates a negative relationship between the comprehensive indicators of psychosocial functioning and standardized measures of chronic diseases using a nationally representative sample. The results are also in line with evidence from high-income countries, which suggests that chronic diseases are linked to detrimental effects on sleep, cognition,

interpersonal relationships, and social connectedness (S. Cohen, 2004; Stanton et al., 2007; Umberson & Montez, 2010)(S. Cohen, 2004; Stanton, Revenson, & Tennen, 2007; Umberson & Montez, 2010).

However, the study did not find any significant associations between the latent classes of psychosocial functioning and a diagnosis of hypertension among men or women. This finding is inconsistent with previous research which showed deterioration in the psychosocial functioning among people living with hypertension (Wryobeck et al., 2007). For instance, Shivashankar et al (2017) found sleep difficulties among people living with hypertension in Delhi, India. Further research is needed to evaluate the relationship between hypertension and the psychosocial functioning among different subgroups of the population.

Chronic diseases have noteworthy psychological and social consequences that demand significant psychosocial adjustment and adaptation in multiple life domains to maintain a successful care continuum of these conditions. Previous studies have reported the effects of living with chronic diseases on common mental health outcomes in India. For instance, Sreedhar (1989) reported increased levels of anxiety in people living with asthma. Similarly, there is also evidence to demonstrate the adverse psychosocial impact of living with diabetes in India (V. Mohan et al., 2014; Sridhar & Madhu, 2002). Moreover, the concomitance of depression and chronic diseases is also well established worldwide, including in India (Grenard et al., 2011; Moussavi et al., 2007). The study adds to the growing literature that demonstrates a link between mental and physical health and provides new additional insights by revealing that the common indicators of psychosocial functioning are also related to chronic disease diagnosis among Indian men and women.

Furthermore, although indicators used in the study, including sleep difficulties, negative affect, interpersonal relationships, cognitive difficulties, do not signify clinical threshold levels of any mental disorder per se, the study shows that even moderate levels of difficulties in personal functioning among men are related to increased odds of being diagnosed with a chronic disorder. Among women, members of the latent class characterized by high sleep and high affect difficulties and members of the latent class characterized by high cognitive difficulties also had higher odds of being diagnosed with chronic disorders as compared to members of the latent class characterized by high psychosocial functioning. These results demonstrate that difficulties in the psychosocial functioning among Indian men and women are predictive of chronic disease diagnosis.

8.5.2. Chronic Disease Multimorbidity and Psychosocial Functioning

The study found that poor psychosocial functioning was a significant predictor of living with two or more chronic as compared to living with one chronic condition. The results are in line with existing literature from India demonstrating chronic multimorbidity is related to lowered self-rated health, lowered perceived quality of life, and depression (Arokiasamy et al., 2015; Mini & Thankappan, 2017; Pati et al., 2015). In addition, a recent systematic literature review of chronic multimorbidity also found that multimorbidity of chronic conditions often has a deleterious mental health impact (Stirland et al., 2020). The study adds to the literature by demonstrating that an individuals' overall psychosocial functioning, including sleep, cognition, interpersonal relationships, social connectedness, and affect is predictive of multimorbidity of chronic conditions. There is a paucity of gender-focused research evaluating chronic diseases in the Indian context. This understanding is especially important in the Indian context because the patterns of behavior depend largely on the gendered social norms. The study takes one of the first steps to

demonstrates the psychosocial impact of chronic diseases separately among men and women. Further research should explore the underlying mechanisms that lead to these gender differences.

The results of supplementary analyses evaluating the relationship between chronic diseases and psychosocial functioning were mixed among both men and women. However, for both genders, the findings indicate that high sleep difficulties and low quality of life predicted increased odds of chronic conditions and multimorbidity of chronic conditions. This confirms findings from models that used latent classes of psychosocial functioning as predictors that indicated that sleep difficulties are associated with increased odds of chronic conditions among women. The goodness of fit tests also indicated that overall, models with latent predictors provided a good model fit. This provided additional evidence that a person-centered approach can be used successfully to investigate the relationship between chronic diseases and multidimensional indicators of psychosocial functioning.

The present study also adds to this growing literature demonstrating the psychosocial impact of chronic conditions. Living with chronic diseases requires rather permanent changes in an individual's daily life, affects their ability to function with their physical and social environment, needs long-term pharmacological treatment and often leads to progressive physical disability and pains (de Ridder et al., 2008). Some chronic diseases also require strict adherence to a particular lifestyle, including medical regimen and physical activities, to successfully maintain the disorder. Chronic diseases in India are also associated with especially higher out of pocket costs of medication and a catastrophic financial burden (Bhojani et al., 2012; Engelgau et al., 2012). Taken together, it can be interpreted that successful management of chronic diseases requires lifestyle adjustments including adherence to medication, physical difficulties,

psychological and financial impacts, and social changes. Some research suggests that around 30% of patients with chronic disease are unable to cope with new realities and have prolonged adjustment periods (Taylor & Aspinwall, 1996). Evidence from qualitative studies from high-income countries suggests that living with chronic diseases is often characterized by feelings of powerlessness, uncertainty and hopelessness, dysfunction in social roles, and feelings of isolation (D. S. F. Yu et al., 2008). Chronic diseases are also accompanied by debilitating interpersonal and social fears, such as fears of not being able to meet social roles and identity and fear of social rejection (Walder & Molineux, 2017). Qualitative evidence from India also echoes findings from the high-income countries and further suggests that living with chronic diseases among older Indians is characterized by increased fears of dependency, economic fears, uncertain living conditions, and restrictions on personal roles and resources (Patel & Prince, 2001). Future research needs to evaluate gender differences and the mechanisms underlying gender differences in the psychosocial impacts of chronic conditions.

8.5.3. Limitations of the Study

The findings from the study should be viewed in light of some limitations. First, the latent class of psychosocial functioning is treated as a predictor variable in the main analyses of the study, which can potentially lead to underestimation of standard errors. However, as discussed previously, the risks of statistical errors were mitigated due to the careful selection of latent classes based on statistical fit indices and substantive distinctiveness of the latent classes. Additionally, the latent class variable allows us to consider all the seven multidimensional indicators of psychosocial functioning simultaneously in one model. Likewise, the supplementary analyses were helpful to confirm the relationship between chronic diseases and psychosocial functioning

among Indian men and women. Similarly, using LCA the study identified the same vulnerable groups that were identified using regression models in Study 1. For instance, similar to results from study 1, LCA in study 2 also confirmed early adult women (25-46 years) are at higher risks of lowered psychosocial functioning and more likely to be in class 2 characterized by high cognitive difficulties, and class 3 characterized by high negative affect and sleep difficulties. Similarly, in present study, LCA also revealed that women in class 2 and 3, and men who have moderate personal functioning (class 2) also had greater odds of chronic diseases. Thus, one of the most important benefits of LCA was nuanced identification into sub-groups of men and women vulnerable for chronic diseases. Second, this is a cross-sectional study and therefore does not indicate the causation and directionality of the relationship between psychosocial functioning and chronic diseases. Third, I have used a count of chronic conditions to measure multimorbidity of conditions which assumes that each of the conditions has an equivalent impact on an individual's health and psychosocial functioning. Indeed, the effects of a chronic disease may rely on multiple determinants such as the severity of a particular disease, time since diagnosis and combination of different diseases. Fourth, the number of symptom-standardized diseases included in the study are limited to those included in the SAGE study. As such, certain highly prevalent disorders such as stroke, diabetes, and cancers were not included in the analyses as there was no symptom standardized measures of these disorders and/or these disorders were not reported by the SAGE study. Finally, the gender categorization of the SAGE study is limited to binary classification (men/women), thus, results may not fully represent experiences of all gender identities.

8.5.4. Strengths and Contributions of the Study

The primary strengths of the current study are three-fold. First, I used a validated symptom-standardized diagnosis of chronic diseases. This helped to overcome the bias and error inherent in the self-reporting of chronic diseases (Allotey et al., 2014; Hosseinpoor et al., 2012). Self-reporting of chronic disease is dependent on respondents' access, ease, knowledge, and affordability of healthcare. Therefore, the findings from this study are more robust as compared to the self-reported outcomes used in the literature thus far. Second, I used comprehensive and validated indicators of psychosocial functioning to identify latent classes of psychosocial functioning. The use of latent class analysis allowed for the consolidation of a complex set of measures into manageable and informational homogenous sets of sub-groups. To the best of my knowledge, this method has not been used to examine the psychosocial functioning among this population in prior research. Thus, this study introduced a novel method of evaluating multiple dimensions of psychosocial functioning and chronic diseases simultaneously in the Indian context. Finally, because gender can exert a powerful influence on psychosocial functioning and impact of chronic diseases, I separated analyses of the study by gender and created gender-focused latent classes of psychosocial functioning. Thus, the study adds much needed gender-stratified evidence to the growing literature in this area of research.

8.5.5. Implications for Public Health Program, Research, and Practice

The findings of the present study have multiple implications for research, practice, and public health interventions. While there is evidence for the mental health impact of chronic diseases (Hopman et al., 2009), the present study also provides one of the first nationally representative research to demonstrate that poor psychosocial functioning is related to the

diagnosis of chronic conditions in the Indian context. It indicates that the discussion of patients' psychosocial functioning during routine primary care and chronic condition specialist visits will help raise address some of the psychosocial impacts of chronic diseases and also create an impetus for patient behavioral change. The study also makes a case for the benefits of integrating behavioral health, mental health, and physical health services in primary care settings in India by demonstrating a strong interrelationship between these facets of health even after controlling for sociodemographic determinants. The integration of mental health services in primary care settings has long been established as one of the most efficient methods to tackle the increasing burden of chronic and mental health conditions in high-income as well as low/middle-income settings (R. Sinha & Pati, 2017). However, because personal and social functioning are also closely related to health-outcomes, addressing common indicators of psychosocial functioning through clinical practice and tailored interventions would also enhance health through multiple direct and indirect pathways.

Furthermore, the finding that decline in psychosocial functioning is strongly associated with multimorbidity, as compared to living with one chronic condition, has multiple important implications. People with multimorbidity are at a higher risk of fragmented healthcare with little crosstalk between healthcare providers for different treatment regimens. Similarly, adverse side effects of multiple distinct pharmaceutical interventions may cause further affect psychosocial functioning, complicate care continuum, and have adverse drug-drug interactions (Wehling, 2014; Wolff et al., 2002). Furthermore, the current healthcare system in India is primarily designed to treat acute illnesses, infectious diseases, diseases related to poverty such as under-nutrition, and maternal and child health care and perhaps ill-equipped to support chronic multimorbidity in

different age groups of populations (Ebrahim et al., 2013). Thus, there is a need to redesign the healthcare system to meet the growing needs of the population. In-depth research about the healthcare and psychosocial needs of the population, understanding of available resources, as well as gaps and current needs are crucial for redesigning the healthcare system to reduce the growing burden of chronic diseases in India. The present research contributes to the literature by demonstrating the effects of chronic conditions and chronic multimorbidity on psychosocial functioning even after accounting for age and other sociodemographic characteristics.

8.5.6. Conclusion

The study provides two important contributions to research demonstrating the interrelationships between psychosocial functioning and chronic diseases. First, this study found that the worsening of psychosocial functioning among men and women is a predictor of diagnosis of chronic diseases. Second, the study also showed that living with two or more chronic conditions is considerably different than living with one chronic condition. The findings indicate the importance of psychosocial functioning in the management of chronic diseases and highlight the urgent need to focus on psychosocial functioning and mental health as one of the key approaches to reduce the overall burden of physical health disease in India. To date, public health research in India has focused primarily on infectious diseases, and maternal and child health. However, the research provides one of the first insights to demonstrate the vital roles of common indicators of psychosocial functioning, including sleep, cognition, interpersonal functioning, social connectedness, quality of life, and affect. Future research is required to advance our understanding of these indicators and their underlying mechanisms in the Indian context through longitudinal and qualitative studies. These common indicators of psychosocial functioning are amenable to changes

through behavioral public health interventions and have numerous benefits for mental and physical health.

CHAPTER NINE: DISCUSSION

The primary aim of the present dissertation study was to gain a deeper understanding of psychosocial functioning – key building blocks of mental health status – and its sociodemographic and physical health correlates among the Indian population. Thus, an overarching goal of the three dissertation studies was to identify distinct sub-groups of psychosocial functioning and to explore the sociodemographic characteristics that are related to psychosocial functioning among Indian men and women. Within this context, the first study examined the levels of multiple dimensions of psychosocial functioning among Indian men and women and described how these self-reported levels vary based on individuals' sociodemographic characteristics. The second study identified latent classes of psychosocial functioning based on the multidimensional indicators of psychosocial functioning. These latent classes are distinct to each other yet homogeneous within the classes. The third study sought to understand whether there is an association between individuals' membership in the latent psychosocial class and diagnoses of chronic diseases. Thus, the first study explored the sociodemographic correlates of psychosocial functioning in India, the second study grouped these seven indicators of psychosocial functioning into distinct latent classes, and the third study evaluated the association between the latent psychosocial classes and chronic disease diagnosis.

Taken together, results from these three studies demonstrate that psychosocial functioning varies based on an individual's personal and social context and should be prioritized in research, policy, and practice to reduce the burden of chronic disease and mental health disorders in India. This conclusion is based on the following key lessons learned across the three dissertation studies.

First, Study 1 found overall support for the theory-driven key hypotheses – that there were sociodemographic patterns in psychosocial functioning among Indian adults. I investigated seven indicators of psychosocial functioning as outcome variables regressed on key sociodemographic characteristics. Detailed results and their implications are discussed in Study 1 (Chapter 6). Broadly speaking, results show that social or economic disadvantage, in terms of older age, low income, low education, informal employment or unemployment, widowhood, Muslim religion, lower social caste, was associated with poorer psychosocial functioning.

More importantly, the results revealed that the effects of disadvantaged socioeconomic characteristics on psychosocial functioning were more nuanced among women than among men. For instance, I found that social connectedness decreases for men only at/after the age of 46 years. Yet among Indian women, the self-reported levels of social connectedness decreased at every stage of age in a linear fashion after the age of 18 years. Similarly, low levels of education were a robust predictor of negative affect (a strong predictor of depression) among women but not among men. In terms of income, any increase in income was linked to higher levels of social functioning among Indian men; however, Indian women received these protective benefits of income only after reaching a certain threshold of income, namely middle-income quintile for social connectedness and richer income quintile for interpersonal interactions. These results consistent with previous studies that indicate gender gaps in psychosocial functioning based on stages of life-cycle (Mirowsky, 1996). Some sociologists contend that throughout the life-course, the relative responsibilities and burden of work and family circumstances vary greatly for men and women. As a consequence there are steep disparities in experiences of stress, strain, financial and economic status, personal autonomy, social authority, and social recognition based on gendered norms and

expectations (Marks et al., 2001; Mirowsky, 1996; Spain & Bianchi, 1996). Similarly, life situations, constraints, and opportunities for middle-aged men and women differ in multiple ways. For instance, roles and responsibilities of child-rearing of young, adolescents, and older children, upkeep of other important household responsibilities, gaps in pay and discrimination in work opportunities, caring for elderly loved ones, and conflicting work/life balance demands are greater for women than for men (Gore & Mangione, 1983; Nomaguchi & Milkie, 2003; Ross et al., 1990). Thus, psychologically, gender differences in middle-aged adults favor men's wellbeing over women (Mirowsky, 1996). The present study showed that in the Indian context, these gender differences remain even after adjusting for other important sociodemographic characteristics. These results are also in line with previous research in Indian settings that showed gender-based disparities in psychosocial functioning (Bora & Saikia, 2015; M. Ganguli et al., 1999; J. Lee et al., 2014a; Perkins et al., 2016b).

Taken together, these results imply that the effects of sociodemographic characteristics on psychosocial functioning should be viewed in tandem with an individual's gender. It also implies that as previously was thought – an increase in socioeconomic advantages leads to psychosocial benefits. However, the strength of this relationship depends on gender within Indian society. One potential explanation for these results could be inherently differential gender-norms, patterns of behavior, societal expectations, and varying levels of domestic responsibilities based on gender. This suggests that public health programs need to tailor their efforts to the specific needs based on gender. Public health programs developed without due consideration to these gender-based issues will not be as effective as programs developed separately based on the gender-specific issues of the target population. These results also imply that perhaps gender-based inequities in psychosocial

functioning may give rise to the observed gender-based health disparities in the Indian context. There is a need to conduct an in-depth exploration of the relationships between psychosocial functioning, gender, and physical health in this population. This is especially important as the indicators of psychosocial functioning are amenable to changes through effective public health interventions and policies.

Second, the findings related to social caste were not consistent with the hypotheses derived from the existing socio-structural theories. Results showed that some groups of women belonging to socially disadvantaged social castes reported elevated negative affect and diminished perceived quality of life yet high levels of social connectedness. Whereas for men, belonging to ‘Other’ caste groups (having no official caste category or belonging to ‘other backward castes’) was more detrimental to personal functioning than any belonging to scheduled caste or scheduled tribe. Taken together, the results indicate that historical disadvantages in terms of social caste hierarchy do not always translate into disadvantages in terms of interpersonal relationships and overall social functioning.

These results demonstrate that the relationship between social disadvantage based on caste and psychosocial functioning is more complicated than previously theorized based on western structural theories based on social stratification and/or social disadvantages. Social caste is one of the most pervasive forms of social stratification and inequities in Indian society. Results show that although membership in a disadvantaged caste group created disparities for some indicators of personal functioning, the same association was not seen for indicators of social functioning. Therefore, an assumption based on current social stratification theories that suggest that social disadvantages are unequivocally associated with personal and social disadvantages would be

erroneous and downplay the availability of social resources available to members of historically lower caste groups. There is a need to explain how the social, political, structural, and cultural discrimination inherent in the social caste system shape psychosocial functioning and health in the Indian populations. Furthermore, while there is ample research evidence to suggest health disparities as a function of social caste in India (S. Agrawal et al., 2015; Borooah, 2010), these results indicate that socially disadvantaged castes report greater functioning for certain facets of psychosocial functioning, such as social connectedness. Thus, there is a need to explore existing personal and social resources that are currently available within the caste sub-groups. There is currently a dearth of literature explaining the levels of resources available in different population subgroups in India – the knowledge of how psychosocial resources are patterned based on sociodemographic characteristics will explain how disparities in psychosocial functioning and health emerge in different caste groups in India. Furthermore, there is an urgent need to examine caste-based discrimination as one of the key predictors of caste-based health disparities in India. Furthermore, focusing on the discrimination inherent in the social caste system will also help advance advocacy for disadvantaged social castes.

Third, the results of this study also underscored the particularly detrimental effects of widowhood on Indian women and men. After adjusting for all sociodemographic factors, widowhood emerged as a robust predictor of all indicators of personal and social functioning among women and increased odds of depression among men. In line with theory and past research (Chen & Dreze, 1998; K. Williams, 2004), this finding indicates that widowhood is related to increased isolation, and increased cognitive and emotional difficulties for Indian adults, especially for Indian women. This finding has implications for research as well as clinical practice. The

findings of this study may help create a more informed clinical practice. Awareness among primary care physicians that people experiencing widowhood may be at a higher risk of declined psychosocial functioning has disease-preventive benefits. Informed clinical care practice may promote a dialog between provider and at-risk patients, foster patient-provider rapport, and lead to early detection of mental health disorders and may increase the utilization of psychosocial health services. Similarly, additional research on correlates and risk factors related to increased risk of adverse psychosocial functioning among widowed adults can also help tailor intervention critical to improving patient outcomes and may serve as the basis for refining the public health recommendations.

Notably, these results make a compelling case for examining multiple indicators of psychosocial functioning and not merely relying on clinical indicators of mental health disorders. Results showed that while some sociodemographic indicators (education, income, area of residence, religion, employment status, and childhood SES) did not consistently predict the likelihood of depression among men or women, they had clear links to negative affect among women. Negative affect is one of the strongest predictors of psychological disorders (Watson et al., 1988). Therefore, a key takeaway from this finding is that studying only the disease outcome (depression) and overlooking indicators of psychosocial functioning would lead to an incomplete understanding of the role of sociodemographic features to influence wellbeing. Similarly, because the indicators of social and personal functioning used in this study, are building blocks of individuals' mental health, evidence-based programmatic efforts geared toward increasing the social and personal functioning would lead to overall improvements in mental and physical health

among Indian population. However, further research is needed to explain which conditions are required to enhance the psychosocial functioning among different population subgroups in India.

Fifth, one of the most important contributions of the dissertation is that the results demonstrated the value of a person-centered approach to modeling the multidimensional facets of psychosocial functioning. Using latent class analysis, this dissertation provided an insightful and parsimonious depiction of the complex interplay between different indicators of psychosocial functioning among Indian adults. The existing literature, using a more traditional approach of combining all indicators of psychosocial functioning in one variable, demonstrates that psychosocial functioning is often related to sociodemographic characteristics including age, disease status, SES, and other contextual factors (for example, see Mehta et al., 2014; Raju et al., 2010). Contrary to the traditional approach of combining all psychosocial indicators into a single index, the LCA allows for distinct variations in the levels of indicators. This allows the LCA to provide a more nuanced description of the interplay between indicators of functioning in this population. Study 2 showed that some indicators of psychosocial functioning, namely affect, sleep, cognition were more closely related to membership into the latent classes of psychosocial functioning characterized by deteriorated functioning than other indicators, such as social connectedness. Similarly, sociodemographic characteristics were related to the psychosocial latent class membership. Thus, this study contributes to the existing literature by using a novel approach to study these associations in the Indian population.

Sixth, the results showed that accounting for sociodemographic characteristics, the latent classes that characterized decreased psychosocial functioning among men and women were associated with a diagnosis of at least one chronic disease among men and women. Similarly,

living with chronic multimorbidity (two or more chronic diseases) was related to decreased psychosocial functioning as compared to living with one chronic disease among men and women, controlling for sociodemographic characteristics. Study 3 provides one of the first evidence to show the relationship between comprehensive psychosocial functioning and chronic diseases in the Indian context. Among men and women, the members of the latent class characterized by deterioration in the psychosocial functioning had significantly higher odds of chronic disease diagnosis of angina, arthritis, chronic lung disease, and asthma after controlling for sociodemographic variables. This indicates that worsening of psychosocial functioning is related to worsening of physical health, namely diagnosis of chronic diseases among this population.

One potential explanation of these findings is that the relationship between poor psychosocial functioning and chronic diseases may be due to remarkable psychological, biological, and social costs that demand significant psychosocial adjustment and adaptation to successfully maintain these conditions. Thus, these added changes to the lifestyle and psychosocial and physiological stressors of managing a chronic condition could result in detriments in psychosocial functioning. Although the temporality and causation of this relationship cannot be established given the cross-sectional nature of the study, this finding has critical clinical, healthcare management, and public health implications. The results underscore the benefits of integrating behavioral health, mental health, and physical health services in primary care settings in India by demonstrating a strong interrelationship between these facets of health even after accounting for sociodemographic determinants. The integration of mental health services in primary care settings is one of the most cost and time-effective methods to tackle the increasing burden of chronic and mental health conditions in high-income as well as low/middle-income settings (R. Sinha & Pati,

2017). However, because personal and social functioning is also closely related to health-outcomes, addressing common indicators of psychosocial functioning in patient-provider discussions and through tailored public health interventions would further enhance physical and mental health through multiple direct and indirect pathways.

The results of this dissertation should be considered in the context of a few methodological limitations. First, the data allowed only a binary categorization of gender. While the study showed that certain subgroups of women are at risk of adverse psychosocial functioning as compared to men, there could be other gender groups that may be more vulnerable and at a higher risk of worse psychosocial functioning, for instance, transgender, non-binary, or gender-queer populations in India. Future data collection efforts should allow for a more inclusive categorization of gender. Second, even though these studies demonstrate the association between psychosocial functioning and chronic diseases and also evaluates how sociodemographic characteristics influence psychosocial functioning, understanding the mechanisms responsible for these relationships was beyond the scope of study. Future research should study the underlying mechanisms, such as moderators and mediators, that influence the relationship between psychosocial functioning and physical and mental health. Third, the cross-sectional nature of the data restricts any conclusions about the temporality or causation of the associations observed in this study. Finally, health behaviors, such as diet, exercise, smoking, have important consequences for psychosocial functioning and physical health. However, they were not included in the scope of the current studies.

Nevertheless, the present studies have numerous public health, research, and clinical implication. First, from a research standpoint to the best of my knowledge, this dissertation is the

first to comprehensively investigate the sociodemographic and physical health correlates of seven distinct facets of psychosocial functioning among Indian men and women using a nationally representative data. Study 1 also underscores multiple avenues for future research to continue our understanding of the psychosocial functioning in the populations. Moreover, Study 3 added to the literature by demonstrating the relationship between psychosocial functioning and chronic diseases in the Indian context. Second, from a public health standpoint, the present research has identified several population sub-groups who are especially vulnerable to adverse psychosocial functioning, such as, older adults, women, widowed men and women, women from historically lower social caste groups, informally employed women, men and women from rural areas, and unemployed men. Future public health programs and policies can be tailored to meet the needs of these population-subgroups. Finally, from a clinical standpoint, the research underscored the importance of going beyond the clinical diagnosis of mental health disorders and opening up provider-patient conversations about the facets of daily psychosocial functioning, such as quality of sleep, perceived cognitive functioning, and interpersonal relationships.

APPENDIX 1

Angina:

1. During the last 12 months, have you experienced any pain or discomfort in your chest when you walk uphill or hurry? (Response options – Yes or No)
2. During the last 12 months, have you experienced any pain or discomfort when you walk at an ordinary pace on the level? (Response options – Yes or No)
3. What do you do if you get the pain or discomfort when you are walking? (Response options – 1. Stop or slow down; 2. Carry on after taking a pain-relieving medicine that dissolves in your mouth; 3. Carry on walking)
4. If you are standing still, what happens to it? (Response options – 1. Relieved; 2. Not Relieved)
5. Will you show me where you usually experience the pain or discomfort? (Respondent is shown a diagram of upper body)

Angina is defined as being present in participants who answer as follows: Q1 or Q2: yes; Q3: stop or slow down; Q4: relieved; Q5: either (a) sternum (upper or middle or lower) or (b) left anterior chest and left arm.

Arthritis:

1. During the last 12 months, have you experienced pain, aching, stiffness or swelling in or around the joints (like arms, hands, legs or feet) which were not related to an injury and lasted for more than a month? (Response options – 1. Yes; 2 – No)
2. During the last 12 months, have your experienced stiffness in the joint in the morning after getting up from bed, or after a long rest of the joint without movement? (Response options – 1. Yes; 2 – No)
3. How long did this stiffness last? (Response options – 1. About 30 minutes of less; 2. More than 30 minutes)
4. Did this stiffness go away after exercise or movement in the joint? (Response options – 1. Yes; 2. No)

Arthritis is defined as being present in participants if participants responded with ‘yes’ to Q1 and/or with “above 30 minutes of less” to Q2 and responded with ‘yes’ to question Q3 and ‘yes’ to question Q4, then the participant was categorized as having arthritis.

Asthma:

1. During the last 12 months, have you experienced attacks of wheezing or whistling breathing?
2. During the last 12 months, attack of wheezing that came on after you stopped exercising or some other physical activity?
3. During the last 12 months, a feeling of tightness in your chest?

4. During the last 12 months, have you woken up with a feeling of tightness in your chest in the morning or any other time?
5. During the last 12 months, have you had an attack of shortness of breath that came on without obvious cause when you were not exercising or doing some physical activity?

Asthma was defined as being present when a respondent reported yes question 1 and yes to at least one of the subsequent questions (2-5).

Chronic Lung Disorder:

1. During the last 12 months, have you experienced any shortness of breath at rest? (while awake)
2. During the last 12 months, have you experienced any coughing or wheezing for ten minutes or more at a time?
3. During the last 12 months, have you experienced any coughing up sputum or phlegm for most days of the month for at least 3 months?

Chronic Lung Disorder was defined as being present when a respondent reported yes to question 1 or yes to question 2 and 3 both.

REFERENCE

- Abraham, A., Silber, T. J., & Lyon, M. (1999). Psychosocial aspects of chronic illness in adolescence. *The Indian Journal of Pediatrics*, *66*(3), 447–453.
<https://doi.org/10.1007/BF02845539>
- Adams, M. L., Grandpre, J., Katz, D. L., & Shenson, D. (2020). Cognitive Impairment and Cardiovascular Disease: A Comparison of Risk Factors, Disability, Quality of Life, and Access to Health Care. *Public Health Reports*, *135*(1), 132–140.
<https://doi.org/10.1177/0033354919893030>
- Adler, N. E., Boyce, T., Chesney, M. A., Cohen, S., Folkman, S., Kahn, R. L., & Syme, S. L. (1994). Socioeconomic status and health: The challenge of the gradient. *American Psychologist*, *49*(1), 15.
- Ageta, H., Murayama, A., Migishima, R., Kida, S., Tsuchida, K., Yokoyama, M., & Inokuchi, K. (2008). Activin in the brain modulates anxiety-related behavior and adult neurogenesis. *PloS One*, *3*(4), e1869.
- Aggarwal, A., Chandran, S., & Misra, R. (2006). *Physical, psychosocial and economic impact of rheumatoid arthritis: A pilot study of patients seen at a tertiary care referral centre*.
<http://sgpgivdrc.nmcn.in/handle/1/5537>
- Aggarwal, A. N., Chaudhry, K., Chhabra, S. K., D Souza, G. A., Gupta, D., Jindal, S. K., Katiyar, S. K., Kumar, R., Shah, B., & Vijayan, V. K. (2006). Prevalence and risk factors for bronchial asthma in Indian adults: A multicentre study. *Indian Journal of Chest Diseases and Allied Sciences*, *48*(1), 13.

- Agrawal, J., Murthy, P., Philip, M., Mehrotra, S., Thennarasu, K., John, J. P., Girish, N., Thippeswamy, V., & Isaac, M. (2011). Socio-demographic Correlates of Subjective Well-being in Urban India. *Social Indicators Research, 101*(3), 419–434. <https://doi.org/10.1007/s11205-010-9669-5>
- Agrawal, S., Taylor, F. C., Moser, K., Narayanan, G., Kinra, S., Prabhakaran, D., Reddy, K. S., Davey Smith, G., & Ebrahim, S. (2015). Associations Between Sociodemographic Characteristics, Pre Migratory and Migratory Factors and Psychological Distress Just After Migration and After Resettlement: The Indian Migration Study. *Indian Journal of Social Psychiatry, 31*(1), 55–66. <https://doi.org/10.4103/0971-9962.162028>
- Ajrouch, K. J., Antonucci, T. C., & Janevic, M. R. (2001). Social Networks Among Blacks and Whites: The Interaction Between Race and Age. *The Journals of Gerontology: Series B, 56*(2), S112–S118. <https://doi.org/10.1093/geronb/56.2.S112>
- Ajrouch, K. J., Blandon, A. Y., & Antonucci, T. C. (2005). Social Networks Among Men and Women: The Effects of Age and Socioeconomic Status. *The Journals of Gerontology: Series B, 60*(6), S311–S317. <https://doi.org/10.1093/geronb/60.6.S311>
- Alderman, H., Behrman, J. R., Ross, D. R., & Sabot, R. (1996). Decomposing the Gender Gap in Cognitive Skills in a Poor Rural Economy. *The Journal of Human Resources, 31*(1), 229–254. JSTOR. <https://doi.org/10.2307/146049>
- Al-Fayez, G. A., & Ohaeri, J. U. (2011). Profile of subjective quality of life and its correlates in a nation-wide sample of high school students in an Arab setting using the WHOQOL-Bref. *BMC Psychiatry, 11*(1), 71–82. <https://doi.org/10.1186/1471-244X-11-71>

- Allotey, P., Davey, T., & Reidpath, D. D. (2014). NCDs in low and middle-income countries- assessing the capacity of health systems to respond to population needs. *BMC Public Health, 14*(2), S1.
- Almanzar, S., Shah, N., Vithalani, S., Shah, S., Squires, J., Appasani, R., & Katz, C. L. (2014). Knowledge of and Attitudes Toward Clinical Depression Among Health Providers in Gujarat, India. *Annals of Global Health, 80*(2), 89–95.
<https://doi.org/10.1016/j.aogh.2014.04.001>
- Alvaro, P. K., Roberts, R. M., & Harris, J. K. (2013). A Systematic Review Assessing Bidirectionality between Sleep Disturbances, Anxiety, and Depression. *Sleep, 36*(7), 1059–1068. <https://doi.org/10.5665/sleep.2810>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*. American Psychiatric Pub.
- Amri, S. B. (2012). Mental Health Help-Seeking Behaviors of Muslim Immigrants in the United States: Overcoming Social Stigma and Cultural Mistrust. *Journal of Muslim Mental Health, 7*(1). <http://dx.doi.org/10.3998/jmmh.10381607.0007.104>
- Anas, M., & Akhouri, D. (2013). Positive and negative affect in depressed and normal adults. *Journal of Indian Health Psychology, 8*(1), 61–68.
- Andrews, G., & Titov, N. (2007). Depression is very disabling. *The Lancet, 370*(9590), 808–809.
[https://doi.org/10.1016/S0140-6736\(07\)61393-2](https://doi.org/10.1016/S0140-6736(07)61393-2)
- Aneshensel, C. S. (2005a). Research in mental health: Social etiology versus social consequences. *Journal of Health and Social Behavior, 46*(3), 221–228.

- Aneshensel, C. S. (2005b). Research in Mental Health: Social Etiology versus Social Consequences. *Journal of Health and Social Behavior*, 46(3), 221–228.
<https://doi.org/10.1177/002214650504600301>
- Aneshensel, C. S., & Sucoff, C. A. (1996). The neighborhood context of adolescent mental health. *Journal of Health and Social Behavior*, 293–310.
- Arango, A., Opperman, K. J., Gipson, P. Y., & King, C. A. (2016). Suicidal ideation and suicide attempts among youth who report bully victimization, bully perpetration and/or low social connectedness. *Journal of Adolescence*, 51, 19–29.
<https://doi.org/10.1016/j.adolescence.2016.05.003>
- Arber, S., Bote, M., & Meadows, R. (2009). Gender and socio-economic patterning of self-reported sleep problems in Britain. *Social Science & Medicine*, 68(2), 281–289.
<https://doi.org/10.1016/j.socscimed.2008.10.016>
- Arber, S., & Cooper, H. (1999). Gender differences in health in later life: The new paradox? *Social Science & Medicine*, 48(1), 61–76.
- Archer, K. J., & Lemeshow, S. (2006). Goodness-of-fit Test for a Logistic Regression Model Fitted using Survey Sample Data. *The Stata Journal*, 6(1), 97–105.
<https://doi.org/10.1177/1536867X0600600106>
- Arokiasamy, P., Uttamacharya, U., Jain, K., Biritwum, R. B., Yawson, A. E., Wu, F., Guo, Y., Maximova, T., Espinoza, B. M., Salinas Rodríguez, A., Afshar, S., Pati, S., Ice, G., Banerjee, S., Liebert, M. A., Snodgrass, J. J., Naidoo, N., Chatterji, S., & Kowal, P. (2015). The impact of multimorbidity on adult physical and mental health in low- and

- middle-income countries: What does the study on global ageing and adult health (SAGE) reveal? *BMC Medicine*, 13. <https://doi.org/10.1186/s12916-015-0402-8>
- Assari, S. (2017). Unequal Gain of Equal Resources across Racial Groups. *International Journal of Health Policy and Management*, 7(1), 1–9. <https://doi.org/10.15171/ijhpm.2017.90>
- Assari, S. (2018). The Benefits of Higher Income in Protecting against Chronic Medical Conditions Are Smaller for African Americans than Whites. *Healthcare (Basel, Switzerland)*, 6(1). <https://doi.org/10.3390/healthcare6010002>
- Badley, E. M. (2008). Enhancing the conceptual clarity of the activity and participation components of the International Classification of Functioning, Disability, and Health. *Social Science & Medicine*, 66(11), 2335–2345. <https://doi.org/10.1016/j.socscimed.2008.01.026>
- Baglioni, C., Battagliese, G., Feige, B., Spiegelhalder, K., Nissen, C., Voderholzer, U., Lombardo, C., & Riemann, D. (2011). Insomnia as a predictor of depression: A meta-analytic evaluation of longitudinal epidemiological studies. *Journal of Affective Disorders*, 135(1), 10–19. <https://doi.org/10.1016/j.jad.2011.01.011>
- Baker, K. S., Gibson, S. J., Georgiou-Karistianis, N., & Giummarra, M. J. (2018). Relationship between self-reported cognitive difficulties, objective neuropsychological test performance and psychological distress in chronic pain. *European Journal of Pain*, 22(3), 601–613. <https://doi.org/10.1002/ejp.1151>
- Bansal, P., Chaudhary, A., Soni, R. K., Sharma, S., Gupta, V. K., & Kaushal, P. (2015). Depression and anxiety among middle-aged women: A community-based study. *Journal*

- of Family Medicine and Primary Care*, 4(4), 576–581. <https://doi.org/10.4103/2249-4863.174297>
- Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2007). Threat-related attentional bias in anxious and nonanxious individuals: A meta-analytic study. *Psychological Bulletin*, 133(1), 1–24. <https://doi.org/10.1037/0033-2909.133.1.1>
- Barnett, K., Mercer, S. W., Norbury, M., Watt, G., Wyke, S., & Guthrie, B. (2012). Epidemiology of multimorbidity and implications for health care, research, and medical education: A cross-sectional study. *The Lancet*, 380(9836), 37–43. [https://doi.org/10.1016/S0140-6736\(12\)60240-2](https://doi.org/10.1016/S0140-6736(12)60240-2)
- Barnett, P. A., & Gotlib, I. H. (1988). Psychosocial functioning and depression: Distinguishing among antecedents, concomitants, and consequences. *Psychological Bulletin*, 104(1), 97–126. <https://doi.org/10.1037//0033-2909.104.1.97>
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497.
- Bayliss, E. A., Steiner, J. F., Fernald, D. H., Crane, L. A., & Main, D. S. (2003). Descriptions of Barriers to Self-Care by Persons with Comorbid Chronic Diseases. *The Annals of Family Medicine*, 1(1), 15–21. <https://doi.org/10.1370/afm.4>
- BBC News. (2018, April 2). Eight dead in massive India caste protests. *BBC News*. <https://www.bbc.com/news/world-asia-india-43616242>
- Beck, A. T. (2002). Cognitive models of depression. In *Clinical advances in cognitive psychotherapy: Theory and Application* (pp. 29–61). Springer Publishing Co.

- Bedi, G. S., Gupta, N., Handa, R., Pal, H., & Pandey, R. M. (2005). Quality of life in Indian patients with rheumatoid arthritis. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 14(8), 1953–1958.
<https://doi.org/10.1007/s11136-005-4540-x>
- Behera, D., Kaur, S., Gupta, D., & Verma, S. K. (2006). Emotional aspects of bronchial asthma in Indian patients: Evaluation of an interventional strategy. *Lung India*, 23(1), 3.
- Belle, D. (1987). *Gender differences in the social moderators of stress* In R. C. Barnett, L. Biener, & G. Baruch (Eds.), *Gender and stress* (pp 257-277). New York: Free Press.
- Berkman, L. F., & Glass, T. (2000). Social integration, social networks, social support, and health. *Social Epidemiology*, 1, 137–173.
- Bhojani, U., Thriveni, B. S., Devadasan, R., Munegowda, C. M., Devadasan, N., Kolsteren, P., & Criel, B. (2012). Out-of-pocket healthcare payments on chronic conditions impoverish urban poor in Bangalore, India. *BMC Public Health*, 12(1), 990.
- Bird, C. E., & Rieker, P. P. (1999). Gender matters: An integrated model for understanding men's and women's health. *Social Science & Medicine*, 48(6), 745–755.
[https://doi.org/10.1016/S0277-9536\(98\)00402-X](https://doi.org/10.1016/S0277-9536(98)00402-X)
- Bisegger, C., Cloetta, B., von Bisegger, U., Abel, T., Ravens-Sieberer, U., & the European Kidscreen group. (2005). Health-related quality of life: Gender differences in childhood and adolescence. *Sozial- Und Präventivmedizin*, 50(5), 281–291.
<https://doi.org/10.1007/s00038-005-4094-2>

- Bishop, M. (2005). Quality of life and psychosocial adaptation to chronic illness and disability: Preliminary analysis of a conceptual and theoretical synthesis. *Rehabilitation Counseling Bulletin, 48*(4), 219–231.
- Blount, A., Schoenbaum, M., Kathol, R., Rollman, B. L., Thomas, M., O’Donohue, W., & Peek, C. J. (2007). The economics of behavioral health services in medical settings: A summary of the evidence. *Professional Psychology: Research and Practice, 38*(3), 290–297.
<https://doi.org/10.1037/0735-7028.38.3.290>
- Bør, T., Øverland, S., Lundervold, A. J., & Hysing, M. (2012). Socioeconomic status and children’s mental health: Results from the Bergen Child Study. *Social Psychiatry and Psychiatric Epidemiology, 47*(10), 1557–1566. <https://doi.org/10.1007/s00127-011-0462-9>
- Bolck, A., Croon, M., & Hageaars, J. (2004). Estimating Latent Structure Models with Categorical Variables: One-Step Versus Three-Step Estimators. *Political Analysis, 12*(1), 3–27.
- Bolton, P., Bass, J., Neugebauer, R., Verdelli, H., Clougherty, K. F., Wickramaratne, P., Speelman, L., Ndogoni, L., & Weissman, M. (2003). Group interpersonal psychotherapy for depression in rural Uganda: A randomized controlled trial. *Jama, 289*(23), 3117–3124.
- Bor, J. S. (2015). *Among the elderly, many mental illnesses go undiagnosed.*
- Bora, J. K., & Saikia, N. (2015). Gender Differentials in Self-Rated Health and Self-Reported Disability among Adults in India. *PLOS ONE, 10*(11), e0141953.
<https://doi.org/10.1371/journal.pone.0141953>

- Borooah, V. (2010). *Inequality in health outcomes in India: The role of caste and religion*.
- Borrell-Carrió, F., Suchman, A. L., & Epstein, R. M. (2004). The Biopsychosocial Model 25 Years Later: Principles, Practice, and Scientific Inquiry. *The Annals of Family Medicine*, 2(6), 576–582. <https://doi.org/10.1370/afm.245>
- Boutin-Foster, C., & Charlson, M. E. (2007). Do Recent Life Events And Social Support Explain Gender Differences in Depressive Symptoms in Patients Who Had Percutaneous Transluminal Coronary Angioplasty? *Journal of Women's Health*, 16(1), 114–123. <https://doi.org/10.1089/jwh.2006.M075>
- Boyd, C. M., & Fortin, M. (2010). Future of Multimorbidity Research: How Should Understanding of Multimorbidity Inform Health System Design? *Public Health Reviews*, 32(2), 451–474. <https://doi.org/10.1007/BF03391611>
- Boyko, E. J., Seelig, A. D., Jacobson, I. G., Hooper, T. I., Smith, B., Smith, T. C., Crum-Cianflone, N. F., & Team, M. C. S. (2013). Sleep characteristics, mental health, and diabetes risk: A prospective study of US military service members in the Millennium Cohort Study. *Diabetes Care*, 36(10), 3154–3161.
- Bratzke, L. C., Carlson, B. A., Moon, C., Brown, R. L., Koscik, R. L., & Johnson, S. C. (2018). Multiple chronic conditions: Implications for cognition—Findings from the Wisconsin Registry for Alzheimer's Prevention (WRAP). *Applied Nursing Research*, 42, 56–61.
- Breslau, N., Roth, T., Rosenthal, L., & Andreski, P. (1996). Sleep disturbance and psychiatric disorders: A longitudinal epidemiological study of young Adults. *Biological Psychiatry*, 39(6), 411–418. [https://doi.org/10.1016/0006-3223\(95\)00188-3](https://doi.org/10.1016/0006-3223(95)00188-3)

- Brinda, E. M., Rajkumar, A. P., Attermann, J., Gerdtham, U. G., Enemark, U., & Jacob, K. S. (2016). Health, Social, and Economic Variables Associated with Depression Among Older People in Low and Middle Income Countries: World Health Organization Study on Global AGEing and Adult Health. *The American Journal of Geriatric Psychiatry*, *24*(12), 1196–1208. <https://doi.org/10.1016/j.jagp.2016.07.016>
- Brinkerhoff, M. B., Fredell, K. a., & Frideres, J. S. (1997). Basic Minimum Needs, Quality of Life and Selected Correlates: Explorations in Villages in Northern India. *Social Indicators Research*, *42*(3), 245–281. <https://doi.org/10.1023/A:1006834830518>
- Brookes, R. L., Hollocks, M. J., Khan, U., Morris, R. G., & Markus, H. S. (2015). The Brief Memory and Executive Test (BMET) for detecting vascular cognitive impairment in small vessel disease: A validation study. *BMC Medicine*, *13*(1), 51. <https://doi.org/10.1186/s12916-015-0290-y>
- Burns, R. A., & Machin, M. A. (2013). Psychological wellbeing and the diathesis-stress hypothesis model: The role of psychological functioning and quality of relations in promoting subjective well-being in a life events study. *Personality and Individual Differences*, *54*(3), 321–326. <https://doi.org/10.1016/j.paid.2012.09.017>
- Burton, E., Stice, E., Bearman, S. K., & Rohde, P. (2007). Experimental test of the affect-regulation theory of bulimic symptoms and substance use: A randomized trial. *International Journal of Eating Disorders*, *40*(1), 27–36.
- Buysse, D. J., Angst, J., Gamma, A., Ajdacic, V., Eich, D., & Rössler, W. (2008). Prevalence, course, and comorbidity of insomnia and depression in young adults. *Sleep*, *31*(4), 473–480. <https://doi.org/10.1093/sleep/31.4.473>

- Byrd, D. R., & McKinney, K. J. (2012). Individual, interpersonal, and institutional level factors associated with the mental health of college students. *Journal of American College Health, 60*(3), 185–193.
- Cagney, K. A., & Lauderdale, D. S. (2002). Education, wealth, and cognitive function in later life. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 57*(2), P163–P172.
- Caldwell, B. A., & Redeker, N. S. (2009). Sleep patterns and psychological distress in women living in an inner city. *Research in Nursing & Health, 32*(2), 177–190.
<https://doi.org/10.1002/nur.20308>
- Calhoun, D. A., & Harding, S. M. (2010). Sleep and hypertension. *Chest, 138*(2), 434–443.
- Calleja, J. L., Bixquert, M., Maldonado, J., & Group, S. S. (2007). Impact of nocturnal heartburn on quality of life, sleep, and productivity: The SINERGE study. *Digestive Diseases and Sciences, 52*(10), 2858–2865.
- Cappuccio, F. P., Taggart, F. M., Kandala, N.-B., Currie, A., Peile, E., Stranges, S., & Miller, M. A. (2008). Meta-analysis of short sleep duration and obesity in children and adults. *Sleep, 31*(5), 619–626.
- Carpiano, R. M., Link, B. G., & Phelan, J. C. (2008). Social inequality and health: Future directions for the fundamental cause explanation. *Social Class: How Does It Work, 232–263*.
- Carr, M., & Chen, M. (2004). Globalization, social exclusion and gender. *International Labour Review, 143*(1–2), 129–160. <https://doi.org/10.1111/j.1564-913X.2004.tb00548.x>

- Caruso, R., GiuliaNanni, M., Riba, M. B., Sabato, S., & Grassi, L. (2017). Depressive Spectrum Disorders in Cancer: Diagnostic Issues and Intervention. A Critical Review. *Current Psychiatry Reports*, 19(6), 33. <https://doi.org/10.1007/s11920-017-0785-7>
- Cepukiene, V., & Pakrosnis, R. (2011). The outcome of Solution-Focused Brief Therapy among foster care adolescents: The changes of behavior and perceived somatic and cognitive difficulties. *Children and Youth Services Review*, 33(6), 791–797.
- Chaix, B. (2009). Geographic Life Environments and Coronary Heart Disease: A Literature Review, Theoretical Contributions, Methodological Updates, and a Research Agenda. *Annual Review of Public Health*, 30(1), 81–105.
<https://doi.org/10.1146/annurev.publhealth.031308.100158>
- Chamelian, L., & Feinstein, A. (2006). The effect of major depression on subjective and objective cognitive deficits in mild to moderate traumatic brain injury. *The Journal of Neuropsychiatry and Clinical Neurosciences*, 18(1), 33–38.
- Chandrasekhar, S., & Sharma, A. (2015). Urbanization and Spatial Patterns of Internal Migration in India. *Spatial Demography*, 3(2), 63–89. <https://doi.org/10.1007/s40980-015-0006-0>
- Charlson, F. J., Baxter, A. J., Cheng, H. G., Shidhaye, R., & Whiteford, H. A. (2016). The burden of mental, neurological, and substance use disorders in China and India: A systematic analysis of community representative epidemiological studies. *The Lancet*, 388(10042), 376–389. [https://doi.org/10.1016/S0140-6736\(16\)30590-6](https://doi.org/10.1016/S0140-6736(16)30590-6)
- Chatterjee, S., Chowdhary, N., Pednekar, S., Cohen, A., Andrew, G., ANDREW, G., ARAYA, R., SIMON, G., KING, M., & TELLES, S. (2008). Integrating evidence-based treatments

- for common mental disorders in routine primary care: Feasibility and acceptability of the MANAS intervention in Goa, India. *World Psychiatry*, 7(1), 39.
- Chen, M. A., & Dreze, J. (1998). *Widowhood and well-being in rural north India*.
- Cherepanov, D., Palta, M., Fryback, D. G., & Robert, S. A. (2010). Gender differences in health-related quality-of-life are partly explained by sociodemographic and socioeconomic variation between adult men and women in the US: Evidence from four US nationally representative data sets. *Quality of Life Research*, 19(8), 1115–1124.
<https://doi.org/10.1007/s11136-010-9673-x>
- Chiles, J. A., Lambert, M. J., & Hatch, A. L. (1999). The impact of psychological interventions on medical cost offset: A meta-analytic review. *Clinical Psychology: Science and Practice*, 6(2), 204–220. <https://doi.org/10.1093/clipsy/6.2.204>
- Chiu, J., Grobbelaar, J., Sikkema, K., Vandormoel, A., Bomela, N., & Kershaw, T. (2008). HIV-related stigma and social capital in South Africa. *AIDS Education & Prevention*, 20(6), 519–530.
- Chopra, A., Saluja, M., Patil, J., & Tandale, H. S. (2002). Pain and disability, perceptions and beliefs of a rural Indian population: A WHO-ILAR COPCORD study. WHO-International League of Associations for Rheumatology. Community Oriented Program for Control of Rheumatic Diseases. *The Journal of Rheumatology*, 29(3), 614–621.
- Chowgule, R. V., Shetye, V. M., Parmar, J. R., Bhosale, A. M., Khandagale, M. R., Phalnitkar, S. V., & Gupta, P. C. (1998). Prevalence of respiratory symptoms, bronchial hyperreactivity, and asthma in a megacity: Results of the European Community

- Respiratory Health Survey in Mumbai (Bombay). *American Journal of Respiratory and Critical Care Medicine*, 158(2), 547–554.
- Cockerham, W. C. (2013). Bourdieu and an Update of Health Lifestyle Theory. In W. C. Cockerham (Ed.), *Medical Sociology on the Move* (pp. 127–154). Springer Netherlands.
https://doi.org/10.1007/978-94-007-6193-3_7
- Cohen, J. E. (2003). Human population: The next half century. *Science*, 302(5648), 1172–1175.
- Cohen, S. (2004). Social Relationships and Health. *American Psychologist*, 59(8), 676–684.
<http://dx.doi.org/10.1037/0003-066X.59.8.676>
- Collins, P. Y., Insel, T. R., Chockalingam, A., Daar, A., & Maddox, Y. T. (2013). Grand challenges in global mental health: Integration in research, policy, and practice. *PLoS Medicine*, 10(4), e1001434.
- Conti, C., Di Francesco, G., Fontanella, L., Carrozzino, D., Patierno, C., Vitacolonna, E., & Fulcheri, M. (2017). Negative affectivity predicts lower quality of life and metabolic control in type 2 diabetes patients: A structural equation modeling approach. *Frontiers in Psychology*, 8, 831.
- Cook, D. G., Shaper, A. G., & MacFarlane, P. W. (1989). Using the WHO (Rose) angina questionnaire in cardiovascular epidemiology. *International Journal of Epidemiology*, 18(3), 607–613.
- Cornwell, B., Laumann, E. O., & Schumm, L. P. (2008). The Social Connectedness of Older Adults: A National Profile. *American Sociological Review*, 73(2), 185–203.
<https://doi.org/10.1177/000312240807300201>

- Corsi, D. J., & Subramanian, S. V. (2019). Socioeconomic Gradients and Distribution of Diabetes, Hypertension, and Obesity in India. *JAMA Network Open*, 2(4), e190411–e190411. <https://doi.org/10.1001/jamanetworkopen.2019.0411>
- Corsi, D. J., Subramanian, S. V., Lear, S. A., Teo, K. K., Boyle, M. H., Raju, P. K., Joshi, R., Neal, B., & Chow, C. K. (2014). Tobacco use, smoking quit rates, and socioeconomic patterning among men and women: A cross-sectional survey in rural Andhra Pradesh, India. *European Journal of Preventive Cardiology*, 21(10), 1308–1318. <https://doi.org/10.1177/2047487313491356>
- Courtens, A. M., Stevens, F. C. J., Crebolder, H., & Philipsen, H. (1996). Longitudinal study on quality of life and social support in cancer patients. *Cancer Nursing*, 19(3), 162–169.
- Cowan, C. K., Pierson, J. M., & Leggat, S. G. (2020). Psychosocial aspects of the lived experience of multiple sclerosis: Personal perspectives. *Disability and Rehabilitation*, 42(3), 349–359.
- Cowling, K., Dandona, R., & Dandona, L. (2014). Social determinants of health in India: Progress and inequities across states. *International Journal for Equity in Health*, 13, 88. <https://doi.org/10.1186/s12939-014-0088-0>
- Craig, T. J., McCann, J. L., Gurevich, F., & Davies, M. J. (2004). The correlation between allergic rhinitis and sleep disturbance. *Journal of Allergy and Clinical Immunology*, 114(5), S139–S145.
- Cramer, V., Torgersen, S., & Kringlen, E. (2006). Personality disorders and quality of life. A population study. *Comprehensive Psychiatry*, 47(3), 178–184.

- Cramm, J. M., Bornscheuer, L., Selivanova, A., & Lee, J. (2015). The Health of India's Elderly Population: A Comparative Assessment Using Subjective and Objective Health Outcomes. *Journal of Population Ageing*, 8(4), 245–259. <https://doi.org/10.1007/s12062-015-9122-2>
- Craske, M. G., Meuret, A. E., Ritz, T., Treanor, M., Dour, H., & Rosenfield, D. (2019). Positive affect treatment for depression and anxiety: A randomized clinical trial for a core feature of anhedonia. *Journal of Consulting and Clinical Psychology*, 87(5), 457.
- Crombez, G., Eccleston, C., Van den Broeck, A., Goubert, L., & Van Houdenhove, B. (2004). Hypervigilance to Pain in Fibromyalgia: The Mediating Role of Pain Intensity and Catastrophic Thinking About Pain. *The Clinical Journal of Pain*, 20(2), 98–102.
- Crookston, B. T., Forste, R., McClellan, C., Georgiadis, A., & Heaton, T. B. (2014). Factors associated with cognitive achievement in late childhood and adolescence: The Young Lives cohort study of children in Ethiopia, India, Peru, and Vietnam. *BMC Pediatrics*, 14(1), 253. <https://doi.org/10.1186/1471-2431-14-253>
- Crotty, M., McFarlane, A. C., Brooks, P. M., Hopper, J. L., Bieri, D., & Taylor, S. J. (1994). The psychosocial and clinical status of younger women with early rheumatoid arthritis: A longitudinal study with frequent measures. *Rheumatology*, 33(8), 754–760.
- Crowson, C. S., Liao, K. P., Davis III, J. M., Solomon, D. H., Matteson, E. L., Knutson, K. L., Hlatky, M. A., & Gabriel, S. E. (2013). Rheumatoid arthritis and cardiovascular disease. *American Heart Journal*, 166(4), 622–628.

- Cuijpers, P., Donker, T., Weissman, M. M., Ravitz, P., & Cristea, I. A. (2016). Interpersonal psychotherapy for mental health problems: A comprehensive meta-analysis. *American Journal of Psychiatry*, *173*(7), 680–687.
- Cummins, R. A. (2005). On the Trail of the Gold Standard for Subjective Well-Being. In A. C. Michalos (Ed.), *Citation Classics from Social Indicators Research: The Most Cited Articles Edited and Introduced by Alex C. Michalos* (pp. 537–558). Springer Netherlands. https://doi.org/10.1007/1-4020-3742-2_18
- Dahl, R. E. (1996). The impact of inadequate sleep on children's daytime cognitive function. *Seminars in Pediatric Neurology*, *3*(1), 44–50.
- Dandona, L., Dandona, R., Kumar, G. A., Shukla, D. K., Paul, V. K., Balakrishnan, K., Prabhakaran, D., Tandon, N., Salvi, S., & Dash, A. P. (2017). Nations within a nation: Variations in epidemiological transition across the states of India, 1990–2016 in the Global Burden of Disease Study. *The Lancet*, *390*(10111), 2437–2460.
- Das, J., Das, R. K., & Das, V. (2012). The mental health gender-gap in urban India: Patterns and narratives. *Social Science & Medicine*, *75*(9), 1660–1672. <https://doi.org/10.1016/j.socscimed.2012.06.018>
- de Ridder, D., Geenen, R., Kuijjer, R., & van Middendorp, H. (2008). Psychological adjustment to chronic disease. *The Lancet*, *372*(9634), 246–255. [https://doi.org/10.1016/S0140-6736\(08\)61078-8](https://doi.org/10.1016/S0140-6736(08)61078-8)
- Denollet, J. (2013). Negative Affectivity. In M. D. Gellman & J. R. Turner (Eds.), *Encyclopedia of Behavioral Medicine* (pp. 1304–1305). Springer. https://doi.org/10.1007/978-1-4419-1005-9_1588

- Denollet, J., Pedersen, S. S., Vrints, C. J., & Conraads, V. M. (2013). Predictive value of social inhibition and negative affectivity for cardiovascular events and mortality in patients with coronary artery disease: The type D personality construct. *Psychosomatic Medicine*, 75(9), 873–881.
- Deo, S. S., Chogle, A. R., Mistry, K. J., Shetty, R. R., & Nadkar, U. L. (2012). Increased prevalence of subclinical atherosclerosis in rheumatoid arthritis patients of Indian descent. *Experimental and Clinical Cardiology*, 17(1), 20–25.
- Desai, S., & Temsah, G. (2014). Muslim and Hindu Women's Public and Private Behaviors: Gender, Family, and Communalized Politics in India. *Demography*, 51(6), 2307–2332. <https://doi.org/10.1007/s13524-014-0319-4>
- Deshmukh, P. R., Dongre, A. R., Rajendran, K. P., & Kumar, S. (2015). Role of social, cultural and economic capitals in perceived quality of life among old age people in Kerala, India. *Indian Journal of Palliative Care*, 21(1), 39.
- DeVylder, J. E., Kelleher, I., Lalane, M., Oh, H., Link, B. G., & Koyanagi, A. (2018). Association of Urbanicity With Psychosis in Low- and Middle-Income Countries. *JAMA Psychiatry*, 75(7), 678–686. <https://doi.org/10.1001/jamapsychiatry.2018.0577>
- Diamond, E. L. (1982). The role of anger and hostility in essential hypertension and coronary heart disease. *Psychological Bulletin*, 92(2), 410.
- Diener, E. (2009). Subjective well-being. In *The science of well-being* (pp. 11–58). Springer.
- Dorland, W. A. N. (2019). *Dorland's illustrated medical dictionary*. (33rd edition.). Elsevier Saunders; WorldCat.org.
- Drèze, J., & Sen, A. (2002). *India: Development and Participation*. Oxford University Press.

- Durai, P. C. T., & Nair, D. G. (2015). Acne vulgaris and quality of life among young adults in South India. *Indian Journal of Dermatology*, *60*(1), 33.
- Dutt, N., Janmeja, A. K., Mohapatra, P. R., & Singh, A. K. (2013). Quality of life impairment in patients of obstructive sleep apnea and its relation with the severity of disease. *Lung India: Official Organ of Indian Chest Society*, *30*(4), 289.
- Dzaja, A., Arber, S., Hislop, J., Kerkhofs, M., Kopp, C., Pollmächer, T., Polo-Kantola, P., Skene, D. J., Stenuit, P., & Tobler, I. (2005). Women's sleep in health and disease. *Journal of Psychiatric Research*, *39*(1), 55–76.
- Eaker, E. D., Haynes, S. G., & Feinleib, M. (1983). Spouse behavior and coronary heart disease in men: Prospective results from the Framingham Heart Study: II. Modification of risk in Type A husbands according to the social and psychological status of their wives. *American Journal of Epidemiology*, *118*(1), 23–41.
- Ebrahim, S., Pearce, N., Smeeth, L., Casas, J. P., Jaffar, S., & Piot, P. (2013). Tackling non-communicable diseases in low- and middle-income countries: Is the evidence from high-income countries all we need? *PLoS Medicine*, *10*(1), e1001377.
<https://doi.org/10.1371/journal.pmed.1001377>
- Ell, K., Nishimoto, R., Mediansky, L., Mantell, J., & Hamovitch, M. (1992). Social relations, social support and survival among patients with cancer. *Journal of Psychosomatic Research*, *36*(6), 531–541.
- Engel, G. L. (2012). The Need for a New Medical Model: A Challenge for Biomedicine. *Psychodynamic Psychiatry*, *40*(3), 377–396. <https://doi.org/10.1521/pdps.2012.40.3.377>

- Engelgau, M. M., Karan, A., & Mahal, A. (2012). The economic impact of non-communicable diseases on households in India. *Globalization and Health*, 8(1), 9.
- Farmer, M. E., Kittner, S. J., Rae, D. S., Bartko, J. J., & Regier, D. A. (1995). Education and change in cognitive function: The epidemiologic catchment area study. *Annals of Epidemiology*, 5(1), 1–7.
- Feizi, A., Aliyari, R., & Roohafza, H. (2012). *Association of Perceived Stress with Stressful Life Events, Lifestyle and Sociodemographic Factors: A Large-Scale Community-Based Study Using Logistic Quantile Regression* [Research Article]. *Computational and Mathematical Methods in Medicine*; Hindawi. <https://doi.org/10.1155/2012/151865>
- Fichter, M. M., Kohlboeck, G., Quadflieg, N., Wyszkon, A., & Esser, G. (2009). From childhood to adult age: 18-year longitudinal results and prediction of the course of mental disorders in the community. *Social Psychiatry and Psychiatric Epidemiology*, 44(9), 792–803. <https://doi.org/10.1007/s00127-009-0501-y>
- Finger, R. P., Kupitz, D. G., Holz, F. G., Balasubramaniam, B., Ramani, R. V., Lamoureux, E. L., & Fenwick, E. (2011). The impact of the severity of vision loss on vision-related quality of life in India: An evaluation of the IND-VFQ-33. *Investigative Ophthalmology & Visual Science*, 52(9), 6081–6088.
- Fischbacher, C. M., Bhopal, R., Unwin, N., White, M., & Alberti, K. (2001). The performance of the Rose angina questionnaire in South Asian and European origin populations: A comparative study in Newcastle, UK. *International Journal of Epidemiology*, 30(5), 1009–1016. <https://doi.org/10.1093/ije/30.5.1009>

- Fletcher, A. E., Ellwein, L. B., Selvaraj, S., Vijaykumar, V., Rahmathullah, R., & Thulasiraj, R. D. (1997). Measurements of vision function and quality of life in patients with cataracts in southern India: Report of instrument development. *Archives of Ophthalmology*, *115*(6), 767–774.
- Ford, D. E., & Kamerow, D. B. (1989). Epidemiologic Study of Sleep Disturbances and Psychiatric Disorders: An Opportunity for Prevention? *JAMA*, *262*(11), 1479–1484.
<https://doi.org/10.1001/jama.1989.03430110069030>
- Fortin, M., Bravo, G., Hudon, C., Vanasse, A., & Lapointe, L. (2005). Prevalence of multimorbidity among adults seen in family practice. *Annals of Family Medicine*, *3*(3), 223–228. <https://doi.org/10.1370/afm.272>
- Fortin, M., Lapointe, L., Hudon, C., Vanasse, A., Ntetu, A. L., & Maltais, D. (2004). Multimorbidity and quality of life in primary care: A systematic review. *Health and Quality of Life Outcomes*, *2*(1), 51.
- Fortunato, V. J., & Harsh, J. (2006). Stress and sleep quality: The moderating role of negative affectivity. *Personality and Individual Differences*, *41*(5), 825–836.
- Fredrickson, B. L., & Losada, M. F. (2005). Positive Affect and the Complex Dynamics of Human Flourishing. *The American Psychologist*, *60*(7), 678–686.
<https://doi.org/10.1037/0003-066X.60.7.678>
- Freeman, A. J., Youngstrom, E. A., Michalak, E., Siegel, R., Meyers, O. I., & Findling, R. L. (2009). Quality of life in pediatric bipolar disorder. *Pediatrics*, *123*(3), e446–e452.
- Freeman, D., Sheaves, B., Goodwin, G. M., Yu, L.-M., Nickless, A., Harrison, P. J., Emsley, R., Luik, A. I., Foster, R. G., Wadekar, V., Hinds, C., Gumley, A., Jones, R., Lightman, S.,

- Jones, S., Bentall, R., Kinderman, P., Rowse, G., Brugha, T., ... Espie, C. A. (2017a). The effects of improving sleep on mental health (OASIS): A randomised controlled trial with mediation analysis. *The Lancet Psychiatry*, 4(10), 749–758.
[https://doi.org/10.1016/S2215-0366\(17\)30328-0](https://doi.org/10.1016/S2215-0366(17)30328-0)
- Freeman, D., Sheaves, B., Goodwin, G. M., Yu, L.-M., Nickless, A., Harrison, P. J., Emsley, R., Luik, A. I., Foster, R. G., Wadekar, V., Hinds, C., Gumley, A., Jones, R., Lightman, S., Jones, S., Bentall, R., Kinderman, P., Rowse, G., Brugha, T., ... Espie, C. A. (2017b). The effects of improving sleep on mental health (OASIS): A randomised controlled trial with mediation analysis. *The Lancet Psychiatry*, 4(10), 749–758.
[https://doi.org/10.1016/S2215-0366\(17\)30328-0](https://doi.org/10.1016/S2215-0366(17)30328-0)
- Freese, J., & Lutfey, K. (2011). Fundamental causality: Challenges of an animating concept for medical sociology. In *Handbook of the sociology of health, illness, and healing* (pp. 67–81). Springer.
- Friese, R. S. (2008). Sleep and recovery from critical illness and injury: A review of theory, current practice, and future directions. *Critical Care Medicine*, 36(3), 697–705.
- Froh, J. J., Fives, C. J., Fuller, J. R., Jacofsky, M. D., Terjesen, M. D., & Yurkewicz, C. (2007). Interpersonal relationships and irrationality as predictors of life satisfaction. *The Journal of Positive Psychology*, 2(1), 29–39. <https://doi.org/10.1080/17439760601069051>
- Fryer, D., & Warr, P. (1984). Unemployment and cognitive difficulties. *British Journal of Clinical Psychology*, 23(1), 67–68. <https://doi.org/10.1111/j.2044-8260.1984.tb00629.x>

- Fujita, F., Diener, E., & Sandvik, E. (1991). Gender differences in negative affect and well-being: The case for emotional intensity. *Journal of Personality and Social Psychology*, *61*(3), 427–434. <https://doi.org/10.1037//0022-3514.61.3.427>
- Fulop, G., Strain, J. J., Fahs, M. C., Hammer, J. S., & Lyons, J. S. (1989). Medical disorders associated with psychiatric comorbidity and prolonged hospital stay. *Psychiatric Services*, *40*(1), 80–82.
- Gabbard, G. O., Lazar, S. G., Hornberger, J., & Spiegel, D. (1997). The economic impact of psychotherapy: A review. *American Journal of Psychiatry*, *154*(2), 147–155.
- Gallo, L. C., Bogart, L. M., Vranceanu, A.-M., & Matthews, K. A. (2005). Socioeconomic status, resources, psychological experiences, and emotional responses: A test of the reserve capacity model. *Journal of Personality and Social Psychology*, *88*(2), 386–399.
- Ganguli, H. C. (2000). EPIDEMIOLOGICAL FINDINGS ON PREVALENCE OF MENTAL DISORDERS IN INDIA. *Indian Journal of Psychiatry*, *42*(1), 14–20.
- Ganguli, M., Dube, S., Johnston, J. M., Pandav, R., Chandra, V., & Dodge, H. H. (1999). Depressive symptoms, cognitive impairment and functional impairment in a rural elderly population in India: A Hindi version of the geriatric depression scale (GDS-H). *International Journal of Geriatric Psychiatry*, *14*(10), 807–820. [https://doi.org/10.1002/\(SICI\)1099-1166\(199910\)14:10<807::AID-GPS31>3.0.CO;2-#](https://doi.org/10.1002/(SICI)1099-1166(199910)14:10<807::AID-GPS31>3.0.CO;2-#)
- GBD 2013 DALYs and HALE Collaborators, Murray, C. J. L., Barber, R. M., Foreman, K. J., Abbasoglu Ozgoren, A., Abd-Allah, F., Abera, S. F., Aboyans, V., Abraham, J. P., Abubakar, I., Abu-Raddad, L. J., Abu-Rmeileh, N. M., Achoki, T., Ackerman, I. N., Ademi, Z., Adou, A. K., Adsuar, J. C., Afshin, A., Agardh, E. E., ... Vos, T. (2015).

- Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990-2013: Quantifying the epidemiological transition. *Lancet (London, England)*, 386(10009), 2145–2191.
[https://doi.org/10.1016/S0140-6736\(15\)61340-X](https://doi.org/10.1016/S0140-6736(15)61340-X)
- Gellis, L. A., Lichstein, K. L., Scarinci, I. C., Durrence, H. H., Taylor, D. J., Bush, A. J., & Riedel, B. W. (2005). Socioeconomic status and insomnia. *Journal of Abnormal Psychology*, 114(1), 111.
- George, E., & Engel, L. (1980). The clinical application of the biopsychosocial model. *American Journal of Psychiatry*, 137(5), 535–544.
- Ghosh, S. N., & Sharma, S. P. (2006). Trait anxiety and trait anger: A comparison of peptic ulcer and bronchial asthma patients. *Journal of the Indian Academy of Applied Psychology*, 32(2), 151–157.
- Gildner, T. E., Liebert, M. A., Kowal, P., Chatterji, S., & Snodgrass, J. J. (2014). Associations between sleep duration, sleep quality, and cognitive test performance among older adults from six middle income countries: Results from the Study on Global Ageing and Adult Health (SAGE). *Journal of Clinical Sleep Medicine*, 10(06), 613–621.
- Gillison, F., Standage, M., & Skevington, S. (2008). Changes in quality of life and psychological need satisfaction following the transition to secondary school. *The British Journal of Educational Psychology*, 78(Pt 1), 149–162. <https://doi.org/10.1348/000709907X209863>
- Giri, P. A., Baviskar, M. P., & Phalke, D. B. (2013). Study of sleep habits and sleep problems among medical students of Pravara Institute of Medical Sciences Loni, Western Maharashtra, India. *Annals of Medical and Health Sciences Research*, 3(1), 51–54.

- Glaser, D. (2002). Emotional abuse and neglect (psychological maltreatment): A conceptual framework. *Child Abuse & Neglect*, 26(6–7), 697–714.
- Goel, V., Schultz, K., & Kumar, H. (2018, January 3). Mumbai Shuts Down as Protests Erupt Over Caste Tensions. *The New York Times*.
<https://www.nytimes.com/2018/01/03/world/asia/india-protests-mumbai-dalits.html>
- Gomes, M. F., Chowdhary, N., Voursoura, E., & Verdelli, H. (2016). “When Grief Breaks Your Heart”: A Case Study of Interpersonal Psychotherapy Delivered in a Primary Care Setting. *Journal of Clinical Psychology*, 72(8), 807–817.
<https://doi.org/10.1002/jclp.22362>
- Gore, S., & Mangione, T. W. (1983). Social roles, sex roles and psychological distress: Additive and interactive models of sex differences. *Journal of Health and Social Behavior*, 300–312.
- Gorrindo, T., Chatterji, S., Kowal, P., Epstein, Z., & Weinstein, M. (2013). A Cross-Country Comparison of Sociodemographic Correlates of Depression in the WHO Study of Global Aging and Adult Health (SAGE). In N. Hoque, M. A. McGehee, & B. S. Bradshaw (Eds.), *Applied Demography and Public Health* (pp. 45–60). Springer Netherlands.
https://doi.org/10.1007/978-94-007-6140-7_4
- Grandner, M. A., Patel, N. P., Gehrman, P. R., Xie, D., Sha, D., Weaver, T., & Gooneratne, N. (2010). Who gets the best sleep? Ethnic and socioeconomic factors related to sleep complaints. *Sleep Medicine*, 11(5), 470–478. <https://doi.org/10.1016/j.sleep.2009.10.006>

- Gregory, A. M., & Eley, T. C. (2005). Sleep problems, anxiety and cognitive style in school-aged children. *Infant and Child Development: An International Journal of Research and Practice*, *14*(5), 435–444.
- Gregory, A. M., Rijdsdijk, F. V., Dahl, R. E., McGuffin, P., & Eley, T. C. (2006). Associations between sleep problems, anxiety, and depression in twins at 8 years of age. *Pediatrics*, *118*(3), 1124–1132.
- Grenard, J. L., Munjas, B. A., Adams, J. L., Suttorp, M., Maglione, M., McGlynn, E. A., & Gellad, W. F. (2011). Depression and Medication Adherence in the Treatment of Chronic Diseases in the United States: A Meta-Analysis. *Journal of General Internal Medicine*, *26*(10), 1175–1182. <https://doi.org/10.1007/s11606-011-1704-y>
- Groeger, J. A., Zijlstra, F. R. H., & Dijk, D.-J. (2004). Sleep quantity, sleep difficulties and their perceived consequences in a representative sample of some 2000 British adults. *Journal of Sleep Research*, *13*(4), 359–371. <https://doi.org/10.1111/j.1365-2869.2004.00418.x>
- Grover, Sandeep, Avasthi, A., Sahoo, S., Lakdawala, B., Dan, A., Nebhinani, N., Dutt, A., Tiwari, S. C., Subramanyam, A. A., & Kedare, J. (2018). Relationship of loneliness and social connectedness with depression in elderly: A multicentric study under the aegis of Indian Association for Geriatric Mental Health. *Journal of Geriatric Mental Health*, *5*(2), 99.
- Grover, Sandeep, Dutt, A., & Avasthi, A. (2010). An overview of Indian research in depression. *Indian Journal of Psychiatry*, *52*(7), 178. <https://doi.org/10.4103/0019-5545.69231>

- Grover, Sundeep, Sinha, R. P., Singh, U., Tewari, S., Aggarwal, A., & Misra, R. (2006). Subclinical atherosclerosis in rheumatoid arthritis in India. *The Journal of Rheumatology*, 33(2), 244–247.
- Gunn, J. M., Ayton, D. R., Densley, K., Pallant, J. F., Chondros, P., Herrman, H. E., & Dowrick, C. F. (2012). The association between chronic illness, multimorbidity and depressive symptoms in an Australian primary care cohort. *Social Psychiatry and Psychiatric Epidemiology*, 47(2), 175–184. <https://doi.org/10.1007/s00127-010-0330-z>
- Gupta, D., Aggarwal, A. N., Chaudhry, K., Chhabra, S. K., D Souza, G. A., Jindal, S. K., Katiyar, S. K., Kumar, R., Shah, B., & Vijayan, V. K. (2006). Household environmental tobacco smoke exposure, respiratory symptoms and asthma in non-smoker adults: A multicentric population study from India. *INDIAN JOURNAL OF CHEST DISEASES AND ALLIED SCIENCES*, 48(1), 31.
- Gupta, Dipankar. (2000). *Interrogating Caste: Understanding Hierarchy and Difference in Indian Society*. Penguin Books India.
- Gupta, R. (2009). Systems Perspective: Understanding Care Giving of the Elderly in India. *Health Care for Women International*, 30(12), 1040–1054. <https://doi.org/10.1080/07399330903199334>
- Gupta, R., & Gupta, V. P. (2009). Hypertension epidemiology in India: Lessons from Jaipur Heart Watch. *Current Science*, 97(3), 349–355. JSTOR.
- Gupta, Rajeev, Misra, A., Pais, P., Rastogi, P., & Gupta, V. P. (2006). Correlation of regional cardiovascular disease mortality in India with lifestyle and nutritional factors.

International Journal of Cardiology, 108(3), 291–300.

<https://doi.org/10.1016/j.ijcard.2005.05.044>

Gupta, Rashmi, Rowe, N., & Pillai, V. K. (2009). Perceived caregiver burden in India:

Implications for social services. *Affilia*, 24(1), 69–79.

Gururaj, G., Varghese, M., Benegal, V., G N, R., K, P., Singh, L., Mehta, R., D, R., TM, S.,

Kokane, A., Singh RK, L., Chavan, S., P, S., C, R., PK, D., PK, S., SP, D., Giri, A., AB,

K., & collaborators group. National Mental Health Survey of India, N. (2017). *National*

Mental Health Survey of India, 2015-16 Prevalence, Pattern and Outcomes.

Haddad, S., Mohindra, K. S., Siekmans, K., Màk, G., & Narayana, D. (2012). “Health divide”

between indigenous and non-indigenous populations in Kerala, India: Population based

study. *BMC Public Health*, 12, 390. <https://doi.org/10.1186/1471-2458-12-390>

Hagenaars, J. A., & McCutcheon, A. L. (2002). *Applied latent class analysis*. Cambridge

University Press.

Hammen, C. (2009). Adolescent Depression: Stressful Interpersonal Contexts and Risk for

Recurrence. *Current Directions in Psychological Science*, 18(4), 200–204.

<https://doi.org/10.1111/j.1467-8721.2009.01636.x>

Hammen, C., Shih, J. H., & Brennan, P. A. (2004). Intergenerational transmission of depression:

Test of an interpersonal stress model in a community sample. *Journal of Consulting and*

Clinical Psychology, 72(3), 511.

Handa, R., Rao, U. R. K., Lewis, J. F. M., Rambhad, G., Shiff, S., & Ghia, C. J. (2016).

Literature review of rheumatoid arthritis in India. *International Journal of Rheumatic*

Diseases, 19(5), 440–451. <https://doi.org/10.1111/1756-185X.12621>

- Hansson, L. (2002). Quality of life in depression and anxiety. *International Review of Psychiatry, 14*(3), 185–189. <https://doi.org/10.1080/09540260220144966>
- Harvey, A. G., Murray, G., Chandler, R. A., & Soehner, A. (2011). Sleep disturbance as transdiagnostic: Consideration of neurobiological mechanisms. *Clinical Psychology Review, 31*(2), 225–235. <https://doi.org/10.1016/j.cpr.2010.04.003>
- Hatzenbuehler, M. L., Phelan, J. C., & Link, B. G. (2013). Stigma as a Fundamental Cause of Population Health Inequalities. *American Journal of Public Health, 103*(5), 813–821. <https://doi.org/10.2105/AJPH.2012.301069>
- Haynes, S., Feinleib, M., & Kannel, W. B. (1980). The relationship of psychosocial factors to coronary heart disease in the framingham study. Iii. Eight-year incidence of coronary heart disease. *American Journal of Epidemiology, 111*(1), 37–58. <https://doi.org/10.1093/oxfordjournals.aje.a112873>
- Haynes, S. G., & Feinleib, M. (1980). Women, work and coronary heart disease: Prospective findings from the Framingham heart study. *American Journal of Public Health, 70*(2), 133–141.
- Heiberg, I. H., Jacobsen, B. K., Balteskard, L., Bramness, J. G., Næss, Ø., Ystrom, E., Reichborn-Kjennerud, T., Hultman, C. M., Nesvåg, R., & Høyve, A. (2019). Undiagnosed cardiovascular disease prior to cardiovascular death in individuals with severe mental illness. *Acta Psychiatrica Scandinavica*.
- Hemingway Harry, Langenberg Claudia, Damant Jacqueline, Frost Chris, Pyörälä Kalevi, & Barrett-Connor Elizabeth. (2008). Prevalence of Angina in Women Versus Men.

Circulation, 117(12), 1526–1536.

<https://doi.org/10.1161/CIRCULATIONAHA.107.720953>

Hildebrandt, M. J., & Hayes, S. C. (2012). The contributing role of negative affectivity and experiential avoidance to increased cardiovascular risk. *Social and Personality Psychology Compass*, 6(8), 551–565.

Hoch, C. C., Dew, M. A., Reynolds, C. F., Monk, T. H., Buysse, D. J., Houck, P. R., Machen, M. A., & Kupfer, D. J. (1994). A Longitudinal Study of Laboratory- and Diary-Based Sleep Measures in Healthy “Old Old” and “Young Old” Volunteers. *Sleep*, 17(6), 489–496.
<https://doi.org/10.1093/sleep/17.6.489>

Hollocks, M. J., Jones, C. R., Pickles, A., Baird, G., Happé, F., Charman, T., & Simonoff, E. (2014). The association between social cognition and executive functioning and symptoms of anxiety and depression in adolescents with autism spectrum disorders. *Autism Research*, 7(2), 216–228.

Holt-Lunstad, J., Smith, T. B., Baker, M., Harris, T., & Stephenson, D. (2015). Loneliness and social isolation as risk factors for mortality: A meta-analytic review. *Perspectives on Psychological Science*, 10(2), 227–237.

Hooren, S. A. H. van, Valentijn, A. M., Bosma, H., Ponds, R. W. H. M., Boxtel, M. P. J. van, & Jolles, J. (2007). Cognitive Functioning in Healthy Older Adults Aged 64–81: A Cohort Study into the Effects of Age, Sex, and Education. *Aging, Neuropsychology, and Cognition*, 14(1), 40–54. <https://doi.org/10.1080/138255890969483>

- Hopman, W. M., Harrison, M. B., Coo, H., Friedberg, E., Buchanan, M., & VanDenKerkhof, E. G. (2009). Associations between chronic disease, age and physical and mental health status. *Chronic Dis Can*, 29(3), 108–16.
- Horne, R. M., Johnson, M. D., Galambos, N. L., & Krahn, H. J. (2018). Time, money, or gender? Predictors of the division of household labour across life stages. *Sex Roles*, 78(11–12), 731–743.
- Horton, R., & Das, P. (2011). Indian health: The path from crisis to progress. *The Lancet*, 377(9761), 181–183. [https://doi.org/10.1016/S0140-6736\(10\)62179-4](https://doi.org/10.1016/S0140-6736(10)62179-4)
- Hosseinpoor, A. R., Bergen, N., Mendis, S., Harper, S., Verdes, E., Kunst, A., & Chatterji, S. (2012). Socioeconomic inequality in the prevalence of noncommunicable diseases in low-and middle-income countries: Results from the World Health Survey. *BMC Public Health*, 12(1), 474.
- Huang, J., Maassen van den Brink, H., & Groot, W. (2009). A meta-analysis of the effect of education on social capital. *Economics of Education Review*, 28(4), 454–464. <https://doi.org/10.1016/j.econedurev.2008.03.004>
- Huang, X., Liu, J., & Bo, A. (2019). Living arrangements and quality of life among older adults in China: Does social cohesion matter? *Aging & Mental Health*, 0(0), 1–10. <https://doi.org/10.1080/13607863.2019.1660856>
- Huang, Y.-L., Liu, R.-Y., Wang, Q.-S., Van Someren, E. J., Xu, H., & Zhou, J.-N. (2002). Age-associated difference in circadian sleep–wake and rest–activity rhythms. *Physiology & Behavior*, 76(4–5), 597–603.

- Huffman, M. D., Mohanan, P. P., Devarajan, R., Baldrige, A. S., Kondal, D., Zhao, L., Ali, M., Spertus, J. A., Chan, P. S., Natesan, S., Abdullakutty, J., Krishnan, M. N., Abilash, T. P., Renga, S., Punnoose, E., Unni, G., Prabhakaran, D., & Lloyd-Jones, D. M. (2019). Health-related quality of life at 30-days among Indian patients with acute myocardial infarction: Results from the ACS QUIK trial. *Circulation. Cardiovascular Quality and Outcomes*, *12*(2), e004980. <https://doi.org/10.1161/CIRCOUTCOMES.118.004980>
- Hylkema, M. N., & Blacquièrè, M. J. (2009). Intrauterine effects of maternal smoking on sensitization, asthma, and chronic obstructive pulmonary disease. *Proceedings of the American Thoracic Society*, *6*(8), 660–662.
- Irani, F., Barbone, J. M., Beausoleil, J., & Gerald, L. (2017). Is asthma associated with cognitive impairments? A meta-analytic review. *Journal of Clinical and Experimental Neuropsychology*, *39*(10), 965–978. <https://doi.org/10.1080/13803395.2017.1288802>
- Jackson, M. L., Sztendur, E. M., Diamond, N. T., Byles, J. E., & Bruck, D. (2014). Sleep difficulties and the development of depression and anxiety: A longitudinal study of young Australian women. *Archives of Women's Mental Health*, *17*(3), 189–198. <https://doi.org/10.1007/s00737-014-0417-8>
- Jacob, N., Shaik, M., Sivaprasad, K., Poongadan, M. N., & Rauf, C. P. (2017). Central Sleep Apnea Presenting As Nocturnal Angina. *BMH Medical Journal-ISSN 2348–392X*, *4*(3), 100–102.
- Jahoda, M. (1958). *Current concepts of positive mental health*.

- Jamison, D. T., Breman, J. G., Measham, A. R., Alleyne, G., Claeson, M., Evans, D. B., Jha, P., Mills, A., & Musgrove, P. (2006). *Disease control priorities in developing countries*. The World Bank.
- Jamison, R. N., Edwards, R. R., Liu, X., Ross, E. L., Michna, E., Warnick, M., & Wasan, A. D. (2013). Relationship of negative affect and outcome of an opioid therapy trial among low back pain patients. *Pain Practice, 13*(3), 173–181.
- Jansen, K., Mondin, T. C., de Azevedo Cardoso, T., da Costa Ores, L., de Mattos Souza, L. D., Pinheiro, R. T., da Silva Magalhães, P. V., & da Silva, R. A. (2013). Quality of life and mood disorder episodes: Community sample. *Journal of Affective Disorders, 147*(1–3), 123–127.
- Jefferson, A. L., Gibbons, L. E., Rentz, D. M., Carvalho, J. O., Manly, J., Bennett, D. A., & Jones, R. N. (2011). A Life Course Model of Cognitive Activities, Socioeconomic Status, Education, Reading Ability, and Cognition. *Journal of the American Geriatrics Society, 59*(8), 1403–1411. <https://doi.org/10.1111/j.1532-5415.2011.03499.x>
- Jencks, S. F. (1985). Recognition of mental distress and diagnosis of mental disorder in primary care. *Jama, 253*(13), 1903–1907.
- Jensen, P. S., Martin, D., & Cantwell, D. P. (1997). Comorbidity in ADHD: Implications for research, practice, and DSM-V. *Journal of the American Academy of Child & Adolescent Psychiatry, 36*(8), 1065–1079.
- Jespersen, L., Abildstrøm, S. Z., Hvelplund, A., & Prescott, E. (2013). Persistent angina: Highly prevalent and associated with long-term anxiety, depression, low physical functioning,

- and quality of life in stable angina pectoris. *Clinical Research in Cardiology*, 102(8), 571–581.
- Jindal, S. K., Aggarwal, A. N., Gupta, D., Agarwal, R., Kumar, R., Kaur, T., Chaudhry, K., & Shah, B. (2012). Indian study on epidemiology of asthma, respiratory symptoms and chronic bronchitis in adults (INSEARCH). *The International Journal of Tuberculosis and Lung Disease*, 16(9), 1270–1277.
- Jindal, S. K., Gupta, D., Aggarwal, A. N., Jindal, R. C., & Singh, V. (2000). Study of the prevalence of asthma in adults in North India using a standardized field questionnaire. *Journal of Asthma*, 37(4), 345–351.
- John, T. J., Dandona, L., Sharma, V. P., & Kakkar, M. (2011). Continuing challenge of infectious diseases in India. *The Lancet*, 377(9761), 252–269.
[https://doi.org/10.1016/S0140-6736\(10\)61265-2](https://doi.org/10.1016/S0140-6736(10)61265-2)
- Jose, P. E., Ryan, N., & Pryor, J. (2012). Does Social Connectedness Promote a Greater Sense of Well-Being in Adolescence Over Time? *Journal of Research on Adolescence*, 22(2), 235–251. <https://doi.org/10.1111/j.1532-7795.2012.00783.x>
- Kalavar, J. M., & Jamuna, D. (2011). Aging of Indian women in India: The experience of older women in formal care homes. *Journal of Women & Aging*, 23(3), 203–215.
- Kalra, S., Sridhar, G. R., Balhara, Y. P. S., Sahay, R. K., Bantwal, G., Baruah, M. P., John, M., Unnikrishnan, A. G., Madhu, K., Verma, K., Sreedevi, A., Shukla, R., & Prasanna Kumar, K. M. (2013). National recommendations: Psychosocial management of diabetes in India. *Indian Journal of Endocrinology and Metabolism*, 17(3), 376–395.
<https://doi.org/10.4103/2230-8210.111608>

- Kaneita, Y., Yokoyama, E., Harano, S., Tamaki, T., Suzuki, H., Munezawa, T., Nakajima, H., Asai, T., & Ohida, T. (2009). Associations between sleep disturbance and mental health status: A longitudinal study of Japanese junior high school students. *Sleep Medicine, 10*(7), 780–786.
- Kantor, P. (2009). Women's Exclusion and Unfavorable Inclusion in Informal Employment in Lucknow, India: Barriers to Voice and Livelihood Security. *World Development, 37*(1), 194–207. <https://doi.org/10.1016/j.worlddev.2008.05.002>
- Kar, N. (1994). A short communication on occurrence of rheumatic diseases attending hospital. *Indian Journal of Public Health, 38*(3), 115–118.
- Katz, R. S., Heard, A. R., Mills, M., & Leavitt, F. (2004). The prevalence and clinical impact of reported cognitive difficulties (fibrofog) in patients with rheumatic disease with and without fibromyalgia. *JCR: Journal of Clinical Rheumatology, 10*(2), 53–58.
- Kaul, A., Ansari, M. A., & Rai, H. (2005). *Gender, affect and upward influence*.
- Kawachi, I., & Berkman, L. F. (2001). Social ties and mental health. *Journal of Urban Health, 78*(3), 458–467. <https://doi.org/10.1093/jurban/78.3.458>
- Kawachi, I., & Berkman, L. F. (2014). *Social Capital, Social Cohesion, and Health*. Oxford University Press.
<https://oxfordmedicine.com/view/10.1093/med/9780195377903.001.0001/med-9780195377903-chapter-8>
- Kaye, W. H., Bulik, C. M., Thornton, L., Barbarich, N., Masters, K., & Group, P. F. C. (2004). Comorbidity of anxiety disorders with anorexia and bulimia nervosa. *American Journal of Psychiatry, 161*(12), 2215–2221.

- Keogh, E., & Asmundson, G. J. (2004). Negative affectivity, catastrophizing, and anxiety sensitivity. *Understanding and Treating Fear of Pain*, 91–115.
- Kessler, R. C. (1979). Stress, social status, and psychological distress. *Journal of Health and Social Behavior*, 259–272.
- Khurana, A., Katyal, S., & Marwaha, R. K. (2006). Psychosocial burden in thalassemia. *The Indian Journal of Pediatrics*, 73(10), 877–880. <https://doi.org/10.1007/BF02859278>
- Kiesler, D. J. (1996). *Contemporary interpersonal theory and research: Personality, psychopathology, and psychotherapy*. John Wiley & Sons.
- Kim, H.-J., Hong, S., & Kim, M. (2015). Living Arrangement, Social Connectedness, and Life Satisfaction among Korean Older Adults with Physical Disabilities: The Results from the National Survey on Persons with Disabilities. *Journal of Developmental and Physical Disabilities*, 27(3), 307–321. <https://doi.org/10.1007/s10882-014-9418-9>
- Kimble, L. P., Dunbar, S. B., Weintraub, W. S., McGuire, D. B., Manzo, S. F., & Strickland, O. L. (2011). Symptom clusters and health-related quality of life in people with chronic stable angina. *Journal of Advanced Nursing*, 67(5), 1000–1011. <https://doi.org/10.1111/j.1365-2648.2010.05564.x>
- King, N. J., Ollendick, T. H., & Gullone, E. (1991). Negative affectivity in children and adolescents: Relations between anxiety and depression. *Clinical Psychology Review*, 11(4), 441–459.
- Kinra, S., Bowen, L. J., Lyngdoh, T., Prabhakaran, D., Reddy, K. S., Ramakrishnan, L., Gupta, R., Bharathi, A. V., Vaz, M., Kurpad, A. V., Smith, G. D., Ben-Shlomo, Y., & Ebrahim,

- S. (2010). Sociodemographic patterning of non-communicable disease risk factors in rural India: A cross sectional study. *BMJ*, *341*, c4974. <https://doi.org/10.1136/bmj.c4974>
- Klier, C. M., Muzik, M., Rosenblum, K. L., & Lenz, G. (2001). Interpersonal Psychotherapy Adapted for the Group Setting in the Treatment of Postpartum Depression. *The Journal of Psychotherapy Practice and Research*, *10*(2), 124–131.
- Klose, M., & Jacobi, F. (2004). Can gender differences in the prevalence of mental disorders be explained by sociodemographic factors? *Archives of Women's Mental Health*, *7*(2), 133–148. <https://doi.org/10.1007/s00737-004-0047-7>
- Kohli, R. M., Sane, S., Kumar, K., Paranjape, R. S., & Mehendale, S. M. (2005). Assessment of quality of life among HIV-infected persons in Pune, India. *Quality of Life Research*, *14*(6), 1641–1647.
- Kohn, M. L., & Schooler, C. (1973). Occupational experience and psychological functioning: An assessment of reciprocal effects. *American Sociological Review*, *97*–118.
- Kohrt, B. A., Speckman, R. A., Kunz, R. D., Baldwin, J. L., Upadhaya, N., Acharya, N. R., Sharma, V. D., Nepal, M. K., & Worthman, C. M. (2009). Culture in psychiatric epidemiology: Using ethnography and multiple mediator models to assess the relationship of caste with depression and anxiety in Nepal. *ANNALS OF HUMAN BIOLOGY*, *36*(3), 261–280. <https://doi.org/10.1080/03014460902839194>
- Koran, L. M., Sox, H. C., Marton, K. I., Moltzen, S., Sox, C. H., Kraemer, H. C., Imai, K., Kelsey, T. G., Rose, T. G., & Levin, L. C. (1989). Medical evaluation of psychiatric patients. I. Results in a state mental health system. *Archives of General Psychiatry*, *46*(8), 733–740.

- Kovacs, M., & Lopez-Duran, N. (2010). Prodromal symptoms and atypical affectivity as predictors of major depression in juveniles: Implications for prevention. *Journal of Child Psychology and Psychiatry*, *51*(4), 472–496. <https://doi.org/10.1111/j.1469-7610.2010.02230.x>
- Kowal, P., Chatterji, S., Naidoo, N., Biritwum, R., Fan, W., Lopez Ridaura, R., Maximova, T., Arokiasamy, P., Phaswana-Mafuya, N., Williams, S., Snodgrass, J. J., Minicuci, N., D'Este, C., Peltzer, K., Boerma, J. T., & SAGE Collaborators. (2012). Data resource profile: The World Health Organization Study on global AGEing and adult health (SAGE). *International Journal of Epidemiology*, *41*(6), 1639–1649. <https://doi.org/10.1093/ije/dys210>
- Kowal, P., Kahn, K., Ng, N., Naidoo, N., Abdullah, S., Bawah, A., Binka, F., Chuc, N. T. K., Debpuur, C., Ezeh, A., Xavier Gómez-Olivé, F., Hakimi, M., Hirve, S., Hodgson, A., Juvekar, S., Kyobutungi, C., Menken, J., Van Minh, H., Mwanyangala, M. A., ... Tollman, S. M. (2010). Ageing and adult health status in eight lower-income countries: The INDEPTH WHO-SAGE collaboration. *Global Health Action*, *3*. <https://doi.org/10.3402/gha.v3i0.5302>
- Kowal, P., Williams, S., Jiang, Y., Fan, W., Arokiasamy, P., & Chatterji, S. (2012). *Aging, Health, and Chronic Conditions in China and India: Results from the Multinational Study on Global AGEing and Adult Health (SAGE)*. National Academies Press (US). <https://www.ncbi.nlm.nih.gov/books/NBK109232/>
- Koyanagi, A., Garin, N., Olaya, B., Ayuso-Mateos, J. L., Chatterji, S., Leonardi, M., Koskinen, S., Tobiasz-Adamczyk, B., & Haro, J. M. (2014). Chronic conditions and sleep problems

- among adults aged 50 years or over in nine countries: A multi-country study. *PloS One*, 9(12).
- Krantz, D. S., & McCeney, M. K. (2002). Effects of psychological and social factors on organic disease: A critical assessment of research on coronary heart disease. *Annual Review of Psychology*, 53, 341–369. <https://doi.org/10.1146/annurev.psych.53.100901.135208>
- Kressin, N. R., Spiro III, A., & Skinner, K. M. (2000). Negative affectivity and health-related quality of life. *Medical Care*, 858–867.
- Krishnan, M. N., Zachariah, G., Venugopal, K., Mohanan, P. P., Harikrishnan, S., Sanjay, G., Jeyaseelan, L., & Thankappan, K. R. (2016). Prevalence of coronary artery disease and its risk factors in Kerala, South India: A community-based cross-sectional study. *BMC Cardiovascular Disorders*, 16(1), 12. <https://doi.org/10.1186/s12872-016-0189-3>
- Kristofferzon, M.-L., Löfmark, R., & Carlsson, M. (2003). Myocardial infarction: Gender differences in coping and social support. *Journal of Advanced Nursing*, 44(4), 360–374. <https://doi.org/10.1046/j.0309-2402.2003.02815.x>
- Kumar, A., & Singh, A. (2013). Decomposing the gap in childhood undernutrition between poor and non-poor in urban India, 2005–06. *PloS One*, 8(5), e64972.
- Kumar, A., & Singh, A. (2016). Explaining the gap in the use of maternal healthcare services between social groups in India. *Journal of Public Health (Oxford, England)*, 38(4), 771–781. <https://doi.org/10.1093/pubmed/fdv142>
- Kumar, R., & Indrayan, A. (2011). Receiver operating characteristic (ROC) curve for medical researchers. *Indian Pediatrics*, 48(4), 277–287. [https://doi.org/10.1007/s13312-011-0055-](https://doi.org/10.1007/s13312-011-0055-4)

- Kusuma, Y. S., & Babu, B. V. (2018). Migration and health: A systematic review on health and health care of internal migrants in India. *The International Journal of Health Planning and Management*. <https://doi.org/10.1002/hpm.2570>
- Kuyken, W., & Dalgleish, T. (1995). Autobiographical memory and depression. *British Journal of Clinical Psychology*, *34*(1), 89–92.
- Laffaye, C., Cavella, S., Drescher, K., & Rosen, C. (2008). Relationships among PTSD symptoms, social support, and support source in veterans with chronic PTSD. *Journal of Traumatic Stress: Official Publication of the International Society for Traumatic Stress Studies*, *21*(4), 394–401.
- Laird, L. D., Amer, M. M., Barnett, E. D., & Barnes, L. L. (2007). Muslim patients and health disparities in the UK and the US. *Archives of Disease in Childhood*, *92*(10), 922–926.
- Lall, D., Engel, N., Devadasan, N., Horstman, K., & Criel, B. (2018). Models of care for chronic conditions in low/middle-income countries: A ‘best fit’ framework synthesis. *BMJ Global Health*, *3*(6), e001077.
- Lallukka, T., & Sivertsen, B. (2017). Sleep improvement by internet-based cognitive behavioural therapy might help prevent mental health disorders. *The Lancet Psychiatry*, *4*(10), 734–735. [https://doi.org/10.1016/S2215-0366\(17\)30360-7](https://doi.org/10.1016/S2215-0366(17)30360-7)
- Langan, J., Mercer, S. W., & Smith, D. J. (2013). Multimorbidity and mental health: Can psychiatry rise to the challenge? *The British Journal of Psychiatry*, *202*(6), 391–393. <https://doi.org/10.1192/bjp.bp.112.123943>
- Lanza, S. T., Dziak, J. J., Huang, L., Wagner, A. T., & Collins, L. M. (2015). LCA Stata plugin users’ guide (Version 1.2). *University Park: The Methodology Center, Penn State*.

- Lavrakas, P. (2008). *Encyclopedia of Survey Research Methods*. Sage Publications, Inc.
<https://doi.org/10.4135/9781412963947>
- Lee, C., Dobson, A. J., Brown, W. J., Bryson, L., Byles, J., Warner-Smith, P., & Young, A. F. (2005). Cohort Profile: The Australian Longitudinal Study on Women's Health. *International Journal of Epidemiology*, *34*(5), 987–991.
<https://doi.org/10.1093/ije/dyi098>
- Lee, J., McGovern, M. E., Bloom, D. E., Arokiasamy, P., Risbud, A., O'Brien, J., Kale, V., & Hu, P. (2015). Education, gender, and state-level disparities in the health of older Indians: Evidence from biomarker data. *Economics and Human Biology*, *19*, 145–156.
<https://doi.org/10.1016/j.ehb.2015.09.003>
- Lee, J., Shih, R., Feeney, K., & Langa, K. M. (2014a). Gender disparity in late-life cognitive functioning in India: Findings from the longitudinal aging study in India. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *69*(4), 603–611.
- Lee, J., Shih, R., Feeney, K., & Langa, K. M. (2014b). Gender disparity in late-life cognitive functioning in India: Findings from the longitudinal aging study in India. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, *69*(4), 603–611.
<https://doi.org/10.1093/geronb/gbu017>
- Lee, J., & Smith, J. P. (2014). Regional disparities in adult height, educational attainment, and late-life cognition: Findings from the Longitudinal Aging Study in India (LASI). *The Journal of the Economics of Ageing*, *4*, 26–34. <https://doi.org/10.1016/j.jeoa.2014.02.002>
- Lee, R. M., & Robbins, S. B. (1998). *The relationship between social connectedness and anxiety, self-esteem, and social identity*.

- Lee, R. M., & Robbins, S. B. (2000). Understanding Social Connectedness in College Women and Men. *Journal of Counseling & Development, 78*(4), 484–491.
<https://doi.org/10.1002/j.1556-6676.2000.tb01932.x>
- Lei, X., Smith, J. P., Sun, X., & Zhao, Y. (2014). Gender differences in cognition in China and reasons for change over time: Evidence from CHARLS. *The Journal of the Economics of Ageing, 4*, 46–55. <https://doi.org/10.1016/j.jeoa.2013.11.001>
- Lespérance, F., Frasure-Smith, N., Juneau, M., & Thérioux, P. (2000). Depression and 1-year prognosis in unstable angina. *Archives of Internal Medicine, 160*(9), 1354–1360.
- Levasseur, M., Desrosiers, J., & Noreau, L. (2004). Is social participation associated with quality of life of older adults with physical disabilities? *Disability and Rehabilitation, 26*(20), 1206–1213.
- Lieberman, M., Gauvin, L., Bukowski, W. M., & White, D. R. (2001). Interpersonal influence and disordered eating behaviors in adolescent girls: The role of peer modeling, social reinforcement, and body-related teasing. *Eating Behaviors, 2*(3), 215–236.
- Lin, J., Epel, E., & Blackburn, E. (2012). Telomeres and lifestyle factors: Roles in cellular aging. *Mutation Research/Fundamental and Molecular Mechanisms of Mutagenesis, 730*(1–2), 85–89.
- Link, B. G., & Phelan, J. (1995). Social Conditions As Fundamental Causes of Disease. *Journal of Health and Social Behavior, 80–94*. <https://doi.org/10.2307/2626958>
- Linzer, M., Spitzer, R., Kroenke, K., Williams, J. B., Hahn, S., Brody, D., & deGruy, F. (1996). Gender, quality of life, and mental disorders in primary care: Results from the PRIME-

- MD 1000 study. *The American Journal of Medicine*, 101(5), 526–533.
[https://doi.org/10.1016/S0002-9343\(96\)00275-6](https://doi.org/10.1016/S0002-9343(96)00275-6)
- Liu, M. C., Tirth, S., Appasani, R., Shah, S., & Katz, C. L. (2014). Knowledge and Attitudes Toward Depression Among Community Members in Rural Gujarat, India: *The Journal of Nervous and Mental Disease*, 202(11), 813–821.
<https://doi.org/10.1097/NMD.0000000000000199>
- Lobana, A., Mattoo, S. K., Basu, D., & Gupta, N. (2001). Quality of life in schizophrenia in India: Comparison of three approaches. *Acta Psychiatrica Scandinavica*, 104(1), 51–55.
- Lonigan, C. J., Phillips, B. M., & Hooe, E. S. (2003). Relations of positive and negative affectivity to anxiety and depression in children: Evidence from a latent variable longitudinal study. *Journal of Consulting and Clinical Psychology*, 71(3), 465.
- Lotfaliany, M., Hoare, E., Jacka, F. N., Kowal, P., Berk, M., & Mohebbi, M. (2019). Variation in the prevalence of depression and patterns of association, sociodemographic and lifestyle factors in community-dwelling older adults in six low- and middle-income countries. *Journal of Affective Disorders*, 251, 218–226. <https://doi.org/10.1016/j.jad.2019.01.054>
- Lubetkin, E. I., Jia, H., Franks, P., & Gold, M. R. (2005). Relationship among sociodemographic factors, clinical conditions, and health-related quality of life: Examining the EQ-5D in the US general population. *Quality of Life Research*, 14(10), 2187–2196.
- Luo, Y., Hawkey, L. C., Waite, L. J., & Cacioppo, J. T. (2012). Loneliness, health, and mortality in old age: A national longitudinal study. *Social Science & Medicine*, 74(6), 907–914. <https://doi.org/10.1016/j.socscimed.2011.11.028>

- Luo, Y., & Waite, L. J. (2005). The impact of childhood and adult SES on physical, mental, and cognitive well-being in later life. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *60*(2), S93–S101.
- Luyster, F. S., Strollo, P. J., Zee, P. C., & Walsh, J. K. (2012). Sleep: A health imperative. *Sleep*, *35*(6), 727–734.
- Lyubomirsky, S., King, L., & Diener, E. (2005). The benefits of frequent positive affect: Does happiness lead to success? *Psychological Bulletin*, *131*(6), 803.
- Mahon, N. E., Yarcheski, A., & Yarcheski, T. J. (2005). Happiness as Related to Gender and Health in Early Adolescents. *Clinical Nursing Research*, *14*(2), 175–190.
<https://doi.org/10.1177/1054773804271936>
- Majumdar, M., & Mooij, J. E. (2011). *Education and inequality in India: A classroom view* (Vol. 46). Routledge.
- Malzberg, B. (1940). *Social and biological aspects of mental disease*.
- Manber, R., & Armitage, R. (1999). Sex, Steroids, and Sleep: A Review. *Sleep*, *22*(5), 540–541.
<https://doi.org/10.1093/sleep/22.5.540>
- Mankar, M. J., Joshi, S. M., Velankar, D. H., Mhatre, R. K., & Nalgundwar, A. N. (2011). A comparative study of the quality of life, knowledge, attitude and belief about leprosy disease among leprosy patients and community members in Shantivan Leprosy Rehabilitation centre, Nere, Maharashtra, India. *Journal of Global Infectious Diseases*, *3*(4), 378.
- Mannino, D. M., & Buist, A. S. (2007). Global burden of COPD: Risk factors, prevalence, and future trends. *The Lancet*, *370*(9589), 765–773.

- Marazziti, D., Consoli, G., Picchetti, M., Carlini, M., & Faravelli, L. (2010). Cognitive impairment in major depression. *European Journal of Pharmacology*, *626*(1), 83–86.
- Marengoni, A., Angleman, S., Melis, R., Mangialasche, F., Karp, A., Garmen, A., Meinow, B., & Fratiglioni, L. (2011). Aging with multimorbidity: A systematic review of the literature. *Ageing Research Reviews*, *10*(4), 430–439.
<https://doi.org/10.1016/j.arr.2011.03.003>
- Markowitz, J. C., Petkova, E., Neria, Y., Van Meter, P. E., Zhao, Y., Hembree, E., Lovell, K., Bivanova, T., & Marshall, R. D. (2015). Is exposure necessary? A randomized clinical trial of interpersonal psychotherapy for PTSD. *American Journal of Psychiatry*, *172*(5), 430–440.
- Marks, N. F., Bumpass, L. L., & Jun, H. J. (2001). *Family roles and well-being during the middle life course*. Center for Demography and Ecology, University of Wisconsin-Madison Madison, MI.
- Marshall, F., & Randhawa, P. (2017). *India's Peri-urban Frontier: Rural-urban Transformations and Food Security*. International Institute for Environment and Development (IIED).
- Masoli, M., Fabian, D., Holt, S., Beasley, R., & Program, G. I. for A. (GINA). (2004). The global burden of asthma: Executive summary of the GINA Dissemination Committee report. *Allergy*, *59*(5), 469–478.
- Mathuranath, P. S., Cherian, P. J., Mathew, R., Kumar, S., George, A., Alexander, A., Ranjith, N., & Sarma, P. S. (2010). Dementia in Kerala, South India: Prevalence and influence of age, education and gender. *International Journal of Geriatric Psychiatry: A Journal of the Psychiatry of Late Life and Allied Sciences*, *25*(3), 290–297.

- Maurer, J. (2010). Height, education and later-life cognition in Latin America and the Caribbean. *Economics and Human Biology*, 8(2), 168–176.
<https://doi.org/10.1016/j.ehb.2010.05.013>
- Mauss, I. B., Troy, A. S., & LeBourgeois, M. K. (2013). Poorer sleep quality is associated with lower emotion-regulation ability in a laboratory paradigm. *Cognition and Emotion*, 27(3), 567–576. <https://doi.org/10.1080/02699931.2012.727783>
- Mazzotti, D. R., Guindalini, C., Moraes, W. A. dos S., Andersen, M. L., Cendoroglo, M. S., Ramos, L. R., & Tufik, S. (2014). Human longevity is associated with regular sleep patterns, maintenance of slow wave sleep, and favorable lipid profile. *Frontiers in Aging Neuroscience*, 6, 134.
- Mberu, B. U., Haregu, T. N., Kyobutungi, C., & Ezeh, A. C. (2016). Health and health-related indicators in slum, rural, and urban communities: A comparative analysis. *Global Health Action*, 9, 33163.
- McCullough, M. E., & Larson, D. B. (1999). Religion and depression: A review of the literature. *Twin Research and Human Genetics*, 2(2), 126–136. <https://doi.org/10.1375/twin.2.2.126>
- McDermott, O., Charlesworth, G., Hogervorst, E., Stoner, C., Moniz-Cook, E., Spector, A., Csipke, E., & Orrell, M. (2019). Psychosocial interventions for people with dementia: A synthesis of systematic reviews. *Aging & Mental Health*, 23(4), 393–403.
- McDonald, V. M., Kennington, E., & Hyland, M. E. (2019). Understanding the experience of people living with severe asthma. *Severe Asthma (ERS Monograph)*. Sheffield, European Respiratory Society, 16–29.

- McDonough, P., & Walters, V. (2001). Gender and health: Reassessing patterns and explanations. *Social Science & Medicine*, *52*(4), 547–559. [https://doi.org/10.1016/S0277-9536\(00\)00159-3](https://doi.org/10.1016/S0277-9536(00)00159-3)
- McEwen, L. N., Kim, C., Haan, M. N., Ghosh, D., Lantz, P. M., Thompson, T. J., & Herman, W. H. (2009). Are health-related quality-of-life and self-rated health associated with mortality? Insights from Translating Research Into Action for Diabetes (TRIAD). *Primary Care Diabetes*, *3*(1), 37–42.
- McKee, K. J., & Schüz, B. (2015). Psychosocial factors in healthy ageing. *Psychology & Health*, *30*(6), 607–626. <https://doi.org/10.1080/08870446.2015.1026905>
- McLeod, J. D., & Nonnemaker, J. N. (1999). Social stratification and inequality. In *Handbook of sociology of mental health* (pp. 321–344). Kluwer Academic Publishers.
- McPherson, J. M., & Smith-Lovin, L. (1987). Homophily in voluntary organizations: Status distance and the composition of face-to-face groups. *American Sociological Review*, *370–379*.
- Mehta, S., Mittal, P. K., & Swami, M. K. (2014). Psychosocial functioning in depressive patients: A comparative study between major depressive disorder and bipolar affective disorder. *Depression Research and Treatment*, *2014*.
- Michael Vanderlind, W., Beevers, C. G., Sherman, S. M., Trujillo, L. T., McGeary, J. E., Matthews, M. D., Todd Maddox, W., & Schnyer, D. M. (2014). Sleep and sadness: Exploring the relation among sleep, cognitive control, and depressive symptoms in young adults. *Sleep Medicine*, *15*(1), 144–149. <https://doi.org/10.1016/j.sleep.2013.10.006>

- Miech, R. A., Caspi, A., Moffitt, T. E., Wright, B. R. E., & Silva, P. A. (1999). Low socioeconomic status and mental disorders: A longitudinal study of selection and causation during young adulthood. *American Journal of Sociology*, *104*(4), 1096–1131.
- Miller, L. R., & Cano, A. (2009). Comorbid Chronic Pain and Depression: Who Is at Risk? *The Journal of Pain*, *10*(6), 619–627. <https://doi.org/10.1016/j.jpain.2008.12.007>
- Mini, G. K., & Thankappan, K. R. (2017). Pattern, correlates and implications of non-communicable disease multimorbidity among older adults in selected Indian states: A cross-sectional study. *BMJ Open*, *7*(3), e013529. <https://doi.org/10.1136/bmjopen-2016-013529>
- Mirowsky, J. (1996). Age and the Gender Gap in Depression. *Journal of Health and Social Behavior*, *37*(4), 362–380. JSTOR. <https://doi.org/10.2307/2137263>
- Mirowsky, J., & Ross, C. E. (1992). Age and Depression. *Journal of Health and Social Behavior*, *33*(3), 187–205. JSTOR. <https://doi.org/10.2307/2137349>
- Mirowsky, J., & Ross, C. E. (2003). *Education, social status, and health*. Aldine de Gruyter (Hawthorne, NY, US).
<https://search.proquest.com/docview/620121512/BE416F5B503048D1PQ/1>
- Misra, S., Kundu, S., Majumder, D., Kundu, S., Ghoshal, A. G., & Mitra, R. (2015). A study of depression in adult patients with bronchial asthma presenting to a tertiary care hospital in eastern India. *Indian J Chest Dis Allied Sci*, *57*(2), 87–90.
- Mitte, K. (2008). Memory bias for threatening information in anxiety and anxiety disorders: A meta-analytic review. *Psychological Bulletin*, *134*(6), 886–911.
<https://doi.org/10.1037/a0013343>

- Mohan, P., Mohan, S. B., & Dutta, M. (2019). Communicable or noncommunicable diseases? Building strong primary health care systems to address double burden of disease in India. *Journal of Family Medicine and Primary Care*, 8(2), 326–329. https://doi.org/10.4103/jfmipc.jfmipc_67_19
- Mohan, V., Shah, S. N., Joshi, S. R., Seshiah, V., Sahay, B. K., Banerjee, S., Wangnoo, S. K., Kumar, A., Kalra, S., Unnikrishnan, A. G., Sharma, S. K., Rao, P. V., Akhtar, S., Shetty, R. V., & Das, A. K. (2014). Current status of management, control, complications and psychosocial aspects of patients with diabetes in India: Results from the DiabCare India 2011 Study. *Indian Journal of Endocrinology and Metabolism*, 18(3), 370–378. <https://doi.org/10.4103/2230-8210.129715>
- Mohapatra, K. K. (2012). *Women Workers in Informal Sector in India: Understanding the Occupational Vulnerability*.
- Monga, N., Rehm, J., Fischer, B., Brissette, S., Bruneau, J., El-Guebaly, N., Noël, L., Tyndall, M., Wild, C., & Leri, F. (2007). Using latent class analysis (LCA) to analyze patterns of drug use in a population of illegal opioid users. *Drug and Alcohol Dependence*, 88(1), 1–8.
- Moussavi, S., Chatterji, S., Verdes, E., Tandon, A., Patel, V., & Ustun, B. (2007). Depression, chronic diseases, and decrements in health: Results from the World Health Surveys. *Lancet (London, England)*, 370(9590), 851–858. [https://doi.org/10.1016/S0140-6736\(07\)61415-9](https://doi.org/10.1016/S0140-6736(07)61415-9)
- Mudey, A., Ambekar, S., Goyal, R. C., Agarekar, S., & Wagh, V. V. (2011). Assessment of Quality of Life among Rural and Urban Elderly Population of Wardha District,

- Maharashtra, India. *Studies on Ethno-Medicine*, 5(2), 89–93.
<https://doi.org/10.1080/09735070.2011.11886394>
- Mufson, L., Dorta, K. P., Wickramaratne, P., Nomura, Y., Olfson, M., & Weissman, M. M. (2004). A randomized effectiveness trial of interpersonal psychotherapy for depressed adolescents. *Archives of General Psychiatry*, 61(6), 577–584.
- Mukherjee, P., & Saraswati, L. R. (2011). Levels and patterns of social cohesion and its relationship with development in India: A woman's perspective approach. *International Conference on Social Cohesion and Development, OECD, Paris.* [Cited 2014 Oct 20]. Available from <Http://Www. Oecd. Org/Dev/Pgd/46839502. Pdf>.
- Mulcahy, R., Reay, R. E., Wilkinson, R. B., & Owen, C. (2010). A randomised control trial for the effectiveness of group interpersonal psychotherapy for postnatal depression. *Archives of Women's Mental Health*, 13(2), 125–139. <https://doi.org/10.1007/s00737-009-0101-6>
- Naghavi, M., Abajobir, A. A., Abbafati, C., Abbas, K. M., Abd-Allah, F., Abera, S. F., Aboyans, V., Adetokunboh, O., Afshin, A., Agrawal, A., Ahmadi, A., Ahmed, M. B., Aichour, A. N., Aichour, M. T. E., Aichour, I., Aiyar, S., Alahdab, F., Al-Aly, Z., Alam, K., ...
- Murray, C. J. L. (2017). Global, regional, and national age-sex specific mortality for 264 causes of death, 1980–2016: A systematic analysis for the Global Burden of Disease Study 2016. *The Lancet*, 390(10100), 1151–1210. [https://doi.org/10.1016/S0140-6736\(17\)32152-9](https://doi.org/10.1016/S0140-6736(17)32152-9)
- Nathawat, S. S., & Mathur, A. (1993). Marital Adjustment and Subjective Well-Being in Indian-Educated Housewives and Working Women. *The Journal of Psychology*, 127(3), 353–358. <https://doi.org/10.1080/00223980.1993.9915570>

- Nayak, P., & Mahanta, B. (2012). Women empowerment in India. *Bulletin of Political Economy*, 5(2), 155–183.
- Nazareth, I., D’Costa, G., Kalaitzaki, E., Vaidya, R., & King, M. (2010). Angina in primary care in Goa, India: Sex differences and associated risk factors. *Heart Asia*, 2(1), 28–35. <https://doi.org/10.1136/ha.2009.001255>
- Nehra, A., Singla, S., Bajpai, S., Malviya, S., Padma, V., & Tripathi, M. (2014). Inverse relationship between stigma and quality of life in India: Is epilepsy a disabling neurological condition? *Epilepsy & Behavior*, 39, 116–125.
- Ng, N., Van Minh, H., Juvekar, S., Razzaque, A., Huu Bich, T., Kanungsukkasem, U., Ashraf, A., Masud Ahmed, S., & Soonthornthada, K. (2009). Using the INDEPTH HDSS to build capacity for chronic non-communicable disease risk factor surveillance in low and middle-income countries. *Global Health Action*, 2. <https://doi.org/10.3402/gha.v2i0.1984>
- Nielsen, K. B., & Waldrop, A. (2014). *Women, gender and everyday social transformation in India*. Anthem Press.
- Nilsson, P. M., Engberg, M., Nilsson, J., Aake, Karlslose, B., & Lauritzen, T. (2003). Adverse social factors predict early ageing in middle-aged men and women: The Ebeltoft Health Study, Denmark. *Scandinavian Journal of Public Health*, 31(4), 255–260.
- Nirmal, B., Divya, K. R., Dorairaj, V. S., & Venkateswaran, K. (2008). Quality of life in HIV/AIDS patients: A cross-sectional study in south India. *Indian Journal of Sexually Transmitted Diseases and AIDS*, 29(1), 15.
- Nolen-Hoeksema, S. (2001). Gender Differences in Depression. *Current Directions in Psychological Science*, 10(5), 173–176. <https://doi.org/10.1111/1467-8721.00142>

- Nomaguchi, K. M., & Milkie, M. A. (2003). Costs and rewards of children: The effects of becoming a parent on adults' lives. *Journal of Marriage and Family*, *65*(2), 356–374.
- Nongkynrih, B., Patro, B. K., & Pandav, C. S. (2004). Current status of communicable and noncommunicable diseases in India. *Japi*, *52*, 118–23.
- Norman, D. K., Murphy, J. M., Gilligan, C., & Vasudev, J. (1982). Sex Differences and Interpersonal Relationships: A Cross-Sectional Sample in the U.S. and India. *The International Journal of Aging and Human Development*, *14*(4), 291–306.
<https://doi.org/10.2190/4Y0G-N8F3-RVJW-2WR3>
- Nygaard, I., Turvey, C., Burns, T. L., Crischilles, E., & Wallace, R. (2003). Urinary incontinence and depression in middle-aged United States women. *Obstetrics & Gynecology*, *101*(1), 149–156. [https://doi.org/10.1016/S0029-7844\(02\)02519-X](https://doi.org/10.1016/S0029-7844(02)02519-X)
- Ochsner, K. N., & Gross, J. J. (2005). The cognitive control of emotion. *Trends in Cognitive Sciences*, *9*(5), 242–249. <https://doi.org/10.1016/j.tics.2005.03.010>
- Oginska, H., & Pokorski, J. (2006). Fatigue and mood correlates of sleep length in three age-social groups: School children, students, and employees. *Chronobiology International*, *23*(6), 1317–1328.
- Ohayon, M. M., & Vecchierini, M.-F. (2002). Daytime sleepiness and cognitive impairment in the elderly population. *Archives of Internal Medicine*, *162*(2), 201–208.
- Ohayon, M. M., & Vecchierini, M.-F. (2005). Normative sleep data, cognitive function and daily living activities in older adults in the community. *Sleep*, *28*(8), 981–989.

- Onur, I., & Velamuri, M. (2016). A Life Course Perspective on Gender Differences in Cognitive Functioning in India. *Journal of Human Capital, 10*(4), 520–563.
<https://doi.org/10.1086/688898>
- Osler, W. (1897). *Lectures on angina pectoris and allied states*. New York: D. Appleton.
- Osmani, S., & Sen, A. (2003). The hidden penalties of gender inequality: Fetal origins of ill-health. *Economics & Human Biology, 1*(1), 105–121. [https://doi.org/10.1016/S1570-677X\(02\)00006-0](https://doi.org/10.1016/S1570-677X(02)00006-0)
- Özaltın, E., Hill, K., & Subramanian, S. V. (2010). Association of maternal stature with offspring mortality, underweight, and stunting in low-to middle-income countries. *Jama, 303*(15), 1507–1516.
- Palinkas, L. A., Wingard, D. L., & Barrett-Connor, E. (1990). Chronic illness and depressive symptoms in the elderly: A population-based study. *Journal of Clinical Epidemiology, 43*(11), 1131–1141. [https://doi.org/10.1016/0895-4356\(90\)90014-g](https://doi.org/10.1016/0895-4356(90)90014-g)
- Pallak, M. S., Cummings, N. A., Dörken, H., & Henke, C. J. (1993). Managed mental health, medicaid, and medical cost offset. *New Directions for Mental Health Services, 1993*(59), 27–40. <https://doi.org/10.1002/ymd.23319935905>
- Pan, A., Sun, Q., Czernichow, S., Kivimaki, M., Okereke, O. I., Lucas, M., Manson, J. E., Ascherio, A., & Hu, F. B. (2012). Bidirectional association between depression and obesity in middle-aged and older women. *International Journal of Obesity, 36*(4), 595–602. <https://doi.org/10.1038/ijo.2011.111>

- Panda, S., Taly, A. B., Sinha, S., Gururaj, G., Girish, N., & Nagaraja, D. (2012). Sleep-related disorders among a healthy population in South India. *Neurology India*, *60*(1), 68.
<https://doi.org/10.4103/0028-3886.93601>
- Pandey, A., Sengupta, P. G., Mondal, S. K., Gupta, D. N., Manna, B., Ghosh, S., Sur, D., & Bhattacharya, S. K. (2002). Gender differences in healthcare-seeking during common illnesses in a rural community of West Bengal, India. *Journal of Health, Population and Nutrition*, 306–311.
- Pandita, R. (2015). Dropout Percentage of Scheduled Caste & Scheduled Tribe Children in India: A Decadal Analysis up to Secondary level. *Journal of Indian Education*, *41*(2), 0972.
- Patel, V., & Prince, M. (2001). Ageing and mental health in a developing country: Who cares? Qualitative studies from Goa, India. *Psychological Medicine*, *31*(1), 29–38.
- Patel, V., Weiss, H. A., Chowdhary, N., Naik, S., Pednekar, S., Chatterjee, S., Bhat, B., Araya, R., King, M., & Simon, G. (2011). Lay health worker led intervention for depressive and anxiety disorders in India: Impact on clinical and disability outcomes over 12 months. *The British Journal of Psychiatry*, *199*(6), 459–466.
- Patel, V., Weiss, H. A., Chowdhary, N., Naik, S., Pednekar, S., Chatterjee, S., De Silva, M. J., Bhat, B., Araya, R., & King, M. (2010). Effectiveness of an intervention led by lay health counsellors for depressive and anxiety disorders in primary care in Goa, India (MANAS): A cluster randomised controlled trial. *The Lancet*, *376*(9758), 2086–2095.
- Patel, V., Xiao, S., Chen, H., Hanna, F., Jotheeswaran, A. T., Luo, D., Parikh, R., Sharma, E., Usmani, S., Yu, Y., Druss, B. G., & Saxena, S. (2016). The magnitude of and health system responses to the mental health treatment gap in adults in India and China. *Lancet*

(London, England), 388(10063), 3074–3084. [https://doi.org/10.1016/S0140-6736\(16\)00160-4](https://doi.org/10.1016/S0140-6736(16)00160-4)

- Pati, S., Swain, S., Hussain, M. A., Kadam, S., & Salisbury, C. (2015). Prevalence, Correlates, and Outcomes of Multimorbidity Among Patients Attending Primary Care in Odisha, India. *The Annals of Family Medicine*, 13(5), 446–450. <https://doi.org/10.1370/afm.1843>
- Patrick, D. L., & Erickson, P. (1993). Assessing health-related quality of life for clinical decision-making. In *Quality of life assessment: Key issues in the 1990s* (pp. 11–63). Springer.
- Paul, V. K., Sachdev, H. S., Mavalankar, D., Ramachandran, P., Sankar, M. J., Bhandari, N., Sreenivas, V., Sundararaman, T., Govil, D., & Osrin, D. (2011). India: Towards universal health coverage 2: reproductive health, and child health and nutrition in India: meeting the challenge. *The Lancet*, 377(9762), 332.
- Pearlin, L. I. (1999). The stress process revisited. In *Handbook of the sociology of mental health* (pp. 395–415). Springer.
- Pechtel, P., & Pizzagalli, D. A. (2011). Effects of early life stress on cognitive and affective function: An integrated review of human literature. *Psychopharmacology*, 214(1), 55–70.
- Pellissery, S., Pampackal, A. J., & Bopaiah, P. (2015). Caste and Distributive Justice: Can Social Policy Address Durable Inequalities? *SOCIAL POLICY & ADMINISTRATION*, 49(6), 785–800. <https://doi.org/10.1111/spol.12169>
- Pellissery, Sony. (2008). Social Hierarchies, Economic Inequalities and Interpersonal Relationships: An Overview from India. *Interpersona: An International Journal on Personal Relationships*, 2(2), 243–259. <https://doi.org/10.5964/ijpr.v2i2.28>

- Peltzer, K., & Pengpid, S. (2017). Sleep duration, sleep quality, body mass index, and waist circumference among young adults from 24 low-and middle-income and two high-income countries. *International Journal of Environmental Research and Public Health*, *14*(6), 566.
- Penninx, B. W., Beekman, A. T., Ormel, J., Kriegsman, D. M., Boeke, A. J., van Eijk, J. T., & Deeg, D. J. (1996). Psychological status among elderly people with chronic diseases: Does type of disease play a part? *Journal of Psychosomatic Research*, *40*(5), 521–534.
[https://doi.org/10.1016/0022-3999\(95\)00620-6](https://doi.org/10.1016/0022-3999(95)00620-6)
- Perez, I. R., Bano, J. R., Ruz, M. L., del Arco Jimenez, A., Prados, M. C., Liano, J. P., Rico, P. M., De la Torre Lima, J., Pardal, J. P., & Gomez, M. L. (2005). Health-related quality of life of patients with HIV: Impact of sociodemographic, clinical and psychosocial factors. *Quality of Life Research*, *14*(5), 1301–1310.
- Perkins, J. M., Lee, H., James, K. S., Oh, J., Krishna, A., Heo, J., Lee, J., & Subramanian, S. V. (2016a). Marital status, widowhood duration, gender and health outcomes: A cross-sectional study among older adults in India. *BMC Public Health*, *16*(1), 1032.
- Perkins, J. M., Lee, H., James, K. S., Oh, J., Krishna, A., Heo, J., Lee, J., & Subramanian, S. V. (2016b). Marital status, widowhood duration, gender and health outcomes: A cross-sectional study among older adults in India. *BMC Public Health*, *16*(1), 1032.
<https://doi.org/10.1186/s12889-016-3682-9>
- Peters, D. H., Garg, A., Bloom, G., Walker, D. G., Brieger, W. R., & Hafizur Rahman, M. (2008). Poverty and access to health care in developing countries. *Annals of the New York Academy of Sciences*, *1136*(1), 161–171.

- Peterson, Z. D., & Janssen, E. (2007). Ambivalent Affect and Sexual Response: The Impact of Co-Occurring Positive and Negative Emotions on Subjective and Physiological Sexual Responses to Erotic Stimuli. *Archives of Sexual Behavior, 36*(6), 793–807.
<https://doi.org/10.1007/s10508-006-9145-0>
- Petitte, T., Mallow, J., Barnes, E., Petrone, A., Barr, T., & Theeke, L. (2015). A systematic review of loneliness and common chronic physical conditions in adults. *The Open Psychology Journal, 8*(Suppl 2), 113.
- Phelan, J. C., & Link, B. G. (2013a). Fundamental cause theory. In *Medical sociology on the move* (pp. 105–125). Springer.
- Phelan, J. C., & Link, B. G. (2013b). Fundamental cause theory. In *Medical sociology on the move* (pp. 105–125). Springer.
- Phelan, J. C., & Link, B. G. (2015). Is racism a fundamental cause of inequalities in health? *Annual Review of Sociology, 41*, 311–330.
- Phelan, J. C., Link, B. G., & Tehranifar, P. (2010). Social conditions as fundamental causes of health inequalities: Theory, evidence, and policy implications. *Journal of Health and Social Behavior, 51*(1_suppl), S28–S40.
- Phelan, M., Stradins, L., & Morrison, S. (2001). Physical health of people with severe mental illness: Can be improved if primary care and mental health professionals pay attention to it. *BMJ, 322*(7284), 443–444. <https://doi.org/10.1136/bmj.322.7284.443>
- Pilania, M., Bairwa, M., Kumar, N., Khanna, P., & Kurana, H. (2013). Elderly depression in India: An emerging public health challenge. *The Australasian Medical Journal, 6*(3), 107–111. <https://doi.org/10.4066/AMJ.2013.1583>

- Planning Commission of India. (2014). *Education Sector, Planning Commission, Government of India* [Governmental]. <http://planningcommission.gov.in/hackathon/Education.pdf>
- Poongothai, S., Pradeepa, R., Ganesan, A., & Mohan, V. (2009a). Prevalence of depression in a large urban South Indian population—The Chennai Urban Rural Epidemiology study (CURES–70). *PloS One*, *4*(9).
- Poongothai, S., Pradeepa, R., Ganesan, A., & Mohan, V. (2009b). Prevalence of Depression in a Large Urban South Indian Population—The Chennai Urban Rural Epidemiology Study (Cures – 70). *PLOS ONE*, *4*(9), e7185. <https://doi.org/10.1371/journal.pone.0007185>
- Pretty, G. M. H., Andrewes, L., & Collett, C. (1994). Exploring adolescents' sense of community and its relationship to loneliness. *Journal of Community Psychology*, *22*(4), 346–358. [https://doi.org/10.1002/1520-6629\(199410\)22:4<346::AID-JCOP2290220407>3.0.CO;2-J](https://doi.org/10.1002/1520-6629(199410)22:4<346::AID-JCOP2290220407>3.0.CO;2-J)
- Priel, B., Heimer, D., Rabinowitz, B., & Hendler, N. (1994). Perceptions of asthma severity: The role of negative affectivity. *Journal of Asthma*, *31*(6), 479–484.
- Przeworski, A., Newman, M. G., Pincus, A. L., Kasoff, M. B., Yamasaki, A. S., Castonguay, L. G., & Berlin, K. S. (2011). Interpersonal pathoplasticity in individuals with generalized anxiety disorder. *Journal of Abnormal Psychology*, *120*(2), 286.
- Rabin, L. A., Wang, C., Katz, M. J., Derby, C. A., Buschke, H., & Lipton, R. B. (2012). Predicting Alzheimer's Disease: Neuropsychological Tests, Self-Reports, and Informant Reports of Cognitive Difficulties. *Journal of the American Geriatrics Society*, *60*(6), 1128–1134.

- Rajkumar, A. P., Thangadurai, P., Senthilkumar, P., Gayathri, K., Prince, M., & Jacob, K. S. (2009). Nature, prevalence and factors associated with depression among the elderly in a rural south Indian community. *International Psychogeriatrics*, *21*(2), 372–378.
<https://doi.org/10.1017/S1041610209008527>
- Raju, R. S., Sarma, P. S., & Pandian, J. D. (2010). Psychosocial problems, quality of life, and functional independence among Indian stroke survivors. *Stroke*, *41*(12), 2932–2937.
- Ram, U., Strohschein, L., & Gaur, K. (2014). Gender socialization: Differences between male and female youth in India and associations with mental health. *International Journal of Population Research*, 2014.
- Ramachandran, V., Malaisamy, M., Ponnaiah, M., Kaliaperuaml, K., Vadivoo, S., & Gupte, M. D. (2012). Impact of chikungunya on health related quality of life Chennai, South India. *PLOS One*, *7*(12), e51519.
- Rani, M., Bonu, S., Jha, P., Nguyen, S. N., & Jamjoun, L. (2003). Tobacco use in India: Prevalence and predictors of smoking and chewing in a national cross sectional household survey. *Tobacco Control*, *12*(4), e4–e4.
- Rawal, S., & Kingdon, G. (2010). *Akin to my teacher: Does caste, religious or gender distance between student and teacher matter? Some evidence from India*. Department of Quantitative Social Science-UCL Institute of Education
- Reay, R., Fisher, Y., Robertson, M., Adams, E., Owen, C., & Kumar, R. (2006). Group interpersonal psychotherapy for postnatal depression: A pilot study. *Archives of Women's Mental Health*, *9*(1), 31–39. <https://doi.org/10.1007/s00737-005-0104-x>

- Reeve, S., Sheaves, B., & Freeman, D. (2015). The role of sleep dysfunction in the occurrence of delusions and hallucinations: A systematic review. *Clinical Psychology Review, 42*, 96–115. <https://doi.org/10.1016/j.cpr.2015.09.001>
- Reevy, G. M., & Maslach, C. (2001). Use of social support: Gender and personality differences. *Sex Roles, 44*(7–8), 437–459.
- Reid-Arndt, S. A. (2009). Breast cancer and "chemobrain": The consequences of cognitive difficulties following chemotherapy and the potential for recovery. *Missouri Medicine, 106*(2), 127–131.
- Ribaï, P., Nguyen, K., Hahn-Barma, V., Gourfinkel-An, I., Vidailhet, M., Legout, A., Dodé, C., Brice, A., & Dürr, A. (2007). Psychiatric and cognitive difficulties as indicators of juvenile huntington disease onset in 29 patients. *Archives of Neurology, 64*(6), 813–819.
- Richards, L. (2016). For Whom Money Matters Less: Social Connectedness as a Resilience Resource in the UK. *Social Indicators Research, 125*(2), 509–535. <https://doi.org/10.1007/s11205-014-0858-5>
- Richardson, K., Ananou, A., Lafortune, L., Brayne, C., & Matthews, F. E. (2011). Variation Over Time in the Association between Polypharmacy and Mortality in the Older Population. *Drugs & Aging, 28*(7), 547–560. <https://doi.org/10.2165/11592000-000000000-00000>
- Riegel, B., & Weaver, T. E. (2009). Poor sleep and impaired self-care: Towards a comprehensive model linking sleep, cognition, and heart failure outcomes. *European Journal of Cardiovascular Nursing, 8*(5), 337–344. <https://doi.org/10.1016/j.ejcnurse.2009.06.003>

- Ro, E., & Clark, L. A. (2009). Psychosocial functioning in the context of diagnosis: Assessment and theoretical issues. *Psychological Assessment, 21*(3), 313–324.
<https://doi.org/10.1037/a0016611>
- Robinson, L. C. (2000). Interpersonal relationship quality in young adulthood: A gender analysis. *Adolescence, 35*(140), 775–775.
- Rodrigue, J. R., Morgan, S. B., & Geffken, G. (1990). Families of autistic children: Psychological functioning of mothers. *Journal of Clinical Child Psychology, 19*(4), 371–379.
- Rogers, C. R. (1957). Becoming a Person. In *Healing: Human and divine: Man's search for health and wholeness through science, faith, and prayer* (pp. 57–67). Association Press.
<https://doi.org/10.1037/10811-003>
- Rohleder, N. (2014). Stimulation of Systemic Low-Grade Inflammation by Psychosocial Stress. *Psychosomatic Medicine, 76*(3), 181–189.
<https://doi.org/10.1097/PSY.0000000000000049>
- Roman Lay, A. A., Ferreira do Nascimento, C., Caba Burgos, F., Larraín Huerta, A. del C., Rivera Zeballos, R. E., Pantoja Silva, V., & Duarte, Y. A. de O. (2020). Gender Differences between Multimorbidity and All-Cause Mortality among Older Adults. *Current Gerontology and Geriatrics Research, 2020*.
- Rose, G. A. (1965). Chest pain questionnaire. *The Milbank Memorial Fund Quarterly, 43*(2), 32–39.

- Rosekind, M. R., Gregory, K. B., Mallis, M. M., Brandt, S. L., Seal, B., & Lerner, D. (2010). The cost of poor sleep: Workplace productivity loss and associated costs. *Journal of Occupational and Environmental Medicine*, 52(1), 91–98.
- Rosenfield, S., & Mouzon, D. (2013). Gender and mental health. In *Handbook of the sociology of mental health* (pp. 277–296). Springer.
- Rosenfield, S., & Smith, D. (2010). Gender and Mental Health: Do Men and Women Have Different Amounts or Types of Problems? In *A Handbook for the Study of Mental Health: Social Contexts, Theories, and Systems* (pp. 256–267).
- Rosenfield, S., Vertefuille, J., & Mcalpine, D. D. (2000). Gender Stratification and Mental Health: An Exploration of Dimensions of the Self. *Social Psychology Quarterly*, 63(3), 208–223. <https://doi.org/10.2307/2695869>
- Ross, C. E., & Mirowsky, J. (2006). Sex differences in the effect of education on depression: Resource multiplication or resource substitution? *Social Science & Medicine*, 63(5), 1400–1413. <https://doi.org/10.1016/j.socscimed.2006.03.013>
- Ross, C. E., Mirowsky, J., & Goldsteen, K. (1990). The Impact of the Family on Health: The Decade in Review. *Journal of Marriage and Family*, 52(4), 1059–1078. JSTOR. <https://doi.org/10.2307/353319>
- Ross, C. E., & Van Willigen, M. (1997a). Education and the subjective quality of life. *Journal of Health and Social Behavior*, 38(3), 275.
- Ross, C. E., & Van Willigen, M. (1997b). Education and the Subjective Quality of Life. *Journal of Health and Social Behavior*, 38(3), 275–297. JSTOR. <https://doi.org/10.2307/2955371>

- Ross, C. E., & Wu, C. (1995). The links between education and health. *American Sociological Review*, 719–745.
- Roth, T., & Ancoli-Israel, S. (1999). Daytime consequences and correlates of insomnia in the United States: Results of the 1991 National Sleep Foundation Survey. II. *Sleep: Journal of Sleep Research & Sleep Medicine*.
- Rotolo, T. (2000). Town heterogeneity and affiliation: A multilevel analysis of voluntary association membership. *Sociological Perspectives*, 43(2), 271–289.
- Roy, D., Tripathy, S., Kar, S. K., Sharma, N., Verma, S. K., & Kaushal, V. (2020). Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian Journal of Psychiatry*, 51, 102083.
<https://doi.org/10.1016/j.ajp.2020.102083>
- Roy, K., & Chaudhuri, A. (2008). Influence of socioeconomic status, wealth and financial empowerment on gender differences in health and healthcare utilization in later life: Evidence from India. *Social Science & Medicine*, 66(9), 1951–1962.
- Rubin, R. R., & Peyrot, M. (2002). Was Willis right? Thoughts on the interaction of depression and diabetes. *Diabetes/Metabolism Research and Reviews*, 18(3), 173–175.
<https://doi.org/10.1002/dmrr.292>
- Ryff, C. D. (1995). Psychological well-being in adult life. *Current Directions in Psychological Science*, 4(4), 99–104.
- Ryff, C. D., & Singer, B. (1996). Psychological Well-Being: Meaning, Measurement, and Implications for Psychotherapy Research. *Psychotherapy and Psychosomatics*, 65(1), 14–23. <https://doi.org/10.1159/000289026>

- Ryff, C. D., & Singer, B. (1998). The Contours of Positive Human Health. *Psychological Inquiry*, 9(1), 1–28. https://doi.org/10.1207/s15327965pli0901_1
- Ryff, C. D., & Singer, B. H. (2008). Know Thyself and Become What You Are: A Eudaimonic Approach to Psychological Well-Being. *Journal of Happiness Studies*, 9(1), 13–39. <https://doi.org/10.1007/s10902-006-9019-0>
- Sachar, R., Hamid, S., Oommen, T. K., Basith, M. A., Basant, R., Majeed, A., & Shariff, A. (2006). *Social, Economic and Educational Status of the Muslim Community of India* (No. 22136; Development Economics Working Papers). East Asian Bureau of Economic Research. <https://ideas.repec.org/p/eab/develo/22136.html>
- Saha, A. (2013). An assessment of gender discrimination in household expenditure on education in India. *Oxford Development Studies*, 41(2), 220–238.
- Saikia, N., Singh, A., Jasilionis, D., & Ram, F. (2013). Explaining the rural-urban gap in infant mortality in India. *Demographic Research*, 29, 473–506.
- Samuel, R., McLachlan, C. S., Mahadevan, U., & Isaac, V. (2016). Cognitive impairment and reduced quality of life among old-age groups in Southern Urban India: Home-based community residents, free and paid old-age home residents. *QJM: An International Journal of Medicine*, 109(10), 653–659.
- Santhi, N., Lazar, A. S., McCabe, P. J., Lo, J. C., Groeger, J. A., & Dijk, D.-J. (2016). Sex differences in the circadian regulation of sleep and waking cognition in humans. *Proceedings of the National Academy of Sciences*, 113(19), E2730–E2739. <https://doi.org/10.1073/pnas.1521637113>

- Sara, A., Kate, D., & Jay, G. (2003). *Gender And Ageing: Changing Roles And Relationships: Changing Roles and Relationships*. McGraw-Hill Education (UK).
- Sareen, J., Jacobi, F., Cox, B. J., Belik, S.-L., Clara, I., & Stein, M. B. (2006). Disability and poor quality of life associated with comorbid anxiety disorders and physical conditions. *Archives of Internal Medicine*, *166*(19), 2109–2116.
- Sateia, M. J., & Lang, B. J. (2008). Sleep and cancer: Recent developments. *Current Oncology Reports*, *10*(4), 309–318.
- Sato, M. (2020). *Understanding Social Connectedness amongst Older People in Low-Income and Middle-Income Countries*.
- Schatz, M., Mosen, D., Apter, A. J., Zeiger, R. S., Vollmer, W. M., Stibolt, T. B., Leong, A., Johnson, M. S., Mendoza, G., & Cook, E. F. (2005). Relationships among quality of life, severity, and control measures in asthma: An evaluation using factor analysis. *Journal of Allergy and Clinical Immunology*, *115*(5), 1049–1055.
- Schelling, G., Stoll, C., Haller, M., Briegel, J., Manert, W., Hummel, T., Lenhart, A., Heyduck, M., Polasek, J., & Meier, M. (1998). Health-related quality of life and posttraumatic stress disorder in survivors of the acute respiratory distress syndrome. *Critical Care Medicine*, *26*(4), 651–659.
- Schmidt, M. M., Quadros, A. S., Abelin, A. P., Minozzo, E. L., Wottrich, S. H., Kunert, H. Z., Viguera, E. S., Ruschel, P. P., Sarmiento-Leite, R., & Gottschall, C. A. M. (2011). Psychological characteristics of patients undergoing percutaneous coronary interventions. *Arquivos Brasileiros de Cardiologia*, *97*(4), 331–337. <https://doi.org/10.1590/S0066-782X2011005000104>

- Schneiderman, N., Antoni, M. H., Saab, P. G., & Ironson, G. (2001a). Health Psychology: Psychosocial and Biobehavioral Aspects of Chronic Disease Management. *Annual Review of Psychology*, 52(1), 555–580. <https://doi.org/10.1146/annurev.psych.52.1.555>
- Schneiderman, N., Antoni, M. H., Saab, P. G., & Ironson, G. (2001b). Health psychology: Psychosocial and biobehavioral aspects of chronic disease management. *Annual Review of Psychology*, 52(1), 555–580.
- Schnur, J. B., David, D., Kangas, M., Green, S., Bovbjerg, D. H., & Montgomery, G. H. (2009). A Randomized trial of a cognitive-behavioral therapy and hypnosis intervention on positive and negative affect during breast cancer radiotherapy. *Journal of Clinical Psychology*, 65(4), 443–455. <https://doi.org/10.1002/jclp.20559>
- Schnurr, P. P., Hayes, A. F., Lunney, C. A., McFall, M., & Uddo, M. (2006). Longitudinal analysis of the relationship between symptoms and quality of life in veterans treated for posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology*, 74(4), 707.
- Scott, D. L., Wolfe, F., & Huizinga, T. W. (2010). Rheumatoid arthritis. *The Lancet*, 376(9746), 1094–1108. [https://doi.org/10.1016/S0140-6736\(10\)60826-4](https://doi.org/10.1016/S0140-6736(10)60826-4)
- Sears, S. F., & Conti, J. B. (2002). Quality of life and psychological functioning of ICD patients. *Heart*, 87(5), 488–493.
- Seedat, S., Scott, K. M., Angermeyer, M. C., Berglund, P., Bromet, E. J., Brugha, T. S., Demyttenaere, K., De Girolamo, G., Haro, J. M., & Jin, R. (2009). Cross-national associations between gender and mental disorders in the World Health Organization World Mental Health Surveys. *Archives of General Psychiatry*, 66(7), 785–795.
- Segrin, C. (2001). *Interpersonal processes in psychological problems*. Guilford Press.

- Segrin, C., & Taylor, M. (2007). Positive interpersonal relationships mediate the association between social skills and psychological well-being. *Personality and Individual Differences, 43*(4), 637–646.
- Segui, J., Ramos-Casals, M., Garcia-Carrasco, M., De Flores, T., Cervera, R., Valdeés, M., Font, J., & Ingelmo, M. (2000). Psychiatric and psychosocial disorders in patients with systemic lupus erythematosus: A longitudinal study of active and inactive stages of the disease. *Lupus, 9*(8), 584–588.
- Sekine, M., Chandola, T., Martikainen, P., Marmot, M., & Kagamimori, S. (2006). Work and family characteristics as determinants of socioeconomic and sex inequalities in sleep: The Japanese Civil Servants Study. *Sleep, 29*(2), 206–216.
<https://doi.org/10.1093/sleep/29.2.206>
- Selvamani, Y., & Singh, P. (2018). Socioeconomic patterns of underweight and its association with self-rated health, cognition and quality of life among older adults in India. *PLOS ONE, 13*(3), e0193979. <https://doi.org/10.1371/journal.pone.0193979>
- Senarath, U., & Gunawardena, N. S. (2009). Women’s Autonomy in Decision Making for Health Care in South Asia. *Asia Pacific Journal of Public Health, 21*(2), 137–143.
<https://doi.org/10.1177/1010539509331590>
- Sengupta, P., & Benjamin, A. I. (2015). Prevalence of depression and associated risk factors among the elderly in urban and rural field practice areas of a tertiary care institution in Ludhiana. *Indian Journal of Public Health, 59*(1), 3. <https://doi.org/10.4103/0019-557X.152845>

- Shackman, A. J., Salomons, T. V., Slagter, H. A., Fox, A. S., Winter, J. J., & Davidson, R. J. (2011). The integration of negative affect, pain and cognitive control in the cingulate cortex. *Nature Reviews Neuroscience*, *12*(3), 154–167.
- Shahar, E., Whitney, C. W., Redline, S., Lee, E. T., Newman, A. B., Javier Nieto, F., O'CONNOR, G. T., Boland, L. L., Schwartz, J. E., & Samet, J. M. (2001). Sleep-disordered breathing and cardiovascular disease: Cross-sectional results of the Sleep Heart Health Study. *American Journal of Respiratory and Critical Care Medicine*, *163*(1), 19–25.
- Shastri, A. (2014). Gender inequality and women discrimination. *IOSR Journal of Humanities and Social Science*, *11*(19), 27–30.
- Shivashankar, R., Kondal, D., Ali, M. K., Gupta, R., Pradeepa, R., Mohan, V., Kadir, M. M., Narayan, K. M. V., Tandon, N., Prabhakaran, D., & Peasey, A. (2017). Associations of Sleep Duration and Disturbances With Hypertension in Metropolitan Cities of Delhi, Chennai, and Karachi in South Asia: Cross-Sectional Analysis of the CARRS Study. *Sleep*, *40*(9). <https://doi.org/10.1093/sleep/zsx119>
- Shrivastava, A., Johnston, M., & Bureau, Y. (2012). Stigma of mental illness-1: Clinical reflections. *Mens Sana Monographs*, *10*(1), 70.
- Shumaker, S. A., & Hill, D. R. (1991). Gender differences in social support and physical health. *Health Psychology*, *10*(2), 102.
- Shye, D., Mullooly, J. P., Freeborn, D. K., & Pope, C. R. (1995). Gender differences in the relationship between social network support and mortality: A longitudinal study of an

- elderly cohort. *Social Science & Medicine*, 41(7), 935–947. [https://doi.org/10.1016/0277-9536\(94\)00404-H](https://doi.org/10.1016/0277-9536(94)00404-H)
- Siddique, Z. (2011). Evidence on Caste Based Discrimination. *Labour Economics*, 18(Supplement 1), S146–S159. <https://doi.org/10.1016/j.labeco.2011.07.002>
- Silva, P. A. B., Soares, S. M., Santos, J. F. G., & Silva, L. B. (2014). Cut-off point for WHOQOL-bref as a measure of quality of life of older adults. *Revista de Saúde Pública*, 48, 390–397. <https://doi.org/10.1590/S0034-8910.2014048004912>
- Singh, K., Bassi, M., Junnarkar, M., & Negri, L. (2015). Mental health and psychosocial functioning in adolescence: An investigation among Indian students from Delhi. *Journal of Adolescence*, 39, 59–69.
- Singh, K., Junnarkar, M., & Sharma, S. (2015). Anxiety, stress, depression, and psychosocial functioning of Indian adolescents. *Indian Journal of Psychiatry*, 57(4), 367.
- Singh, K., Kaur, J., Singh, D., & Junnarkar, M. (2014). Socio-Demographic Variables Affecting Well-Being: A Study on Indian Rural Women. *Psychological Studies*, 59(2), 197–206. <https://doi.org/10.1007/s12646-014-0239-9>
- Singh, L., Arokiasamy, P., Singh, P. K., & Rai, R. K. (2013). Determinants of gender differences in self-rated health among older population: Evidence from India. *Sage Open*, 3(2), 2158244013487914.
- Singh, M., Gupta, N., & Kumar, R. (2016). Effect of obesity and metabolic syndrome on severity, quality of life, sleep quality and inflammatory markers in patients of asthma in India. *Advances in Respiratory Medicine*, 84(5), 258–264. <https://doi.org/10.5603/PiAP.2016.0032>

- Singh, P. K. (2013). Trends in child immunization across geographical regions in India: Focus on urban-rural and gender differentials. *PloS One*, 8(9), e73102.
- Singh, R. (2014). Psychological well-being of hypertensive people. *Indian Journal of Health and Wellbeing*, 5(2), 264.
- Singha, P., & Raychaudhuri, S. (2016). Well-being, happiness and interpersonal relationship as correlated components of job satisfaction among the public sector employees of India: A brief detail focused into gender difference. *Indian Journal of Positive Psychology*, 7(3), 348.
- Sinha, R., & Pati, S. (2017). Addressing the escalating burden of chronic diseases in India: Need for strengthening primary care. *Journal of Family Medicine and Primary Care*, 6(4), 701–708. https://doi.org/10.4103/jfmmpc.jfmmpc_1_17
- Sinha, S. P., Shrivastava, S. R., & Ramasamy, J. (2013). Depression in an older adult rural population in India. *MEDICC Review*, 15, 41–44.
- Sivakumar, M. (2008). *Gender discrimination and women's development in India*.
- Smith, P. J., Blumenthal, J. A., Trulock, E. P., Freedland, K. E., Carney, R. M., Davis, R. D., Hoffman, B. M., & Palmer, S. M. (2016). Psychosocial Predictors of Mortality Following Lung Transplantation. *American Journal of Transplantation*, 16(1), 271–277. <https://doi.org/10.1111/ajt.13447>
- Sowa, A., Tobiasz-Adamczyk, B., Topór-Mądry, R., Poscia, A., & la Milia, D. I. (2016). Predictors of healthy ageing: Public health policy targets. *BMC Health Services Research*, 16(5), 289. <https://doi.org/10.1186/s12913-016-1520-5>

- Spain, D., & Bianchi, S. (1996). *Balancing act: Motherhood, marriage, and employment among American women*. Russell Sage Foundation.
- Spinelli, M. G., & Endicott, J. (2003). Controlled clinical trial of interpersonal psychotherapy versus parenting education program for depressed pregnant women. *American Journal of Psychiatry, 160*(3), 555–562.
- Sprang, G., Clark, J. J., & Whitt-Woosley, A. (2007). Compassion fatigue, compassion satisfaction, and burnout: Factors impacting a professional's quality of life. *Journal of Loss and Trauma, 12*(3), 259–280.
- Sprangers, M. A., Thong, M. S., Bartels, M., Barsevick, A., Ordonana, J., Shi, Q., Wang, X. S., Klepstad, P., Wierenga, E. A., & Singh, J. A. (2014). Biological pathways, candidate genes, and molecular markers associated with quality-of-life domains: An update. *Quality of Life Research, 23*(7), 1997–2013.
- Sreedhar, K. P. (1989). Manifest anxiety in bronchial asthma. *Indian Journal of Psychiatry, 31*(4), 311.
- Sridhar, G. R., & Madhu, K. (2002). Psychosocial and cultural issues in diabetes mellitus. *Current Science, 83*(12), 1556–1564. JSTOR.
- Srinivasan, L., & Tirupati, S. (2005). Relationship Between Cognition and Work Functioning Among Patients With Schizophrenia in an Urban Area of India. *Psychiatric Services, 56*(11), 1423–1428. <https://doi.org/10.1176/appi.ps.56.11.1423>
- Srivastava, K. (2009). Urbanization and mental health. *Industrial Psychiatry Journal, 18*(2), 75–76. <https://doi.org/10.4103/0972-6748.64028>

- Stangier, U., Schramm, E., Heidenreich, T., Berger, M., & Clark, D. M. (2011). Cognitive therapy vs interpersonal psychotherapy in social anxiety disorder: A randomized controlled trial. *Archives of General Psychiatry*, *68*(7), 692–700.
- Stanton, A. L., Revenson, T. A., & Tennen, H. (2007). Health psychology: Psychological adjustment to chronic disease. *Annu. Rev. Psychol.*, *58*, 565–592.
- Stirland, L. E., González-Saavedra, L., Mullin, D. S., Ritchie, C. W., Muniz-Terrera, G., & Russ, T. C. (2020). Measuring multimorbidity beyond counting diseases: Systematic review of community and population studies and guide to index choice. *BMJ*, *368*.
<https://doi.org/10.1136/bmj.m160>
- Stranges, S., Tigbe, W., Gómez-Olivé, F. X., Thorogood, M., & Kandala, N.-B. (2012). Sleep Problems: An Emerging Global Epidemic? Findings From the INDEPTH WHO-SAGE Study Among More Than 40,000 Older Adults From 8 Countries Across Africa and Asia. *Sleep*, *35*(8), 1173–1181. <https://doi.org/10.5665/sleep.2012>
- Strike, P. C., & Steptoe, A. (2004). Psychosocial factors in the development of coronary artery disease. *Progress in Cardiovascular Diseases*, *46*(4), 337–347.
<https://doi.org/10.1016/j.pcad.2003.09.001>
- Strohschein, L., & Ram, U. (2017). Gender, marital status, and mental health: A test of the sex role hypothesis in India. *Journal of Family Issues*, *38*(13), 1899–1922.
- Subramanian, S. V., Ackerson, L. K., Subramanyam, M. A., & Sivaramakrishnan, K. (2008). Health inequalities in India: The axes of stratification. *The Brown Journal of World Affairs*, *14*(2), 127–138.

- Subramanian, S. V., Davey Smith, G., & Subramanyam, M. (2006). Indigenous health and socioeconomic status in India. *PLoS Medicine*, 3(10), e421.
<https://doi.org/10.1371/journal.pmed.0030421>
- Subramanian, S. V., Subramanyam, M. A., Selvaraj, S., & Kawachi, I. (2009). Are self-reports of health and morbidities in developing countries misleading? Evidence from India. *Social Science & Medicine*, 68(2), 260–265. <https://doi.org/10.1016/j.socscimed.2008.10.017>
- Sundeen, R. A. (1990). Family life course status and volunteer behavior: Implications for the single parent. *Sociological Perspectives*, 33(4), 483–500.
- Sundquist, K., Lindström, M., Malmström, M., Johansson, S.-E., & Sundquist, J. (2004). Social participation and coronary heart disease: A follow-up study of 6900 women and men in Sweden. *Social Science & Medicine*, 58(3), 615–622. [https://doi.org/10.1016/S0277-9536\(03\)00229-6](https://doi.org/10.1016/S0277-9536(03)00229-6)
- Suurmeijer, T. P., Reuvekamp, M. F., & Aldenkamp, B. P. (2001). Social functioning, psychological functioning, and quality of life in epilepsy. *Epilepsia*, 42(9), 1160–1168.
- Tait, R. J., French, D. J., Burns, R., & Anstey, K. J. (2012). Alcohol use and depression from middle age to the oldest old: Gender is more important than age. *International Psychogeriatrics*, 24(8), 1275–1283.
- Takai, M., Takahashi, M., Iwamitsu, Y., Ando, N., Okazaki, S., Nakajima, K., Oishi, S., & Miyaoka, H. (2009). The experience of burnout among home caregivers of patients with dementia: Relations to depression and quality of life. *Archives of Gerontology and Geriatrics*, 49(1), e1–e5.

- Taylor, S. E., & Aspinwall, L. G. (1996). Psychosocial aspects of chronic illness. In *Psychological aspects of serious illness: Chronic conditions, fatal diseases, and clinical care* (pp. 3–60). American Psychological Association. <https://doi.org/10.1037/10076-007>
- Tell, D., & Nilsson, P. M. (2006). Early ageing in middle-aged men is associated with adverse social factors and increased mortality risk: The Malmö Preventive Project. *Scandinavian Journal of Public Health, 34*(4), 346–352.
- Tellegen, A. (1985). Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report. In *Anxiety and the anxiety disorders* (pp. 681–706). Lawrence Erlbaum Associates, Inc.
- The New York Times. (2019). *Why People Are Protesting in India—The New York Times*. <https://www.nytimes.com/2019/12/17/world/asia/india-protests-citizenship-muslims.html>
- The World Health Organization. (1946). *Constitution* [World Health Organization]. Constitution. <https://www.who.int/about/who-we-are/constitution>
- Thoits, P. A. (1991). On Merging Identity Theory and Stress Research. *Social Psychology Quarterly, 54*(2), 101–112. JSTOR. <https://doi.org/10.2307/2786929>
- Thompson, J. N., Sheldrick, R., & Berry, E. (2011). Cognitive and mental health difficulties following subarachnoid haemorrhage. *Neuropsychological Rehabilitation, 21*(1), 92–102.
- Thomsen, D. K., Mehlsen, M. Y., Viidik, A., Sommerlund, B., & Zachariae, R. (2005). Age and gender differences in negative affect—Is there a role for emotion regulation? *Personality and Individual Differences, 38*(8), 1935–1946. <https://doi.org/10.1016/j.paid.2004.12.001>
- Thorat, S., & Attewell, P. (2007). The legacy of social exclusion: A correspondence study of job discrimination in India. *Economic and Political Weekly, 41*41–4145.

- Thorat, S., & Neuman, K. S. (2012). *Blocked by Caste: Economic Discrimination in Modern India* [OUP Catalogue]. Oxford University Press.
<https://econpapers.repec.org/bookchap/oxpobooks/9780198081692.htm>
- Tilak, J. B. G. (2007). Post-elementary education, poverty and development in India. *International Journal of Educational Development*, 27(4), 435–445.
<https://doi.org/10.1016/j.ijedudev.2006.09.018>
- Tsuno, N., Besset, A., & Ritchie, K. (2005). Sleep and depression. *The Journal of Clinical Psychiatry*.
- Tuli, M., & Chaudhary, N. (2010). Elective interdependence: Understanding individual agency and interpersonal relationships in Indian families. *Culture & Psychology*, 16(4), 477–496.
<https://doi.org/10.1177/1354067X10380157>
- Turner, R. J., & Marino, F. (1994). Social Support and Social Structure: A Descriptive Epidemiology. *Journal of Health and Social Behavior*, 35(3), 193–212.
<https://doi.org/10.2307/2137276>
- Tyack, Z., Frakes, K., Barnett, A., Cornwell, P., Kuys, S., & McPhail, S. (2016). Predictors of health-related quality of life in people with a complex chronic disease including multimorbidity: A longitudinal cohort study. *Quality of Life Research*, 25(10), 2579–2592.
- Umberson, D. (1992). Gender, marital status and the social control of health behavior. *Social Science & Medicine*, 34(8), 907–917. [https://doi.org/10.1016/0277-9536\(92\)90259-S](https://doi.org/10.1016/0277-9536(92)90259-S)
- Umberson, D., & Montez, J. (2010). Social relationships and health: A flashpoint for health policy. *Journal of Health and Social Behavior*, 51(1_suppl), S54–S66.

- United Nations. (1982). *Provisional guidelines on international age standards* (No. 74; Statistical Papers). Department of International Economics and Social Affairs.
https://unstats.un.org/unsd/publication/SeriesM/SeriesM_74e.pdf
- Valderas, J. M., Starfield, B., Sibbald, B., Salisbury, C., & Roland, M. (2009). Defining Comorbidity: Implications for Understanding Health and Health Services. *Annals of Family Medicine*, 7(4), 357–363. <https://doi.org/10.1370/afm.983>
- Van den Berg, G. J., Deeg, D. J., Lindeboom, M., & Portrait, F. (2010). The role of early-life conditions in the cognitive decline due to adverse events later in life. *The Economic Journal*, 120(548), F411–F428.
- van der Helm, E., Gujar, N., & Walker, M. P. (2010). Sleep Deprivation Impairs the Accurate Recognition of Human Emotions. *Sleep*, 33(3), 335–342.
<https://doi.org/10.1093/sleep/33.3.335>
- Van Schaik, A., Van Marwijk, H., Adèr, H., Van Dyck, R., De Haan, M., Penninx, B., Van Der Kooij, K., Van Hout, H., & Beekman, A. (2006). Interpersonal psychotherapy for elderly patients in primary care. *The American Journal of Geriatric Psychiatry*, 14(9), 777–786.
- Vancampfort, D., Stubbs, B., Firth, J., Hagemann, N., Myin-Germeys, I., Rintala, A., Probst, M., Veronese, N., & Koyanagi, A. (2018). Sedentary behaviour and sleep problems among 42,489 community-dwelling adults in six low- and middle-income countries. *Journal of Sleep Research*, 27(6), e12714. <https://doi.org/10.1111/jsr.12714>
- Vaux, A. (1985). Variations in social support associated with gender, ethnicity, and age. *Journal of Social Issues*, 41(1), 89–110.

- Vellakkal, S., Subramanian, S. V., Millett, C., Basu, S., Stuckler, D., & Ebrahim, S. (2013). Socioeconomic Inequalities in Non-Communicable Diseases Prevalence in India: Disparities between Self-Reported Diagnoses and Standardized Measures. *PLOS ONE*, 8(7), e68219. <https://doi.org/10.1371/journal.pone.0068219>
- Vernooij-Dassen, M. J., Moniz-Cook, E. D., Woods, R. T., Lepeleire, J. D., Leuschner, A., Zanetti, O., Rotrou, J. de, Kenny, G., Franco, M., & Peters, V. (2005). Factors affecting timely recognition and diagnosis of dementia across Europe: From awareness to stigma. *International Journal of Geriatric Psychiatry: A Journal of the Psychiatry of Late Life and Allied Sciences*, 20(4), 377–386.
- Vieth, A. Z., Hagglund, K. J., Clay, D. L., Frank, R. G., Thayer, J. F., Johnson, J. C., & Goldstein, D. E. (1997). The contribution of hope and affectivity to diabetes-related disability: An exploratory study. *Journal of Clinical Psychology in Medical Settings*, 4(1), 65–77.
- Vinokur, A. D., Threatt, B. A., Caplan, R. D., & Zimmerman, B. L. (1989). Physical and psychosocial functioning and adjustment to breast cancer. Long-term follow-up of a screening population. *Cancer*, 63(2), 394–405. [https://doi.org/10.1002/1097-0142\(19890115\)63:2<394::AID-CNCR2820630233>3.0.CO;2-5](https://doi.org/10.1002/1097-0142(19890115)63:2<394::AID-CNCR2820630233>3.0.CO;2-5)
- Violan, C., Foguet-Boreu, Q., Flores-Mateo, G., Salisbury, C., Blom, J., Freitag, M., Glynn, L., Muth, C., & Valderas, J. M. (2014). Prevalence, Determinants and Patterns of Multimorbidity in Primary Care: A Systematic Review of Observational Studies. *PLoS ONE*, 9(7). <https://doi.org/10.1371/journal.pone.0102149>

- von Ruesten, A., Weikert, C., Fietze, I., & Boeing, H. (2012). Association of Sleep Duration with Chronic Diseases in the European Prospective Investigation into Cancer and Nutrition (EPIC)-Potsdam Study. *PLoS ONE*, 7(1).
<https://doi.org/10.1371/journal.pone.0030972>
- Wagstaff, A. (2002). Poverty and health sector inequalities. *Bulletin of the World Health Organization*, 80, 97–105.
- Walder, K., & Molineux, M. (2017). Occupational adaptation and identity reconstruction: A grounded theory synthesis of qualitative studies exploring adults' experiences of adjustment to chronic disease, major illness or injury. *Journal of Occupational Science*, 24(2), 225–243. <https://doi.org/10.1080/14427591.2016.1269240>
- Wang, L., LaBar, K. S., Smoski, M., Rosenthal, M. Z., Dolcos, F., Lynch, T. R., Krishnan, R. R., & McCarthy, G. (2008). Prefrontal mechanisms for executive control over emotional distraction are altered in major depression. *Psychiatry Research: Neuroimaging*, 163(2), 143–155.
- Wanic, R., & Kulik, J. (2011). Toward an understanding of gender differences in the impact of marital conflict on health. *Sex Roles*, 65(5–6), 297–312.
- Watkins, E. D., & Teasdale, J. D. (2001). Rumination and overgeneral memory in depression: Effects of self-focus and analytic thinking. *Journal of Abnormal Psychology*, 110(2), 353.
- Watson, D., & Clark, L. A. (1984). Negative affectivity: The disposition to experience aversive emotional states. *Psychological Bulletin*, 96(3), 465.

- Watson, D., Clark, L. A., & Carey, G. (1988). Positive and negative affectivity and their relation to anxiety and depressive disorders. *Journal of Abnormal Psychology, 97*(3), 346–353. <http://dx.doi.org/10.1037/0021-843X.97.3.346>
- Watson, D., & Pennebaker, J. W. (1989). Health complaints, stress, and distress: Exploring the central role of negative affectivity. *Psychological Review, 96*(2), 234.
- Wehling, M. (2014). Non-steroidal anti-inflammatory drug use in chronic pain conditions with special emphasis on the elderly and patients with relevant comorbidities: Management and mitigation of risks and adverse effects. *European Journal of Clinical Pharmacology, 70*(10), 1159–1172. <https://doi.org/10.1007/s00228-014-1734-6>
- Weir, D., Lay, M., & Langa, K. (2014a). Economic development and gender inequality in cognition: A comparison of China and India, and of SAGE and the HRS sister studies. *The Journal of the Economics of Ageing, 4*, 114–125. <https://doi.org/10.1016/j.jeoa.2014.08.002>
- Weir, D., Lay, M., & Langa, K. (2014b). Economic development and gender inequality in cognition: A comparison of China and India, and of SAGE and the HRS sister studies. *The Journal of the Economics of Ageing, 4*, 114–125. <https://doi.org/10.1016/j.jeoa.2014.08.002>
- Wethington, E., McLeod, J., & Kessler, R. C. (1987). *The importance of life events for explaining sex differences in psychological distress*.
- WHO. (1993). *The ICD-10 classification of mental and behavioural disorders: Diagnostic criteria for research*. <https://apps.who.int/iris/handle/10665/37108>
- WHO. (2010). *WHO | India*. WHO. <http://www.who.int/countries/ind/en/>

- Wig, N., Lekshmi, R., Pal, H., Ahuja, V., Mittal, C. M., & Agarwal, S. K. (2006). *The impact of HIV/AIDS on the quality of life: A cross sectional study in north India.*
- Williams, B., Mancia, G., Spiering, W., Agabiti Rosei, E., Azizi, M., Burnier, M., Clement, D. L., Coca, A., de Simone, G., Dominiczak, A., Kahan, T., Mahfoud, F., Redon, J., Ruilope, L., Zanchetti, A., Kerins, M., Kjeldsen, S. E., Kreutz, R., Laurent, S., ... Brady, A. (2018). 2018 ESC/ESH Guidelines for the management of arterial hypertensionThe Task Force for the management of arterial hypertension of the European Society of Cardiology (ESC) and the European Society of Hypertension (ESH). *European Heart Journal*, 39(33), 3021–3104. <https://doi.org/10.1093/eurheartj/ehy339>
- Williams, D. R., Yan Yu, Jackson, J. S., & Anderson, N. B. (1997). Racial Differences in Physical and Mental Health: Socio-economic Status, Stress and Discrimination. *Journal of Health Psychology*, 2(3), 335–351. <https://doi.org/10.1177/135910539700200305>
- Williams, K. (2004). The Transition to Widowhood and the Social Regulation of Health: Consequences for Health and Health Risk Behavior. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 59(6), S343–S349. <https://doi.org/10.1093/geronb/59.6.S343>
- Williams, K. L., & Galliher, R. V. (2006). Predicting depression and self-esteem from social connectedness, support, and competence. *Journal of Social and Clinical Psychology*, 25(8), 855–874.
- Witkiewitz, K., & Villarroel, N. A. (2009). Dynamic association between negative affect and alcohol lapses following alcohol treatment. *Journal of Consulting and Clinical Psychology*, 77(4), 633.

- Wolff, J. L., Starfield, B., & Anderson, G. (2002). Prevalence, Expenditures, and Complications of Multiple Chronic Conditions in the Elderly. *Archives of Internal Medicine*, 162(20), 2269–2276. <https://doi.org/10.1001/archinte.162.20.2269>
- World Health Organization. (n.d.). *India—Study on Global Ageing and Adult Health-2007, Wave 1*. Retrieved December 3, 2019, from http://apps.who.int/healthinfo/systems/surveydata/index.php/catalog/65/related_materials
- World Health Organization. (1996). *WHOQOL-BREF: Introduction, administration, scoring and generic version of the assessment: field trial version, December 1996*. Geneva: World Health Organization.
- World Health Organization. (2001). *WHO | International Classification of Functioning, Disability and Health (ICF)*. WHO. <http://www.who.int/classifications/icf/en/>
- World Health Organization. (2004). The global burden of disease: 2004 update. 2004 http://www.who.int/entity/healthinfo/global_burden_disease.GBD_report_2004update_full.Pdf.
- World Health Organization. (2011). *WHO | Global status report on noncommunicable diseases 2010 (Noncommunicable Diseases and Mental Health)*. World Health Organization. https://doi.org//entity/nmh/publications/ncd_report2010/en/index.html
- World Health Organization. (2020). *WHO | WHO Study on global AGEing and adult health (SAGE)*. The World Health Organization: Health Statistics and Information Systems. <https://www.who.int/healthinfo/sage/en/>

- Wryobeck, J. M., Lippo, G., Mclaughlin, V., Riba, M., & Rubenfire, M. (2007). Psychosocial Aspects of Pulmonary Hypertension: A Review. *Psychosomatics*, *48*(6), 467–475.
<https://doi.org/10.1176/appi.psy.48.6.467>
- Yadav, S., & Arokiasamy, P. (2014). Understanding epidemiological transition in India. *Global Health Action*, *7*. <https://doi.org/10.3402/gha.v7.23248>
- Yokoyama, E., Kaneita, Y., Saito, Y., Uchiyama, M., Matsuzaki, Y., Tamaki, T., Munezawa, T., & Ohida, T. (2010). Association between depression and insomnia subtypes: A longitudinal study on the elderly in Japan. *Sleep*, *33*(12), 1693–1702.
<https://doi.org/10.1093/sleep/33.12.1693>
- Yoon, E., & Lee, R. M. (2010). Importance of social connectedness as a moderator in Korean immigrants' subjective well-being. *Asian American Journal of Psychology*, *1*(2), 93.
- Yoon, E., Lee, R. M., & Goh, M. (2008). Acculturation, social connectedness, and subjective well-being. *Cultural Diversity and Ethnic Minority Psychology*, *14*(3), 246.
- You, S., Van Orden, K. A., & Conner, K. R. (2011). Social connections and suicidal thoughts and behavior. *Psychology of Addictive Behaviors*, *25*(1), 180.
- Yu, D. S. F., Lee, D. T. F., Kwong, A. N. T., Thompson, D. R., & Woo, J. (2008). Living with chronic heart failure: A review of qualitative studies of older people. *Journal of Advanced Nursing*, *61*(5), 474–483. <https://doi.org/10.1111/j.1365-2648.2007.04553.x>
- Yu, Y., & Williams, D. R. (1999). Socioeconomic status and mental health. In *Handbook of the sociology of mental health* (pp. 151–166). Springer.

- Zautra, A. J., Burleson, M. H., Matt, K. S., Roth, S., & Burrows, L. (1994). Interpersonal stress, depression, and disease activity in rheumatoid arthritis and osteoarthritis patients. *Health Psychology, 13*(2), 139–148. <https://doi.org/10.1037/0278-6133.13.2.139>
- Zepelin, H., & Rechtschaffen, A. (1974). Mammalian Sleep, Longevity, and Energy Metabolism; pp. 447–470. *Brain, Behavior and Evolution, 10*(6), 447–470.
- Zhang, B., & Wing, Y.-K. (2006). Sex differences in insomnia: A meta-analysis. *Sleep, 29*(1), 85–93. <https://doi.org/10.1093/sleep/29.1.85>
- Zhang, Z., Gu, D., & Hayward, M. D. (2008). Early Life Influences on Cognitive Impairment Among Oldest Old Chinese. *The Journals of Gerontology: Series B, 63*(1), S25–S33. <https://doi.org/10.1093/geronb/63.1.S25>
- Zizi, F., Jean-Louis, G., Brown, C. D., Ogedegbe, G., Boutin-Foster, C., & McFarlane, S. I. (2010). Sleep duration and the risk of diabetes mellitus: Epidemiologic evidence and pathophysiologic insights. *Current Diabetes Reports, 10*(1), 43–47.